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NORTHWESTERN UNIVERSITY

SOME ASPECTS OF REGIONAL - NATIONAL SCIENTIFIC
RELATIONSHIPS IN EAST AFRICA

A DISSERTATION
SUBMITTED TO THE GRADUATE SCHOOL
IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
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Field of Industrial Engineering and Management Sciences

by
THEODORE W. SCHLIE

Evanston, Illinois

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ABSTRACT

Some Aspects of Regional - National Scientific Relationships
in East Africa

by Theodore W. Schlie

This study of some aspects of regional-national scientific relationships in East Africa focuses on the interplay between the East African Agricultural and Forestry Research Organization (EAAFRO) of the East African Community (EAC) and the national agricultural and forestry research systems of the Partner States which make up the Community -- Kenya, Uganda, and Tanzania. Recently, regional (in the multi-national sense) cooperation or integration has increasingly been proposed as one way in which small developing countries can utilize their scarce resources in a more effective and efficient manner and thus develop faster. This argument has also been used for the creation or establishment of regional scientific research institutions. Despite the seeming logic and rationality behind these arguments, however, most attempts to date have either failed or have not lived up to expectations. The East African Community, however, is an existing and active regional scheme with a set of 12 regional research institutions, the largest of which is EAAFRO. There are, moreover, established national agricultural and forestry research systems in each of the Partner States with which EAAFRO is to cooperate and to which EAAFRO's output is to be transferred. Thus there are defined organizations at the regional and national levels for agricultural and forestry research, and this study focuses on the relationships between them.

The literature on integration theory was reviewed and summarized because it was felt that it could offer some insights into these relationships. This study then attempted to take some aspects of general political and/or economic

integration theory and to adapt and apply them -- or their analogs -- to the specific and specialized activity of agricultural and forestry research in the specific regional setting of East Africa, in the hopes that this would lead to insights into and explanations for human behavior related to this specific activity.

The first major section of this study covered two exercises. In one, a methodology for "objectively" measuring the direct benefits from EAAFRO and determining how they were distributed among the Partner States was developed and utilized. Involved in this exercise was an analysis of EAAFRO's research priorities and the regional or national orientation of those priorities, an analysis of the agricultural and forestry priorities of each of the Partner States, and comparisons between the two levels of analysis. Information for this exercise was obtained from national five-year development plans, from EAAFRO publications, and from extensive interviews with EAAFRO research officers. In a second exercise, a transaction analysis was attempted which covered the professional visits of EAAFRO officers to locations in the Partner States and of visits of national level representatives to EAAFRO headquarters. The results were then related to distance and national borders in an attempt to see what factors might be influencing these transaction patterns.

The second major section of this study focused on the individual national researcher in all Partner States. The primary dependent variable investigated was his general opinion toward EAAFRO, and a set of hypothesized relationships was tested to try and explain that opinion. Independent variables tested included benefits from EAAFRO, opinions toward the EAC, the opinions of relevant national groups toward EAAFRO, proximity to EAAFRO, knowledge about EAAFRO, the race of the national researcher, the extent of personal contact transactions.

and the extent to which EAAFRO's work complemented that of the national researcher. In addition, several propositions were tested which were related to the research results and scientific services which the national researcher did or did not receive from EAAFRO. Information for this part of the study was obtained from extensive interviews with national researchers in all three Partner States.

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Chapter I

Some Aspects of Regional - National Scientific Relationships
in East Africa --

A Summary

This study of some aspects of regional-national scientific relationships in East Africa focuses on the interplay between the East African Agricultural and Forestry Research Organization (EAAFRO) of the East African Community (EAC) and the national agricultural and forestry research systems of the Partner States which make up the Community -- Kenya, Uganda, and Tanzania. Thus, the word "regional" is used in this study in the multi-national sense as opposed to either the sub-national or continental sense.

The basis for almost all theories of regional or multi-national cooperation involve some aspect of the efficiencies or increased capabilities that can be associated with a centralization of effort. Particularly when nations are small and relatively lacking in scarce resources, it would seem to make sense that they should get together and cooperate. It is important to remember, however, that regionalism is usually not perceived to be an end in itself, but a more efficient means to some further end. In the case of developing countries, that further end is socio-economic development. Recently the arguments for regional cooperation in order to overcome such obstacles to development as small national markets -- particularly for Africa which has a large number of small and very poor countries -- have been increasing, both within developing countries and from national and international aid agencies.

Despite the seeming logic and rationality behind the establishment of regional cooperation and/or integration schemes in developing countries, most attempts to date have either failed or at least not achieved the levels of success that were expected of them. The Central African Common Market, the Maghreb Common Market, the Latin American Free Trade Association, the Central American Common Market, and the Regional Co-operation for Development are five examples of such schemes in developing countries which have either failed or have not lived up to expectations. The East African Community is another such scheme, which is, however, still actively in existence and attempting to live up to its goals. The Pearson Commission has recently described it as

...perhaps the most important cooperative arrangement, involving a common market and an impressive range of services which are operated jointly by the three countries.

Composed of the three countries of Kenya, Uganda, and Tanzania -- all former colonies of Great Britain -- this regional scheme has a relatively long history

1) Pearson, Lester B. (Chairman, Commission on International Development), Partners in Development, Praeger Publishers, New York, 1969, p. 95.

behind it, and at the time of independence in the early 1960's it was fully intended that the three countries would federate and become one independent nation. Due to complex political and socio-economic factors, the East African Federation has not been achieved, and the fortunes of the East African Community (and its predecessor, the East African Common Services Organization) have shifted between better and worse as time has gone by and economic and political relationships have changed. For all its problems, however, the East African Community exists and is active in a number of areas.

One of those areas is scientific research and development (R&D). It has not yet been demonstrated which way the causality runs between the two highly correlated variables of national expenditures on scientific R&D and per capita income -- the most frequently used indicator of economic development -- but the importance of what science might do for developing countries is hard to deny. Inherent in the term "developing country," however, is the implication that scientific R&D, along with a number of other indicators, is at a relatively low stage of development. One way that has been recommended for developing countries to "catch up" in science, so to speak, is through the establishment of regional -- rather than national -- research institutions. The Advisory Committee for the Application of Science and Technology to Development (ACAST) of the United Nations, for example, has stated the following:

An important goal for developing countries is the achievement of a substantial degree of scientific and technical independence, based on adequate and vigorous national institutions. Until that stage can be reached in some countries, regional institutes must be relied upon... Many of the problems of developing countries to which science and technology can contribute are regional. Moreover, the minimum effective size of the needed research activities, both as to staff and special equipment, may make it necessary for countries in the region to pool their resources and personnel for combined action. Such pooling may take the form of a regional institute, or it may consist of a consortium of national institutions closely linked for cooperative action.

Emulating their broader regional economic and political counterparts, many past attempts to establish regional scientific institutions have failed. In West Africa, for example, an entire set of West African Cocoa, Palm Oil, etc. Research Institutes have become national institutes of Nigeria, Ghana, and other West African nations. The East African Community, however, is currently operating

2) ACAST, "Third Report to the Economic and Social Council," United Nations, Document No. E/4178, New York, May 1966, p. 17.

a set of 12 regional research institutes, but by far the largest and most important of these institutes is the East African Agricultural and Forestry Research Organization based at Muguga, just outside of Nairobi, Kenya.³⁾ Besides being the largest of the regional institutes, all three Partner States have established agricultural and forestry research systems with which EAAFRRO is to cooperate and to which EAAFRRO's results are to be transferred. Thus there are defined organizations at the regional and national levels for agricultural and forestry research, and this study focuses on the relationships between them.

As part of an over-all regional framework that at one point in time was to be an East African Federation, in a very real sense EAAFRRO can be considered to be an integrating agent -- successful or otherwise -- for agricultural and forestry research in East Africa. In this situation, it was felt that integration theory might offer some insights into the relationships between these regional and national research systems. This study therefore attempts to take some aspects of general political and/or economic integration theory and to adapt and apply them -- or their analogs -- to the specific and specialized activity of agriculture and forestry research in the specific regional setting of East Africa, in the hopes that this will lead to insights into and explanations for human behavior related to this specific activity.

The primary rationale behind most integration schemes in developing countries is economic rather than political, but in practice these two concepts are highly inter-related and the difference between them may be more of a difference in degree rather than kind. The crux of the political problem in economic integration, for example, is that some loss of national sovereignty is inevitably involved in the policy harmonizations which are necessary to make economic integration work. Despite the importance of some of these political factors, most of the literature on integration focuses on economic integration. What is meant by "integration?"

³⁾ The other institutions are as follows: the East African Veterinary Research Organization (EAVRO) also located at Muguga, Kenya; the East African Marine Fisheries Research Organization located on the island of Zanzibar; the East African Fresh-water Fisheries Research Organization located at Jinji, Uganda; the East African Institute for Medical Research located at Mwanza, Tanzania; the East African Virus Research Institute located at Entebbe, Uganda; the East African Trypanosomiasis Research Organization located at Tororo, Uganda; the East African Malaria and Vector Borne Disease Research Institute located at Amani, Tanzania; the East African Leprosy Research Center located at Alupe, Uganda; the East African Tuberculosis Investigation Centre at Nairobi, Kenya; the East African Industrial Research Organization (EAIRO) located at Nairobi, Kenya; and the Tropical Pesticides Research Institute located at Arusha, Tanzania.

OECD defines it as follows:

Integration is understood here as a process by which discrimination existing along national borders are progressively removed between two or more developing countries.

Most authors on the subject describe integration in terms of stages which represent successively higher degrees of integration as various economic discriminations are removed. The OECD list is typical:

- a) the free trade area, which implies the removal of quantitative restrictions and customs tariffs;
- b) the customs union, which unifies the tariff of the countries within the area against outsiders;
- c) the common market, where all restrictions on factor movements within the area are abolished;
- d) the economic union, where economic, monetary, fiscal, social and counter-cyclical policies are to some extent harmonized;
- e) the supranational union, where the respective governments abandon completely their sovereignty over the policies listed above and a supranational authority issues binding decisions. (OECD, op. cit. p. 11)

The traditional economic theory of economic integration has been based on the work of Jacob Viner⁵⁾ and the concepts of "trade creation" and "trade diversion." In brief, trade creation refers to an increase of trade among the members of a customs union while trade diversion refers to a reduction of trade with the rest of the world, both of which may follow the formation of a customs union. The point is that the worth of any customs union would depend upon which of these forces dominated the other, and from the viewpoint of free trade, trade creation was good while trade diversion was bad.

According to this traditional theory, few -- if any -- integration schemes among developing countries would qualify as being worthwhile, but it is claimed by most authors that this static analysis is severely limited in its application to developing countries. They prefer a dynamic theory which emphasizes such points as the existence of unemployed resources in developing countries, the favorable effects of protection on the inflow of investment capital, and the

⁴⁾ Kahnert, F. et al, Economic Integration Among Developing Countries, OECD Publications, Paris, 1969, p. 11).

⁵⁾ Viner, Jacob, The Customs Union Issue, Carnegie Endowment for International Peace, New York, 1950.

process of economic growth and structural change. This dynamic approach is based on three related assumptions:

- Economic growth and development is a major goal of developing countries, and regional integration is one means toward that end;
- Most developing countries see industrialization as the key to future growth and development;
- Many developing countries will not have a comparative advantage in most of their "infant industries" and therefore will require protection in their industrial sector for quite long periods of time.

Industrialization and market protection are thus at the base of any dynamic theoretical justification for economic integration. Regional integration is supposed to be important in that it provides for larger protected markets. This, in turn, allows for greater possibilities for industrial specialization, for the obtaining of economies of scale, for the provision of larger resources, for better terms of trade with the rest of the world, etc. Opposed to these reasons for integration, however, are several constraints or obstacles of both an economic and non-economic nature: geographic and/or transportation difficulties between member countries; financial resource limitations; cultural barriers; time pressures; and vested interests.

Once a regional scheme is established, however, the greatest problem likely to face it is the unbalanced allocation of benefits among the member countries. Developing countries are usually drawn to regional economic schemes in the first place because of perceived economic benefits for their own country, and if these benefits are not evenly distributed, problems are likely to arise. Unhappily, in the short run, some member countries are likely to benefit from regional integration more than others because of the dynamics of industrial location. The largest source of additional capital likely to be attracted to a regional scheme is foreign private investment, and this investment will almost all flow to the location where its profit-making potential is the greatest -- i.e., to the already most developed area of the entire region. To be successful, therefore, regional integration schemes usually attempt to intervene in the market process through balanced regional investment policies or through some form of compensation arrangements. The latter mechanism is not likely to satisfy the poorer member countries for very long, however.

One problem related to this issue is the difficulty of measuring the benefits from regional schemes -- or to try and answer the question if a particular country

would be better off within or outside the regional scheme. There is no generally accepted way to measure these gains and losses, and although many attempts have been made to quantify intra-regional trade data or other indicators, the general consensus is that all of these attempts to date have suffered from gaps in the statistical information available and have not been successful."

Political integration has been described as follows:

Political integration generally implies a relationship of community among people within the same political entity. That is, they are held together by mutual ties of one kind or another which give the group a feeling of identify and self-awareness. Integration, therefore, is based on strong cohesiveness within a social group; and political integration is present when a political governmental unit of some sort is cohesive.

In summarizing this integration literature, Jacob and Teune cite ten factors, derived from previous research, which are considered to be significantly related to integration. The first of these is geographic proximity, the hypothesis being that the closer people are, the more that integrative relationships are likely to develop between them. The second is social homogeneity, the hypothesis being that integrative relationships are more likely to develop among similar people than among people who are different -- or who perceive themselves to be different. The third factor is transactions, the hypothesis being that integration among people can be measured by -- and is probably promoted by -- the extent of interaction transactions among them. The fourth factor is mutual knowledge or understanding, the hypothesis being that mutual knowledge or understanding among people is essential for integrative relationships to develop. The convergence of functional interests is the fifth factor discussed; the hypothesis being that similar functional interests are more likely than diverse functional interests to lead to the development of integrative relationships among people. The sixth factor concerns character or social motivations of people, the hypothesis being that those people with a high "affiliation motivation" are more likely to successfully develop integrative relationships than those with high achievement or power motivations. Factor number seven addresses the decision-making or power structure of a community, and relates such community characteristics as democratic vs. authoritarian, pluralistic vs. monolithic, or socially stratified vs. socially mobile to its integrative potential. The eighth factor is the influence of the

6) Jacob, P. and Teune, H., "The Integrative Process: Guidelines for Analysis of the Bases of Political Community," in The Integration of Political Communities, Jacob and Toscano (ed), J. B. Lippincott & Co., Philadelphia and New York, 1964; p. 4.

felt need for sovereignty on the integrative potential of a community, in which the greater the community's need for sovereignty, the less likely it is to integrate with other communities. The effectiveness of the governmental unit of the integrated system in meeting the demands of the constituent peoples is the ninth factor discussed which affects the integration within that system. Finally, the "spill-over" theory is mentioned in which one successful integrative experience is likely to lead to another.

One aspect crucial to many of the above indicators is the positive or negative nature of the knowledge about other people, transactions with other people, etc. If these factors have negative connotations associated with them, the tendency will be toward disintegration. Another aspect is that many of these variables are inter-related. Proximity, for example, should influence transactions, and proximity, transactions, and homogeneity should all influence mutual knowledge or understanding.

The first exercise to be reported in this study concerns the development and utilization of a methodology for "objectively" measuring the benefits from EAAFRO and determining how they are distributed among the Partner States of the East African Community. It was found to be helpful throughout this study to distinguish between Research Results and Scientific Services in addressing EAAFRO's direct scientific outputs. For the purposes of this study, "research" is characterized by its experimental nature and by work being done for one's self; "services" are also scientific in nature, but are usually more routine work and are done for someone else -- i.e., for someone else's research.

The methodology used was fairly simple. In one analysis, EAAFRO's research projects and scientific services were first ranked in priority order on the basis of criteria which reflected EAAFRO's own priorities -- the amount of EAAFRO manpower time and effort devoted to each project and service. Secondly, each EAAFRO research project was examined and ranked for 1) the EAAFRO activity in Kenya, Uganda, or Tanzania that it generated; 2) the EAAFRO involvement with or cooperation from Kenya, Uganda, or Tanzania that it generated; and 3) the applicability of it in Kenya, Uganda, or Tanzania. In addition, the origins of the projects were investigated insofar as possible, and the different Partner State, EAAFRO, or foreign sources of impetus for beginning them were identified. On a related matter, any input that Specialist Committees had into the selection process which chose these projects was noted. Thirdly, a subjective judgment was made on the basis of the above variables of the regionality of the project -- i.e., whether

the project was oriented toward the entire East African region, or toward one or two of the Partner States only. Each EAAFRRO service was also examined and ranked for 1) the EAAFRRO involvement with or cooperation from Kenya, Uganda, or Tanzania that it generated; 2) the applicability of it in Kenya, Uganda, and Tanzania; and 3) the utilization of it in Kenya, Uganda, and Tanzania.

Information upon which this analysis was based was obtained from EAAFRRO publications such as Annual Reports and a Newsletter, but the most important source of information was an extensive interview given to almost all EAAFRRO research officers in late 1971. This interview consisted of in-depth questions on all the different projects and services the EAAFRRO officer might be working on, including aspects of collaboration with the national level, field sites in the Partner States, applicability in the region, communication patterns with the Partner States, etc.

The results showed that EAAFRRO's Class I highest priority projects included work on sugar-cane breeding, softwoods breeding, sorghum breeding, maize breeding, and a virus survey; Class II priority projects included work on millet breeding, water resources/land use, hardwood and softwood decay, and basic herbarium research; Class III priority projects included work on groundwater resources, soil fertility and maize, the propagation of horticultural crops, a tobacco virus, a rice nematode, rangeland compensatory livestock growth, rangeland livestock nutrient requirements, softwood insects, softwood root rot disease, and sorghum/millet agronomy; Class IV priority projects included work on rangeland silage, rangeland cultivation techniques, water requirements of selected crops, pulp and paper log storage, utilization of charcoal by-products, woolly aphid, nematodes on selected crops, bean nematodes, horticultural cuttings in quarantine, chemical control of sugar-cane diseases, and basic herbarium research again; the lowest Class V priority projects included work on trace elements in soils, seed beds, the pin hole borer, cypress canker disease, and livestock body composition prediction techniques.

The results of the regionality analysis showed that there was only a slight bias in Kenya's favor in the orientation of EAAFRRO's top two priority class projects. In the three lower priority classes, however, a definite bias toward Kenya appeared, with the most projects being oriented toward Kenya, the least toward Uganda, and Tanzania falling in between. In interpreting these results, it appears that both EAAFRRO's location in Kenya and the greater capabilities of Kenya's national research system contribute to EAAFRRO's orientation toward Kenya. The

capabilities of Uganda's national research system are fairly high as well, but what seems to affect EAAFRO's low orientation toward it is the fact that Kenya and Tanzania are more ecologically similar to each other than either are to Uganda, so that "regional" projects affecting at least two of the Partner States more often than not are oriented toward Kenya and Tanzania and not toward Uganda. The capabilities of Tanzania's national research system appear to be very low, and much of Tanzania is relatively far away and isolated. Yet, EAAFRO is still more oriented toward Tanzania than Uganda.

The results of the analysis of EAAFRO services showed that the highest Class I priority services included the Plant Quarantine Service, the EAAFRO/EAVRO Library, the East African Literature Service, and the Herbarium plant identification services; Class II services included the armyworm forecasting service, the East African Agricultural and Forestry Journal, statistical advice, the Machinery Coordination Service, and liaison and advisory services on cereals; Class III services included chemical analyses of soil and plant, and feed and animal samples; Class IV services included Fungi, Insect, Virus, and Nematode reference collections; and Class V services included carcass analysis technique training, providing experimental livestock, and providing experimental quarantine facilities.

Most of the scientific services were highly applicable in all Partner States. This seems to be inherent in the nature of scientific services, that they deal with basic information, analytical, or advisory services that can apply across the board to all Partner States. The utilization of some of these services, however, does seem to be affected by location and distance. Services such as the library or statistical advice are either limited to EAAFRO headquarters or are dependent upon a great deal of face-to-face interaction. In sum, it would appear to be correct to say that EAAFRO's scientific services are oriented in theory to the entire region, but due to location and distance effects some are utilized in Kenya more than in the other two Partner States.

In a second exercise relevant to this methodology, the agricultural and forestry priorities of the Partner States were "objectively" determined from detailed analyses of their 5-year development plans. Information on planned agricultural and forestry development expenditures, on agricultural and forestry R&D budget plans, and on agricultural and forestry production at the time the plans were developed and expected -- or target -- goals for such production, was used to develop these national priorities. Whereas EAAFRO priorities usually identified the particular aspects of the product research that it was doing --

e.g., sugar-cane breeding -- national priorities are limited to the product itself since those are the terms in which production figures and targets, as well as other data, are given.

The results show that Kenya's Class I top priorities concern Rangeland/Livestock, Maize, Sugar Cane, Tea, and Plantation Softwoods; the Class II priorities concern Dairy development, Coffee, Horticultural Crops (Pineapples), Rice, and Wheat; the Class III priorities concern Cotton, and Pyrethrum; Class IV priorities concern Sisal, Legumes, Oil Seeds, Potatoes, Wattle, Cashew Nuts, Coconuts, Tobacco, Farm Mechanization, and Indigenous hardwoods; Class V priorities concern Water Resources/Land Use and all other crops mentioned but never specifically designated for any purpose, such as sorghum and millet, barley, oats, poultry, pigs, etc.

Uganda's Class I highest priorities concern cotton, sugar, and tea; Class II concerns coffee, tobacco, and beef development; Class III concerns horticultural crops, plantation softwoods, water resources/land use, dairy development, and farm mechanization; Class IV concerns groundnuts, cocoa, kenaf, rice, beans, maize, and sorghum/millet; and Class V concerns silk, sim-sim, and all others.

Tanzania's Class I highest priorities concern Cotton, Wheat, Dairy Development, Softwoods, Tea, and Flue-Cured Tobacco; Class II concern Sugar, Sisal, and Maize; Class III concern Cashewnuts, Coffee, Rice, Groundnuts and Oil Seeds/Beans, Horticultural Crops, Rangeland Development, Beef Development, Hardwoods; Class IV concern Coconuts, Kenaf, Farm Mechanization, Water Resources/Land Use, Pyrethrum, and Fire-Cured Tobacco; and Class V concern Sorghum/Millet, Bananas, and all others.

Finally the agricultural and forestry priorities of the Partner States were compared in several ways with EAAFR0's own research priorities. The first comparison looked at the Balance of National Interest in each of EAAFR0's priority classes -- as distinguished from an earlier discussion of the orientation toward the region or nations of each of EAAFR0's priority classes. What is immediately apparent when EAAFR0's top two priority classes are examined in this way is that some of the projects -- particularly sorghum and millet breeding -- are of common disinterest to all three Partner States. When these are eliminated from consideration, it appears that both Kenya and Tanzania exhibit more interest in EAAFR0's top priority projects than Uganda, due principally to their greater priorities assigned to maize and softwoods. The only project in the top two classes that shows a common, high priority interest on the part of all Partner States is Sugar Cane Breeding. In priority classes III to V, this pattern of regional imbalance

is reinforced, except that Kenya displays even more interest in those EAAFRO projects than does Tanzania due to a greater interest in rangeland and rice research.

A second comparison is made in which the national priorities are all listed and the research priorities of EAAFRO and "other" research institutions are then filled in. In this way, research gaps for the different Partner States were noted. "Other" research institutions included the Tea Research Institute, the Coffee Research Foundation, and other research that was going on in East Africa with a regional orientation. The results of this comparison shows that Kenya's top two priority classes are reasonably well covered by existing research in East Africa; Uganda's top two priority classes are also reasonably well covered; Tanzania has some gaps in the coverage of its top priority classes with respect to flue-cured tobacco and sisal, but in the latter case it is doubtful that more research is desired since sisal is a declining crop. But what is observed from this comparison, is that non-EAAFRO regional research activities on cotton, wheat, tea, and coffee are providing much more of an impact on the top priority agricultural and forestry products of the Partner States than EAAFRO is. This coverage may be more apparent than real, however. Although the Cotton Research Corporation pretty well covers cotton research in all three Partner States, both the supposedly regional Tea Research Institute and Coffee Research Foundation are located in Kenya and their efforts are heavily oriented around their headquarters. A second Canadian wheat research team has arrived in Tanzania, but most of the work to date on wheat has also taken place in Kenya. Therefore, there might well be a constructive role that EAAFRO could play in this regard to perhaps expand the range of the research that is already being conducted on wheat, coffee, and tea and to ensure that the results from work done in Kenya are widely disseminated and applied in Uganda and Tanzania.

In examining the lower priority classes of the Partner States, most of the gaps seem to concern new crops or activities, which are opportunities for which research is especially important. Some of these crops which EAAFRO might consider include cashewnuts, coconuts, cocoa, kenaf, legumes, oilcrops, etc.

The second exercise to be reported in this study was a transaction analysis of the professional visits of EAAFRO officers to locations in the Partner States and of the visits of national level representatives from each of the Partner States to EAAFRO headquarters at Muguga. As was pointed out earlier, the ideal situation for any multi-national institution -- and certainly for EAAFRO -- would

be that over a period of years each participating country should receive approximately equal benefits from it -- i.e., if one were to travel on a straight line in any direction away from EAAFRO to the borders of the East African Community, the benefits from EAAFRO would not decrease, even as distance increased and national borders were crossed.

A different situation would be expected to occur in nature -- what geographers call "isotropic conditions," a featureless plain with an even distribution of resources and equal ease of movement in all directions.⁷⁾ Under these conditions, the normally expected relationship between distance and benefits would be a fairly regular and decreasing linear or curvi-linear function. But neither of the above situations may conform to the real world. In discussing the concept of territoriality as it relates to human beings, Soja states the following:

One major dimension of territoriality, therefore, appears to be the existence of an identifiable disruption of a distance-ordered regularity in activity patterns caused by social as opposed to physical phenomena (such as environmental barriers). Assuming some form of social organization exists, we can also infer that these disruptions will shape and channel spatial interaction even under isotropic conditions... What is essentially being proposed is that territoriality produces discontinuities and "plateaus" in normally expected patterns of spatial interaction and activity... abrupt drops in activity at particular points and broad distance zones in which the intensity of activity is approximately the same throughout. (Soja, op. cit., pp. 26-27)

The "social phenomena" in the case of this study are the national borders of Uganda and Tanzania that one would have to cross traveling in a straight line south and north-west from EAAFRO before the edges of the East African Community were reached.

It is very difficult to measure the benefits from a research institution in a country, let alone at a particular place in the country, and therefore we use measurable indicators that are logically associated with benefits that can be counted and ordered in some fashion. In this case we are using personal visit transactions from EAAFRO to the Partner States and from the Partner States to EAAFRO to test if any of the three distance-benefits relationship patterns described above fit the situation in East Africa. Under idealized isotropic conditions and with no social boundaries or territoriality, nature would expect that EAAFRO's benefits and transactions would regularly decrease as distance increased; EAAFRO

⁷⁾ Soja, Edward W., "The Political Organization of Space," Association of American Geographers, Resource Paper No. 8, 1971, p. 26.

would probably claim that their efforts are approaching a situation in which their benefits and transactions remain relatively constant as distance increases and as national borders are crossed; Uganda and Tanzania might claim that territoriality does make a difference and that although EAAFRO's benefits and transactions might remain relatively constant as distance increases within Kenya, that as soon as their national borders are crossed there is a sharp drop-off of benefits and transactions from EAAFRO.

The data for this exercise was obtained from the EAAFRO monthly Newsletter, which listed the scientific visits that EAAFRO officers made to national locations in the Partner States and also the visitors to EAAFRO headquarters at Muguga. Although this data was not entirely satisfactory, it did allow an analysis to be made and some conclusions to be drawn. Although it is obvious from the results that Uganda and Tanzania do not have nearly as many transactions with EAAFRO as Kenya does, it does not appear that this is caused by the effect of crossing a national border. And although it is just as obvious that East Africa is far from being an "isotropic plain," it does appear that in the case of EAAFRO visits to national locations that distance is one of the operating factors. The other factor that seems to be operating here, and completely dominates the pattern of visits to EAAFRO headquarters, is the effect of population/government centers. Nairobi, of course, is the population, industrial, governmental, and cultural center of East Africa, and with EAAFRO being so close, transactions with it dominate both patterns. But smaller centers of population and other functions are found in the Kampala-Entebbe metropolitan area of Uganda and the Dar es Salaam and Arusha metropolitan areas of Tanzania, and significant numbers of transactions are also recorded for these centers.

Both of the exercises described above have operated at the levels of the institution or Partner State. A second major section of this study, however, operates at the level of individual national scientists working in the agricultural and forestry research systems of the Partner States. These national researchers, it was felt, formed a unique set of Respondents who could provide valuable and pertinent information with their opinions toward and perceptions of and interactions with EAAFRO in order to answer the following research question: How is the regional research institution of EAAFRO relating to national agricultural and forestry research systems in Kenya, Uganda, and Tanzania, and what are some of the factors influencing those relationships?

One of the reasons for selecting EAAFRO as the regional focus of this study was the fact that definable national counterparts did exist. Not only did they exist, but there were official and documented historical relationships between EAAFRO and national research systems. The primary relationship was that regional EAAFRO would do the more fundamental research in a particular field of agriculture, the national (territorial) systems would do the more applied research in the same field, and somewhere in the middle these different levels would overlap, implying the transfer of results or technology between them. For example, the following statement was made in 1952:

It is, however, possible to make a broad definition of the functional relationship between the regional organization and the territorial department working in the same general subject. There are three main stages in science; firstly, there is fundamental or long-range research which is designed to discover new principles; secondly, there is the technological stage in which a new principle is tested in a variety of local conditions in order to determine how far it is applicable and to adapt the technique to local circumstances; thirdly comes the application of the new principle in farming, medicine, industry or whatever the subject may be. The regional research organization is concerned with the first two, the fundamental and technological stages; it is not usually concerned with the application to practice. The territorial department, on the other hand, is primarily concerned with the application of the new knowledge and all the executive work which is thereby entailed, but it has also to take a large share in the technological stage of the trial in local conditions. It is thus in the second or technological stage that the functions overlap and there is need for the closest collaboration.

This distinction of functions has, of course, many variants. 8)

Although this functional relationship has evolved over the years, the basic idea has remained the same.

The principal dependent variable in this section of the study was the general reaction or response opinions that individual national researchers had toward EAAFRO, positive or negative, as measured on a continuum scale. The attempt here was to get at what these national researchers feel about EAAFRO rather than what they might "objectively" conclude after going through some internalized reasoning process, since it was thought that these feelings might be a much more important factor in regional-national relationships. In particular, it is these initial reactions of people toward an institution such as EAAFRO

8) Worthington, E.B., A Survey of Research and Scientific Services in East Africa, East African High Commission, Nairobi, 1952, p. 14.

which seem to do much to create a public mood or feeling toward it -- a factor that can greatly influence the success of a multi-national institution -- especially when the people are in positions perceived to be credible and when the reaction receives publicity through the newspaper or other media. In addition, individual opinions are the only real way to get at what people perceive or believe about EAAFRO. Earlier, an "objective" methodology was used to analyze the balance of the distribution of EAAFRO's benefits among the Partner States, but the extent to which any such methodology can be used to counteract people's beliefs is very limited. And any such methodology is also usually limited to printed or verbal information that may be relatively superficial. If a multinational institution such as EAAFRO is going to really be examined and understood, somewhere along the line knowledgeable national people are going to have to be asked to react or respond to it at the gut level, and that reaction or response is going to have to be followed up with probing questions about the real usefulness of EAAFRO research and EAAFRO services -- and other such issues -- along with the reasons why.

Using the integration literature, the following eight propositions were therefore developed to be tested in this study:

1. The degree of positiveness of the general reaction/response opinions of national researchers toward EAAFRO will be directly related to their perceptions of the benefits they have received from EAAFRO in the past -- i.e., to the amount of Research Results and/or Scientific Services and/or Experimental Collaboration and/or Institution-Building and/or Interpersonal Relations and/or Publishing benefits, dependent in some cases on an External Scientific Aid parameter as described.
2. The degree of positiveness of the general reaction/response opinions that national researchers have toward EAAFRO will be directly related to their general reaction/response opinions toward the EAC.
3. The degree of positiveness of the general reaction/response opinions that national researchers have toward EAAFRO will be directly related to the opinions their relevant national groups have toward EAAFRO.
4. The degree of positiveness of the general reaction/response opinions that national researchers have toward EAAFRO will be directly related to their Proximity to EAAFRO.
5. The degree of positiveness of the general reaction/response opinions that national researchers have toward EAAFRO will be directly related to the extent of their Knowledge of EAAFRO.

6. The degree of positiveness of the general reaction/response opinions that national researchers have toward EAAFRO will be directly related to the Race of the national researcher.
7. The degree of positiveness of the general reaction/response opinions that national researchers have toward EAAFRO will be directly related to the amount of Personal Contact Transactions they have with EAAFRO research officers.
8. The degree of positiveness of the general reaction/response opinions that national researchers have toward EAAFRO will be directly related to the extent that EAAFRO's scientific work Complements their own.

In addition to these propositions, a number of the variables -- e.g., Knowledge of EAAFRO, Personal Contact Transactions, etc. -- should be directly related to the length of time a national researcher has been working in East Africa or at his stations, and these propositions are also tested.

The independent variables above are also most probably inter-dependent amongst themselves. For example, it might well be true that Proximity, Racial Homogeneity, and Personal Contact Transactions all interact upon Knowledge of EAAFRO in influencing the General Reaction/Response Opinion of the individual national researcher toward EAAFRO as has been suggested in the integration literature, and many other interaction combinations could be logically proposed. Some of these combinations are also tested in this study, particularly ones which involve Proximity and Knowledge of EAAFRO. 9)

Since the principal designated outputs of a scientific research institution are research results and/or scientific services, further propositions are developed below which address the responses of the national researchers to whether or not they received these benefits from EAAFRO, and these are also tested in this study:

9. The perceived utilization of the EAAFRO output benefits of research results and/or scientific services by national researchers will be directly related to their perceptions of the relevance of EAAFRO's projects and services and/or the competence of EAAFRO's scientific work and/or the success of EAAFRO's information/technology transfer effort.
10. The perceived utilization of the EAAFRO output benefits of research results and/or scientific services by national researchers will be directly related to the extent of their experience at their national station and/or to the extent that EAAFRO's scientific work complements their own.

9). Although the issue of tribe and tribalism is very significant for the African citizen of East Africa and for national integration, it was not felt that this was an important factor for the African national researcher with respect to his relationships with EAAFRO. Although there are significant tribal-based problems within Kenya and Uganda, there seems to be no similar problem directly related to East Africa. At the regional level, the tribal issue seems to be subsumed in that of which Partner State is benefitting or not benefitting from the Community.

11. The perceived utilization of the EAAFRO output benefits of research results and/or scientific services by national researchers will be directly related to the capacity of the national institution of which they are a part to utilize those results and/or services.
12. The perceptions of national researchers about the relevance and the applied nature of EAAFRO's scientific work will be directly inter-related.
13. The perceived success of EAAFRO's information or technology transfer efforts by national researchers will be directly related to their Proximity to EAAFRO and/or to the amount of Personal Contact Transactions they have had with EAAFRO officers.

The results for this section of the study were based on extensive interviews with as many national researchers in all Partner States as it was possible to see. When completed, 165 national researchers had been interviewed, 75 from Kenya, 44 from Uganda, and 46 from Tanzania, representing about 75% of the total number. The national researchers who were not interviewed were missed for random reasons which should not interject any systematic bias into the results. The wealth of detailed material that came out of these interviews is summarized below.

Chi square frequency tests were performed on this data in order to determine the significance of the relationships hypothesized above, and they were performed for the total sample and for citizen, non-citizen, Kenyan, Ugandan, and Tanzanian sub-samples. In many cases, the positive responses were not large or varied enough to cover the full range of cells and attain required expected values, so row and/or column categories had to be combined. Even then, some of the statistical results should be interpreted with some caution.

The criteria chosen for accepting or rejecting the relationships being tested was if the chi square was significant at a level of .05 or less. The following propositions are therefore supported by this study:

1. The degree of positiveness of the general opinion of national researchers toward EAAFRO (as measured by their agreement or disagreement with a statement about EAAFRO being "truly regional, East African") is directly related to the amount of Experimental Collaboration benefits they have received from EAAFRO in the past.* ($\chi^2 = 14.20193$, $df = 3$, $p = .0026$)
2. The degree of positiveness of the general reaction/response opinions that national researchers have toward EAAFRO (as measured by their direct favorable-unfavorable responses) is directly related to their general reaction/response opinions toward the EAC. ($\chi^2 = 5.80938$, $df = 1$, $p = .0159$)

*The External Scientific Aid parameter did not appear to affect this relationship or even to be operative in this case.

5. The degree of positiveness of the general reaction/response opinions that national researchers have toward EAAFRO (as measured by their direct favorable-unfavorable responses) is directly related to the extent of their knowledge of EAAFRO (as measured by the number of EAAFRO officers they were able to name). ($\chi^2 = 10.24862$, $df = 4$, $p = .0364$)
10. (a) The perceived utilization of the EAAFRO output benefit of research results by national researchers is directly related to the extent that EAAFRO's scientific work complements their own. ($\chi^2 = 10.67571$, $df = 2$, $p = .0048$)
- (b) The perceived utilization of the EAAFRO output benefit of scientific services by national researchers is directly related to the extent of their experience at their national station. ($\chi^2 = 27.58310$, $df = 12$, $p = .0064$)

In addition to the explicitly stated propositions which were supported by the statistical results, a number of inter-relationships between indicator measures also received significant support. Some of these significant relationships are not surprising; others are:

- The general reaction/response opinions of national researchers toward EAAFRO (as measured on a five level favorable-unfavorable scale) were found to be significantly related to the perceived success of EAAFRO's information or technology transfer efforts; ($\chi^2 = 7.30647$, $df = 2$, $p = .0259$)
- The composite scores of benefits received by national researchers from EAAFRO were found to be significantly related to the critical size of the national institute where the national researchers were located; ($\chi^2 = 39.21621$, $df = 4$, $p = .0000$)
- The indicator measure for Objective Knowledge -- the number of EAAFRO officers known by the national researcher -- was found to be significantly related to the national researcher's perception of his own knowledge about EAAFRO; ($\chi^2 = 35.89935$, $df = 4$, $p = .0000$)
- The national researcher's perception of his own knowledge about EAAFRO was found to be significantly related to whether he had ever utilized the results of EAAFRO research in his own scientific work or not; ($\chi^2 = 15.13808$, $df = 4$, $p = .0044$)
- The number of EAAFRO officers a national researcher considers to be his "personal friends" was found to be significantly related to the length of time he had been at his national station; ($\chi^2 = 9.22548$, $df = 3$, $p = .0264$)
- Whether or not a national researcher had ever engaged in experimental collaboration with an EAAFRO research officer was found to be significantly related to the extent that EAAFRO's scientific work complemented his own; ($\chi^2 = 26.07964$, $df = 2$, $p = .0000$)
- The number of EAAFRO officers a national researcher considers to be his "personal friends" was found to be significantly related to the extent that EAAFRO's scientific work complemented his own; ($\chi^2 = 9.38475$, $df = 2$, $p = .0092$)
- The amount of personal contact transactions a national researcher had with EAAFRO officers was found to be significantly related to his proximity to EAAFRO. ($\chi^2 = 17.72168$, $df = 4$, $p = .0014$)

In attempting to interpret the above results for the general opinions which national researchers have toward EAAFRO, not too much of a positive nature can be said. It appears that favorable opinions about the larger framework within which EAAFRO is located, greater knowledge about EAAFRO, and higher perceptions of EAAFRO's success in transferring information and results to themselves may influence national researchers to have favorable general opinions toward EAAFRO itself. It also appears that the experience of having collaborated with EAAFRO researchers on joint experimental projects may influence national researchers to agree that EAAFRO truly is a regional, East African institution. What may be more interesting is the interpretations that might be given to all of the relationships that did not turn out to be significant.

The over-all lack of influence which potential EAAFRO benefits appear to have on general opinions toward EAAFRO may not be so surprising. Despite the official pronouncements of the functional relationships between regional and national research which implies more fundamental and more applied research at the respective different levels in the same field and the transfer of results in between, the results from the national interviews clearly show that this is in fact occurring only in a limited number of cases, maize breeding being the best example. Much of the research done at regional and national levels -- fundamental or applied -- is in different fields, and so there is little national utilization of EAAFRO research results and little experimental collaboration between them. With the one exception of the East African Literature Service; the different scientific services which EAAFRO offers also effectively reach only a very limited number of national researchers. Of the remaining potential benefits from EAAFRO, institution-building is limited to the four national stations where decentralized divisions are located. The extent of interpersonal relations, as measured by the number of EAAFRO officers national researchers considered to be friends, was not as great as might have been expected due perhaps to racial or proximity factors or the newness of many national researchers to research in East Africa. Finally, for whatever reason or reasons, only a very few national researchers have published in the East African Agricultural and Forestry Journal.

Therefore, it appears that a situation exists in East Africa in which the benefits from EAAFRO do not generally flow to the national agricultural and forestry research systems. There are exceptions, of course, but instead of working together on agricultural and forestry problems, the regional and national levels of research are working separately. This situation obviously runs counter to the

official pronouncements of how EAAFRO and national agricultural and forestry research systems are supposed to be working together, and brings into question the centralization of efforts argument that lies behind EAAFRO and other regional institutions. Indeed, if a regional institution is not going to handle the entire job or function that it is set up to accomplish and national institutions are established to do the same types of jobs or functions, then some analog of the more fundamental research at regional level and more applied research at national level probably exists to justify or rationalize the existence of comparable institutions which might be accused of duplicating efforts. One of the carry-overs from this study to other regional-national institutions, therefore, might be the examination of how much these supposedly complementary institution levels are actually complementing each other in terms of the greater centralization, greater specialization, etc., arguments for the existence of regional institutions.

In the absence of widespread benefits from EAAFRO upon which to base their opinions, it is perhaps not surprising that proposition 2 was supported and that the general opinions of national researchers toward the EAC seemed to influence their general opinions toward EAAFRO. The fact that this relationship is supported suggests that EAAFRO, as part of the East African Community, has behind it the favorable hopes and expectations of the national researchers, who want it to succeed and to do better. It does not appear that national researchers are satisfied with either EAAFRO or the EAC. To the contrary, many complaints and qualifications about pieces of EAAFRO's performance were continually raised, even as favorable opinions were being given; "politics" sums up their fears that the EAC may be broken up due to conflicts between the governments of the Partner States. But although fears, qualifications, and complaints were raised, they were usually -- particularly for African national researchers, it seemed -- placed in the context of wanting the EAC, and EAAFRO, to improve and succeed. 10)

Contrary to what was predicted in propositions 3 and 6, the Partner State the researchers were working in or their race did not appear to have any significant influence on their general opinions toward EAAFRO. The bases for both of these propositions were found in the integration literature, but they were also heavily supported by conventional wisdom and/or public opinion that appeared to be quite strong in East Africa. One would have thought, for example, from past assertions by Tanzania that Kenya was dominating regional arrangements and profiting the most from them, that researchers from Tanzania would have had the most unfavorable

10) Indeed, the "fears" for the future of the Community reflect both its perilous position caught between feuding Partner States but also a perhaps greater strength than many people had suspected. While this study was being carried out in late 1971 - early 1972, relations between Tanzania and Uganda deteriorated to the point where border incidents and alleged "invasions" were occurring to the west of Lake Victoria. Still the Community has somehow managed to survive.

opinions toward EAAFRO, that researchers from Kenya would have had the most favorable, and that researchers from Uganda would have fallen somewhere in between. One might also have thought, from EAAFRO's image and reputation as a "white man's institution," that African citizen national researchers would have had a more unfavorable opinion toward EAAFRO and European non-citizens a more favorable opinion. Neither one of these suppositions appear to be true. This is not to say that the Partner State the national researcher was working in or his race made no difference at all, however. There were a few national researchers from Tanzania and Uganda who continually made remarks about Kenya benefitting more from EAAFRO than their country and about EAAFRO not understanding or slighting their country throughout their interviews, but these were only a few. The racial factor, while again felt only by a few African national researchers, seemed to be felt more deeply and more bitterly by Kenyans, and was repeated in their responses to many interview questions. Response patterns based on race also turned out to be different on some issues such as whether EAAFRO was doing enough applied - as opposed to fundamental research.

The proximity variable was not related to the opinions of national researchers toward EAAFRO as hypothesized in proposition 4, and did not appear to have as much influence on any aspect of regional-national relationships as might have been expected. Likewise, the personal contact transactions and scientific complementarity with EAAFRO variables were not related to the opinions of national researchers toward EAAFRO as hypothesized in propositions 7 and 8. Other than to note that this was the way they turned out, no comments are able to be offered. The one other hypothesized relationship (proposition 5) that was statistically supported was that of the national researcher's knowledge about EAAFRO, as objectively measured by the number of EAAFRO officers he was able to name, and his opinion toward EAAFRO. Again, no comment is able to be offered on why this relationship was supported.

Of all the non-hypothesized relationships tested with respect to the opinions of national researchers toward EAAFRO, only one - with the perceived success of EAAFRO's information or technology transfer effort - proved to be significantly supported. It was a bit surprising that the perceived relevance of EAAFRO's scientific work, or the popularly related issue of applied vs fundamental research were not the variables significantly related to the general opinions, if any were to be. As has been noted, the needs of developing countries are so great that the

concepts of relevant and applied research have perhaps become over-emphasized in our awareness and thinking. What seemed to be more important to the national researchers in influencing their opinions toward EAAFRO (since competence was generally perceived to be fairly high) was EAAFRO's information or technology transfer efforts. At least this seemed to be the case particularly for non-citizens. The fact that the critical size of the national station where the national researcher was located was not significantly related to his opinion toward EAAFRO may reflect that although researchers at the smaller, less capable national institutions may be less able to absorb and utilize some of EAAFRO's potential benefits like research results or scientific services than researchers at larger and more capable national institutions, they do need and therefore appreciate whatever benefits they do receive. The final indicator measure that was not related to the opinions which national researchers have toward EAAFRO was the length of time they had been at their national station.

As mentioned earlier, the other indicator measure for the opinions of national researchers toward EAAFRO that concerned their agreement or disagreement with a statement about EAAFRO being a truly regional institution did not significantly relate to their direct favorable-unfavorable responses toward EAAFRO. This former indicator did, however, significantly relate to one of the potential benefits from EAAFRO - whether or not the national researcher had collaborated with EAAFRO officers on any joint experimental projects. This relationship seemed to be most important for citizen national researchers, but it is really difficult to say how important it is in view of the limited positive response.

Since research results and scientific services are probably the two most important direct outputs and benefits of any scientific research institution, some interpretation of these results will also be summarized. In previous discussions, three basic processes of all research institutions were described: the process of selecting projects to work on; the process of doing the scientific work; and the process of transferring the results. If done well, these processes would respectively result in relevant projects selected, competent work being done on them, and successful transfer of the results to an intended receiver; if a breakdown occurred at any point in this chain of events, results and services could not be utilized. Perceptions about EAAFRO's performance of these three functions by national researchers were hypothesized to be related to their utilization of EAAFRO research results and/or scientific services in proposition 9. None of these relationships were significantly supported by the statistical analyses performed.

One other possible breakdown factor was hypothesized in proposition 11 - the capacity of the national institution where the researcher was located to utilize EAAFRO results or services might be so low as to preclude this from happening. This relationship was not statistically supported either.

In light of previous discussions, this result is not so surprising either if it is recognized that EAAFRO and national agricultural and forestry research systems are, with a few exceptions, generally working in different agricultural areas. Therefore, national researchers may believe that EAAFRO is selecting relevant projects, doing competent scientific work, and successfully transferring the results to some unknown colleagues - and be located at a relatively strong national research station - and still not have personally utilized EAAFRO research results or scientific services. This interpretation is supported by the fact that the two intervening variables explicitly mentioned in proposition 10 - the length of time the national researcher has been at his station and the extent to which EAAFRO's scientific work complements that of the national researcher - are significantly related to, respectively, the utilization of scientific services and the utilization of research results from EAAFRO. These relationships also make a certain amount of logical sense in that scientific complementarity would seem to be a natural requirement for the utilization of research results, but not necessarily for the utilization of more general scientific services; and the greater the length of time a national researcher had been at his national station would seem to logically have given him a greater opportunity to utilize the general scientific services, but would not necessarily, however, have given him any more opportunity to utilize research results if he and EAAFRO were not working in the same field.

As kind of a check on some of the above tests, the composite score of the amount of all six benefits received by national researchers from EAAFRO was also tested for significance with a number of other variables. It was a bit surprising that the only relationship to be significantly supported with the composite benefits a national researcher received from EAAFRO was the critical size of the national institute where he was located. This fact is an important point to remember with respect to how the different Partner States organize their own agricultural and forestry research systems.

Some additional comments might be made at this point on some of the characteristics of scientific services alluded to earlier as opposed to scientific

research. Although some scientific services are more related to some agricultural research fields than others, in general scientific services can provide aid across the board -- e.g., the East African Literature Service provides scientific information in all fields of agricultural research. The output from scientific research, on the other hand, even if it is of a more fundamental nature so that the results can be utilized in further applied research, is of direct use only to other researchers in the same field. Therefore, it seems appropriate that EAAFRRO might consider the emphasis it places on providing scientific services to national research systems since 1) with the exceptions of the East African Literature Service and the Plant Quarantine Service, it does not appear that much time or effort has been expended on them; 2) at least some of the scientific services already offered on a limited scale are urgently needed and would be greatly appreciated by national researchers; and 3) it appears that the provision of across-the-board scientific services might be a very appropriate function for a regional institution like EAAFRRO to carry out. Unlike scientific research, no Partner State could claim that these service benefits were intended more for one State than another. Problems of providing some scientific services over large distances would still remain, but much more could be done in this area. If one wished to speculate on the future and wished to emphasize this point to the extreme, one might expect that as national agricultural and forestry research systems inevitably become stronger that EAAFRRO might find its logical role in the region becoming more of a provider of expensive but routine scientific services and less of a doer of research. Such a development would totally change the character of EAAFRRO, however, since top-quality researchers want to do experimental research, and it is by no means certain that this is desirable.

Although other significant results were indicated in the previously reported chi square test, the most important ones have been summarized above. It is by no means felt that this study has definitively answered all or any of the questions concerning multi-national scientific integration or the relationships between regional and national agricultural and forestry research systems in East Africa, but it is hoped that some good questions were raised and some useful insights gained into this complex phenomena.

Chapter II

Introduction:

The Case for the Study of Regional - National Scientific Relationships
in East Africa

This study is concerned with the concept of "regionalism" in developing countries and this introductory chapter presents the case for research on scientific regionalism in East Africa. The word "region," however, has been used in different ways and it is necessary to make clear what is meant by the term in this study. In a sub-national sense, a region is a part of a nation which exhibits enough differentiating characteristics from the remainder so as to be to some extent identifiable. Thus in the United States there is an area associated with the Mid-West region or the Great Lakes region, and in smaller countries there may also be sub-national "regions." A regional organization in this sense would refer to a decentralization of effort which is generally justified in terms of an increased ability of the organization to deal with the more localized aspects of its specific mission. In other instances, "regional" is used in a supra- or multi-national sense to refer to two or more (usually smaller) nations which have enough shared characteristics -- natural or artificial -- to be identified collectively as a region. In Africa, for example, there are regional areas associated with the terms North Africa, West Africa, Central Africa, and East Africa. Regional organizations in this sense would refer to a centralization of effort which is generally justified in terms of increased efficiency or quality or scope of effort. The United Nations has gone one step further with the term "regional" by using it in a continental-wide sense. Thus there are "regional" Economic Commissions for Asia, Africa, Europe, and Latin America. In this paper, the term "regional" will be used in the multi-national sense, although not on a continental-wide scale. Each Africa, for example, is a region which is composed of the three nations of Tanzania,¹⁾ Uganda, and Kenya.²⁾

When all the theories of regionalism or multi-national integration are summarized, one basic claim emerges: The multi-national whole is greater than the sum of its national parts. Particularly when smaller nations are relatively lacking in scarce resources, it would seem to make sense that they should get together. Organizationally, one large firm, public agency, or research institute

1) Tanzania is composed of what was formerly Tanganyika and Zanzibar.

2) Sometimes, East Africa is used in a larger sense to refer to the three countries mentioned above, plus Somalia, Ethiopia, Rwanda, Burundi, Zambia, and Malawi. In other cases, "Greater East Africa" is used to refer to this larger region.

serving an entire region would seem to offer such advantages as less duplication of effort, a more economical use of natural and human resources, and an increased potential for specialization over separate -- and smaller -- organizations in each nation.

It is important to remember that regionalism is not a goal in itself, however; it is a means to some further end -- and, hopefully, a more efficient means. For the developing countries, this goal is most often that of economic development, although the political influence associated with such concepts as Pan-Africanism have also been mentioned.³⁾ In Economic Cooperation in Africa - Retrospect and Prospects, Green and Krishna state:

Economic integration cannot be viewed as an abstract goal in itself. It has -- and will -- become a serious possibility or an attained reality only when it is and, even more critical, is seen to be relevant to the attainment of other economic objectives ... The two major economic challenges confronting African states to which economic integration should be relevant are: allowing a more rapid rate of economic development and providing a basis for lessened inequality in international economic relations. (Green & Krishna, op cit, p. 90)

The report of the Organization for Economic Co-operation and Development (OECD) on Economic Integration Among Developing Countries states that its "basic assumption" is

... that a development effort in developing countries is inevitable and that the primary objective of international policy in this field should be to minimize the cost of this effort. (Kahnert, F., et al, Economic Integration Among Developing Countries, OECD publications, Paris, 1969, p. 127)

Arguments for regional integration, particularly in Africa, usually begin with a statement about the lack of viability of small, poor nations, followed by regionalism as one solution to their problems. The OECD report begins as follows:

The unsatisfactory outcome of the first development decade (which has occasioned almost worldwide disappointment) is now giving rise to an awareness that most of the under-developed countries are too small to be able to create modern, viable industrial structures within their national frameworks... Hence the necessity for such countries to follow the example of the European Economic Community in pooling

3) "The interest in co-operation has also been reinforced by political considerations, the central theme of which is the desire to present a collective African front in matters affecting the continent as a whole." (Green, R.H. & Krishna, K.G.V., Economic Cooperation in Africa-Retrospect and Prospect, Oxford University Press, London, 1967, p. 1).

their resources and co-ordinating their development in a movement towards regional solidarity. (Ibid, p. 9)⁴

The attention of international and national aid agencies has also increasingly been drawn to a regional approach for their efforts. African nations may propose plans and projects for development, but external sources of finance many times decide which projects will be implemented and if multi-national projects are favored, these will be the ones supported. Since about 1963, for example, the United States has begun to argue that a regional approach to economic aid is a more effective way to promote development than a national approach. In 1966, the Korry Report -- named after Edward M. Korry, U.S. ambassador to Ethiopia at the time -- was submitted to the U.S. Agency for International Development (AID) and was later adopted as the official aid policy for Africa. This report concluded that regional aid projects were more beneficial than those to small nations, and direct U.S. aid was subsequently cut from 24 to 10 African regions/countries on the

4) Some other examples are: "Someone has remarked that Africa has the highest rate of frontiers to total area of any continent. Whether this is so or not, it certainly contains a number of states which are very small in terms of population and natural resources... decolonization has so far resulted in the fragmentation of an already over-divided continent." (Robson, Peter, Economic Integration in Africa, George Allen and Unwin Ltd., London, 1968, p. 66) "In the first place, Africa has come to be dotted with the largest number of sovereign nations of any continent. The viability, either politically or economically, of up to a score of the very small nations is, at best, a dubious proposition." (Green & Krishna, op cit, p. 7) "Most developing countries' internal markets are simply too small to allow operating and manufacturing efficiencies." The solution to this problem, Rolfe says, is regional economic organization. "The possibilities of effective regional economic organizations are conjectural, and depend in large measure on the speed with which political difficulties can be overcome..." (Rolfe, Sidney E., The International Corporation, Report to the XXII Congress of the International Chamber of Commerce, Istanbul, 31 May - 7 June 1969, pp. 38 & 39) "To the extent that progress depends on the division of labor and consequently on the size of market, reasonable market size is a concomitant of reasonably rapid development. This is especially true in the light of African economic nationalism, which, by and large, obstructs economic integration into larger units. Individual African markets are now extremely small... The general smallness of African markets and their natural complementarity are necessary and sufficient economic reasons for urging that African states (with possible exceptions such as the U.A.R. or Nigeria) combine their efforts, wherever possible, to attain greater economic viability." (Report of the Commission on International Development, Lester B. Pearson, Chairman, Partners in Development, Praeger Publishers, New York, 1969, p. 277) "What makes

basis of its recommendations. France has also adopted the position of supporting regional groupings among her ex-colonies, a policy which was favored in the "Jeanery Report" and in subsequent statements by the Ministry of Development and Cooperation.⁵⁾ Great Britain, due perhaps to some unfortunate experiences with federations promoted by her in developing areas,⁶⁾ seems to be more passive in this respect. She has expressed the belief that attempting to push regionalism from the outside is counter-productive, and although the Ministry of Overseas Development does advocate economic cooperation among adjacent sterling area states in Africa, it makes few grants or loans on this basis. Two of the most important international aid agencies for Africa are the European Development Fund of the European Economic Community and the International Bank for Reconstruction and Development (IBRD). The former organization endorsed economic regionalism in its Second Fund provisions for 1964-68, but little has been done in this direction: IBRD has supported regionalism, particularly in the transport and power development areas. (Green & Krishna, op. cit, pp. 77-79)

black Africa different from other developing areas such as Asia is that it is still relatively thinly populated and divided into small units. Many African countries have less than ten people per square mile, and only six (Nigeria, Ethiopia, Congo (Kinshasa), Sudan, Tanzania and Kenya) have more than 10 mn people. In some ways this is an advantage... On the other hand low population density means that the cost per head of providing public services such as roads is high, and there are few large markets to generate self-sustaining industrialization. The market problem is made even worse by the balkanization of many African states. Nigeria, for example, has a larger population than the 15 ex-French territories put together... Nevertheless new industries are vital. And they need reasonable sized markets -- which rules out a good deal of Africa. The obvious answer is for the countries to do their industrialization on a regional basis." (The Economist, January 30, 1971, pp. 52 & 53)

5) One reason for this, which has been referred to in the above footnote, is that Francophonic African nations are very, very small -- even for Africa.

6) Federations in Central Africa, Malaysia, and the West Indies have all broken up soon after their establishment with the help and encouragement of Great Britain. The experience in East Africa is discussed in Appendix I.

Indeed, a most recent and entailed report on foreign aid, sponsored by IBRD and written by the Commission on International Development with Lester Pearson as Chairman, although not discussing regionalism under a specific heading, leaves no doubt that it considers the approach very important:

Finally, international agencies have an important part to play in facilitating regional integration among developing countries. The potential gains from closer cooperation of this kind are very large, and in many cases some form of economic integration seems indispensable to economic viability. (Pearson Commission, op cit, p. 214)

Regional integration is also strengthened by multi-lateral investment projects which possess great intrinsic economic merit... We would urge aid-givers to give special attention in their aid allocation to projects which have the effect of strengthening old, or forging new, economic links among groups of developing countries. (Ibid, pp. 95 & 96)

We recommend that bilateral donors and international agencies provide financial assistance to institutions such as development banks and clearing and payments unions which are designed to promote trade among developing countries on a regional scale. (Ibid, p. 95)

The case most generally made for subregional cooperation in Africa rests on the assumption that industrial development is a major policy of African countries, and that at present and for many years to come industrialization must be based on import substitution... By basing import substitution on regional rather than national markets, integration should increase the growth rate of manufactured output. (Ibid, p. 279)

There is a qualification, however:

Yet it would be a mistake to assume that all development problems can be solved through integration. The usefulness of integration and the configuration of subgroupings within the region will vary according to the nature of the problems and the sectors wherein they fall... Integration is not a universal remedy for all ills and will require a certain level of development, extensive coordinating experience, and increased degrees of political cohesion. (Ibid, p. 280)

The United Nations has also advocated the regional approach to development in developing countries. To quote just one example, the Economic Commission for Africa has stated the following:

The Economic Commission for Africa has sought to encourage the creation of a subregional ⁷⁾ framework for co-operation, so as to

7) As has been mentioned previously, a "region" in the United Nations terminology refers to a continent-wide area, while "sub-region" is used to represent what is the focus of interest in this paper.

increase the number of countries participating in each grouping and to provide a basis for co-operation in trade as well as in other fields. At its seventh session, in 1965, it recommended through its resolution 142(VII) the early establishment at the subregional level of intergovernmental machinery responsible for the harmonization of economic and social development in the subdivisions of North, West, Eastern, and Central Africa. These subdivisions of the African region are regarded as viable economic units within which economic and particularly industrial development could be planned on an integrated basis. (Department of Economic and Social Affairs, Economic Co-operation and Integration in Africa: Three Case Studies, United Nations, ST/ECA/109, New York, 1969, pp. 1 & 2)

The logic of statistics does support the argument for regionalism, especially in Africa. Population figures for 1967 show that of 94 non-Communist developing countries in Asia, Africa, and Latin America, 66 of them had an average population of only 3.2 million, and that 31 of those countries were in Africa. Furthermore, smallness measured in terms of purchasing power or Gross National Product (GNP) in Africa is just as extreme. All 94 developing countries in 1964 had an average GNP of \$2.8 billion, and the smallest 53 of these countries had an average GNP of only \$0.4 billion! Twenty-eight of this latter group of countries were in Africa, with an average GNP of \$0.3 billion. (OECD, 1969, pp. 51 & 52) With these facts in mind, it is not surprising that many regional economic schemes have been tried; but their success has not matched the hopes that brought them into existence. Many, such as the West African Customs Union or the Central African Federation, have ceased to exist. Others are running into difficulties or are at too early and nebulous a stage to discuss meaningfully.⁸⁾ Besides East Africa, which will be discussed throughout later chapters of this paper, there are five other schemes which might be mentioned briefly: the Central African Common Market, the Maghreb Common Market, the Latin American Free Trade Association, the Central American Common Market, and the Regional Co-operation for Development (RCD).⁹⁾ Most of these schemes are large in terms of geographic area, but with the exceptions of LAFTA and RCD, they are still relatively small in terms of population and GNP. OECD sums up these five schemes as follows:

8) Before "experts" in developed countries criticize regional results in developing countries too much, however, it might be well to remember the Civil War and other disintegrative events in the United States, the French secessionist movement in Canada, the long and violent history of Ireland and England, or the difficulties of the European Economic Community today.

9) Other schemes which might be mentioned are the Association of South East Asian Nations, the Arab Common Market, the West African Iron and Steel Community,

In conclusion, it can be said that even those we have examined, which are the most advanced of the integration schemes in the developing world, are still far from reaching their objectives. (OECD, *op.cit.*, p. 133).

The Central African Customs and Economic Union (Union Douaniere et Economique de l'Afrique Centrale -- UDEAC) was composed of the countries of Gabon, Chad, Congo (Brazzaville), the Central African Republic, and the Federal Republic of Cameroon.¹⁰⁾ With the exception of Cameroon, the other countries had formed "French Equatorial Africa" since 1910 and thus some measure of integration (common services such as posts and telegraph) had been developed among them. This "federation" broke up in 1956 over the issue of territorial distribution of federal revenue, but the countries were so small that cooperation was deemed essential and in 1959 -- after agreement had been reached on a revenue allocation formula -- the convention establishing the Equatorial Customs Union was signed. In 1961, Cameroon began to be integrated into the customs union, and this eventually resulted in the Treaty establishing UDEAC in 1966. Most of the decision-making power in this union resides in the Steering Committee, which is composed of the Finance Ministers and one other member from each nation -- plus advisors -- and which is under the authority of the Conference of Heads of States. Interstate trade within the union has been growing relatively fast, although differences in the tariff and internal tax structures remain. Industries serving the entire union are granted "taxe unique" status which exempts them from all import duties and internal indirect taxes, and which grants them a lower direct tax rate than non-union industries must pay. Until the treaty in 1966, this status and some ad hoc agreements which took place as they were made necessary by events were the only measures at all related to industrial coordination within the union. Since the treaty, the coordination of all economic activities -- development plans, transport policy, industrial development, etc. -- is supposed to have been regulated by rather complex procedures. Although the UDEAC is not yet as important as the East African Community, it

the Caribbean Free Trade Association, the Andean group or Andean Common Market, and others.

10) Chad was an original member of UDEAC, but withdrew in 1968, along with the Central African Republic, to join Congo (Kinshasa) -- now Zaire -- in the Union of Central African States. The Central African Republic rejoined UDEAC the same year.

preceded the latter with an over-all, written framework for cooperation.¹¹⁾
(Ibid, pp. 58-63)

In North Africa, the Islamic countries of Algeria, Morocco, Tunisia, and Libya¹²⁾ formed what was known as the "Maghreb" group, but except for some coordination of common services a Maghreb Common Market was an ideal rather than a reality. Long before independence, the desirability of a unified Maghreb had been expressed, but the form which this unity should take was never defined. A Conference for the Unification of the Arab Maghreb was held in Tangier in 1958 and suggestions and proposals were made to this end, but nothing ever came of them. A difference in political ideologies and border disputes over natural resources seems to have been at least partly responsible for this failure. The Economic Commission for Africa strongly supported regionalism in North Africa, and a sub-regional office in Tangier was opened in 1963. Various Co-ordinating Missions and Councils of Ministers and Committees and Commissions functioned at various times, but only limited progress was ever made in the one area of common services. Except for Tunisia, inter-state trade among the Maghreb was virtually negligible and no agreement on its promotion, or on the coordination of economic and industrial activity, was ever reached. (Ibid, pp. 64-68) At present, the Maghreb could be considered a failure.

The Latin-American Free Trade Association (LAFTA)¹³⁾ was established in 1960 by the Treaty of Montevideo. The original countries involved were Argentina, Brazil, Chile, Mexico, Paraguay, Peru, and Uruguay, while Colombia and Ecuador joined in 1961, Venezuela in 1966, and Bolivia in 1967. As is apparent, LAFTA is the largest regional scheme among developing countries. By 1973, all inter-state trade within LAFTA was to be freed of tariffs. Although there have been some declarations of further integration measures, free

11) For more information on this and subsequent regional groupings, the OECD publication referred to provides a good summary. See also Green & Krishna, op cit, pp. 36-41 & 110-112.

12) More recent events have seen the announcement by Libya, the Sudan, and the United Arab Republic of their intention to federate, and the formal federation of Libya, the United Arab Republic, and Syria.

13) For a further discussion of both LAFTA and the Central American Common Market, see "Economic Integration in Latin America" by Noberto Gonzales in the Appendices of Green & Krishna, op cit, pp. 145-148.

trade was the only concrete goal established in the Treaty. The establishment of a common external tariff, the freedom of movement of capital and labor, and the balanced coordination of regional investment and economic expansion were not provided for. The intention to coordinate industrial policies through "complementation agreements" was stated in the Treaty, but very few of these agreements have been signed. Inter-state trade within the region has increased, but it is not apparent that the regional agreement was primarily responsible. A certain amount of industrial specialization has also taken place, but no new industries have been set up to serve the regional market. LAFTA has experienced difficulties because of the determination of some countries to preserve protected market sectors and because of economic disparities between member countries. These difficulties have been one of the reasons for the formation of sub-regional groups within LAFTA. Beginning in 1965, a group of Andean countries began to explore the possibilities of sub-regional free trade and joint natural resource exploitation, and there has been a recent agreement to form an Andean Common Market composed of Chile, Peru, Bolivia, Ecuador, and Columbia. (Ibid, pp. 68-72)

The movement toward free trade and economic cooperation in Central America began in the 1950's. In 1958, the first free trade treaty of the Central American Common Market (CACM) was signed by the five countries of Costa Rica, El Salvador, Guatemala, Honduras, and Nicaragua, but this was overtaken by the General Treaty of Central American Economic Integration of 1960. Even in regional scope, the area and population of CACM is still very small, but a certain degree of successful integration has been achieved. By 1966, free trade in the region was virtually completed and since 1959 a common external tariff has been gradually applied to most external imports, although not as fast as was originally hoped. Freedom of capital movement within the region has been established, but labor movement across national boundaries is still restricted. There has been a considerable rise in the exports of manufactured goods of member countries, and most of this has gone to other member countries. The rise has largely been caused by increased competition in established industrial sectors and the establishment of new industries -- both facilitated by the common market. This increase in industrialization, however, has not been evenly spread among member countries, and one of the biggest problems CACM faces is the instability of its members. Several schemes to coordinate the location of industry so as to balance development and benefit the poorer countries have been tried, but this has become an ad hoc, project by project

matter which sometimes has broken down.¹⁴⁾ Finally, there has been some regional specialization in certain common services, but not in others. Centers for scientific research and civil service training have been set up; the Pan-American highway exists and intergrative road link-ups are proceeding; a Central American Bank for Economic Integration has been founded -- but other potential common services have made no progress. (Ibid, pp. 72-76)

Economic cooperation between the Regional Co-operation for Development (RCD) countries of Iran, Pakistan, and Turkey, dates back to the Baghdad Pact military alliance of 1955 and the Central Treaty Organization (CENTO) of 1959. These previous arrangements did not have economic cooperation as their main objective, but transport and telecommunications services were achieved on a regional basis and the preconditions for closer economic cooperation were created. RCD then took over these and other CENTO services related to the economic field. RCD was not actually an economic integration scheme, because there was no provision made for the abolishment of regional trade restrictions, but it did aim at a number of other regional goals. Cooperation on regional investment projects was one of these primary goals. Working committees under the Regional Planning Council, which was composed of the heads of the three national planning organizations, prepared recommendations for the allocation of joint industrial projects which were viable only on a regional basis. At least three -- and perhaps four other -- such projects are being implemented. Other major common service agreements were reached for a regional airline, shipping line, cultural institute, petroleum organization, etc. Inter-state trade within the region has been rising, but is still at a very low level due to the essentially competitive nature of the national economies.¹⁵⁾ (Ibid, pp. 76-78)

The subject of this paper, however, involves only a small part of the total picture of regionalism -- regional scientific research and development (R&D) institutions. This is a subject of interest in its own right, but it is hoped that any progress in understanding made on this limited topic will also have applications to regionalism in a broader sense. The studies of

14) Each country has its own petrol refinery, for example, there is excess capacity in each refinery, and regional trade in petroleum products is restricted. (OECD, op cit, p. 74)

15) Several federation schemes could have also been mentioned and discussed briefly. OECD covers Cameroon, Malaysia, Nigeria, and Pakistan (Ibid, pp. 78-86), and Green and Krishna mention Nigeria. (op cit, pp. 38 & 39)

of economic integration in developing countries have made the point that while wide-ranging and general regional schemes may fail, may not be feasible, or may be a long way off due to political or other reasons, that cooperation on a limited basis -- on certain projects or institutions that avoid head-on conflict over unresolved political or economic issues -- may offer a more realistic hope for success. And, as the "spill-over" theory of integration points out (which will be discussed in a later chapter of this paper), multi-national agreement in one functional area may make agreement in another functional area easier.

It has not yet been proven which way the causality runs between the two highly correlated variables of national expenditures on scientific-R&D and per capita income (the most frequently used indicator of economic development), but the importance of science to developing countries in such areas as the "Green Revolution," discovering new uses for indigenous agricultural products, or developing new technologies for the processing of indigenous natural resources cannot be denied. Although expenditures in developing countries on R&D are often superseded by more pressing human and economic development problems,¹⁶⁾ at least some of the political leaders in them also recognize the importance of science to development. For example, the late Minister of Economic Development and Planning in Kenya, Tom Mboya, addressed a meeting of scientists in East Africa as follows:

The subject of your seminar -- research in the biological sciences -- is really one limb on the all-encompassing body of truth. But it is a limb that is very close to us and to our needs. To us in Africa it has vivid application. Biology in the purest sense, which of course includes zoology, is a study well attuned to Africa. In this context, we are rich in raw material. We stand to gain greatly from findings and their consequences and to offer a great deal to the whole world of science outside. (East African Institute of Social and Cultural Affairs, Research Priorities for East Africa, East African Press Ltd., Nairobi, 1966, p. 8)

Inherent in the term "developing country," however, is the implication that scientific R&D, along with a number of other indicators, is at a relatively

16) Indeed, the Frazer Report uses this as one of its arguments for the continuation of United Kingdom support for R&D in East Africa: "It is not at all easy for Colonial Territories with their resources as yet undeveloped, to make an adequate contribution to research programmes or projects, the results of which can only be felt in the long term. Indeed, one of the reasons why they are reluctant to spend a great deal of money on even short-term research is because the calls on their available funds are so often for immediately productive economic projects designed to raise the standard of living of their peoples at the earliest possible moment." (Frazer, Prof. A.C., Chairman, "Report of the Commission on the Most Suitable Structure for the Management, Direction and Financing of Research on an East African Basis," Government Printer, Nairobi, 1961, p. 74)

low stage of development. This fact, and its consequences, are aptly summed up in a "Draft Introductory Statement for the World Plan of Action for the Application of Science and Technology to Development," which was prepared by a group of consultants from the University of Sussex for the Advisory Committee on the Application of Science and Technology to Development (ACAST) of the United Nations:

The advanced countries have found that science and technology are extremely powerful tools which help them achieve their national objectives. As a consequence, large resources amounting in many advanced countries to 2 and even 3 per cent of GNP are currently allocated for research and development. Many times this amount are additionally spent in applying the results of this R&D.

By contrast, modern science has not been pursued to the same extent in the developing countries. This has had far reaching effects not only on their ability to develop indigenous technology appropriate to their local needs, but also in their ability to absorb foreign technology. It has also meant that they have been unable to capitalise on the social role of science as a modernizing force. The world view of science which implies that the laws of nature can be understood and that this knowledge can be used is still alien to a large segment of people in the developing countries. (Department of Economic and Social Affairs, "Science and Technology for Development: Proposals for the Second United Nations Development Decade," United Nations, ST/ECA/133, New York, 1970, pp. 19-20)

One way for the developing countries to "catch up" in science, so to speak, has been perceived as the development of regional, multi-national scientific institutions, and so the trend toward regionalism has also found expression in recommendations for such organizations. In its third report to the Economic and Social Council, ACAST stated the following:

An important goal for developing countries is the achievement of a substantial degree of scientific and technical independence, based on adequate and vigorous national institutions. Until that stage can be reached in some countries, regional institutes must be relied upon... Many of the problems of developing countries to which science and technology can contribute are regional. Moreover, the minimum effective size of the needed research activities, both as to staff and special equipment, may make it necessary for countries in the region to pool their resources and personnel for combined action. Such pooling may take the form of a regional institute, or it may consist of a consortium of national institutions closely linked for cooperative action. (ACAST, "Third Report to the Economic and Social Council," United Nations, E/4178, New York, May 1966, p. 17)

UNESCO makes the matter seem much more urgent:

Whether nations in any region choose this, or some other formulation of regional co-operation, the importance of tackling this question soon cannot be overlooked. Scientific institutions throughout the world are growing rapidly. A nation's ability to keep pace, or to catch up, may well rest on the degree to which co-operative multi-lateral programmes can be formalized. (UNESCO, "Contributions to Stage II of the World Plan of Action for the Application of Science and Technology to Development - Sector No. 1: Science and Technology Policies and Institutions," UNESCO/NS/ROU/191 prov. 1, Paris, 20 February 1970, p. 92)

Emulating their broader regional economic and political counterparts, many regional science institutions -- despite their seeming rationality -- have failed to remain regional. In West Africa, for example, an entire set of West African Cocoa, Palm Oil, etc. Research Institutes have become national institutes of Nigeria, Ghana, or other West African nations. There is good reason to believe that the regional research institute for the Central American Common Market has become a national -- Guatemalan -- institute in fact, if not in name, and that the same thing has happened to a regional CENTO research institute in Iran. Despite all the words being written on the concept, however, the state of the art of regional scientific organization is not very advanced. UNESCO states:

Although the general desirability of regional science programmes has been formally recognized, at least since the Lagos Conference in 1964, there has been no definite study of the factors which must be considered or the techniques which might be employed. (UNESCO, op cit, pp. 90-91)

Hopefully, this study will contribute something to this field:

The East African Community (EAC) is an existing and viable regional grouping of the three countries of Kenya, Uganda, and Tanzania. The Pearson Commission has described EAC as

... perhaps the most important cooperative arrangement, involving a common market and an impressive range of services which are operated jointly by the three countries. (Pearson Commission, op cit, p. 95)

All former colonies of Great Britain, the three countries at one time had intended to federate and become one independent nation. In a statement issued by the indigenous political leaders of the three territories on June 5, 1963, this was explicitly stated:

We, the leaders of the people and governments of East Africa assembled in Nairobi on 5 June 1963, pledge ourselves to the Political

Federation of East Africa... (Hughes, A.J., East Africa: The Search for Unity, Penguin Books Ltd., Middlesex, 1963, p. 265)

For reasons that are discussed fully in Appendix I, the federation did not take place; but the dynamics of regional cooperation have continued up to this day and one of the aspects of this cooperation has been a set of 12 regional scientific R&D institutes which appear to be working on a regional-wide basis. These institutes range from the Industrial to the Leprosy Research Organization, but of the 12, this study will focus on the East African Agricultural and Forestry Research Organization (EAAFRO). This institute has by far the largest budget and the largest number of scientists working for it, reflecting agriculture's importance in the region, and, more important, all three countries in the region have national agricultural and forestry research systems with which EAAFRO is to cooperate and to which EAAFRO's results are to be transferred. Thus, there are defined organizations at the regional and national levels, and this study will focus on the interrelationships between them.

In Chapter III of this study, a summary of the state-of-the-art of political and economic integration theory is presented. Some of this literature was originally written with developing countries- and even East Africa - in mind; some was written in more general terms. None of it was written in the context of agricultural and forestry research systems, institutions, or personnel. Although, as was just stated, the focus of this study is the relationships between regional and national agricultural and forestry research systems in East Africa, EAAFRO was and is a multi-national institution in a multi-national system that was established to integrate the three British colonial territories of Kenya, Uganda, and Tanzania in certain functional areas, and at one point in history this regional system was to have become an over-all East African Federation. In a real sense, therefore, EAAFRO can be considered to have played the role of an integrating agent for agricultural and forestry research in East Africa - whether it has successfully played this role or not is a different matter. In this situation, it was felt that integration theory might offer some insights into the relationships between regional and national agricultural and forestry research systems in East Africa. This study attempts to take some aspects of general integration theory and to apply them - or their analogs - to a specific and specialized functional activity in a specific

multi-national region. Although this attempt involves the adaptation of general integration theory to a specific functional activity which may be different from the original purposes for which the theory was developed, it is hoped that this utilization of adapted theory can lead to insights into and explanations for human behavior relating to this specific activity.

Two of the important issues related to integration and discussed in Chapter III are benefits from the multi-national system to the member states of the multi-national grouping and transactions between the multi-national system and the member states. In Chapter IV, therefore, the issue of the balance of the benefits from regional EAAFRO among the Partner States of the East African Community is addressed. A methodology is followed in which the research priorities in agriculture and forestry of the different Partner States as analyzed from their national five-year development plans, are compared with EAAFRO's own research priorities, as developed from interviews with EAAFRO research officers and EAAFRO publications. The purpose here is both to develop and run through a methodology which might more objectively determine the balance of a regional research institution's project portfolio benefits, and to see if a qualitative assessment can be made of the influence of variables such as proximity on this balance. Chapter V, on the other hand, address the relationships between transactions and proximity in quantitative terms. Using some theory from political geography in which the effects of distance on transactions are hypothesized under isotropic conditions and under conditions where social boundaries (e.g., national borders) are crossed, three models are developed of possible relationships between EAAFRO-Partner State transactions and distance. These models are then tested using data concerning transactions of the scientific visits of EAAFRO officers to locations in the Partner States and of the visits of Partner State officials and representatives to EAAFRO headquarters.

The subject matter in chapters IV and V operates at the level of the Partner State or the institution. Chapters VI, VII, and VIII, however, operate at the level of the individual - in this case, the individual national researcher. In Chapter VI, propositions are developed which relate to the opinions, perceptions, and reported interactions of national researchers toward, about, and with EAAFRO. These propositions are once again based principally on general economic and political integration theory as summarized in Chapter III.

In order to obtain the data to test these propositions, 165 national researchers in the national agricultural and forestry research systems of Kenya, Uganda, and Tanzania were interviewed. This national interview instrument and how it relates to the propositional variables is also covered in Chapter VI. The results of the information obtained from the national interviews are presented in tabular form and discussed in Chapter VII. Insofar as possible, non-statistical inferences about the results are also discussed in this chapter. In cases where the data was amenable to statistical analysis, however, chi square tests were performed to test certain propositional relationships, and the results of these tests are presented in Chapter VIII. Chapter VIII then concludes with some summarizing interpretations and evaluations of what may have been learned in this study.

Chapter III

Some Aspects of

General Economic and Political Integration Theory.

The primary rationale behind most integration schemes in developing countries today is economic -- not political -- but in practice it is very hard to separate the two concepts --

The concern of African countries with integration, like that of countries elsewhere, derives not only from economic considerations; but, in part, from political and social factors as well, which cannot easily be disentangled from each other. (Robson, op.cit., p. 11)

Economic integration is a political issue since the rate and direction of economic development is an important political goal in developing countries, and political integration is an economic issue insofar as it implies economic integration as well. In the appendices of Green and Krishna, Ali Mazrui claims that economic and political integration are not a difference in kind, but a difference in degree; that political integration is more comprehensive and includes economic integration within it -- that a federation normally includes a common market. (Green & Krishna, op.cit., p. 131) There is a difference of opinion as to whether political or economic integration should come first. Most authors¹⁾ seem to argue, at least with respect to Africa, that economic cooperation would be a means to achieving eventual political integration. The conventional wisdom argues that African countries are not yet ready to unify politically and will not be so for an indefinite period, but that this need not act as a barrier to cooperation in the economic field. Mazrui, however, speculates that political integration may be easier if there has been no economic cooperation! Citing the example of East Africa, he states:

The East African Common Market and Common Services Organization have formed a cooperative framework for competitive relationships. Such a situation can have a greater potential for acute and divisive rivalries than complete absence of cooperation. Indeed, such 'family rivalries' can provoke greater passions than rivalry with a distant enemy. (Ibid, p. 132)

The crux of the political problem in economic integration is that some loss of national sovereignty is involved. Although some small measure of economic cooperation might be feasible without political links between cooperating countries, substantial gains require national governmental involvement in some durable multi-national arrangement and a consequent loss of sovereignty. OECD states the following:

Integration requires the participating governments to relinquish their freedom of action over progressively wider areas of economic and social policy. (OECD, op.cit., p. 39)

They also quote a "prevailing view" of Robinson (Robinson, E.A.G. (ed), Economic

¹⁾See, for example, Green & Krishna, op.cit., pp. 5 & 18

Consequences of the Size of Nations, London, 1963, p. xff) as follows:

If a group of countries are to gain, they must be prepared from the first to recognize and accept significant losses of individual sovereignty over their economic affairs. That is the price of their gain. (Ibid, p. 40) 2)

This is a particularly important problem in newly-independent countries which were treated for years as the property of colonial powers. A growth of national consciousness -- although perhaps not as important to the independence struggle as "anti-colonialism" -- has been deliberately fostered by indigenous governments anxious to establish viable and integrated nations. National consolidation has usually received a high priority; the immediate concerns are for a national identity, national institutions, and national development to keep the promises made before independence. A national government must have effective control of a country before integration or cooperation with other countries can be implemented. This does not mean that regional economic integration is impossible in newly-independent African countries, but that the issue of national sovereignty so soon after independence may place very real limits on it.

A very obvious danger is that the promise of greater economic growth for the region in the future may be heavily discounted in comparison with political advantages to promoting national economic growth now. For economic cooperation to work, however, policy harmonization between cooperating countries is required in a number of areas. Exchange rates between the countries should not create distortions which would interfere with trade flows, for example, or growth policies (inflation or deflation) should not conflict to cause balance of payments difficulties. As the cooperative interdependence or integration between countries increases, more policy matters require harmonization with a consequent loss of national sovereignty.

The political-economic interface of integration may also be complicated by differences in political and/or economic ideologies. Nations try to evolve an economic system which reflects their political philosophies, and although it is probably not necessary for an identity of political viewpoint to exist among cooperating nations, it is also true that fundamental differences in such viewpoints will be very difficult to overcome.³⁾ A commitment to total laissez faire on the part

2) Also, "Effective economic integration demands a willingness to cooperate intimately with other countries, perhaps to the extent of accepting a substantial measure of dependence Economic gains from integration will thus have a price in terms of a reduction of flexibility and autonomy." (Robson, op.cit., pp. 302-303)
 "Integration involves a conscious surrender or at least pooling of a measure of national sovereignty in policy formulation and execution." (Green & Krishna, op. cit., p. 53)

3) "It is a counsel of despair to argue that identity of political purposes, social philosophies and internal economic systems is a prerequisite for meaningful

of one or more cooperating countries would effectively preclude any attempt to balance industrial locations among them, for example. Generally speaking, different dominant philosophies of socialism and private enterprise might also find themselves incompatible for technical as well as ideological reasons. Political "style" may cause problems also, but these difficulties are usually indications of more basic political and economic differences. The danger is that political differences will lead to bickering and destroy the mutual goodwill and trust necessary for nations to cooperate economically.⁴⁾ (Green & Krishna; op.cit., pp. 102-104)

Despite some of these aspects of political factors involved in economic integration, most authors on the subject concentrate almost entirely on economic issues.⁵⁾ What is meant by economic integration, or just integration? OECD defines it as follows:

Integration is understood here as a process by which discriminations existing along national borders are progressively removed between two or more developing countries. (OECD; op.cit., p. 11)

OECD emphasizes a dynamic process instead of a static state of affairs and concentrates on national borders which produce discontinuities in trade, the flow of factors of production, and other economic relationships. Robson defines integration as a situation having two characteristics: 1) the facilitation of specialization and exchange between independent member countries by means of the elimination or reduction of trade barriers; and 2) economic discrimination against non-member countries. He emphasizes that integration is the static "result of a process" of progressive adjustments made with the above characteristics in mind. (Robson, op.cit., pp. 25 & 26) Whichever definitional point of view is taken, most authors recognize various "stages" of integration which represent successively higher

- 3)(cont.) economic integration. Equally, however, it is a counsel of folly to assume that a formal demonstration of joint community gains from economic integration is either adequate to overcome, or even basically relevant to overcoming, political or political economic reservations." (Green & Krishna, op.cit., p. 102)
- 4) Mazrui says, "The main risk involved is that disagreement on some non-economic issue -- e.g., the Commander-in-Chief of the armed forces -- might become so politically explosive as to put even economic cooperation in serious jeopardy." (Ibid, p. 132)
- 5) "The matter is complicated by the fact that political considerations are intimately involved both in the conception and in the execution of integration schemes and that purely economic reasoning is inadequate. However, there is no alternative to examining first the economic side of the question, spelling out later some of the political conditions needed to realize the economic benefits." (OECD, op.cit., p. 15)

degrees of integration as various economic discriminations are removed. The OECD list is typical:

- a) the free trade area; which implies the removal of quantitative restrictions and customs tariffs;
- b) the customs union, which unifies the tariff of the countries within the area against outsiders;
- c) the common market, where all restrictions on factor movements within the area are abolished;
- d) the economic union, where economic, monetary, fiscal, social and counter-cyclical policies are to some extent harmonized;
- e) the supranational union, where the respective governments abandon completely their sovereignty over the policies listed above and a supranational authority issues binding decisions.⁶⁾ (OECD, op.cit., p. 11)

As in all such arbitrary classification schemes, the boundaries between stages can be somewhat vague and real-world economic regions may fall in between them. OECD excludes from their definition of integration projects of international cooperation on infrastructure development -- such as the development of international river basins -- on the grounds that such cooperation is made obligatory by a fact of geography. (Ibid, p. 127) Other authors, as will be discussed later, state that such projects -- because they are obligatory -- are good ones to start with in a strategy for integrating countries economically.

Traditional economic theory of economic integration is usually based on the work of Jacob Viner (The Customs Union Issue, Carnegie Endowment for International Peace, New York, 1950) or elaborations and refinements of it. In an attempt to demonstrate the invalidity of the previously generally accepted view that customs unions were good because they increased free trade, Viner introduced the concepts of "trade creation" and "trade diversion." Trade creation was defined as a shift in trade from a high-cost to a low-cost producer, and trade diversion was a shift in the opposite direction -- from a low-cost to high-cost producer.⁷⁾ Or, put

⁶⁾ Green and Krishna present the same five stages, with much the same definitions, except that they call the last stage "economic integration" instead of "supranational union." (Green & Krishna, op.cit., p. 86) Robson includes only the first four stages in his list, with the same names and much the same definitions. (Robson, op.cit., p. 25)

⁷⁾ For example, "The removal of tariffs makes possible the replacement of high cost domestic production of one member by lower cost production from another which was prevented beforehand by the existence of duties. After integration, each country will expand the production of commodities it can manufacture at lower cost. This is trade creation. It results in an increase in the income of the members of the union." When, however, a common external tariff prevents trade from lower-cost producers outside the union, the effect is negative. "In other words A's demand is diverted from a lower-cost producer, which is the rest of the world, to a higher

another way,

Trade creation refers to an increase of trade among the members of a customs union, and trade diversion to a reduction of trade with the rest of the world, both of which may follow the removal of trade barriers between the members of a union. (Robson, op.cit., p. 27)

According to Viner's theory, the effect of a customs union on the welfare of the world -- and the welfare of the member countries -- would depend on which of these forces was predominant. From the viewpoint of free trade, of course, trade creation was good and trade diversion was bad.

According to this creation vs. diversion criterion, few integration schemes among developing countries would probably qualify as offering opportunities for gain.⁸⁾ This traditional, static theory has, however, several limitations which make it largely irrelevant in comparison with later, dynamic theories. OECD, for example, identifies "three basic shortcomings."⁹⁾ First of all, the world-wide distribution of income -- the gap between rich and poor, developed and developing, etc. -- is not taken into account, and yet this is precisely the object of the integration effort! Questions such as whether trade diversion from developed countries to other developing countries -- even given a decline in temporary world economic efficiency -- is a negative development from the point of view of developing countries are not considered in traditional theory. Yet, a trade diverting industry in a developing country which is based on resources which were previously unutilized can significantly increase that country's real income. A second and related shortcoming concerns the fact that trade diversion may be the only -- and therefore inevitable -- course open to a developing country. Establishing the beginning of industrial growth may only be possible by import substitution,¹⁰⁾ even if this is inefficient on the world market. At least some growth would be achieved in this way where none would take place otherwise, and often at no sacrifice of alternative uses of resources. Besides, in the absence of trade-diverting

7)(cont.) cost producer within the union. This is trade diversion. It results in a reduction in world income, and, given the terms of trade, in the income of the members of the union." (Robson, op.cit., pp. 27-28)

8)"The general conclusion is that in terms of the criterion of gain of traditional theory, a customs union among typical less-developed countries would be likely to offer small opportunities of gain." (Robson, op.cit., p. 32)

9)OECD, op.cit., pp. 16-18. See also Robson, op.cit., pp. 27-37.

10)"The alternative to this strategy would be to produce competitively for export markets but the scope for expansion in this direction seems at present fairly limited." OECD, op.cit., p. 17) There are contradictory viewpoints on this issue, however. See, for example, The International Corporation, op.cit.)

regional schemes, trade diversion might well take place at the national level in any case. The third and most important shortcoming of traditional theory according to OECD is that it is a static and short-term analysis when the benefits of integration are likely to be long term and dynamic --

Attention has therefore to be paid to the long-run effects economic integration is likely to have, and the evaluation of integration in a static framework is likely to be not only incomplete, but also largely beside the point, particularly from the point of view of developing countries. (OECD, op.cit., pp. 17-18)

Robson, in addition to some of the points made by OECD, mentions some other inconsistencies in traditional theory. If an integration scheme produces gains only through trade creation -- which is essentially based on the values of free trade -- then why should not total free trade be the goal and the protective tariffs of individual countries and a customs union both be completely done away with? Under such circumstances, economies of scale could be achieved by any country regardless of the size of its domestic market because of export possibilities. (Robson, op.cit., p. 37) Even disregarding this somewhat extreme logical conclusion to the free trade argument, Robson says that trade creation vs. trade diversion is not an adequate measure of integration gains and losses because no account is taken of the size of the differences in production costs of different commodities in the different countries. Trade creation is a gain because costs are lowered, while trade diversion is a loss because costs are raised. It is necessary not only to consider the volume of created and diverted trade therefore, but also the amount of cost change on each unit of such trade. Theoretically, in the limiting case of demand elasticities being zero and supply elasticities being infinite, this should be possible by multiplying the volume of created and diverted trade in each category by the fall or rise in cost of that category, but in other cases such an analysis becomes very complex with added factors of intercommodity substitution and consumption effects, and the results are less obvious. (Ibid, pp. 29-30) Robson also mentions that trade creation is thought to be likely to result under conditions where member countries have little external trade in proportion to their internal production, and most of that external trade is amongst themselves. In a typical developing country however, there is a large external trade relative to domestic production and that trade is generally not with other developing countries which might form a regional integration scheme. Trade creation is also thought to be more likely the higher that each member's pre-integration duties were on the others' products, but the bulk of exports of developing countries are primary products which generally are not protected and the bulk of imports to developing countries are intermediate and capital goods which are not produced at all in many developing countries. (Ibid, p. 32) Therefore, Robson also can

conclude the following:

The traditional theory of customs unions is only of limited applicability for understanding the rationale and problems of integration in less-developed countries in terms of its criterion of gain It is evident that the central criterion of benefit in the static model which turns on the distinction between trade diversion and trade creation, is inappropriate.¹¹⁾ (Ibid, pp. 56-57)

The "dynamic" approach to economic integration not only draws different conclusions for developing countries, but relies on different assumptions of the real world.¹²⁾ In contrast to static theories, different questions and issues are raised:

Among the arguments employed by this group of economists,¹³⁾ leading notions include the need to consider changes other than purely marginal ones operating within the existing structure, since it is contended that the problem is one of fostering structural transformation of these economies; a disposition to interpret comparative advantage as something which is not only changing but which can forcibly be changed; emphasis on the existence of unemployed resources which the traditional theory disregards; emphasis on a persistent trend towards external imbalance, dramatically portrayed in the statistical estimation of the 'trade gap'; arguments for reducing export dependence in the interests of promoting domestic stability; and in particular the favourable effects of protection on the inflow of capital. Their analysis is also typified by its emphasis on a range of factors, not readily susceptible to the tools of economic analysis, such as the contribution which industrialization can make to the development of new skills and growth facilitating changes in personal attitudes, and by its refusal to rule out purely sociological considerations.¹⁴⁾ (Ibid, pp. 34-35)

11) Robson also cites the lack of attention to economies of scale and to the distribution of benefits within the integration scheme as limitations to traditional theory. He qualifies his criticisms somewhat, however, by saying that traditional theory does have some relevance in that the basic source of gain from dynamic integration is also the contribution which economic specialization can make to efficiency -- but within the integration scheme. (Robson, op.cit., pp. 57-58) Perhaps the essential difference is that the traditional trade creation and trade diversion criterion focuses on world-wide efficiency and welfare, while more dynamic criteria focus on efficiency and welfare for the region.

12) Some of the assumptions of traditional theory are listed as follows: "It thus deals with a situation in which the inputs of factors of production, the state of technical knowledge, tastes and the form of economic organization are all treated as constant or as autonomous variables. Trade within each country is assumed to be perfectly competitive, and external economies and diseconomies are disregarded, so that domestic grounds for interference with the operation of the price system can be ignored. Full employment is implied. Problems of adjustment which in practice would be involved in the formation of a customs union are disregarded." (Robson, op.cit., p. 27)

13) Nurkse, Myrdal, Prebisch and Seers.

14) Just one example of many of this type of argument in the policy-making field can be provided by the Raisman Commission concerning East Africa: ". . . the growth of industry under protection, displacing imports . . . , does not simply divert resources from one productive use to another equally (or perhaps) less productive, as may happen when protection is applied in a highly developed country. It draws into employment labour which would otherwise be largely unproductive, brings in

Rather than deal with actual trade flows and an actual degree of competitiveness or complementarity among developing countries -- which in many cases is the result of colonial history and not an indication of future potential -- a dynamic approach focuses on economic growth and structural change; on inputs of factors of production, particularly capital and labor, which are variable and whose nature and effectiveness are bound up with the nature of production. There are, however, some assumptions behind the dynamic argument which can be summarized in three related steps, at least one of which has already been mentioned:

- 1) Economic growth and development is a major goal of developing countries, and regional integration is one means toward that end;
- 2) Most developing countries see industrialization as the key to future growth and development;
- 3) Many developing countries will not have a comparative advantage in most of their "infant industries" and therefore will require protection in their industrial sector for quite long periods of time.¹⁵⁾

The first step has been discussed briefly in Chapter I and needs no further explanation, but a few words should be mentioned about the latter steps.

In a purely economic sense, the priority given to industrialization may or may not be justified, depending on the economist and his point of view regarding this controversial question. In theoretical terms, Robson suggests that a "community welfare function" might be defined which would include the utility from the "collective consumption of industrial production." In order to then maximize the region's real income¹⁶⁾ -- i.e., utility enjoyed from both private and public consumption -- industrial protection should be carried (on a regional basis) to the point where the marginal collective utility derived from the collective consumption of domestic industry is equal to the marginal excess private cost of protected industrial production. (Ibid, p. 38) It is doubtful, however, if such a theory could be explained to -- let alone convince -- policy-makers in any country. What is more often the case is an argument that equates industrialization with modernization; that industrialization is an important stimulus to a whole set of socially desirable variables which are the essence of development rather than just economic growth.¹⁷⁾ (OECD, op.cit., p. 12; Robson, op.cit., p. 38)

14) capital from abroad, and generally stimulates activity." Quoted in Robson, op.cit., p. 35.

15) OECD explicitly defines these as its assumptions -- see OECD, op.cit., p. 127. Robson also generally accepts these assumptions, but does not clearly define them as such.

16) But not necessarily the real product -- i.e., total production of privately appropriable goods and services -- of the region, since maximizing real income may require the sacrifice of some real product to the collective consumption of industrial production. (Robson, op.cit., p. 38)

17) For the clearest discussion of "growth versus development," see Growth (cont.)

If one accepts a policy of industrialization, however, there is still argument on the question whether it should be directed towards import substitution (which implies regional protection against external imports -- the third step) or export markets, or both. The OECD study, while not exploring the reasons and arguments behind this controversy, (see Ch. 11, Footnote 10) states the following:

The main rationale for economic integration is that it widens the scope for and reduces the cost of import substitution. (OECD, op.cit., pp. 12-13)¹⁸⁾

Protection, therefore, is at the base of any dynamic theoretical justification for regional economic integration --

Basing the case for integration on a prior case for protection does have a very important theoretical advantage which must at this point be noted. This is that it provides a logical foundation for regional integration which is otherwise lacking. If there is no case for protection, there is in terms of pure theory, no case for integration. (Robson, op. cit., p. 36)

Economic integration, therefore, is seen as a means to undertake industrialization more economically -- through protection of regional-based import substitution industries -- and thus to accelerate economic growth and development. Thus, it is no longer necessary to assess integration schemes in terms of trade creation and trade diversion -- against the ideal of world-wide free trade -- but in terms of the developmental situation that would probably result if integration did not take place. Integration can then produce gains from trade diversion if that diversion on a regional basis is handled more efficiently than would occur otherwise or if it stimulated regional economic growth and development in the long run.

How does regional economic integration work to produce economic growth and development in the long run? General lists of factors perceived by authors to be important can be found in almost every work on the subject. For example, in The Common Market and Development in East Africa, Philip Ndegwa says:

In conclusion, customs unions or common markets are important today for underdeveloped countries, not only because of the greater possibilities they offer for specialization, economies of scale, better terms of trade, but also in general higher rates of development and industrialization. (Ndegwa, Philip, The Common Market and Development in East Africa, East

¹⁷⁾(cont.) Without Development, Clower, R.W., et.al., Northwestern University Press, Evanston, Illinois, 1966.

¹⁸⁾Also, "They are widely accepted in many less developed countries as justifying protection for the purpose of accelerating industrial development which, initially, must rest on the development of industries which produce substitutes for imports." (Robson, op.cit., p. 36)

African Institute of Social Research, Nairobi, 1965, p. 91)¹⁹⁾

Behind all of these arguments, however, is a crucial definitive factor of regional integration schemes -- the larger size of the market. OECD says --

The main rationale for economic integration is that larger markets are superior to smaller markets from the point of view of factor efficiency. (OECD, op.cit., p. 19)²⁰⁾

Market size has to be conceived of in terms of "effective monetary demand" or as a function of two variables -- population and per capita income. In some developing countries, the latter variable is usually the problem, but a small population size also plagues many African countries. In either case, regional schemes hope to increase the size of the market.

An increase in market size should result in an improvement in factor efficiency in industrial production -- largely through economies of scale and specialization. Robson describes a "three-fold effect" on the operation of individual industries resulting from the enlargement of the market as follows:

19) Other general lists include factors such as the better opportunity to mobilize capital from both external and internal sources, diversification of economic activity, less duplication of productive activity, and help in political, social, and cultural unification (Green & Krishna, op.cit., p. 13); "Economic integration helps in overcoming the barriers of size, limited capital availability, and the sheer impossibility of attaining any effective division of labour within a tiny economic unit . . . promoting a wide range of economically viable activities . . . can enable them [African nations] to employ their resources to the maximum possible advantage . . . integration also contributes towards greater economic stability by reducing the dependence on a very limited number of primary products . . ." (Ibid, pp. 21-22); "In the case of increasing the rate of economic development contributions may be attained by: making new lines of production economically possible, allowing greater specialization leading to increased efficiency, providing markets and resource bases (or other economic factors) large enough to provide significant economies of scale." (Ibid, p. 90); "In principle, these [economic benefits] may be derived from a number of different sources. These include: (i) the specialization of production according to comparative advantage which is the basis of the classical case for the gains from trade; (ii) economies of scale; (iii) changes in the terms of trade; (iv) forced changes in efficiency due to increased competition; and (v) a change in the rate of economic growth;" (Robson, op.cit., p. 26) "Integration is seen as a means of helping to overcome the disadvantages of small size and of making possible a greater rate of economic growth and development. Integration makes it possible on a basis of reciprocity, to exploit economies of scale and to take advantage of differences in comparative advantage in the production of commodities. Furthermore, wider markets may make it possible to attract more foreign capital and to increase employment. Other advantages include the diversification of output which, it is hoped, may contribute to economic stability as well as to growth." (Ibid, p. 12)

20) See also, "The crucial factor in African economic advancement is the continuous expansion and integration of the African market." (Green and Krishna, op.cit., p. 21)

In the first place, as the size of the market increases, larger plants may be built where costs can be lowered by so doing. In the second place, a widening of the market for particular products may make it possible to reduce the variety of products in individual plants and to lengthen productive runs. In the third place, in a larger market, productive processes formerly integrated in a single plant can be separated in individual plants. An increase in the size of the market can thus make possible the establishment of larger plants and also horizontal and vertical specialization, from which economies of scale can be derived. (Robson, op. cit., p. 30)

Economies of scale can exist in both a technological and economic sense. The technological optimum size of a market depends on the technology used in the productive process and on intra-industry specialization, and is therefore different for each industry and difficult to ascertain.²¹⁾ But, even if the optimum technical size of a market is reached, the optimum size economically may still be further off. One reason for this is that some share of the benefits of larger markets is expected to be derived from competition; therefore, the total market must be at least a multiple of twice the technologically optimal size. Often, however, competition is incompatible with the size of even the regional market for certain industries, and competitive benefits are sacrificed to the necessity of monopoly guarantees to attract the necessary industrial investment. There are other, non-technological economies of scale which must also be considered. These economies occur in such areas as administration and the utilization of skilled manpower, the ability to purchase inputs and sell outputs in greater quantity and by more sophisticated techniques -- e.g., market research -- and the resources to support extensive services, such as maintenance, and ancillary creative input organizations such as research and development laboratories. These economies are not affected by the productive technology employed, and are usually beyond the means of smaller industrial organizations.²²⁾ There are also some adverse effects of large-scale production, however, which may negate any gains from economies of scale. For example, with this centralization of activity, marketing and distribution costs may grow disproportionately with the increase in output. Transport costs, particularly in developing countries where the transport infrastructure may be weak, may be much higher at one central large-scale plant than for many

21) Ship-building technology, for example, would demand a technologically larger market than the textile industry technology. But technologies -- contrary to the belief of many individuals -- are not fixed factors in the production process. The new emphasis on "appropriate technology" (sometimes called intermediate technology), which is defined as technology which is in harmony with its environment, in the United Nations and other organizations is a move toward technologies for developing countries which are oriented toward small-scale production and labor-intensiveness. See the discussion in paragraph 43, page 26 of "Science and Technology for Development -- Proposals for the Second United Nations Development Decade," op. cit.

22) The trend toward the establishment of "industrial parks" in which a member of different small-scale industries get together and purchase some materials in

(continued)

smaller-scaled plants scattered throughout the region. Therefore, although many economists take it for granted that the economic size of industrial plants is necessarily large and that therefore national markets are too small in many developing countries to support them, more and more economists are beginning to question this view. OECD states:

On balance, it is very difficult to say how important the benefits due to economies of scale may be that can be expected from integration among developing countries. (OECD, op.cit., p. 22)

In some industries, the large markets of a region are undoubtedly a necessary condition for their economic operation; in other industries this may not be the case.

Economies of scale can also be an important factor in another area of regional integration besides industry -- that of common public services and administration. Indeed, most successful examples of regional cooperation are in common services such as regional air lines and other transportation services, posts and telecommunications,²³⁾ and scientific research. More difficult and controversial common services would be in education and military fields, and a very advanced degree of integration would seem to be necessary to overcome political obstacles facing them.

Specialization, according to OECD, could occur in regional schemes of developing countries in three ways: (1) Member countries could specialize in broad categories of agriculture, heavy industry, etc.; (2) They could specialize in certain industries within the industrial sector; or (3) They could specialize in components of an industrial process -- vertical or horizontal specialization. (Ibid, pp. 22-23). The first type is not likely to be acceptable to the country assigned to agriculture and the third type will take some time and developmental progress before it can take place in developing countries, but the second type holds some promise for developing regions. This inter-industry specialization is based on the doctrine of comparative advantage in classical economic trade theory, which states that each country will tend to produce those products for which it has the greatest superiority or the least inferiority. The superiority/inferiority is based on differences in resource endowment among different countries which contributes to different factor prices. This traditional theory, however, has limited relevance to developing regions. In the first place, it assumes full

22)(cont.) common, and support services such as maintenance or research in common, is intended to at least partially solve this problem.

23)Green and Krishna say that such successful common services are characterized by minimum overheads for central management, repair and maintenance facility requirements, and capital equipment which adds less to unit costs when spread over a broader economic base of operations. (Green and Krishna, op.cit., p. 91)

employment and perfect competition, where market prices reflect opportunity costs and can thus be used to measure superiority/inferiority. This assumption is not necessarily supported by experience. More important is that the benefits from comparative advantage cannot be great if the differences in resource endowments between countries is small. In general, developing countries exhibit a number of common characteristics, such as a scarcity of capital and an abundance of unemployed unskilled labor, and are more factor-competitive than factor-complementary. Thus, specialization may not occur automatically just because a regional scheme is established; planning within a framework of an accepted regional investment policy may be necessary. (Ibid, pp. 22-23)

Economies of scale and specialization are ways in which economic integration works within the region. There is, however, one external factor which should be favorably stimulated by the larger markets of the region -- that of private foreign investment --

The one area in which an integration process might clearly improve the flow of investment finance is that of private foreign capital.
(Ibid, p. 28)

There is some tendency in the literature on economic integration to regard the small market size of many developing countries as the constraint to developmental projects; that if integration occurs and investment opportunities are created, investment will automatically take place. Unfortunately, this is not always true. A small market is only one of several constraints facing developing countries, and usually not the most important one --

. . . in many developing countries the availability of capital and in particular the availability of foreign exchange may well be the main constraint on growth. (Ibid, p. 129)

For three sources of potential investment finance -- local private, local public, and foreign public -- the effects of economic integration are likely to be ambiguous; ²⁴⁾

²⁴⁾ To the extent that economic integration improves real income in the region, local private savings should also increase. But the distribution of these savings among member countries and among different categories of recipients with different savings habits can make this source of savings unreliable. Similarly, local public revenues of member countries will be adversely affected by the reduction or abolishment of customs duties on intra-regional trade, but may also be aided if a rise in economic activity produces greater internal taxation revenues. Investment from foreign public sources might be increased if developing regions were able to wield more bargaining power vis-a-vis the aid donor or if the aid donor made it a policy to give priority to regional schemes. The former situation is likely to occur only if a complete political union is achieved in the region -- an unlikely possibility -- and although the latter situation has occurred (see the reference to the Korrey Report and U.S. aid policy to Africa in Chapter II) in the past, if priorities are simply changed and total aid is not increased, the initial benefits to developing regions come at the expense of other developing countries and are likely to even out in the long run as more developing countries join in regional schemes. (OECD, op.cit., pp. 27-28)

but private foreign investors who had formerly viewed production in many developing countries as unfeasible because of small markets are likely to be favorably impressed by regional groupings. A sufficient market size is, of course, not a sufficient condition for private foreign investment, but it is a necessary and important one.

The case for economic integration then, rests on the two pillars of industrialization through a policy of import substitution and a subsequent expansion of trade between member countries which are specializing in producing these various substitute products. Robson mentions five factors which would determine the magnitude of gains from a regional scheme in developing countries. These gains should be larger the stronger the preference for industry, the more steeply the private cost of industrial development rises with the rate of industrial development, the greater the differences of production cost ratios in member countries, the larger the economies of scale, and the more that "dynamic" gains associated with industrialization are made possible. (Robson, op.cit., pp. 39-40). He goes on to say that in the African case, a start can be made in evaluating potential regional schemes by analyzing their dependences on imports from outside Africa and then estimating the possibilities of import substitution and the extent to which integration would affect the scale of it and the benefits from it. Looking at African imports for 1962, for instance, he (not very surprisingly) notes the high proportion of manufactured imports and suggests that the opportunities for gain from regional-induced import substitution of manufactured goods might be expected to be considerable. There is some danger in an uncritical analysis of import data, however, because some of these imports may depend on raw materials or technologies not yet available in Africa. (Ibid, pp. 84-87)

Moreover, a structure and facilities for expanded intra-regional trade in developing countries also must be developed -- not just industry. Although many authors contend that trade of manufactured products among developing countries makes more sense than from a developing to a developed country,²⁵⁾ the general lack of trade among developing countries²⁶⁾ is recognized as a "wide-spread phenomenon." One of the principal causes of this, of course, is that under colonial rule the development of African territories was guided by the requirements of the colonial power concerned (albeit, perhaps, with the best of intentions).

25) ". . . underdeveloped countries are more likely to find markets for their manufactured goods in other underdeveloped countries, rather than in the developed industrial countries where competition is keen and tastes are sophisticated." (Ndegwa, op.cit., p. 47)

26) Ndegwa says it is only estimated to be 10% of total world trade. (Ibid, p. 125)

In general, African colonies supplied raw materials to the industrial economies of the European colonizers and served as a market outlet for the latter's manufactured products. Trade routes and facilities and transportation and communications systems, were thus developed from a colony to the European ruler -- not (usually) between colonies. Restrictions were not always placed on trade between developing colonies, but neither was this trade encouraged or facilitated -- except in a few cases where colonies of the same power were adjacent, and then these were only based on administrative convenience or economic goals of the colonizer. In this atmosphere, the bulk of colonial trade became tied up with the colonial ruler. (Green and Krishna, op.cit., p. 4)

This is an example of but one of many obstacles which may lie in the path of economic integration. Before going on to others, the place of agriculture -- the presently most important economic sector for most developing countries -- in an integration scheme which is dominated by industrial considerations must be mentioned briefly. OECD simply does not deal with this subject in any great detail, and mentions that this is true for "almost all" the literature on economic integration. They contend that the appropriate production technologies in agriculture vary so much between -- and sometimes within -- countries that meaningful generalizations about the effects of economic integration would be extremely difficult. (OECD, op.cit., p. 13). In looking at his aggregate import figures for Africa, Robson allows that although the over-all proportion of agricultural compared to total imports is not that large, in certain food sectors such as wheat, maize, rice, meat, fish, sugar, etc. there are possible gains from integration --

For a variety of reasons, statistics of aggregate import dependence obviously greatly exaggerate the possible opportunities of gains from integration in agriculture. It is neither possible, nor, on economic grounds, would it be desirable to replace much of these imports, but where supply can be readily expanded and the African product is a good substitute for the imported product, inter-country differences in the conditions of agricultural production may offer substantial gains from the abolition of trade barriers. (Robson, op.cit., p. 85)

Green and Krishna state that regional gains from specialization from existing production sectors would probably be most significant in agriculture. (Green & Krishna, op.cit., p. 90) In different ecological zones of Africa, the optimal agricultural use of land varies widely, and short-run gains from increased agricultural specialization and trade should be considerable. Even proportionally small gains may be significant in terms of real income because agriculture accounts for such a large proportion of economic activity. For example, in West Africa, the inland savanna area is very suitable for certain grains and livestock production, while the coastal area is more suited for most tree and root crops. In another instance concerning East Africa, Ugandan specialization in maize, sugar, tobacco and vegetable oils, Kenyan specialization in dairy products, vegetables,

and meat, and Tanzanian specialization in sugar, vegetable oils, and wheat is mentioned as a means of speeding rural development in each country. Another potential gain from integration might be in the area of agricultural exports -- both their promotion and coordination through commodity agreement quotas. (Ibid, p. 97; see also Robson, op.cit., p. 86)

No matter how economically sound such arguments appear, agricultural integration and trade among African developing countries is very difficult politically --

Precisely because the majority of all African labour forces are engaged in agriculture and because the incomes of most farmers are extremely low, no African government can lightly disregard any opportunity for raising agricultural output. Rural development is seen as difficult enough without foregoing domestic opportunities in favour of imports whether foreign or African. (Green & Krishna, op.cit., pp. 96-97)

Robson also mentions some obstacles to agricultural integration: the desire for national self-sufficiency in food production; transportation problems; and faulty national agricultural policies in general. (Robson, op.cit., p. 85) It therefore seems that most of the attention in economic integration will continue to be placed on industrialization.

Any realistic assessment of the potential for economic integration in a region must consider relevant constraints or obstacles of both an economic and non-economic nature. Green and Krishna list some of these major constraints: financial capacity, real resource availability, geographic compatibility, institutional capacity, temporal requirements, and national political and policy considerations. (Green & Krishna, op.cit., p. 99) Geographic realities often place limits on the viable membership of regional schemes and on the scope of joint cooperation within them. Although there are some cases where non-contiguous states may be able to cooperate, geographic -- as well as operational or economic -- non-contiguity usually makes economic integration very difficult.²⁷⁾ As has been referred to earlier, financial resources available in developing regions may also effectively block integrative action. To some degree, any regional integration scheme is going to need investment for administrative facilities, trade and transport infrastructure, and directly productive firms and factories in order to "take off." These expenditures will not be possible unless additional funds are found. Beyond the financial capacity of a developing region, there is a "capacity" to do anything -- even when investment funds are available -- in a given time period. For example, only so much construction can be done in a year. A major constraint in this respect is said to be a general lack of qualified manpower, but sometimes even more important (and often over-looked) is the institutional capacity of a developing region --

²⁷⁾For example, Chad and Sudan are geographically contiguous but not operationally so because the cost of transport between them is too great.

The creation of a body of knowledge, experience, procedures, lines of communication and working patterns within an institution requires time and directed effort not merely funds and staff. The same holds true for radical expansion of activities especially if these differ in kind as well as quantity from those previously carried out. (Ibid, p. 101)

Cultural barriers may also operate to inhibit integration. In Africa, for example, integration between anglophonic and francophonic states has not succeeded even though they may be contiguous and complementary.²⁸⁾ Besides cultural barriers, national political opposition can be expected because of the necessary loss of sovereignty.

Related to all of the above non-economic constraints to regional integration is the factor of time. All constraints are less serious in the long- than in the short-run; all obstacles can be overcome if enough time is available. But time itself is a scarce resource, and often integration schemes are under pressure to show some results quickly. In part this pressure may be due to a desire to reinvest anticipated gains at the earliest possible moment, but it probably also stems from the psychological and political necessity to visibly demonstrate signs of development facing most governments in developing countries. Time is important in another sense --

The longer agreements are delayed the more national policies of agricultural self-sufficiency and home market industrialization will create productive units which would be gravely threatened in an economic union and therefore constitute vested interests against it. (Ibid, p. 28)²⁹⁾

Vested interests -- established firms and other economic institutions -- are one of the constraints to regional integration usually based on economics. In many cases, the advantages from the regional market cannot be realized if any (or many) of the countries already has plants in a particular branch of industry and decides to keep them. Small and relatively inefficient plants designed for national markets will probably be unable to face competition from regional-based plants, and would naturally be opposed to integration. If one member country's plant has an advantage already in scale or efficiency or the capacity for capital expansion, the other countries will rationally fear for their own plants in a regional scheme. Even if all national plants are suboptimal, but equally so, they may fear the entry of strong international firms into the regional market. The less innovating and less technically efficient, the weaker financially, the less involved in the local economy, and the more dependent on cheap local labor a firm is, the more likely it will be a vested interest against economic integration.

²⁸⁾This is true particularly in West Africa. See the mention of the West African Iron and Steel Community later on in this Chapter. Perhaps the best case of non-cooperation between "naturally" compatible ex-French and ex-British colonies is Senegal and Gambia.

²⁹⁾See also Robson, op.cit., pp. 303-304 on this point.

The converse is also likely to be the case. In the case of primary export producers, they will benefit from the regional market if their output is able to be sold regionally at prices higher than exist on the world market. Commodities whose world market is glutted or whose pre-export processing is hampered by foreign duties are likely to benefit from regional trade and protection -- particularly if member countries are at all complementary rather than competitive. Primary commodities which are clearly oriented for the world market, however, will fare less favorably with regional integration. Benefits are unlikely while wage and tax costs are likely to rise with the increase in economic activity. The reaction of commercial and trading interests to economic integration also depends on the specific situation. Importers and sellers of foreign goods can expect to be hurt by a policy of regional import substitution, but an effective regional scheme which increases economic activity may also boost imports of sophisticated and complex capital equipment and consumers' durables. (Green and Krishna, op. cit., pp. 80-82)

Although the first problem of any regional integration scheme in developing countries is to increase industrial activity, the most important obstacle to or constraint on continued regional cohesion arises as a result of that increase -- the unbalanced allocation of regional benefits among member countries.³⁰⁾ Developing countries are not usually drawn to regional economic schemes out of a concern for the region as a whole so much as for their own country. If each member country can be assumed to have this concern for its own gains, then some arrangement for a balanced distribution of regional benefits will be necessary. This usually becomes a crucial issue because such gains as industrial build-up or income and product gains are not evenly distributed among member countries but follow a well-known tendency to cluster in specific areas -- at least in the short run.³¹⁾ Indeed, in the short run some member countries may even be worse off within a regional scheme than they were before so that they would be better off outside!

A central theme of these analyses has been the proposition that except in favorable circumstances, natural forces operating within a free trade area or customs union may tend to produce an inequitable distribution of its benefits in the absence of countervailing policy measures. This is because it is believed that within a single market area,

³⁰⁾"Yet, one of the major difficulties is to achieve equitable distribution of benefits which, in practice, means an acceptable regionalization of industrial development." (Pearson Commission, op.cit., p.279). "One of the major difficulties in maintaining and promoting integration hitherto has centered on arranging an equitable distribution of benefits -- which in practice means an acceptable distribution of industrial development." (Robson, op.cit., p.301) "Crises usually arise because the distribution of gains resulting from integration is felt to be inequitable." (Green & Krishna, op.cit., p.68) "One of the crucial areas where the partner countries can effectively demonstrate that they are willing to see this scheme through to success concerns the distribution of benefits inside the integration area." (OECD, op.cit., p.131)

³¹⁾See next page

the growth of manufacturing industry and its dependent economic activities, tends to become highly localized. Moreover, this process is thought to operate cumulatively, so that increasing inequality is generated. (Robson, op.cit., p.42)

This problem is particularly likely to develop where regional integration involves the grouping of countries at different stages of development -- the relatively rich and relatively poor -- where market forces direct the benefits of integration mainly toward the former.³²⁾ Until at some point where external diseconomies or other cost-increasing factors develop due to an over-concentration of economic activity, the factors of production -- both capital and labor -- will be attracted to growth areas where their efficiency will be higher if regional integration involves the freedom of factor mobility across national borders. Obviously as OECD says,

From the point of view of the partner country that loses factors of production, this is a serious and undesirable phenomenon. (OECD, op.cit., p. 25)

OECD mentions that the loss of local capital from the poorer regional countries is not likely to be that great because the bulk of investment capital in these countries is in the public sector and will not follow market criteria of maximum economic efficiency, but that may be beside the point. Foreign, private investment -- the principal capital gain from regional integration -- will concentrate in these maximum efficiency clusters, and not in the poorer countries. If the products from this industrial concentration are later sold throughout the region, problems of capital outflow and balance of payments difficulties in the poorer countries could easily become acute.³³⁾ The migration of labor (which may be un-

³¹⁾ If each member country would have a similarly attractive, industrial growth point within its own territory, acceptance of industrial concentration in certain areas would be enhanced, but then regional gains cannot be realized by the abolishment of trade restrictions alone. (OECD, op.cit., p.24)

³²⁾ The Pearson Commission says: "Integration is hampered, of course, by a tendency for centers of development to attract resources from the poorer areas and so impose a further strain on their extremely limited resources." (The Pearson Commission, op.cit., p.280) Also, "most investments have tended to concentrate in a few countries, whose infrastructure may be best suited to productive ends. The fears and loss of production and employment to the most advanced areas of the region have been expressed in Latin America and elsewhere." (Rolfe, op.cit., p.40)

³³⁾ It is both the concentration of industry and the resulting trade patterns that produce the unequal distribution of regional benefits. Although the concentration of industry aspect has been stressed and is discussed further, the resultant trade patterns produce the most immediate problems. In speaking about the European Economic Community experience, the Pearson Commission says: "The experience in Western Europe, where significant progress has been made toward a customs union and a free trade area, suggests the contribution such arrangements can make to accelerated development. Without exception they have been followed by rapid growth of trade among member countries. Furthermore, a high and growing proportion of such trade tends to be in manufactured products, which illustrates the great stimulus to industrialization provided by enlarged markets. The universal

(continued)

or under-employed) from the poorer countries may seem less serious -- or even a blessing -- but it is a loss of that part of the population which is most likely to be enterprising and dynamic. These "backwash" or "polarization" effects, as leading development economists refer to them, are limited by several factors which -- in time -- should produce industrial centers in each country: the location of fixed, natural resources in several countries; the limits of population mobility; costs of distribution of the manufactured product; and national or regional policy. Moreover, there are "spread" or "trickledown" effects -- the process by which economic activity will tend to spread from the relatively richer to the relatively poorer country. The most important of these is the increase of the richer country's purchases -- both raw materials and consumer goods -- from the poorer country, which can be expected to the extent that this demand can be met inside the region. Also, the emigrant labor force is likely to transfer some of its income back to the poorer country, and eventually labor costs and internal diseconomies in the richer growth area should make the poorer countries more attractive as industrial locations. The only trouble is that besides being uncertain, these spread effects are likely to be both too slow in materializing and too weak to have an effect on the intra-regional distribution of benefits gap -- OECD cites studies of Southern Italy and the Southern United States as cases in point -- and time, as has been mentioned, is a politically scarce resource in developing countries.

The initial location of industry in a region can be determined by a variety of historical and economic reasons, but once the process of industrial concentration has started it is very difficult to decentralize. New industries tend to locate where industrial activity is already taking place so as to take advantage of external economies, which are advantages cumulatively created by industrialization, not pre-existing to it.³⁴⁾ Robson includes such advantages as the availability

33) (cont.) problem arising in such preferential trading arrangements is that they tend to generate unequal benefits and costs among member countries. It is essential for the creation and long-run stability of regional trade that mechanisms be devised to ensure an equitable distribution of benefits generated by expanded trade." (Pearson Commission, op.cit., p. 95)

34) Robson says that modern location theory cites four factors which determine industrial location: natural resources, nearness to markets, transportation costs, and external economies. "Of these, external economies are generally thought to play a dominant role where secondary manufacturing industry is concerned -- whose development provides a major part of the case for regional integration." (Robson, op.cit., p.42) OECD cites factors such as ". . . external economies, savings in transport costs due to proximity of supplies and customers, easier communications, established infrastructure," but places no priority importance on them. (OECD, op.cit., p.24) Green & Krishna claim that a nearness to natural resources, which are fairly widely distributed, is not as important to industrial location as "economies of plant and market size, of available industrial infrastructure, of the presence of other manufacturing plants, and of the existence of a sizable body of at least moderately experienced factory workers. . . ." (Green & Krishna, op.cit., p.94)

of public utility services, a skilled or semi-skilled labor force, and the presence of subsidiary and service industries in banking, finance, and distribution in his list of external economies which indirectly reduce costs and influence location. As these factors reinforce each other, non-economic, social facilities come to be provided in the growth area and the process feeds upon itself and makes it increasingly difficult for industries to operate elsewhere. The example of Nairobi in East Africa is a striking case in point:

The original settlement owed its location in the midst of an unprepossessing swampy plain to the accident that it was a convenient place for construction of the Uganda Railway to stop while the engineering difficulties of building over the escarpment into the Great Rift Valley of East Africa were tackled. Later on, it became the seat first of local, and then of central administration. An inflow of labour, capital and industry followed, and the Nairobi region has become today Kenya's major pole of development and a preferred location for new industries serving the whole of the East African market. (Robson, op.cit., p.43)

A regional integration scheme must, therefore, intervene somehow into the natural market process which would concentrate a disproportionate share of the benefits of integration in a few (or even one) locations if it is to survive politically. Indeed, as the Pearson Commission implies, there is something of an almost moral or spiritual quality to this necessity as well:

But the very concept of integration involves some measure of redistribution of resources for the benefit of all participants. It implies solidarity and concern for both its members and the group as a whole. (Pearson Commission, op.cit., p.280)

When faced with a crisis caused by this unequal distribution of integration benefits, three resolution strategies (or combinations thereof) would seem to be open to the region: 1) to dismantle all or part of the integration scheme; 2) to make some changes in joint policies and institutions aimed at altering the location of economic activity; and 3) to add new areas of integration which are seen as particularly valuable by the poorer member countries. (Green and Krishna, op.cit., p.68) The third alternative, of course, would be much the better from a regional point of view -- using the crisis to actually expand the integration effort -- but opportunities in this direction may be limited, and what is needed to calm the dissenting member countries is firm assurances rather than mere possibilities of balanced regional development.

Most writers seem to agree that there are two principal mechanisms for redistributing the benefits of integration: compensation and a regional investment policy.³⁵⁾ Although direct income transfers as compensation from richer to poorer

³⁵⁾ For example, "... the distribution of benefits inside the integration area. There are two main means of achieving this. One is an agreed regional investment policy that is seen to be implemented and endorsed by all member governments and the second one is a scheme for compensating those partners that will still be left with a less than fair share of the overall benefits." (OECD, op.cit., p.131) See also Green & Krishna, op.cit., p.29 and Robson, op.cit., pp. 44 & 45.

member countries may be necessary to the short run survival of the regional scheme, it is doubtful if these alone are sufficient in the long run. As Green and Krishna say,

The weaker economies want economic growth points -- not revocable subsidies. (Green and Krishna, op.cit., p. 29)

If every member country wants to industrialize, then there must be some kind of locational planning of industrial investment to ensure an economically equitable (not necessarily even) and politically acceptable distribution of these regional benefits which preserves as much of the regional advantages from economies of scale and specialization as possible. To a certain extent such a policy of balanced investment will be "uneconomical" for the region as a whole, but such effects may be exaggerated due to lower average transport costs from producer to consumer for decentralized industries.³⁶⁾

If a regional investment policy is to be effective, there are certain guidelines that it should follow. One requirement is that it should be as comprehensive as possible. It is much easier to share the benefits of regional integration if a wide-spread package deal rather than one specific industry is considered.³⁷⁾ Comprehensiveness might include not only the industrial sector, but other areas of investment also, such as agriculture, common services, education, etc. Thus, if it is impossible in the short run to balance the allocation of industry, the poorer countries might be the recipients of investment in regional transportation

36) There is also the "moral" argument in favor of balanced investment, plus the fact that there generally are social diseconomies -- slums, unemployment, crime, etc. -- if industrial concentration is too much, too quickly. (OECD, op.cit., p.44)

37) "... ad hoc political discussions on each industry West African Iron and Steel Community -- is both time consuming and peculiarly susceptible to polarization of interests between proposed plant site economies and others." (Green & Krishna, op.cit., p.94) Green and Krishna advocate "A continuous process of industry by industry location decisions (including private investor choices) on basically technical and economic considerations but within the framework of an overall formula for distributing industrial sector activity. . . ." (Ibid, p.94)

The West African Iron & Steel Community project grew out of the results of a West African Industrial Integration Conference held at Bamako (Mali). Although a draft treaty was signed and a provisional council appointed in 1965, OECD describes it as "still too much in the project phase to make a detailed discussion . . . a useful undertaking." (OECD, op.cit., p.52) The case for a regional-based industry is economically strong, but Green and Krishna identify three factors which have delayed progress: 1) Nigeria's insistence on her own, ill-considered plans; 2) the basic studies did not cover Guinea adequately or Mauritania at all, both of which have rich iron deposits; and 3) with just one industry and three plants to allocate, the agreement of non-recipient states has been difficult. "Had several industries been presented for allocation at Bamako with fully detailed studies, a rather more successful series of functional agreements could probably have been concluded much more rapidly." (Green and Krishna, op.cit., p.41)

facilities or other common services. Usually, a regional investment policy has to be aimed at allocating new economic activities rather than existing ones. Although relocating industries or other economic activity is possible,³⁸⁾ it is generally very difficult and agreement among member countries is much more likely to be reached in allocating potential investments.

Such agreement is a second requirement mentioned. A minimum condition for obtaining an investment agreement would probably be that no country's industrial development should be harmed by regional policy, and the maximum condition that investment benefits should be completely balanced by that policy. In the former case, however, a strong commitment to the region is not likely to develop among the poorer countries, and in the latter case, an over-emphasis on complete balance -- besides making planning impossible because no one can predict the exact future effects of investment -- will probably result in no policy agreement ever being reached. Some form of agreement on the allocation and promotion of economic activity among the member countries of a region is necessary, but such a policy should remain flexible and need not take the form of a rigid allocation list.³⁹⁾

Agreement on a regional investment policy is difficult enough in itself, but it must also be enforced to be effective, and this presents more difficulties. If the bulk of investment funds are from regional public sources, implementing such a policy is easy; the region simply invests where it has agreed to do so. Foreign governments might also be persuaded to support it with aid, but foreign private investment -- expected to form the largest part of any increase in regional investment -- is a more difficult problem. Foreign investors will want to locate in the most economically desirable setting -- which, as we have seen, is likely to be in the already relatively well-off country or countries -- and they always have the alternative of not investing at all if their conditions are not met.⁴⁰⁾ A regional investment policy is thus much easier recommended than it is carried out. In all the regional schemes surveyed by OECD, none was found to have a working regional investment policy. (OECD, op.cit., pp. 43-46)

³⁸⁾In the East African Community, some of the common service activity and the main head quarters in the Community itself have been moved from Kenya to Tanzania and Uganda in an effort to balance investment, but this does not appear to have happened with industry.

³⁹⁾Green and Krishna state that an extensive pre-study allocation of specific industries can lead to benefits much more uneven than, and different from, what was envisaged, and cites the Kampala Agreement in East Africa as a case in point. (Green and Krishna, op.cit., p.93)

⁴⁰⁾It would take a politically brave developing country to turn away an investor because such a field had been allocated to another member country of the region, particularly when the investor says, "I want to invest in country X or I won't invest at all!"

Nevertheless, if a regional market is deemed attractive and cost differences between alternative locations are marginal or expected to be temporary, the investment site-choice of private investors can be influenced.⁴¹⁾ It may, however, become necessary to use fiscal policy as a means of influencing the location of new industries in accordance with agreed-upon balanced development policy. Differential tax rates and other investment concessions and incentives could be used. Regional development corporations or development banks could be created with loan and investment policies aimed at financing balanced investment activity.⁴²⁾ A system of industrial licensing and even the establishment of some fiscal barriers to trade or a "code of trading conduct" are more extreme measures of influencing locational choice.

The case against allocating industries without examination of economic considerations is irrefutable, as is the claim that one cannot simply order private investors to build at an arbitrary location. However, the spread of raw material location, the critical importance of industrial development caused, rather than causing, economies and the significance of market access, investment incentives, and public sector capital suggest there is substantial scope for economically viable, politically acceptable, and foreign investment-inducing allocation policies within African economic communities. (Green and Krishna, op.cit., p.95)

But not all the problems resulting from a regional integration scheme can be solved by a regional investment policy -- particularly in the short run -- and so some sort of compensation arrangement may also be necessary. The purpose of such arrangements is more to help member countries over (hopefully) temporary discontinuities caused by the regional scheme than it is to provide long-term solutions to basic development problems. For example, it has been mentioned previously that if the intra-regional trade within a common market replaces much of the imports into member countries which were formerly subject to customs duties, then there might well be a serious loss of public revenue for some developing countries which are already hard-pressed to raise funds. Eventually, of course, the expectation is that regional integration will result in increased economic activity which can then be taxed to make up this loss of revenue, but this will be true only for the countries which receive the industrial investment and then not until some years in

⁴¹⁾Green & Krishna say that promotion missions influenced the location of Nytil in Uganda and radio and aluminium plants in Tanzania more so than cost evaluations of comparative locations, which (they imply) might have favored Kenya. (Green & Krishna, op.cit., p.95)

⁴²⁾"A regional investment bank may be able to make some contribution to the achievement of regional balance but this is hardly likely to be great unless finance is a limiting factor in relation to the projects, or unless the bank has special resources from which projects in lagging regions can be subsidized." (Robson, op.cit., p.307)

the future! Foreign aid might thus be required for short-run compensation, but the longer term redistribution argument is that countries gaining revenue from increased income taxes should compensate those which have lost revenue, because the former's gain is a direct result of the latter's loss. OECD suggests that a convenient system of compensation for this inequity might be to establish a direct income tax or sales tax at the source of regional production and to distribute the revenue in proportion to the importing country's consumption of the goods in question. (OECD, op.cit., pp.48-49) 43)

Another related temporary problem that might face a developing country is a general rise in retail prices resulting from higher import prices. Previous to a common market arrangement, if any country had a lower average tariff than the new common external tariff, the prices of all goods still imported from outside the region could be expected to rise, and the opposite would be true for any country which previously had a higher average tariff. Some form of compensation to lower the prices in the former case might be considered. (Ibid, p.47)

After tariffs between member countries are removed, the increased level of competition within the region may adversely affect the level of economic activity and employment in some member countries. In the case where such an effect is due to a country's inefficient industrial sector -- possibly very old and previously protected by high tariffs -- a compensation system might aim at easing the transition by allowing longer time periods for tariff reduction or some other similar means. Where the adverse effect of competition is due to the smallness or low stage of development of the member country's industrial sector, however, more long-term efforts to spread industrial development are necessary. There are other kinds of short-term problems that can face member countries of regional integration schemes, and a wide variety of compensatory arrangements can be devised in some kind of "package deal" to satisfy legitimate complaints. (Ibid, pp. 48-49)

One difficulty, in the whole question of redistribution, however, is that there is no generally accepted way of measuring the gains and losses from regional integration in order to answer the crucial question, "Would country X have been better off outside the regional scheme?" Individual member countries may have an accurate "sense" of whether and why they are benefitting or losing from regional integration, but attempts to quantify this "sense" in order to enter into bargaining with other member countries aimed at resolving complaints have not been generally accepted by all bargainers to reflect the truth of the situation. 44) Although

43) Both UDEAC and the East African Community presently have an income tax on regional-based industries which is used partly for compensation and partly to pay for common services. In the UDEAC, this is the "tax unique" (See Ch.II) which is distributed to the consuming countries. The East African Community situation is discussed in Appendix I.

44) "Dynamic viability is basically an issue of the benefit/cost ratio of economic (continued)

attempts have been made both to quantify the overall effects of integration on the region⁴⁵⁾ and of the gains and losses to individual member countries, any such assessments always run up against one overwhelming obstacle:

The fundamental problem is, of course, that one needs to compare the real situation as it obtains in the integration area with a hypothetical one that would obtain had integration not taken place. (OECD, op.cit., p.133)

In order to do this, one would have to assess the effects which resulted from the regional scheme and the alternative opportunities member countries could have taken outside it, an almost impossible task to achieve given that different people would have to agree on the results.⁴⁶⁾ Alternatively, most quantitative attempts have selected indicators of progress towards the ultimate objective of economic integration -- faster economic growth -- and then linked these indicators and their performance with integration.

For example, one most obvious attempt would be to compare the rate of growth of real product in a country before and after integration, or the extrapolated trend of the pre-integration period to the actual performance after integration. But due to the dependency of developing countries on extra-regional export proceeds, the long-term nature of integration benefits, and the lack of reliability of required data, such attempts have been erratic and inconclusive. Another widely used indicator for assessing the effects of regional schemes is the development of intra-regional trade. East Africa has been the focus of study in many of these studies⁴⁷⁾ and the on-going debate among authors has been stimulating, but although trade figures do indicate the growth of economic interdependence among the countries of the region, they are not in themselves a good measure of the gains and losses from

⁴⁴⁾(cont.) integration as seen by the member or prospective member states . . . gains received but not fully recognized, e.g., service and commercial sector incomes accruing from union but overlooked in the absence of adequate inter-territorial payments and regional accounts data, do not form an effective basis for preserving integration. The reverse holds true of costs The fact that government estimates -- usually guesstimates --- of the economic effects of integration, rather than actual effects, govern political decisions creates a case for more, not less, efforts to prepare accurate regional and territorial benefit/cost balance sheets. From a technical point of view, they are useful tools in analyzing policy alternatives and programme implementation. Politically, as well, they form a safer basis for constant and agreed-upon change than erroneous guesses or ignorance." (Green & Krishna, op.cit., p.60)

⁴⁵⁾See Robson's discussion of approaches based on explanations of the level and composition of industry in different countries and on a more direct projection of a country's Gross Domestic Product and commodity demands, op.cit., pp. 89-93.

⁴⁶⁾Robson suggests that more important questions for member countries of existing regional schemes are the gains and losses -- both static and long-term -- that would be involved for them in the break-up of the scheme. These may be somewhat more manageable to answer, but are still subject to considerable difficulties. (Robson, op.cit., pp. 130-131)

⁴⁷⁾See Ghai, Dharam, "Territorial Distribution of the Benefits & Costs of the East African Common Market," in Federation in East Africa, C. Leys and P. Robson (ed), (continued)

integration and their distribution. To make such an assessment, effective protection rates must be known and tariff structures in the absence of integration assumed, and this information is usually not available in developing countries. A third indicator involves the identification of those industrial investments which are related to integration and those which are not, and their location. The locational balance of industries which are "shiftable" -- i.e., located in one member country and exporting to the others, but would be located in the others if their markets were protected -- as opposed to those industries which are clearly regional-based -- i.e., the industry would not be able to exist in any national market if the others were protected -- is perhaps the most promising approach to the assessment problem. Again, most of the studies using this technique have focused on East Africa,⁴⁸⁾ and the ensuing debate has highlighted the difficulties involved in reaching agreement on the identification process used. Although this approach is static and does not take account of future benefits or cumulative past effects, it does point toward the correction of regional imbalances and might be used as the basis for a regional investment policy and/or a compensation arrangement. Clear-cut results are not yet available, however, and a lot of work needs to be done yet. As OECD says for all of these methods,

The general conclusion that emerges from this summary is that not only the methodologically ideal criterion is lacking, but also that the partial assessments made so far in practice all suffer from the existing gaps in statistical information. (OECD, op.cit., p.97)⁴⁹⁾

The above discussions of constraints and obstacles to regional integration serve to emphasize at least one important conclusion for what might be regarded as a "strategy" for success: the necessity of a planned (as opposed to laissez faire), directed, and coordinated scheme which progressively harmonizes wider and wider areas

⁴⁷⁾ (cont.) Nairobi, 1965; Hazlewood, Arthur, "The East African Common Market: Importance and Effects," Bulletin of the Oxford University Institute of Economics and Statistics, Vol.28, No.1, February, 1966; and Wood, R.N., "The East African Common Market: A Reassessment," Bulletin of the Oxford University Institute of Economics and Statistics, Vol.28, No.3, November 1966.

⁴⁸⁾ See Brown, A.J., "Economic Separation versus a Common Market in Developing Countries," Yorkshire Bulletin of Economic & Social Research, May & November, 1961; Massell, B.F., "East African Economic Union: an Evaluation and some Implications for Policy," Rand Corporation Memorandum RM -- 3880 -- RC, December, 1963; Newlyn, W.T., "Gains & Losses in the East African Common Market," Yorkshire Bulletin of Economic & Social Research, Vol.17, No.2, November, 1965; and Hazlewood, A., "The 'Shiftable' of Industry & the Measurement of Gains & Losses in the East African Common Market," Bulletin of the Oxford University Institute of Economics & Statistics, Vol.28, No.2, May, 1966.

⁴⁹⁾ Robson says, "No satisfactory estimates of the benefits and costs of the East African Common Market have yet been made, mainly because although in a static framework the factors on which these values depend are clear enough, the cost and demand data necessary for adequate quantification are not available." (Robson, op. cit., p.147) For a more detailed discussion of these assessment studies, see OECD, pp. 90-97 or Robson, pp. 132-148.

of national economic and social policy. Even before any regional scheme begins, it is necessary to harmonize some such policies, and as the scheme develops progressively, wider areas of decision-making need to be brought under an agreed-upon regional policy umbrella in order for an image of dynamic progress to be built up and confidence instilled in the region's durability. (OECD, op.cit., pp. 130-131; Green & Krishna, op.cit., p.99) There are several elements in such a strategy which might be mentioned, the first of which is the desirability of a binding treaty or constitution for the regional scheme:

. . . a treaty framework setting out a definite list of rights, obligations and powers -- but with provisions for revision and review at stated intervals -- is at least beneficial and possibly necessary to a co-ordinated approach to regional affairs and to preventing erosion of programmes or of mutual confidence within an ill-defined structure. (Green and Krishna, op.cit., pp.64-65)

Such a treaty recognizes the political basis of any economic integration scheme, and firm and clear relationships between nation and region should be negotiated and established with the political participation of all national legislative and executive bodies. A careful balance between flexibility and specificity must be maintained throughout such a treaty. Vagueness and a lack of commitment to agreed principles are to be avoided in favor of specifying powers and duties, rights and obligations, and procedures for adoption, creation, or modification of policies and programs and for arbitrating or adjudicating disputes. On the other hand, a certain amount of flexibility is always required in resolving issues and crises in a manner which is politically acceptable to individual member countries and preserves as much as possible of the economic benefits of regionalism at the same time. (Ibid, pp.104-108)

A related question which often arises is whether it is better to attempt a widespread and comprehensive integration scheme right from the beginning or to concentrate on the dynamics of integration, beginning with limited marginal activities and benefits and building up to a full economic union. There are some dangers to the latter "piecemeal" approach in that real integration may never get off the ground -- all that may develop is a series of over-lapping and uncoordinated agreements among various groupings of nations. Also, a large and impressive regional scheme at the outset may be valued as a symbol of the desired unity and as an inbuilt dynamic stimulus to the future integration process. Nevertheless, this former approach is usually limited by the reality that all prospective member nations must agree to the regional scheme before it can be established. Agreement on a wide range of regional activities may well be impossible to achieve, and the strained relations between countries involved in bitter negotiations may -- in fact -- hinder further

progress.⁵⁰⁾ (Robson, op.cit., p.305) The process of integration, however, should not be approached from either of the two extreme alternatives -- total integration or none at all. It is possible and potentially valuable to begin by agreeing on market integration and the location of certain specified activities within each country without creating a full economic union.⁵¹⁾ By dwelling on this issue of extremes, the really critical issues of regional integration are being ignored:

Neither of these approaches is helpful because of the resulting shift in emphasis from the crucial issues, i.e., whether the scope for integration exists, and whether adequate preparation is being made to facilitate integration What is important, however, is that there should be an agreed time-table which indicates both the pace at which integration is to be achieved, and also the manner in which its coverage is to be extended." (Green & Krishna, op.cit., pp. 20 & 22)

Another element that must be considered in a strategy of regional integration is the institutional framework which must be set up to handle the shared responsibilities and activities of the region. While preliminary negotiations can identify objectives and possibilities for regional integration, once independent countries agree on a measure of economic integration, the actual process can only be facilitated by suitable institutions. These can range from periodic meetings of heads of state or specific ministers to large, continuously functioning secretariats for specific regional activities. The range and responsibilities of regional institutions would depend on the degree of integration which has been agreed upon, but even a minimum scheme would require a variety of technical, administrative, and policy formulating institutions to avoid conflicts and sustain progress once the scheme has been initiated.

Green & Krishna state:

An overall decision-making body linked to an administrative and research secretariat appears most satisfactory for ensuring coordination and continuity among major decisions. (Ibid, p.64)

⁵⁰⁾"The danger in attempting and failing to reach initial agreement on areas with high levels of integration costs or of interest conflicts is not simply that time and effort are wasted. Rather, it is the risk of creating a cumulative pattern of disagreement and a growing belief that there are no areas in which acceptable joint solutions can be achieved. Much of the pessimism and uncertainty surrounding the future of East African Community in December 1965 sprang precisely from the growth of such patterns. To attempt to integrate too much can result in integrating nothing." (Green and Krishna, op. cit., p. 63)

⁵¹⁾"Contrary to the impression sometimes given both by economists and by politicians a complete customs union is far from the most crucial element. Production for and trade within a regional market is quite compatible with separate tariff systems so long as a minimum rate is imposed by each state on those commodities the economic community wishes to protect. This is especially true while the process of integration is proceeding." (Green & Krishna, op.cit., p.93)

Varieties of executive policy-formulation bodies at the highest regional levels usually maintain strong links with national governments for setting broad policy, but at lower levels the amount of power which a regional secretariat has often becomes an issue. Once regional institutions have been created, they may begin to form an entity of their own and even vested interests of their own which reflect a regional and collective -- rather than national and insular -- outlook. Inevitably, such regional institutions will have an effect on substantive policies and decisions -- not just on technical procedural or implementation questions -- and the premises used by them may be very different from those of any one member country. Whether this is a good thing or not depends on a member nation's view of its own sovereignty and how much authority it can give over to supra-national institutions and technocrats. There are obvious economic and technical advantages to the region as a whole in having decisions and policies made for the benefit of the collective whole, but as has been mentioned time and time again, the political acceptance of member countries is essential for a regional scheme.⁵²⁾ Somewhat off-setting the tendency for most any organization to take on a life of its own, and a vested interest in that life, is the fact that regional institutions will have to be staffed -- with the exception of outsiders -- by people from the member countries. Although these staff people may be expected to function as professionals or "technocrats" -- immune to national pressures and restraints -- they may psychologically have difficulties in either formulating or carrying out policy that does not benefit their own home country.

"Technocrats" refers more to the dispassionate nature of a person and the over-riding importance of rationality in his decision-making rather than his close relation with technology per se (although this type of character is thought to be a product of technology), but the more technical institutional sections in a regional secretariat might be emphasized briefly. The relevance of detailed statistical data in making decisions -- both regional and national -- has already been noted, as well as the extreme lack of such data in developing countries. Before regional integration can begin, technical study groups should be set up to assess the integrative potential of a region, and later on to formulate specific projects which would relate to

⁵²⁾ For example, in talking about the European Commission of the European Economic Community -- a strong regional secretariat -- Green & Krishna state: "It has consistently been a driving force in the advancement of the European Community and has been remarkably effective in combining a Community interest based technical approach to individual issues with skillful selection of a group of issues such as to ensure substantial gains to each of the Six. On the other hand, it has come under vehement attack from France for acting as if it were a regional cabinet or government in the economic sphere." (Green & Krishna, op.cit., p.109)

regional goals. Technical bodies and staffs of technical experts are thus an extremely important part of any regional secretariat.⁵³⁾ Some form of regional judicial institution outside the secretariat would also appear to be necessary. No matter how precise and legally binding a regional treaty is made, conflicts over interpretations may arise among member countries which must be resolved in accordance with agreed-upon procedures so that they do not lead to a breakup of the region.

One problem of regional institutions which is likely to arise is how their costs should be divided up among member countries -- if outside aid agencies cannot be found to provide support. There would naturally be a reluctance on the part of any member-country to substantially help pay for any regional project it felt was only of marginal or delayed benefit to it, but it would be hopelessly complex and time consuming for any regional institution to negotiate each part of its budget separately with each individual member country or to separately set up and finance the requisite institutions for each project. A simple solution is to apportion the costs of the whole integration scheme among member countries according to an agreed formula and then spend it where and as needed, but a perhaps more palatable solution would be to have a "core" budget to which all member countries would contribute on an agreed-upon basis, and then have supplementary budgets for specific projects which would be supported by member countries according to their anticipated gain. (Green & Krishna, *op.cit.*, pp.44-55)

The essence of economic integration is the harmonization of national development plans within the region. Discussions and negotiations on regional integration stand a better chance of success if national plans have not been finalized. In certain cases, regional cooperation on a limited number of measures may be possible after national plans have been separately formulated, but these are likely to be marginal gains instead of maximal and there will be a permanent element of discontinuity in the integration process. A complete merger of national planning formulation and implementation, at least in the initial stages of integration, may be politically unacceptable, however, as the sovereignty costs of giving up control of central economic policy decisions is extremely high. In that event, Green and Krishna identify three areas where coordination and the partial unification of national plans may be possible: First, national plans could include sections or regional programs and these relevant sections could be prepared jointly; second, national plans could

⁵³⁾"To handle the tasks of gathering masses of detailed data, analyzing costs and benefits, identifying the most appropriate locations of activities, working out the inter-relation of projects, examining the spill-over effects in the region as a whole, and finally dovetailing regional projects into national plans, require the creation of both general and specific technical bodies and staffs of experts." (Green & Krishna, *op.cit.*, p.50)

be coordinated before publication to avoid obvious duplications, resolve obvious conflicts, and fill obvious gaps; and, third, certain sectors of the economy could be planned at the regional level. The more actively and the earlier these areas of national plan harmonization are pursued, the more nearly regional development planning is approached in substance, even if the plans are published in the names of individual member states. (Green & Krishna, op.cit., pp.20 & 66-67)

Initial projects for regional planning should be in areas where a broad joint interest exists along with a minimum probable conflict of national interests over the distribution of benefits and a minimum loss of national sovereignty. New ventures and investments -- particularly those which would be economically unfeasible on a national basis -- are more likely to exhibit these characteristics, although specific cases will depend on the specific economic history and structure of the region. Infrastructure development in public services and utilities for the region are often areas in which the very nature of the project necessitates regional cooperation and planning and which can provide the basis for further regional development. Regional advantages of economies of scale and specialization will be operative not only in industry, but also in the large-scale operation of these public utilities and services -- transport, communications, power, water development, etc. Transport and communications links between member countries are particularly important because if they are non-existent or inefficient, intra-regional trade and exchanges -- the basis of economic integration -- will be hindered even in the absence of tariffs.⁵⁴⁾ (Robson, op.cit., pp.56 & 88-89; Green and Krishna, op.cit., pp. 24 & 63)

The most important first step in harmonizing national development plans would be the full, frank, and continuous exchange of information among member countries as to their general objectives and specific programs. One reason why conflicts may develop among member countries is a reluctance to discuss frankly the national interests they have. No country will knowingly make decisions it views, on balance, as being harmful to its interests, so a dialogue and debate based on frank expressions of national interest may prove to be more fruitful and may arouse less hostility -- than attempts to conceal those true interests or talk around a conflict. In fact, the concealment of real conflicts is likely to lead to an over-estimation of the differences involved and to prevent compromise or trade-off solutions. Instead, acrimonious debate often ensues over petty grievances which only maximizes suspicions and hostilities without getting at the underlying issues. Particularly when crises

⁵⁴⁾ "Within both UDEAG and the Economic Community of Eastern Africa many routes important to the development of significant trade (and therefore of viable large-scale production based on joint markets) are literally non-existent or of such poor quality and limited capacity as to have virtually the same effect." (Green & Krishna, op.cit., p.96) Landlocked countries have a particular problem in transport harmonization with their coastal complements because they are naturally dependent on the latter and thus at a bargaining disadvantage.

develop in an integration scheme -- as they are bound to do -- attempts to "buy time" or postpone the crisis by denying its existence are not normally useful. Only if the basic controversy can be more easily resolved at a later date is this strategy wise, and more often it is the reverse which is true -- "basic" controversies only become accentuated over time and meanwhile the atmosphere for integration becomes progressively bitter. (Green & Krishna, op.cit., pp. 23, 60-61 and 67-68).

Another area of regional activity where national policies have to be harmonized to at least some extent is in the fiscal and monetary field. Misdirected and uncoordinated policies applying to taxes, exchange rates, balance of payments problems, etc., can be just as much an obstacle to intra-regional trade as direct restrictions or a lack of transport links, and some form of regional financial institution might be required to handle trade and payments problems. If free trade within an integration scheme is going to be mutually advantageous, then widely divergent price levels and movements and economically irrational flows of goods based on tax or subsidy rates -- and not production costs -- must be prevented.

One problem in taxing has already been referred to -- the distribution of customs revenue among the member countries of a region. The concept of free trade within a region almost surely requires that customs duties in member countries be substantially the same on at least some products⁵⁵⁾ -- otherwise imports would enter the country with the lowest tariff and then be transferred duty-free to the other countries. Even when a common market tariff is imposed for the whole region, imports for the entire region may enter and duties be collected at the most convenient part of entry and then be re-exported to other countries in the region. For developing countries which are heavily dependent on customs duties for their public revenue, this can become quite a divisive issue and Green and Krishna suggest that the West African Customs Union of Francophonic West Africa broke up over it.⁵⁶⁾

Besides import duties, national domestic taxation policies -- particularly in relation to investment concessions -- must be harmonized. For example, if one member country unilaterally lowers its tax rate on industry and this is effective in attracting industry, another member country often suffers the loss. This is bound to lead to mutually competitive incentives of a similar nature in all member countries, leaving them all worse off and with industry the only winner.⁵⁷⁾ Moreover, if there

⁵⁵⁾ See Footnote 51.

⁵⁶⁾ "The interior states believed -- probably correctly -- that the method of allocating customs collected at the ports worked to their disadvantage because goods declared for the coastal states were subsequently re-exported to the interior ones, especially in return for cattle and fish sold in coastal state markets." (Green & Krishna, op. cit., p. 39)

⁵⁷⁾ Note -- this is not to say that an agreed-upon policy for regional investment should not use such taxation incentives to influence the location of industry. In that case, the policies are harmonized; in the above case, the action is unilateral.

are large differences of taxation on certain products in member countries, smuggling is bound to rise and revenue in the higher-levy state will fall anyway, as well as bringing all the attendant problems that go along with enforcing an unpopular law. (Ndegwa, op.cit., p.98; Robson, op.cit., p.47) As Robson states:

Thus, for a combination of reasons relating to economic efficiency, revenue and administrative considerations, effective regional integration normally requires some degree of harmonization of internal taxation, both as to methods and rates, if integration gains are to be optimized. (Robson, op.cit., p.48)

It must be added, however, that such harmonization runs into the oft-repeated problem of national sovereignty by reducing the freedom of member countries to manipulate taxes as they please.

There are also several reasons why the monetary policies of member countries must at least be harmonized -- if there is not to be a complete monetary union -- if the benefits of regional integration are to be obtained.⁵⁸⁾ Investment in the region of a long-term nature will require some assurance that the region's economic relations will not be disturbed for some minimal period of time and that freedom of payments at stable rates of exchange will exist at least for current -- and preferably also for capital -- transactions. (Ibid, p.49)

Essential to any substantial expansion of trade within newly formed African economic communities is some form of clearing or payments union. This need not -- for various reasons probably cannot -- imply speedy adoption of community currencies, common central banks, or pooling or external receipts.⁵⁹⁾

What is essential is free intra-community convertibility of community currencies (at least on current account) at fixed and realistic exchange rates and with a minimum of red tape or exchange commission charges. (Green & Krishna, op.cit., p.98)

If exchange rates among member countries are fluctuating, of course, regionally-based

⁵⁸⁾"In principle, the monetary arrangements which accompany market integration may range from complete autonomy to complete integration. One end of the spectrum would be represented by the case of complete autonomy where each economic unit has its own currency and autonomous monetary authority ...: The other end of the spectrum is represented by a complete monetary union with a single monetary authority; a common currency and pooled and unallocated reserve of external assets. Between these two extremes a number of variants is conceivable. . . ." (Robson, op.cit., p

⁵⁹⁾While not essential, however, full economic union can offer advantages in minimizing costs -- such as collection and administrative costs -- and in potential efficiency gains -- such as using the total regional foreign exchange reserves to meet short-run imbalances. (Green & Krishna, op.cit., p.98) For example, Robson says that the administrative costs of the East African Currency Board were very low and that surplus resources were transferred to great advantage from Tanzania and Kenya into Uganda towards the end of the calendar year to assist in financing the seasonal harvesting and sale of export crops, and then were moved out again once the season was over. Similarly, private firms could transfer funds from their headquarters in one member country to branches or subsidiaries in other member countries as required, or vice-versa. (Robson, op.cit., pp.49-50)

production units will not be able to price their goods bound for other member countries with any degree of confidence, and more speculation will be encouraged instead of productive investment. If exchange rates are not realistic within the region, they can be just as much a barrier to intra-regional trade as a tariff. If other member countries should have overvalued exchange rates, for example, exports from the regional-based industry will be discouraged and imports from non-member countries encouraged. (OECD, op.cit., p.37) Moreover, identical foreign exchange control measures will have to be used by all member countries in order to prevent citizens or firms of one member country from using another member country as a channel for external payments to their own country's disadvantage. (Green & Krishna, op.cit., p.98)

The problem is that these requirements of stable and harmonized monetary policies often conflict with short-run problems which develop as a result of integration. After integration occurs and intra-regional tariffs are either lowered or done away with, changed competitive positions and trade diversion -- both inside and outside the region -- are likely to bring about new trade patterns and to cause some member countries severe balance of payments problems.⁶⁰⁾ It is therefore very difficult to set "realistic" exchange rates which will remain that way, and the member countries affected will be sorely tempted to change the rates or to use more direct measures such as trade restrictions in an effort to solve their problem. Therefore, some arrangement for clearing and settling short-term intra-regional imbalances may be needed along with a system of credits from member countries with a net regional trade surplus to those with a net deficit. However, indefinite credit should not be provided to a country in persistent deficit. Therefore, such arrangements should only be made on a short-term basis and should not be automatically renewed, and they should not hinder any basic adjustments which countries may have to make in order to restore the imbalance to equilibrium. (Green & Krishna, op.cit., p.98; Robson, op.cit., p.53)

Harmonization of national monetary credit policies -- expansionary or deflationary -- within the region is also required. If separate national currencies exist, a member country which followed a much more expansionary policy than other member countries would find its imports from them rising as its incomes rose faster than theirs, and a loss of foreign exchange and possibly capital to them would result. Even if a common currency and central bank exists, agreement on national credit policies still must be reached because a more vigorous development effort on the part of one member country -- financed by expanded credit -- can only be done at the expense of a similar loss of credit to other member countries. Since almost all developing countries are anxious for development and the credits to finance it, such a policy will probably not be acceptable if it is followed unilaterally and

⁶⁰⁾ This has already been discussed somewhat in the section on compensation.

not agreed to beforehand. (Robson, op.cit., pp. 50-51) Once again, however, such harmonization means that member countries must give up control over one of their primary means of financing their own development, and this will not be done easily.

In conclusion, then, as Green and Krishna state:

Economic integration is most usefully viewed as a dynamic process dependent on the past and present of the relevant economies, on their economic needs and objectives, and on the progress of the very economic changes integration is designed to promote. Initially the challenge is one of creating a body of unified economic activities within a joint policy and institutional frame meeting the criteria of short-run viability and longer-run capacity for expansion. Subsequently challenges take the form of expansion related to economic change to maintain the relevance of and joint returns from integration and crisis resolution usually involving expansion, restructuring, or -- in the case of serious previous miscalculations -- contraction designed to adjust nationally unacceptable distribution of gain and cost patterns. (Green & Krishna, op.cit., pp. 57-58)

The most difficult periods in the economic integration process are in its initiation and early phases when gains are unlikely to be large. In practically all fields of regional activity, it is impossible to demonstrate the advantages of integration in a short period of time. Therefore, if there was only a token acceptance of the regional concept to start with, integration will not work. Time, however, is on the side of a functioning integration scheme if it is used to further the inter-dependence of national economies, as well to increase the gains from regional integration and national recognition of their existence. A random collection of cooperative projects or policies is not enough, however; regional activities must play a coordinated role in moving the member nations ever closer together, in laying the basis for further integration. As habits and outlooks associated with the region develop, and as regional administrative and operating bodies make more and more decisions in a competent fashion, a "culture" of regionality can grow among the peoples of the member countries and further the process along. At some point -- due to the economic structural and political changes which have taken place -- the process will become irreversible unless extreme forces should intervene. The decision to withdraw would cause more difficulties for the country concerned -- as well, of course, as to the remaining members -- than it would be worth and the country would remain in the region even if dissatisfied over some issue. (Ibid, pp. 23, 62, & 69)

A favorable "climate" for economic integration emerges for a group of nations when they begin to distinguish between policies which are national in scope and those which must be carried out in cooperation with others in order for them to be effective. One of the factors contributing to this climate is often thought to be the previous experiences with multi-national integration that a country has had. On the one hand, it is suggested that the chances for successful integration are improved if there has been no previous integrative experience. This view assumes that any previous experience had to be bad -- since otherwise it would still be

successfully progressing -- and would therefore complicate future integration attempts. Even accepting this assumption, however, a previously bad experience with integration could have taught the affected countries a lesson so that future attempts will be able to work out solutions to the former problems. Experience of any kind relevant to integration should also increase the capacity of the region to operate joint institutions and policies. As was mentioned earlier, this kind of regional organizational "know-how" cannot be created overnight. And close past links -- short of actual integration, perhaps -- need not have been harmful to the countries concerned, and these usually facilitate the formation of integration schemes. In Africa, for example, it is not irrelevant that all the members of UDEAC were formerly colonies of France and likewise that all the members of the East African Community were formerly colonies of Great Britain; nor that attempts to integrate former French and former English colonies in West Africa, in even such limited schemes as the West African Iron and Steel Community, have largely failed. (Ibid, pp. 19 & 57) For better or worse, however, the colonial experience in Africa has definitely influenced integration efforts today. Green and Krishna succinctly describe the colonial orientation well:

In a sense, colonial African economic communities were highly technocratic although the powers of the 'technocrats' to intervene in market operations -- usually highly oligopolistic not free -- were limited. Administrative efficiency, short-term economic viability and facilitation of metropolitan trade, investment and -- sometimes -- settlement were its goals. . . . Pre-independence economic groupings were designed by colonial states with the intention of benefitting either influential economic groups in the economic area centered on the metropolitan power or settlers and businessmen in the colonies affected and also with a view to reducing administrative and other colonial government costs. The economic policies pursued tended to combine significant preferences (both formal and de facto) for metropolitan trade and investment with a basically laissez faire internal programme usually leading to heavy territorial and sectoral concentration of economic activity. (Ibid, pp. 59 & 72)

- It has been the tendency in Africa -- at least until recently -- to idealize regionalism and to regard it as an inevitable means to development or political influence in the world. To do so, however, is unrealistic. Tangible economic gains in the foreseeable future may be a more materialistic and less "ideal" basis for regional integration, but they are also far more solid. The two basic elements are an accepted goal -- substantial economic benefits to all participating countries over any beyond what they could expect as separate nations -- and a time-table of action to reach that goal, with the sooner that benefits can be expected the better. Provided with an institutional framework and the necessary support, such a regional

scheme may have a good chance for success.⁶¹⁾ (Ibid, pp. 12 & 61-62) The question of to what geographic extent an integration scheme should aspire can be answered partially in the above terms. The wider such a scheme is -- both area-wise and in the number of countries (which are likely to be at different stages of development) -- the greater is its potential for stimulating development; also, however, the greater the difficulties with transport links, vested interests, regional planning and investment, compensation, etc. and the longer it will take to produce significant gains.

With specific gains in the foreseeable future outlined, it should be easier to achieve mass public support within each country of the region for the scheme -- a factor which has not been mentioned yet but which can be of vital importance.⁶²⁾ Green and Krishna suggest that an "integration lobby" made up of politically significant figures in each country should carry on a campaign for integration, mobilizing popular support and pressuring national governments to make definite and positive commitments to it. (Ibid, p.47) In many cases, past integration attempts have been established by a colonial power or -- after independence -- by an indigenous elite. The support of the peoples involved has either been taken for granted or ignored, and many schemes have reportedly failed for this reason. In East Africa itself, the idea of federation -- which is discussed further in Appendix I -- always received public support from heads of state, parliamentarians, leading civil servants, and influential private citizens and interest groups, but federation as a working proposition was never debated in depth in the national parliaments nor were the views of the peoples sought on this vital matter. (Ibid, pp.9-10)

The role of one last external element in the process of economic integration -- foreign aid -- will be briefly discussed. Private foreign investment has already been discussed, but foreign aid is also important to regional success -- even before the regional scheme is established. This is because individual countries which receive substantial amounts of foreign aid in relation to their neighbors may justifiably fear that part of this aid would be diverted to other member countries in a regional integration scheme and thus hesitate about joining. Their fears have two real bases: special links with a former colonial power may be severed or

61) "In many vital respects the EEC was built on the acceptance of a general goal, as well as a time-table of action to reach that goal. There was also a simultaneous formulation of an institutional pattern to support simultaneous action on many fronts and to deal with problems as they arose. By contrast, African attempts lacked both a time-table and the requisite institutions to deal with problems. It is now widely recognized that both are necessary to put cooperative endeavor on a firmer footing." (Green and Krishna, *op. cit.*, pp. 4-5)

62) "The success of integration also depends on the effective mobilization of support within each country. (Green & Krishna, *op.cit.*, p.47)

loosened by joining an integration scheme and foreign aid from this source would then fall; and one of the primary uses of foreign aid to a region in its early stages would be for compensation -- which would automatically go to the weaker members. (OECD, op.cit., p.135; Green & Krishna, op.cit., p.76)

In order to support integration efforts, therefore, aid donors can at least commit themselves not to decrease their total aid to the region and might undertake to temporarily increase it in order to help regional schemes over their initial hurdles.⁶³⁾ Besides using such aid for direct compensation to the weaker member countries of the region, it could be used in a regional investment policy designed to expand economic activity in those same countries, to improve the regional transport and communications systems so necessary to intra-regional trade, or to provide technical assistance in the compilation of basic statistical data for the preparation and planning of regional projects. Aid donors can further support regional efforts by channelling more of their aid through regional institutions, such as development banks, which reflect regional policies, and by encouraging their private investors to also help and support regional objectives. (OECD, op.cit., pp. 136-137; Green & Krishna, op.cit., pp.75 & 86)

The discussion will now turn to some factors which from past experience and research have been linked with the concept of political integration. As was mentioned previously, economic and political integration overlap somewhat and economic is often included within political integration; yet the two approaches focus on different variables or on different aspects of the same variable:

It is unlikely that full agreement on the term "political integration" can be reached -- and neither is it necessary -- but an understanding of the different meanings of it which are being used today is essential. Jacob and Teune state:

Political integration generally implies a relationship of community among people within the same political entity. That is, they are held together by mutual ties of one kind or another which give the group a feeling of identify and self-awareness. Integration, therefore, is based on strong cohesiveness within a social group; and political integration is present when a political governmental unit of some sort is cohesive. (Jacob, Philip and Teune, Henry, "The Integrative Process: Guidelines for analysis of the Bases of Political Community," in The Integration of Political Communities, Jacob and Toscano (ed), J.B. Lippincott & Co., Philadelphia and New York, 1964; p. 4).

⁶³⁾This latter strategy results in a dilemma because in the absence of a total increase in foreign aid, an aid increase to a region means a decrease to some other developing country, which may be just as deserving.

Central to this integrative relationship is the collective action of people functioning together as a coherent social group to promote mutual interests. Both the range and kind of functions in which they engage are important in any analysis of integration. It is probably not very useful, however, to conceive of some level of cohesiveness above which integration begins⁶⁴⁾ or of political integration as a specific condition which does or does not exist. Integration is a relative concept rather than an absolute one, and a relation of more or less integrated or a dynamic focus on progressions of events leading to more or less integration should prove to be the more useful. (Ibid, pp. 5-8)

Jacob and Teune cite ten factors, derived from previous research, which are considered to be significantly related to integration, and each of these will be discussed briefly along with some possible indicators mentioned which might be used in measuring them. The first of these is geographic proximity:

The hypothesis is that the closer people live together geographically, the more likely are integrative relationships to develop among them; and the closer communities are to each other, the greater the likelihood of their political integration. (Ibid, pp. 16-17)

There are several indicators which might be used to measure this variable: distance, travel time by available transport (which more realistically reflects the possibility of physical contact between people), the cost of such transport, or the number of intervening opportunities or choice points along the way (e.g., intersections, shopping centers, etc.). Proximity, in other words, is not necessarily just a function of distance, but also technology, the population density, or some combination of these indices. (Ibid, p. 18)

Homogeneity is the second factor that Jacob and Teune mention:

The hypothesis is that social homogeneity will contribute strongly to the feasibility of political integration and, conversely, that communities whose members are very different from one another will have a very hard time achieving or maintaining political integration. (Ibid, p. 18)

In other words, the more that people in different communities at any level are similar, the more successful attempts will be to build integrative relationships among them. Indicators which have been used in the past to measure homogeneity include income, education, status or class, religion, race, language, ethnic

64) Jacob & Teune point out that the concept of a "threshold of integration" might be relevant as that point where a group of people becomes sufficiently integrated to be considered a community. Where that point is, however, is an arbitrary decision. "The degree of cohesiveness necessary for political integration is ultimately made evident in each case by whether a social group 'jells' and holds together as an identifiable and functioning political unit." (Jacob & Teune, op cit, p. 8)

identification, attitudes, values, and character. All of these reflect an objective measure of homogeneity, however, when what may be more important is a subjective "feeling" of homogeneity among the peoples concerned. One suggested approach to get at this aspect of perceived homogeneity is to use the concept of social distance -- one's readiness to associate with others in a variety of situations -- in analysing people's expressions toward one another and toward outside groups. (Ibid, p. 19)

Transactions is a third factor relating to political integration:

In the most general terms, the hypothesis holds that cohesiveness among individuals and among communities of individuals can be measured by -- and is probably promoted by -- the extent of mutual relationship or interaction among them. (Ibid, p. 23)

There are a tremendous range of transactions which might be investigated, but so far the research which has been done has been concerned with communications (mail, telephone, etc.), trade (exchange of goods and services), and human mobility (the frequency of persons' movements or personal contacts). One very important parameter (among others) which might be mentioned here is the reward or penalty associated with such transactions -- i.e., rewarding transactions will promote integration while unrewarding (or penalizing) transactions will do the opposite. Jacob and Teune approach this idea through the concept of costs of transactions -- all transactions have costs which may differentially benefit one community over another.

The fourth factor is mutual knowledge about each other among members of potentially integratable communities:

The hypothesis here is that mutual knowledge or understanding among people and groups of people is essential to their functioning together effectively as a political community. (Ibid, p. 27)⁶⁵

It is possible, for example, for neighbors to geographically live next door and never know each other. The level of communities involved is one parameter that qualifies this hypothesis; much more knowledge by the public might be required at the local level to coordinate municipal police and fire departments than to negotiate a military alliance at the multi-national level. The quality -- rewarding or unrewarding -- of the associations which produced the mutual knowledge is once again important, particularly as this knowledge relates to group stereotypes which are considered desirable or undesirable. The accuracy

65) One problem which continually keeps arising when a large number of factors are allegedly influencing the same dependent variable is whether they are acting independently, in combination, or in sequence through one another upon the phenomenon being studied. A good case can be made that geographic proximity, homogeneity, and transactions all increase greater mutual knowledge and understanding, and thereby influence political integration.

of this knowledge or these stereotypes may be irrelevant -- it is what people think they know and how they evaluate it which may influence their integrative tendencies. Attitudes, images, perceived stereotypes, and other similar indicators can therefore be used to measure this factor. (Ibid, pp. 27-29)

The convergence of functional interests among communities is the fifth factor discussed. These are interests for which people are prepared to devote a major effort and from which they expect a substantial reward --

The proposition to test is whether the functional interests of the bulk of a community are sufficiently similar so that they will be advanced by the development of common political ties. Conversely, sharp diversity of functional interests within any society might be expected to limit the possibility of any corporate action ... integration would be viewed as dependent on the extent to which the dominant functional interests are shared in each community and thus could be advanced by inter-community agreement or association. (Ibid, p. 29)

Functional interests may easily change, however, and are not a very lasting basis for political integration. These interests, moreover, are often not so much an expression of the community as of a particular interest group which has political influence within the community. And once again, it is the perceptions of these interests rather than the reality which are important. Appropriate indicators of functional interests could therefore be found among the goals expressed by organized interest groups and the policies and actions undertaken by them to achieve those goals, although there are problems in measuring these indicators in terms of their power or intensity. (Ibid, pp. 29-31)

A more abstract and elusive factor concerns a community's "character" or social motivations⁶⁶⁾ which would tend to dispose it toward integration of separateness in relation to other communities. Such a characteristic would be acquired through cultural inheritance and learning, and would be somewhat similar to "achievement motivation" and its hypothesized effects on economic development.⁶⁷⁾ One hypothesis might be that communities characterized by "affiliation motivation" as opposed to either achievement or power motivations would be more disposed toward political integration, but Jacob and Teune say that there has been no evidence yet of such a direct link. The indicators for measuring achievement motivation have already been developed by McClelland and include -- among others -- expressions of aspirations and beliefs found in children's stories. Another

66) "... a set of behavioral dispositions so pervasive and compelling that the whole group will tend to act in a distinctive manner." (Jacob & Teune, op. cit, p. 32)

67) See McClelland, David G., The Achieving Society, Van Nostrand, Princeton, 1961.

approach along this line might be to measure a community's tendency toward optimism or pessimism or its hopes and fears on a self-anchoring scale, and then to try and correlate the findings with measures of integrative disposition.⁶⁸⁾
 (Ibid, pp. 32-34)

Factor number seven is the structural framework of the community, where the system of decision-making -- the power structure -- or the organization of political action is related to the integrative potential of a community. Counter hypotheses can be proposed for pluralistic vs. monolithic communities, for hierarchical vs. egalitarian decision-making, or for socially stratified vs. socially mobile systems. A democratic theory, for example, would tend to believe that an increase in participation in the political process would lead toward greater consensus and cohesion, while an authoritarian theory would say the opposite. Some of the indicators which might be used to measure such a factor include the amount of day-to-day decision-making done by top leaders, the degree of hierarchy of the power structure, the amount of accountability by the decision-maker(s) to others, the amount of political opposition tolerated, the degree of political mobility, etc. A logical variation of this line of thinking is that similar political structures are likely to have similar ideologies and that communities with similar ideologies (e.g., all democracies or all totalitarian states) are more likely to successfully integrate than communities with different ideologies (e.g., a democracy and a totalitarian state), but there is some doubt about the relevancy and/or the accuracy of this view. (Ibid, pp. 36-38)

The eighth factor mentioned was discussed earlier in this chapter -- the sovereignty -- dependency status of a community:

As for the influence of sovereignty upon inter-community relations, it is commonly held to be a major hurdle to integration. In the study of international relations, it is widely asserted that the more sovereign the state, the less disposed it will be to cooperate with others and in particular the more intensely it will oppose political arrangements that encroach upon its autonomy. (Ibid, p. 41)

This assertion, however, is far from being proved, and a case could be made for hypothesizing that it is only those communities which are self-assured about their own sovereignty which will be able to cooperate with others. There are some objective indicators for measuring this factor, such as the extent to which decisions are subject to review by any higher political authority outside the community, but the subjective consciousness of sovereignty as a critical issue -- the felt need for it -- may be more important to integration than the objective

68) See, for example, Cerntril, Hadley & Free, Lloyd A., "Hopes and Fears for Self and Country: The Self-Anchoring Striving Scale in Cross Cultural Research," The American Behavioral Scientist, Vol. 6, No. 2 (Supplement), October, 1962.

reality of the situation. Such indicators might include the amount of attention devoted to sovereignty in a community or its sensitivity to violations -- or claims of violations -- of its sovereignty. (Ibid, p. 42)

The effectiveness of the community government in meeting the demands and expectations of its people directly affects the degree of political integration within that political unit, at whatever level it may be, according to the ninth factor on Jacob and Teune's list. Effectiveness can be measured by both objective and subjective indicators, but one must be careful that they reflect the actual feelings of the people concerned. This might be done by comparing what people expect from the government against what they believe they are receiving -- thus "self-anchoring" the measure in each community. More subjective indicators might attempt to get at the same factor through more abstract feelings of well-being or beliefs in a better future. (Ibid, p. 43)

The final factor mentioned by Jacob and Teune is previous integrative experience -- or the "spill-over" theory.⁶⁹⁾ Briefly stated:

Under the spill-over effect, once any agreement is made, it enhances the propensity of the partners to make further agreements. (Deutsch, Karl W., "Transaction Flows as Indicators of Political Cohesion," in The Integration of Political Communities, Jacob & Toscano (ed), J.B. Lippincott & Co., Philadelphia and New York, 1964b, p. 95)

This theory must be qualified by the nature of the previous integrative experiences or agreements. If they were rewarding, then they might contribute to a generalized habit of integration; if not -- or if they were penalizing -- the opposite effect might occur. The nature of the role which the experience or agreement plays within the communities is another factor which might influence general integrative tendencies. This is known as the Role-Differentiation Theory and it simply proposes that communities may integrate certain functional activities but not others, depending on the role those functions play in their

69) One of the most explicit references to the spillover theory, and to the relation between regional cooperation in science and regionalism in general, was recently provided by the United States Secretary of State, the Hon. William P. Rogers, in an opening address to the 12th Meeting of the Panel on Science and Technology of the House Committee on Science and Astronautics on 26 January, 1971, entitled "U.S. Foreign Policy in a Technological Age":

"Because the problems dealt with by science usually have a low specific gravity in political terms, scientific cooperation is often possible where political cooperation is not.

This habit of cooperation is a good one to keep. If it is kept, it will surely have spillover effect in increasing the constructive role of international organizations, in establishing new patterns of international cooperation, and in strengthening observance of international law."

their lives. For example, municipalities may agree on having a common sewer system but balk at a common educational system; nations may agree in trade relations but balk at military alliances. At the municipal level, this latter view is supported by the work of James Toscano⁷⁰⁾ in the metropolitan area of Philadelphia. (Jacob & Teunè, op cit, pp. 44-45)

In an article in the same book entitled "The Influence of Values in Political Integration," Jacob claims that although transactions, institutions, structures, functions, etc. are all factors which may influence political integration, they all do so through individual human decisions -- the ultimate filter through which all external factors must pass before influencing political events. Political behavior is assumed to be fundamentally a process of decision-making, the result of the complex of human choices, and that geographic, social, or political phenomena such as proximity or transactions are meaningful only as they influence the actions of politically relevant persons. Jacob is concerned with the people who decide whether to integrate or not rather than the characteristics which do or do not tend to accompany integration. (Jacob, Philip E., "The Influence of Values in Political Integration," in The Integration of Political Communities, Jacob & Toscano (ed), J. B. Lippincott & Co., Philadelphia and New York, 1964, pp. 212-214)

Jacob's theory relating values and political integration proceeds from the above assumption. He claims that there are three important factors which affect human decisions: the individual's own personality structure; the expectations of the people around him concerning his role; and the characteristic behavior patterns of his culture and community --

One effect of these factors is to introduce into the process of human decision-making a "normative component" -- that is an imperative to make choices, not only in terms of what a person may directly want, but in terms of standards of what he has come to regard as legitimate or proper... These criteria by which the propriety of action is judged, we identify as "values" -- or more precisely, "normative values". (Ibid, p. 211)

Values, therefore, influence both political policy and the community's response to it, with respect to integration as well as other issues. 71)

70) Toscano, James V., "Transaction Flow Analysis in Metropolitan Areas: Some Preliminary Explorations," in The Integration of Political Communities, Jacob & Toscano (ed), J.B. Lippincott Co., Philadelphia and New York, 1964.

71) Within a community, political decisions often attempt to reconcile divergent values in such a way as to safeguard the decision-maker and keep the community cohesive. In a situation of radical social change, however, modern and traditional values are often irreconcilable and political decisions end up leading to disintegration -- hopefully followed by a new integration based on the modern values. Jacob also defines social norms as values which have permeated widely throughout the community. These promote integration within the community, but can often obstruct integration between different communities. (Jacob, op cit, p. 212)

Consequently, there are at least two ways in which values relate to political integration. First, as has been indicated previously, there must be some degree of compatibility of values among integrating communities -- the values shared have to be great enough to overcome community differences. Secondly, however, as Jacob points out, the values of the communities' leaders -- independent from the community -- are important as they are conducive to the process of integration or interfere with it.

By using a definition of values⁷²⁾ which focuses on their normative quality, Jacob claims to identify one vital element which distinguishes them from concepts such as "goals", "motives", "needs", "interests", "beliefs", or "impulses" -- legitimacy -- and thus makes the definition operational. (Ibid, pp. 220-221) This normative element of claims of legitimacy or illegitimacy usually is found in statements which have a judgmental quality about them -- simple declarations of approval or disapproval, statements of what should or ought to be, or expressions of shame, guilt, or demand for punishment directed either toward one's self or, more customarily, at other persons. And it is what the individual decision-maker indicates is legitimate which is the focus of Jacob's attention. This may or may not be different from the values of the community at large or the smaller social groups within the community with which he associates. (Ibid, pp. 225-226)

The values of "planners" in a community require special consideration because the planning function has become a center for decision-making in many modern communities:

Within the decision-making processes of government, planners are pre-eminently the custodians of integration. They are expected on the one hand to pull together the disparate elements of social behavior within their community into rational, coordinated series of actions which will produce desired outcomes ... On the other hand, broad-gauged planners, alert to factors which impinge on their communities from the outside as well as from within, should be unusually sensitive to the imperatives of interdependence which press for closer inter-community relationships. (Ibid, pp. 239-240)⁷³⁾

72) "The definition of values as 'the normative standards by which human beings are influenced in their choice among the alternative courses of action which they perceive'...." (Jacob, op cit. p. 220)

73) This passage again brings to mind the paradox referred to in footnote 71 that by making the community more stable, cohesive, and viable one is also probably making it more difficult to integrate with other communities. In effect, nation-building is opposed to multi-national regionalism -- unless the nation perceives its survival to be related to the region. This situation and the position of key planners or decision-makers in a community has suggested a theory of integration (in some cases) by deviants which runs counter to most other theories. In this theory, "Integration then comes about on a broad scale as a result of a kind of conspiracy of deviators within existing political communities." (Jacob, op cit. p. 246) In each community, there is only a minority of individuals who hold integration values. They become united, however, and when they each come into positions of power in their respective communities they carry out their intentions to integrate. No examples of this theory were given.

Looking at the actions of such an individual and then deducing his values regarding integration is very susceptible to misinterpretation by the observer. Expressions and judgmental statements made privately to small groups or shared in confidence with an interviewer probably give a better indication of the individual's values. Consistency in value-laden statements before public and private audiences or audiences with different interests may indicate that the values are genuine. Particularly difficult and critical decisions are often the best cases to examine for values. In these instances, the individual must usually establish priorities among conflicting values and clarify his true feelings. A "self-anchoring" approach to identifying values is valuable, particularly in cross-cultural studies. This approach uses the individual's own scale of rewards and punishments, and then the importance of a value to him is measured by the degree to which he strives to obtain reward or avoid punishment on behalf of it. Another approach to measuring the relative importance of values is to determine the willingness of the individual to sacrifice one value when it conflicts with another. (Ibid, pp. 231-235)

Although it is the values of the individual decisionmaker which directly affect integrative behavior, Jacob says that the individual's personality and life experience, the values of the community at large, and the values of the social groups within the community with which he associates all influence his own values and therefore his behavior. Moreover, it is usually in the areas of value overlap between the individual, his social groups, and the community that the most significant values emerge --

Hence it is appropriate in political analysis to turn to data which will contain indices of values held in common by the makers of policy, their important reference groups, and the general political community. (Ibid, p. 229)

One important source of data which might be used to measure group or community values is public rationalizations or justifications of decisions -- especially controversial ones. Even though a "rationalization" or "justification" suggests that the individual may be expressing values he thinks others will have rather than his own, this in itself is valuable insofar as it indicates the importance which he believes the community places on this normative value --

... it indicates the estimate made by the policy-maker of what are socially potent norms in the society which have to be taken into account if decisions are to have a social impact...it is a measure of the regard in which the decision maker holds the social norms and therefore a clue, though not a decisive one, to the part which the external social norms played in the original formulation of the decision. (Ibid, p. 230)

"Content analysis" has been one of the most important techniques used to determine and measure values in this way.

In another article,⁷⁴⁾ Teune claims that the known facts and many theories about political integration can be explained by psychological learning theory. It can be assumed that attitudes, values, personality traits, etc. -- "dispositional characteristics" -- of people will influence their behavior with respect to integration as well as other issues, but how such dispositions are acquired and how they change are questions which learning theory attempts to explain. In essence, they are acquired or changed by past experience and the resultant "learning", and its major principles are outlined in Stimulus-Response terms.⁷⁵⁾

In brief, stimulus-response psychology utilizes three basic conceptual occurrences: the stimulus which confronts the individual; his response to that stimulus; and the reinforcement which follows that response. The major proposition or principle of this theory is as follows:

Reward reinforcements associated with a particular response tend to increase the likelihood of that response occurring again with relation to the same or similar stimuli; Punishment reinforcements associated with a particular response tend to decrease the likelihood of that response occurring again with relation to the same or similar stimuli.

Other major principles are as follows:

In order for learning to occur, the response must follow (or accompany) the stimulus in a relatively short period of time, and the reinforcement must also follow the response in a relatively short period of time.

The rate of learning will be more rapid the more distinct and/or intense the stimulus is.

Learning -- and the strength of the behavioral habit which has been learned -- is directly related to the frequency, the contiguity, and the intensity of the reinforcement.

Learned responses or habits which are subsequently punished or not reinforced are extinguished. (Teune, op cit. pp. 255-257)

74). Teune, Henry, "The Learning of Integrative Habits", in The Integration of Political Communities, Jacob and Toscano (ed), J.B. Lippincott and Co., Philadelphia and New York, 1964.

75) "The major point of this presentation is that known facts about political integration can be explained by a psychological theory -- learning theory. These psychological factors will be similar for political integration at any level. In short, they are highly generalized statements about human behavior of which political integration is a part....

"That dispositional characteristics influence behavior is a tautological issue. How dispositions are acquired and how they change is a question of theoretical importance. A fairly well-defined and confirmed "theory" (or if a more rigorous definition of theory is held, a well-defined "conceptualization") which attempts to explain how dispositions are acquired and how they change is learning theory. Dispositions are acquired largely as a result of past experience or learning. The conditions necessary for dispositions to be acquired are contained in certain statements of stimulus-response (S-R) learning theory." (Teune, op cit, pp. 248 & 253)

According to Teune, political integration is a group -- rather than individual -- level dispositional term. It can be used when certain stimuli are responded to in a similar fashion by a majority or at least a significant number of people of the group, or when groups of people respond to each other as relevant stimuli. (Ibid, p. 257) One indicator of the degree of political integration within or among communities might then be the proportion of people "identifying" with certain political symbols --

"Identification" may be defined as a learned pattern to respond to one set of stimuli as the most relevant for that range of activities. (Ibid, p. 270)

Identification is a learned drive which is often rewarded so much and so long that the stimuli which produce it become rewards in themselves -- what Teune calls the process of political socialization. When a "substantial" portion of the people in a community has learned that political identification is rewarding or has become identified with a specific set of political stimuli, then this can be called a "political community." (Ibid, pp. 270-271) When alterations in political stimuli or when severe changes in the reward pattern occur, however, shifts in political identification will follow. Particularly in the case of consistent, severe, or widespread deprivations such as depressions or wars, there are often changes in identification with political communities. (Ibid, pp. 277-278)

Some of the theories and factors mentioned previously as being related to political integration can be adequately explained also in stimulus-response terms. The spillover theory, for example, involves two principles of learning theory -- frequency of association and the generalization of stimuli. Assuming that the previous integrative experience was rewarding, the more frequent such associations become the more integration should become a "habit" -- if agreement in one area can be generalized to agreements in others. The effect of homogeneity of communities on integration could be caused by similarities in the communities' response conditioning which would facilitate the inter-community transfer of stimuli or symbols and lead to shared values. Integration as a result of a rational calculation of benefits or rewards, and therefore dependent on the effectiveness of the integration-level government, is simply the assertion that changes in reward reinforcement will change integrative behavior, and that if there is no reward, integration may vanish.

What makes a nation a nation, or a people a people, or a region a region? Most writers on political integration have concentrated on the national level because of the importance of the nation state in the world today. Yet, many concepts of integration are applicable at other levels of government -- from the multi-national region up to world government or down to the integration of municipalities in a metropolitan area. If one takes a systems approach,

insights into a system under consideration at one level may be gained from the study of similar systems at different levels. Therefore, although the principal theoretical work on integration by Karl Deutsch, Nationalism and Social Communication (Technology Press of M.I.T. and John Wiley & Sons, Inc., New York, 1963), is written for the national level, he himself has used the concepts developed in this work to suggest ways of studying integration at other levels⁷⁶⁾ and his work will be discussed here for possible application at the regional level.

Deutsch surveys past work on "nationality" and the "nation" and says that most serious writers do not consider these concepts to have any basis in biology or race, but that somehow common relationships to the physical environment and past events evolve and are transmitted in terms of "our" country and "our" history. Many further suggest that similar or complementary elements inside the minds of individual citizens of the country -- values, thoughts, feelings -- and interlocking habits and memories lead to interlocking role relationships which form the basis of any social group. A common attachment to political symbols is one such element often cited. These interlocking role relationships are then linked to social institutions which are themselves elements of nations. All of these elements combine to form "structures" in which the mutually reinforcing pattern of the whole is more important than any single element. Higher-order structures or configurations of society have come to be called "cultures" or "collective personalities" by different writers, but there is little agreement about the reality of what is being described. These societal patterns are related to the personality of individual citizens and are involved with terms like "consciousness" and "wills." Nationalism, nationality, and the nation are concepts which are historical in origin and development and which are somewhat vague -- everyone knows that they mean, but no one can define them exactly.

Deutsch begins his theory of communication and integration by defining several kinds of groupings of people. A society, for example, is a group of people who have learned to work together based on a division of labor:

....we may see society as based on the division of labor, carried on in each case through specific combinations of social institutions and technology. (Deutsch, 1963, p. 21)

If the division of labor becomes more intense and/or elaborate, a society may develop occupational groups, castes (which are occupational groups bounded by cultural barriers), or classes. Any one society is bounded by relative discontinuities where the extent of the division of labor abruptly drops, but two

76) Deutsch, Karl, "Communications Theory and Political Integration," in The Integration of Political Communities, Jacob and Toscano (ed) J. B. Lippincott & Co., Philadelphia and New York, 1964a.

or more societies may develop a larger order division of labor among them and form a kind of "great society," and if one carries the analogy far enough -- as the classical economic doctrines of comparative advantage and free trade do -- it is possible to speak of a "world society." (Ibid, pp. 21 & 61)

Whereas societies thus produce and distribute goods and services, Deutsch says that "cultures" produce, select, and channel information:

A common culture, then, is a common set of stable, habitual preferences and priorities in men's attention, and behavior, as well as in their thoughts and feelings. Many of these preferences may involve communication...we found culture based on the community of communication, consisting of socially stereotyped patterns of behavior, including habits of language and thought; and carried on through various forms of social learning, particularly through methods of child rearing standardized in this culture. (Ibid, pp. 62 & 21)

Sometimes these patterns of culture are called "national character" -- the invisible configuration of values, of rules for distinguishing between do's and don't's, good and bad, beautiful and ugly, interesting or indifferent, etc. A society produces a transportation infrastructure and a printing press; a culture produces a traffic code and an alphabet. A society builds physical walls; a culture imposes taboos. A society "communicates" in terms of tangible goods and services; a culture "communicates" patterns of information -- patterns about how to arrange objects in space, patterns of action, patterns of preference (morality or taste), or patterns of codes and symbols which contain information about other patterns.

"Culture" and "community" are terms which Deutsch says can be used interchangeably since they describe the same phenomenon; yet the terms stress different aspects of the phenomenon which are important. Insofar as a culture facilitates communication within it, it also forms a community.⁷⁷⁾ But "culture" emphasizes more the configuration of preferences and values and institutions divorced from living human beings; a "community" emphasizes the communication process and the living individuals who carry the culture in their minds. (Ibid, pp. 62-63)

There can be no community or culture without society -- without work and products -- and there can be no division of labor in a society without some communication of information. The difference between a society and a community, however, can be crucial to issues and problems of "nationality". It is possible for different communities to live in one society, exchanging specialized goods and services but developing few channels of communication and exchanging little information. Many events -- e.g., depressions or "booms" -- may be similarly experienced but not shared by the communities in such a society. It is also

77) Particular cultures may develop a pattern of extreme interlocking roles -- e.g., male-female, father and child, master and slave -- which inhibit communication between them to a narrow range of subjects permitted by the culture. (Deutsch, 1963, p. 63)

possible for one community to have within it very disparate occupational or economic classes which experience quite different ways of life, but share their experiences vicariously through communication. (Ibid, pp. 69-70)

A community then is made up of complementary habits and communications facilities and it requires equipment to do a job. The job is the storage, recall, transmission, recombination, and reapplication of information, and the equipment includes memories, symbols, habits, libraries, school systems, etc.

A larger group of persons linked by such complementary habits and facilities of communication we may call a people. (Ibid, p. 70)

This larger group called "people" will take the form of individuals from different classes and occupations aligning themselves around a center and a leading group along social, economic, and political lines. The primary basis of this alignment is the complementarity of communications habits which unites the members of the group through more intensive social communication. Often, the complementarity of economic and social preferences links the individuals to the center and leading group as well. The use of industrialism and the market economy has made the economic links -- and also psychological links which are related to a need to succeed or achieve -- much more important. (Ibid, p. 75)

In the modern era, a "people" merges into a "nationality" as large numbers of individuals from lower and middle classes align and link themselves to geographic centers and leading social groups through channels of social communication and economic intercourse. Such an alignment offers to its members the possibility of upward social mobility from one link to another, a claim to a privileged position, and greater opportunities and security. It does so mainly by emphasizing the nationality's preferences and peculiarities and by lessening the competition from the outside. Where the division of labor in a society is competitive and stratified, nationality can thus restrict horizontal competition and substitution from the outside, and at the same time enhance vertical substitution and mobility within the nationality by eliminating or lessening internal, linguistic, racial, class or caste barriers. Communications patterns in a nationality thus gain significance and power from the barriers and patterns which exist in it --

Once the pressures of uprooting and insecurity are then added to these horizontal and vertical barriers, the stage is set for the rise of the political movement of modern nationalism -- that is, for the vast effort to convert the channels of culture into stormladders for the masses of individuals to social advancement and economic privilege. (Ibid, p. 77)

The key to when a "people" becomes a "nationality" is an attempt by nationalists to gain and exercise power through the force of nationalism -- a people striving for some measure of control over the behavior of its members. Such power can be exercised informally through social arrangements, the pressure of group opinion,

and the prestige of national symbols, or more strongly through formal social and political organizations, education and economic institutions, or the machinery of government. These instruments of power function by strengthening and elaborating those channels of communication, behavior preferences, and political and economic linkages which support and make up the nationality. Once a nationality has acquired this power and control over its members, it considers itself a "nation" and is recognized as such by others. Finally, when the nation is successful in putting into operation a state governmental organization, it has become sovereign and is a "nation-state." (Ibid, pp. 78-79)

This evolution of integration levels has one common factor which Deutsch has emphasized -- social communication:

What we are interested in here is the observable ability of certain groups of men and women to share with each other a wide range of whatever might be in their minds, and their observable inability to share these things nearly as widely with outsiders....It is these concepts of information, of the capacity of a communications system, and of the complementarity of its parts, which would be helpful in the field of social science. For all cooperation among human beings requires at least some degree of communication. The richer their cooperation in producing tangible goods and services, in developing highly organized societies, and in developing and sharing intangible treasures of knowledge, art, and values, the greater their need for rich, varied, quick, and accurate communication. We cannot measure directly the piety, beauty, courage, or steadfastness of human beings, but we can measure to a significant extent the ranges and kinds of messages which they can transmit to each other, the speed and accuracy with which they can do so, and the price in effort and in lost information which they have to pay. (Ibid, p. 65)

Deutsch goes on to summarize how social communication interacts with a group of people to promote integration and unity as it progresses from a culture to a nation:

The communicative facilities of a society include a socially standardized system of symbols which is a language, and any number of auxiliary codes, such as alphabets, systems of writing, painting, calculating, etc. They include information stored in the living memories, associations, habits, and preferences of its members, and in its material facilities for the storage of information, such as libraries, statues, signposts, and the like; and a good deal more. Some of these facilities, individual and social, also deal with the treatment of information, its recall from storage or memory, its transmission and recombination to new patterns. Taken all together, they include, therefore, in particular the elements of that which anthropologists call culture. If these elements are in fact sufficiently complementary, they will add up to an integrated pattern or configuration of communicating, remembering, and acting, that is, to a culture in the sense of the citations quoted earlier in our discussion; and the individuals who have these complementary habits, vocabularies, and facilities are what we call a people.

It is now clear why all the usual descriptions of a people in terms of a community of languages, or character, or memories, or past history, are open to exception. For what counts is not the presence or absence of any single factor, but merely the presence of sufficient communication facilities with enough complementarity to produce the overall result. The Swiss may speak four different languages and still act as one people, for each of them has enough learned habits, preferences, symbols, memories, patterns of land-holding and social stratification, events in history, and personal associations, all of which together permit him to communicate more effectively with other Swiss than with the speakers of his own language who belong to other peoples. (Ibid, pp. 70-71)

What Deutsch proposes is a functional definition of national integration based on "performance tests" which are of great value to the researcher because the variables can be observed and measured. In short, members of an integrated group have the ability to communicate more effectively and over a wider range of subjects with one another than with outsiders. This result, however, can be achieved by a variety of functionally equivalent arrangements and one must be careful about assigning too much importance to the most obvious communications devices. This is what holds people together from within. Nationality, culture and communication are concepts inextricably bound to the daily lives of individuals, and yet are relatively independent of them in that they can -- and must -- be exercised only within the context of a group.

Deutsch suggests that social communication could therefore be tested and measured before certain political decisions are taken. Within one people, the range and effectiveness of social communication between different classes, religions, races, castes, etc. can indicate how integrated it is. Many different concepts and techniques from different disciplines can be applied to specific situations -- patterns of land settlement, transport traffic, languages and dialects, major market areas, classes or castes, social institutions, distribution of skills and wealth, etc. can all be plotted on a map of the nation (or region):

The result might well be a map of overlapping clusters, together with indications of the volume of actual communication and traffic between them. The patterns of migration and mobility, the movement of students to school, the number of readers of newspapers and listeners to radios, the movements of workers seeking employment and of farmers going to market, as well as the main patterns of informal communication should eventually appear on such a map. (Ibid, pp. 43-44)

This type of exercise cannot give a definite judgment about attempts to unify or integrate a nation or region, but it can provide a background of the conditions and potential difficulties which such attempts will have to face.

An essential element in any social science theory is the development of meaningful operational indices for the variables under consideration. In further developing his previous theories regarding the relationship between social communication and political integration, Deutsch has used transaction flows as quantitative indicators of social communication. He has called this research technique "essentially a performance approach in the study of integration," and says the following:

The preceding discussion has suggested that we could improve our appraisal of the mutual relevance of political units to one another and of their potential cohesion by using as quantitative indicators the measurements of the flow of certain transactions between them." (Deutsch, Karl, "Transaction Flows as Indicators of Political Cohesion," in The Integration of Political Communities, Jacob & Toscano (ed), J.B. Lippincott and Co., Philadelphia and New York, 1964b, p. 75).

Deutsch considers transactions to be those ordinary and daily acts of interaction which can be counted, measured, and analyzed. Communities can then be conceived of at least partly in terms of the probability of mutual transactions between residents -- the probability being that transactions within the community will be more frequent and more important than those external to the community. The "salience" of a relationship in an individual's life can be measured by the amount of time and resources he spends on that relationship; and this opens the way for studying transactions in a community:

Transactions are therefore the first step to salience. The study of the quantitative densities is the first step toward estimating the degree to which people are connected with each other. (Deutsch, 1964 a, p. 51).

The second step in studying transactions is to measure their covariance. Covariance refers to the jointness of the rewards or penalties among the partners of the transaction. A theory of how this covariance works and relates to integration makes use of the reinforcement concept from learning theory. If there are a significant number of salient transactions which produce joint rewards, all the people involved will like them, and if these transactions are visible, identifiable, and distinguishable, an image of a "community" may begin to form around them. As this process repeats and reinforces itself, a sense of belonging may develop among the people experiencing the jointly rewarding transaction and become patriotism or nationalism or some other term signifying that the individual has identified with the community. When this psychological identification has gone far enough, the individual will retain that identification even if the rewards cease and penalties begin. The rewards must return again at some future time, however, because if they cease forever the community identification may break. Moreover, in the learning process they must occur relatively early -- before the penalties -- and they must be strong and frequent enough to initiate the habit.

Deutsch offers two hypotheses which concern transaction covariance and which are based on experiments with rats:

The first hypothesis that follows would hold that if people have experienced a high level of transactions, with substantial joint rewards at one time, they may be quite willing to accept joint deprivations at a later time, provided joint rewards come again still later ... The second hypothesis, still generalized from the rats and the cheese, is that a group of people taught to identify with each other by means of initial joint rewards but then reinforced by a probabilistic mixture of joint rewards and joint deprivations will show greater cohesion and greater strength of habit than a group of people who have experienced nothing but joint rewards. (Ibid, p. 55).

This theory, which begins with transactions and then goes on to concepts of joint rewards and deprivations, psychological responses to those reinforcements, and the resultant integrative attitudes toward the community, can be measured at every step along the way Deutsch contends. Responses to rewards, identification, perceptions, etc. can be measured through attitude sampling and confirmed from observed community voting and political behavior. The point should be made once again here that the actual and perceived covariance of transaction rewards and penalties may be two different things -- the perception may be totally unrealistic and still crucially important.

Transaction flows then establish the "mutual relevance" of the units involved on the assumption that having much to do with one another is the essence of "relevance" and therefore are a measure of "acculturation, assimilation, and integration." (Ibid, p.69) But transactions are not always pleasant or beneficial and elaborate social barriers may be combined with transactions to prevent the subsequent development of human or social relationships -- e.g., between master and servant. Transaction theory is really based on the following three steps:

- (1) The higher the transaction levels between two groups, the more salient each becomes to the other; however, salience may be positive or negative.
- (2) The higher the levels of mutually indulging transactions, the higher the positive salience; the higher the levels of mutually depriving transactions, the higher the negative salience.
- (3) The higher the positive salience, the higher the probability for cooperation and integration; the higher the negative salience, the higher the probability for disintegration and conflict. (Toscano, James V., "Transaction Flow Analysis in Metropolitan Areas: Some Preliminary Explorations," in The Integration of Political Communities, Jacob & Toscano (ed), J. B. Lippincott & Co., Philadelphia and New York, 1964, p. 102).

A study of transaction flows may look at whether they are on the increase or decrease, and sometimes may compare their progress with that of a comparable set of communities about whom there is greater past knowledge. There is certainly more than one kind of transaction, and if they happen to be moving in

opposite directions a situation of "cross-pressure" occurs. Integration will take place only if most major transactions are moving in the same, positive direction. Otherwise, disintegration or stagnation with slight fluctuations may occur. (Deutsch, 1964b, pp. 85 & 89)

Most of Deutsch's examples of transaction indicators have been used at the national level, but at least some may be applicable also at the regional level. The first of these mentioned is the flow of mail. Deutsch characterizes communities with a high as opposed to low mail volume in terms of literacy, the opportunity for political action, etc. The Domestic to Foreign mail ratio can be an indicator of national vs. foreign preoccupation in a nation. Whatever the specific way this transaction is used, communications via mail correspondence can be charted over time and/or from one place to another. (Ibid, pp. 76-82)

Telephone calls are another transaction for which data can be obtained fairly easily. One way of using this data which Deutsch describes is to take the number of telephone calls between any two cities which are considered representative of an integrated area, and by using a formula which takes into account the number of telephones in each city and the distance between them, to predict the number of phone transactions between other pairs of cities in the same area but which are divided by national, language, or other boundaries. Actual figures can then be compared against predicted ones in order to see the effect of those boundaries.⁷⁸⁾ (Ibid, p. 82)

Some other transactions would include the movement of people and the movement of goods between two or more communities. Economic trade indicators, however, are often not correlated with other transactions, and human mobility is seen as more important because integrative learning depends on human communication more so than commodity communication. Immigration or other travel figures could indicate how many people are moving between communities and whether it is a temporary movement or a permanent change in residence. (Ibid, p. 85 & 89)⁷⁹⁾

78) See Deutsch, Karl, and Isard, Walter, "A Note on a Generalized Concept of Effective Distance," Behavioral Science, Vol. 6, October 1961, pp. 308-311 for a further discussion of this technique.

79) Within a community, local communications transactions can be subjected to content analysis for indications of that community's distribution of attention between itself and other communities, as well as for favorable or unfavorable judgments and value patterns applied to those other communities. (Deutsch, Karl, 1964 b, p. 83)

In the case where many different kinds of transactions are measured, the question of weighting the more important transactions in order to reach some aggregate measure of all of them arises. When different indicators are forced into a single weighted index, however, there is a danger that different people will add and weigh the same indicators differently, resulting in as many indexes as there are people. The covariance between different transactions and their trends should be carefully analyzed, but Deutsch concludes that --

The time is not yet ripe for a single numerical index for transactions which would yield significantly more information than its components or which would at least yield the same information as its components with some degree of economy. (Ibid, p. 87)

If such a single index for transactions is desired, Deutsch adds, it might be developed in terms of attention percentage or time investment, which would require estimates of the total attention span of an individual or group plus that part of the total span taken up by integrative partners. These estimates and computations, however, would be extremely difficult. (Ibid, p. 88)

One example of a study which makes use of social communication and transaction concepts is a geographical analysis of modernization by Edward Soja⁸⁰ -- an attempt to examine the patterns of areal differentiations caused by modernizing forces, the evaluation of these patterns, and their relevance to the general study of modernization in developing areas through social communications:

The fundamental premise of the study is that geographical patterns of modernization reflect the relative extent of social mobilization throughout the state-area and, by association, are closely linked to the development of a national network of social communications Whereas social mobilization is the fundamental process behind the transition to modernity, the network of social communications is the grid or matrix over which modernization takes place. Social communications is a comprehensive term which includes all aspects of interpersonal contact, ranging from a weekly social meeting to the growth of markets and a modern economy. Anything which broadens the information field of an individual promotes social communications. (Soja, op cit, p. 3)

The study also relates integration to transaction flow analysis:

Transaction flow analysis provides another tool with great potential for analyzing the flow of information and the pattern of greater-than-expected interaction between areas. It supplies a means for determining the salient linkages within a given system -- connections between units which indicate that a high level of mutual awareness and relevance exists. This structure of salient transaction flow is the primary skeletal glue which holds the system together and provides the basis for successful territorial integration. (Ibid, p. 117)

In brief, Soja identified nine broad "indicators" of modernization and chose 25 specific "key variables" related to these indicators for which data

80) Soja, Edward, The Geography of Modernization in Kenya, Syracuse University Press, Syracuse, 1968.

was available in Kenya. The 35 administrative districts which existed in Kenya prior to a 1963 boundary change plus Nairobi were then ranked according to each variable and a matrix of Spearman Rank Correlation coefficients was derived from this data. Using this matrix, the variables were then subjected to a form of multi-variate analysis called the principal components technique which is designed to synthesize a large number of variables into a small number of underlying "dimensions" based on the statistical interrelationships of the variables, and thus provide a simpler -- and yet graphic -- description of the phenomenon being studied.

When the average rank correlation coefficients of each variable with all others were tabulated, five of the first six -- total numbers of radios, telephones, postal traffic, and Swahili and English per capita newspaper circulation -- were direct measures of communication. (Ibid, p. 75)

Chapter IV

A Methodology for
the Objective Determination of the Balance of Regional Scientific
Benefits

One of the major points made in Chapter III is that the member states in a multi-national grouping expect equal or proportionally fair-i.e., proportioned according to the contributions of the member states-benefits from any multi-national arrangement. Many of the regional groupings cited briefly in Chapter II have floundered or have not achieved the results expected of them for just this reason that one (or perhaps two) member state has believed she was not receiving a fair share of the benefits from the regional system and therefore pulled out of or otherwise disrupted it. The recent history of the East African Community and its predecessor regional organizations as described in Appendix I to this study shows the same trend as disputes mainly over the economic benefits of the common market trade arrangements have caused problems between Tanzania and Kenya. The same kind of problem seems to underlie EAAFRRO's relationships with the Partner States. In reading the debates of the East African Legislative Assembly over EAAFRRO appropriations, one is struck by the charges from Tanzania and Uganda that they are not receiving as much of the benefits from this institution as Kenya is.¹ To be sure, there were some charges that EAAFRRO research was not benefitting anyone and that the institution should be entirely scrapped, but most of the critical discussion centered around the unequally balanced distribution of EAAFRRO's benefits.

In order to understand some of the feelings that may lie behind these kinds of critical remarks about EAAFRRO, which seem to be reflective of the general informed opinion in the Partner States, some background is necessary. Before World War II, the East African Agricultural and Forestry Research Organization was not located in Kenya, but in Tanganyika at Anani, the present site of the East African Malaria and Vector Borne Diseases Research Institute. After World War II, the colonial government of Kenya "generously" offered some free land to EAAFRRO if it wanted to move to Kenya, which it did. The organization flourished at its present site at Muguga, only 18 miles from Nairobi-the colonial center for all of East Africa-and in an ecological environment generally similar to the "White Highlands" where European settlers were engaged in large-scale, modernized agriculture. These were the days in which racial tensions between African and European were probably most explicitly defined

¹ Although the direct contributions of the Partner States to the General Fund Services of the EAC, which includes the Community's research institutions, are not equal, this inequality was intended to be a redistributive device among the Partner States to compensate those States which had benefitted the least- or may have even been harmed-from the activities of the Community. Therefore, it is undoubtedly correct to say that an equal distribution of the benefits of EAAFRRO's agricultural and forestry research and services among the Partner States, over a period of years, would be the ideal situation from the EAC's point of view.

and when the modern anti-colonial forces were beginning to emerge. Rightly, or wrongly, EAAFRRO become identified as a "white man's institution", and it is this legacy that lies behind at least some of EAAFRRO's problems. Now that independence has come to all of East Africa but the expatriate Europeans are still around at EAAFRRO and principally on Kenyan farms, Tanzania and to a lesser extent Uganda have a ready basis for criticism and the indigenous Kenya government is unfortunately caught in a position of being on the defensive about this regional institution that is located in their country through no action of their own.

One aspect of this issue of benefits mentioned in Chapter III was the desirability of having some "objective" way of measuring them and determining what the distribution "really" was. It would be very difficult to measure the "benefit" that accrues to a country from the outputs of a scientific research institution, but in this chapter a methodology is developed and utilized which attempts to determine the balance of scientific research and scientific service benefits among Kenya, Uganda and Tanzania.

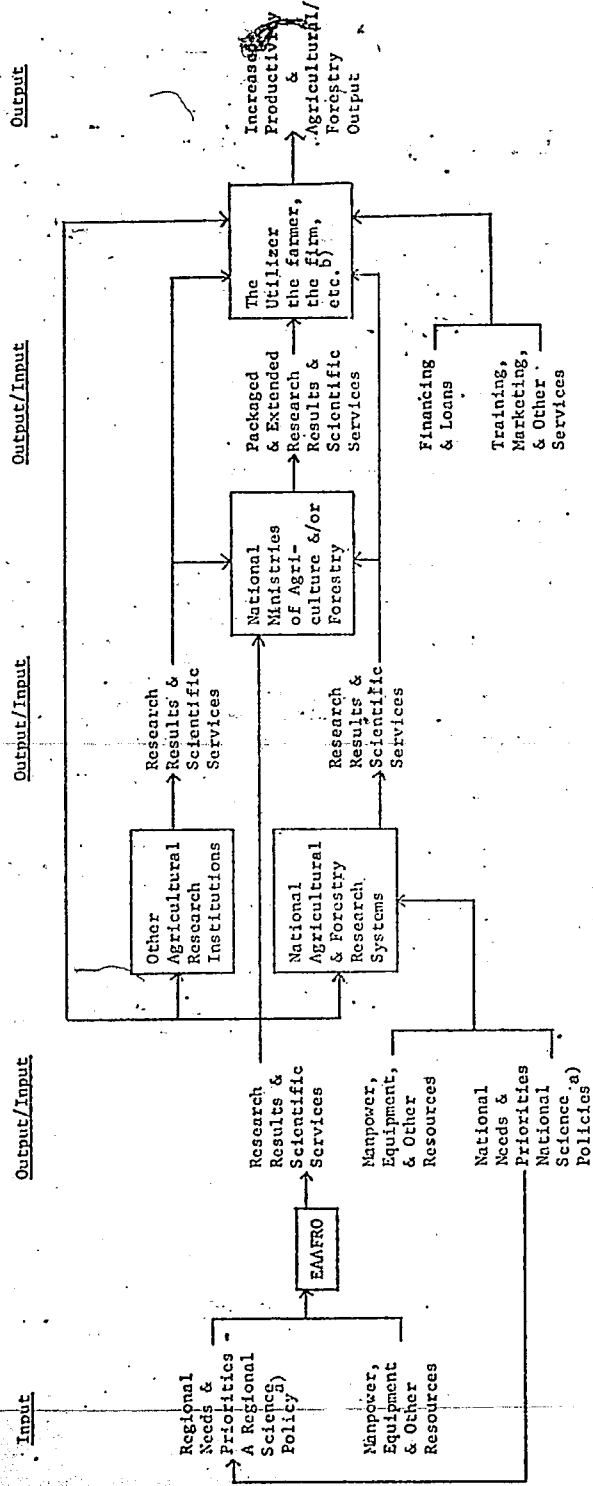
In preliminary discussions out at EAAFRRO, it was found to be very helpful to distinguish between Research Results and Scientific Services in talking about EAAFRRO's direct scientific outputs. For the purposes of this study, "research" is characterized by its experimental nature and by work being done for one's own purposes; "services" are also scientific in nature, but are usually more routine work and are done for someone else's purposes--i.e., for someone else's research. Figure IV.1 on the following page points out the relationships between EAAFRRO and national agricultural and forestry research systems in East Africa with respect to the flow of these research and service outputs. These EAAFRRO outputs can be inputs into national agricultural and forestry research systems to subsequently flow to national ministries or final utilizers, but they can also be inputs to other² non-governmental agricultural research institutes in East Africa or inputs that flow directly to national ministries or final utilizers.

EAAFRRO Priorities

The methodology used in this chapter was fairly simple. First of all, EAAFRRO's research projects and services were ranked in priority order on the basis of criteria which reflected EAAFRRO's own priorities--the amount of man-

²"Other" includes national universities, where some research is done in the Faculty of Agriculture, private research institutions such as the Tea Research Institute or Coffee Research Foundation, and private firms which are conducting some research by themselves or in cooperation with EAAFRRO. There are no "other" forestry research institutions in East Africa.

Figure IV.1 INPUT-OUTPUT FLOW DIAGRAM OF AGRICULTURAL AND FORESTRY RESEARCH SYSTEMS IN EAST AFRICA.



a) There were no explicit national or regional science policies in East Africa at the time of the study, but the lack of such policies is, in itself, a kind of science policy.

b) In some cases, the Utilizer may be the Ministry itself or an institution which is part of or comes under the Ministry.

power time and effort devoted to each activity, both currently when the study was done and previously if the activity had passed its peak effort. One qualification should, however, be noted. Several EAAFRO activities are largely supported by external aid, and there is a legitimate question if these activities reflect EAAFRO's priorities or those of the donor country or international agency. Since it was impossible to resolve this issue satisfactorily, it was assumed that these aid activities were the result of--at the very least--EAAFRO acquiescence after negotiations, and that they did reflect EAAFRO priorities. Attempts were made to utilize other criteria in ranking EAAFRO activities according to their own priorities, but none worked out. Monetary expenditures on each project or service, for example, would be one obvious criteria, but the EAC budget for EAAFRO was broken down in categories such as salaries, expenses, transport and traveling expenses, etc.³

The activity portfolio outlined in the chapter was taken at a specific point in time--late 1971 and early 1972--and so the analysis may suffer from this time constraint--i.e., it may be charged that the results obtained are valid only for this one point in time and that similar analyses performed for previous portfolios would lead to different priority conclusions. This, indeed, may be a consideration to keep in mind. Nevertheless, there are several reasons why this time constraint should not detract too much from the results. First of all, almost all of the major activities of EAAFRO go back in time; only a very few are of recent origin. At the same time, a reading of previous Annual Reports and Newsletters reveals only one area where EAAFRO activities might have been curtailed just prior to late 1971, and that is in the Animal Production Division. Secondly, with the growth of nationalistic pressures upon EAAFRO, they should have been ever more aware and concerned about a balanced portfolio and keeping all three countries satisfied. And, indeed, this author found awareness and concern for this factor to be very high among the EAAFRO administration and research officers. If there is any error in this analysis due to time constraint, it is likely to favor EAAFRO rather than hurt it.

Secondly, each EAAFRO research project was examined and ranked for

- 1) the EAAFRO activity in Kenya, Uganda, or Tanzania that it generated;
- 2) the EAAFRO involvement with or cooperation from Kenya, Uganda, or Tanzania.

³Estimates of Expenditure of the East African Community for the Year 1971-1972, EAC, 1971, pp. 108-109.

that it generated; and the 3) applicability of it in Kenya, Uganda, or Tanzania. In addition, the origins of the projects were investigated insofar as possible, and the different Partner States or EAAFRO or foreign sources of impetus for beginning the projects were checked off. In a related issue, any input that Specialist Committees had into the project selection process of EAAFRO of the particular project was noted. Thirdly, a subjective judgement was made on the basis of the above variables of the orientation of the project toward the entire region or toward Kenya, Uganda, or Tanzania-its regionality. Each EAAFRO scientific service was also examined and ranked for 1) the EAAFRO involvement with or cooperation from Kenya, Uganda, and Tanzania that it generated; 2) the applicability of it in Kenya, Uganda, and Tanzania; and 3) the utilization of it in Kenya, Uganda, and Tanzania.

A certain amount of logic had to be used in approaching the variables which were used to measure a project's "regionality". EAAFRO has to be located someplace, for example, and wherever that place was there was going to be a certain amount of scientific activity that is normally performed at a headquarters-e.g., laboratory analyses. Field sites away from headquarters that were involved in a particular project, however, were used as an indicator measure of the distribution of EAAFRO activity for that project. It was not just the existence of a field site, however, but how important that field site was and how much EAAFRO activity took place there. The "applicability" of a research project was measured principally by an ecological "locale specific" characteristic that was attributed to the subject matter of the research. Particularly in agricultural research, it was discovered that research carried out on a particular crop, at a particular altitude, with a particular rainfall pattern, or under particular soil conditions might not be applicable only a few miles away where the altitude, rainfall pattern, or soil conditions were different. In addition to this ecological constraint on the applicability of research projects, people constraints were considered as well. In some cases, the people for which the particular research crop was intended just did not desire or utilize it despite its ecological applicability in their area. It should be noted, however, that "applicability" does not include a consideration of subjective national priorities among crops or agricultural research-that aspect is discussed later. Origins of EAAFRO projects, insofar as they could be determined many years after some of them had begun, were also thought to be an important characteristic affecting the projects' regionality. Different sources of impetus in initiating particular EAAFRO projects that were considered were in-

ternal EAAFRO sources, foreign sources particularly scientific aid sources, or one or more of the Partner States sources. There could, of course, be more than one source behind the initiation of a particular project. The Specialist Committee system is discussed later in this study, but briefly these committees are explicitly charged to have national representation on them and to make recommendations on the projects which EAAFRO should select to carry out in a particular field. The extent of this national participation in the selection activity of particular EAAFRO projects is what is noted in this chapter.

The EAAFRO Interview

Although EAAFRO publications such as the Annual Reports and the Newsletter were important sources of information in carrying out this part of the study, the most important source was the extensive interview given to almost all of the research officers on EAAFRO's staff in late 1971. Besides the specific information items discussed above, the EAAFRO interview was given to enable this author to gain a general working knowledge of all EAAFRO's activities. It was necessary to know what EAAFRO was doing before interviews were attempted at the national level, because in the national interviews the relationships of the national officer to EAAFRO work and personalities would be explored quite extensively. In order to administer this national interview properly, in order to gain credibility with the national respondents, and in order to intelligently evaluate, follow-up, and interpret their responses, it was necessary to know EAAFRO's activities and how they might be relating to or linking up with national research systems.

The actual EAAFRO interview is shown below. An original version was pilot tested on four EAAFRO officers before this one was used for the remainder. It probably should be pointed out that these questions actually evolved in this author's mind over a period of months while talking with these same officers on an exploratory, unstructured basis. Many of the questions did not provide useful data for direct measurement purposes and some overlapped with others, but they did provide additional insights and information that was quite useful and so they were left in. Also, the instrument was not used rigidly--follow-up questions were asked depending upon the initial response, the wording was changed if a question was not understood, the order of questions was changed if a Respondent inadvertently jumped ahead, etc. The objective was to gain as much useful information as possible, and the instrument proved to be relatively successful. Interviews lasted from one-and-a-half to three hours, and there was hardly any indication that the EAAFRO officers resented this as an imposition on their time. On the

contrary, after the careful preparation this author had gone through in gaining permission at all levels for conducting the study and the time spent in gaining the confidence of key people at the site, most of the officers interviewed seemed to recognize that they were members of a somewhat controversial institution in a fluid political environment, and--having gained their trust--wanted to tell what they knew and felt.

Introduction:

As you may have heard, my name is Ted Schlie and I'm from the Institute for Development Studies at the University of Nairobi -- an institute which is part of the University and supplies some teaching services but which is more research oriented than the regular university department. I am being sponsored over here by grants from the National Science Foundation and the Ford Foundation -- through the Council for Intersocietal Studies of Northwestern University -- from the United States in doing this research for my Ph.D. dissertation in Industrial Engineering and Management Sciences from Northwestern University.

My principal interest over here is the relationships between the multi-national research institutes of the East African Community and the counterpart scientific systems of the Partner States which make up the Community (if they exist) -- particularly between the East African Agriculture and Forestry Research Organization and the national agricultural and forestry systems of Kenya, Uganda, and Tanzania. Since last February when I arrived, I have been working on background studies and acquainting myself with the East African research situation. I have talked at length with Dr. Starnes, Dr. Majisu, Dr. Wangati, and Tecwyn Jones -- among others -- as well as with people at the national level, and I believe that the results of my research will be useful to both regional and national level decision-makers in agricultural and forestry research.

The main part of my data will involve interviewing national agricultural and forestry researchers in (hopefully) all three Partner States, but in order for me to follow-up their responses with further questions and to intelligently interpret those responses, I must know a great deal about EAAFRD and how it works. Therefore, I am going to be asking you some questions about the nature of your scientific work here and your linkages with national researchers and institutes. Dr. Majisu, the Communications and Research Secretariat of the EAC, and the Kenya Government have all given their permission for me to do this. I doubt if there are any questions which you will be hesitant about answering, but in any case all the information will be strictly confidential and will not be attributed to or identified with anyone without their permission.

Are there any questions you would like to ask me before we begin?

Then first I would like to get some background information from you --

(Questions one through six were either asked or noted. In No. 1, the location of the interview was noted since some of EAAFRD's officers were stationed at decentralized points throughout East Africa. Question No. 2 concerned the Respondent's name, being very careful to get the spelling correct, and Question No. 3 concerned his rank or title and the EAAFRD Division he was in. In Question No. 4, the Respondent's citizenship was asked and the race -- African, Asian or European (i.e., white) -- and sex were noted. Several aspects of educational background were ascertained in question No. 5. For all respondents, the highest degree and the date and place of receiving that highest degree were asked, and

respondents who were citizens of East Africa and had a degree higher than a BSc were also asked the same information about their BSc education. Question No. 6 was asked to determine the length of total research experience of the Respondent, the length of research experience at EAAFR0, research experience elsewhere in Africa, and where and what the Respondent was doing just prior to joining EAAFR0. Obviously, some of the questions in No. 6 overlapped and many times not all of them had to be asked directly.)

7. What are the terms of your employment here in connection with external scientific aid -- that is, are you supported at all by any external sources, and if so by who, how, and in what proportion?

8. Approximately what percentage of your time is taken up by administrative duties as opposed to your actual scientific work here?

9. Could you now give me a brief description of your scientific work? (Note on No. 9: As the description proceeds, arrange the work into specific projects and services -- if the respondent does not do so himself -- and use follow-up questions to ensure that each project or service has a specific goal. When the respondent is finished, sum up his response in terms of project and service titles which he is asked to agree with or change. If it is not clear from his previous remarks, determine whether these items are of major or minor importance, the dates when they began, and dates when they are expected to finish -- if there are any!)

If we call "research" work that you do which is connected with an experiment you are involved in, and "services" work which you do for someone else's experiment, approximately what percentage of your scientific work is research and how much is services?

Using the commonly held definitions of fundamental or basic research and of applied research, approximately what percentage of your research work is fundamental and what percentage applied? (Note: do not use the "development" category unless the respondent specifically wants to use it. If he presses for definitional guidelines, stress that he should answer on the basis of what he thinks according to his own definitions.)

10. Beginning with the first project on title, are there any other people at this institute also working on it? (Note on No. 10: Get the names of other researchers, only the numbers of lab assistants or technicians, etc. working full or part time on it.)

11. Are there any people from the national level collaborating on this project? Who are they? Where are they from? How are they collaborating with you? How and when do you communicate with them? etc. etc. (Note on No. 11: A lot of follow-up questions have to be asked on this question to get all the information straight. There is a good chance that answers to other questions will come up here, so take note of them to use later. This question is very detailed and can be quite time-consuming, so it is necessary to approach it carefully with the respondent.)

12. How and where will the results of this project be potentially utilizable in East Africa? Here is a map of East Africa if you would care to use it. Is it possible for you to indicate the importance of this utilizability in some quantitative way for the three countries? If not, can you indicate the importance in terms such as "Very Important," "Important," and "Not So Important?" (Note on No. 12: A quantitative indicator of importance can be the

amount of semi-arid land or the number of acres of plantation forest a country has, depending on the specific project. Examples like this are given to the respondent and he is pressed to answer in some quantitative way if at all possible.)

13. Have there been any results from this project yet? Have they been communicated to anyone at the national level yet? To whom? From where? How were they communicated? When and how many times? etc. (Note on No. 13: If there is national collaboration on this project, much of this information may have already been given in response to No. 11, but it is asked anyway in case any new information comes out.)

Have any of these results been actually utilized yet as far as you know -- in other experiments or in the field? By whom? From where? When? In what way? etc. etc.

14. (Note on No. 14: If the respondent has a large proportion of administrative duties -- See No. 8 -- such as the Head of a Division does, this question is skipped and No. 21 is asked instead when its turn comes.) I would like to explore this matter of personal visits a little further -- how many times in the past two years have you visited national institutes, field sites, etc. in connection with this project? Who? Where were they from? How often have they come and how long did they stay? etc.

Finally, can you approximate how often you communicate by correspondence and by telephone with any national level people concerned with this project in Kenya, Uganda, or Tanzania? (Note on No. 14: Much of this information may -- once again -- have been given in response to earlier questions.)

15. How was this project originally selected to be worked on? (Note on No. 15: If not included in the response, follow-ups on the date and originator of the first initiative, the relationship of the actual process to the official selection committee process, and the existence and extent of external scientific aid influence are asked.)

(General Note: Questions 10 - 15 are repeated for each project on a separate response form sheet.)

16. Are there any other people at this institute also working on providing this _____ title _____ service? (See Note to No. 10)

17. Are there any people from the national level collaborating on providing -- not utilizing! -- this service? Who are they? Where are they from? How are they collaborating? How and when do you communicate with them? etc. (See note to No. 11)

18. What types of scientific work is this service potentially applicable to? Where in East Africa is this work being done -- or likely to be done -- at the national level?

19. Do you have any quantitative ways of measuring this service -- either on a national, national institute, or national researcher basis? If not, can you indicate the importance of this service for the three countries in terms such as "Very Important," "Important," and "Not So Important?" (See note to No. 12)

20. (See note to No. 14) How many times in the past two years have you visited national institutes, field sites, etc. in connection with providing this service? Where did you go? How long did you stay? When were these visits? etc.

In the past two years, has anyone from the national level visited you here -- at this institute -- and in connection with this service? Who? "here were they from? How often -- and how long did they stay?"

Can you approximate how often you have communicated by correspondence or by telephone with any national level people concerned with this service in Kenya, Uganda, or Tanzania? (See note to No. 14)

21. (Note to No. 21: This question is only for administrators -- respondents who have answered questions 14 and 20 do not have to answer this one.) How many times in the past two years have you visited national institutes, field sites, etc; in connection with any project or services or administrative duties? Where did you go? Who did you see? What for? When did you go and how long did you stay? etc.

In the past two years, has anyone from the national level visited you here -- at this institute -- in connection with any projects, services, or administrative duties?

Can you approximate how often you communicate by correspondence and by phone with all national level people connected with any projects, services, or administrative duties in Kenya, Uganda, or Tanzania? (See note to No. 14)

22. Can you list by name all of the national level researchers you personally know and where they are from? They can be in any scientific field -- not just your own. Are any of these personal friends as well as colleagues? Are any of these classmates? From where? (Note to No. 22: These researchers can be in national institutes, universities, ministries, etc. -- as long as they are connected with research. If the respondent has been in East Africa a long time, he may know more national researchers than it is practicable for him to list. In this case, approximate numbers from each country or national department which he knows are asked for, and then he is asked to list only the personal friends and classmates.)

23. Are you a member -- or have you attended -- any of the Specialist Committee meetings? Which one(s)? When did it last meet? How often does it usually meet? Where? For how long? What types of people -- besides specialized scientists -- were there? etc. How effective do you think it is and why? (Note to No. 23: It is unnecessary to ask for some of the factual data if it has been obtained from other respondents.)

24. What improvements do you think could be made at either the regional or national levels in order to improve the relationships between EAAFRD and the three countries? (Note to No. 24: The problem should be implicit in the improvement, but if it isn't, follow-up questions are asked.)

25. What does the term "science policy" mean to you?

At the moment there are no national science policies and no regional science policy in East Africa. If there were, however, what do you think the relationships should be between regional and national science policies?

26. As a scientist, what role do you think scientists should play --- as opposed to that of an economist, politician, planner, etc. -- in the formulation of science policy -- either regional or national?

27. How has external scientific or technological aid affected science and research in East Africa in the past? How would you like to see it operate in the future? (Note to No. 27: Follow-up questions are used to get at the strategy of the aid operation -- not just general statements about the amount.)

The EAAFRO officers who were interviewed and their Division or position are shown below in Table IV.1. In addition to the 37 EAAFRO officers listed,

Table IV.1 - EAAFRO Research Officers Interviewed

<u>OFFICER</u>	<u>DIVISION OR POSITION</u>
O. Starnes	Director
B.N. Majisu	Director/Deputy Director ⁴
T. Jones	Forestry, Head of Division
H.G. Dyson	Forestry
D. Griffin	"
T. Olembo	"
J. Migunda	"
F. Owino	"
F. Wangati	Deputy Director
	Physics and Chemistry, Head of Division and Head of Physics Section
M. Taylor	Physics and Chemistry
S. Cooke	"
J. Osbourne	Physics and Chemistry, Head of Chemistry Section
K.R. Bock	Plant Pathology and Nematology, Head of Division
H. Y. Kulkarni	Plant Pathology and Nematology
D. Taylor	"
J. Guthrie	"
R.P. Kahn	Plant Quarantine Service ⁵
	Head of Service
J.L. Kachecheba	Plant Quarantine Service
B. Inniss	Sugar Cane Breeding, Head of Division
I.S. Mkwawa	"
M. Simbwa-Bunnya	"
H.P. Ledger	Animal Production, Head of Division
C. Karue	"
L. Darrak	Maize Genetics, Head of Division
L. Peters	Sorghum and Millet, Head of Division
J. Overman	Sorghum and Millet
J. Kern	"
L. Allison	"

⁴Dr. Starnes resigned as Director of EAAFRO and left during the period when this study took place; he was replaced by Dr. Majisu who had been Deputy Director.

⁵Officially, the Plant Quarantine Service is part of the Plant Pathology and Nematology Division.

<u>OFFICER</u>	<u>DIVISION OR POSITION</u>
K. Whigham	Field Trials Officer
W. Judy	"
C. Kabuye	Herbarium, Botanist-in-charge
J.B. Gillett	Herbarium
M.A. Hanid	"
P.J. Greenway ⁶	"
S.D. Minto	Machinery Coordinating Service
O.N. Mohamedali	Librarian
D.N. Lazarus	Acting Librarian ⁷

there were two officers in the Statistics Division and one in the Physics and Chemistry Division who it was impossible to interview. With those exceptions, it is believed that all EAAFRO officers who were part of the organization in late 1971-early 1972 were interviewed.

A profile of those EAAFRO officers interviewed is shown in Figures IV.2-IV.8 on the following pages. In Figure IV.2, the large responsibilities that foreigners still had in the operations of EAAFRO is apparent--25 officers were not East African Citizens as compared to 12 who were. Scientists from the United States and the United Kingdom constituted the bulk of the foreign contingent with 11 and 10 officers respectively. All of the United States officers were fully supported under foreign aid--one by the Rockefeller Foundation, seven by a Participating Agency Service Agreement (PASA) of USAID with the U.S. Department of Agriculture, and three through a USAID agreement with the Institute for International Education.⁸ Seven of the ten officers from the U.K. were "topped off" by the U.K. Government under the Over Seas Aid Scheme (OSAS). In this scheme, the EAC is responsible for the base salaries of the officers and the U.K. Government for the remainder, which is from $\frac{1}{4}$ to $\frac{1}{2}$ of their total salaries, plus fringe benefits. One U.K. officer was under a special arrangement where the U.K. Government ultimately paid his entire salary, and two U.K. officers were paid entirely by the EAC.

Amongst the EAAFRO officers who were citizens of East Africa, Kenya dominated as the country of origin with seven officers--Uganda and Tanzania had two and three, respectively. Moreover, as the Africanization process has progressed, both the current Director and Deputy Director are citizens of Kenya. In Figure IV.3, the racial breakdown of the EAAFRO officers reflects the results

⁶ Now semi-retired.

⁷ O.N. Mohamedali resigned as Librarian at EAAFRO and left during the period when this study took place, and D.N. Lazarus was named Acting Librarian.

⁸ In this latter arrangement, the EAC apparently pays the base salary for these three positions into a trust fund administered by the Regional Office of AID for regional research expenses or something.

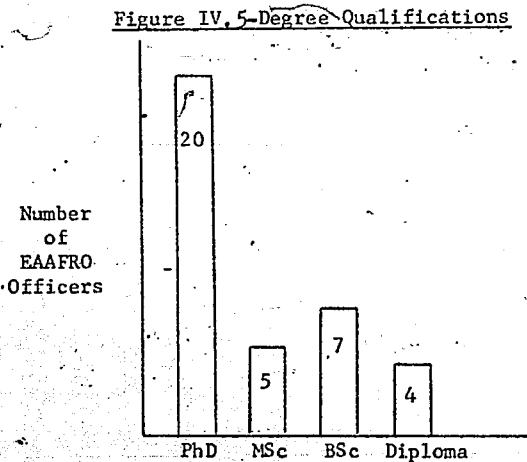
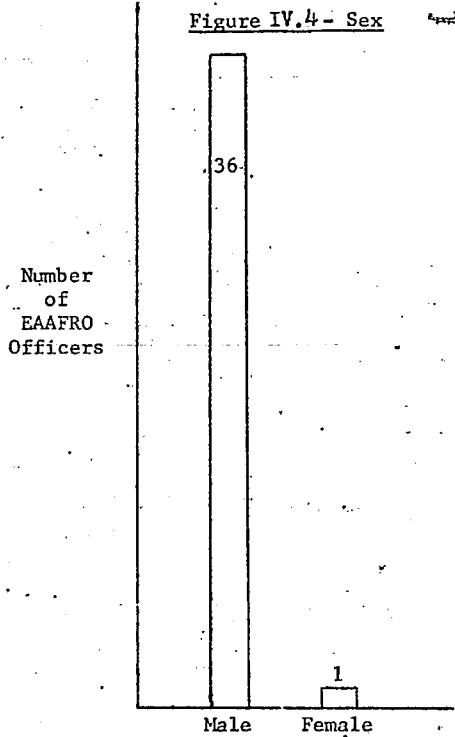
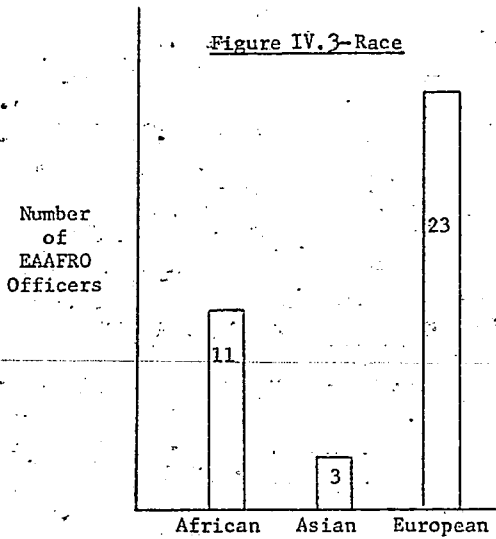
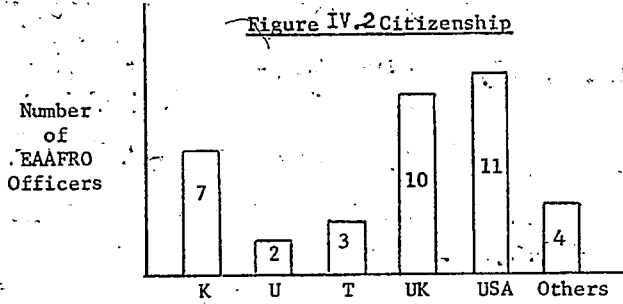


Figure IV.6 Total Experience in Research

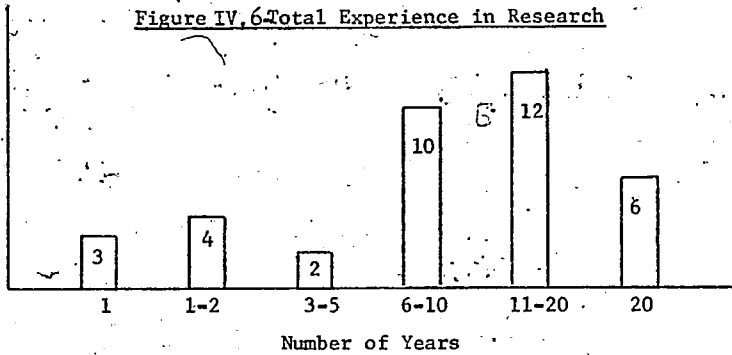
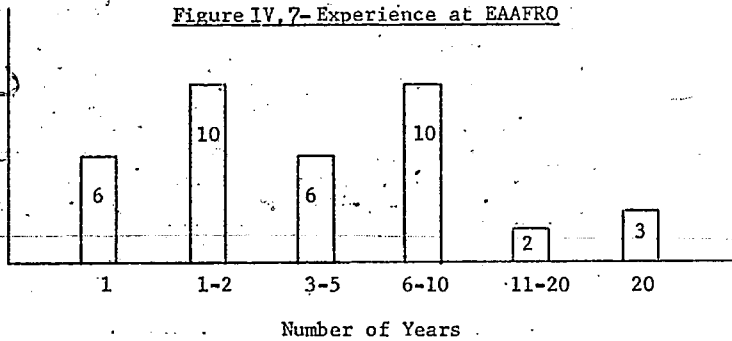
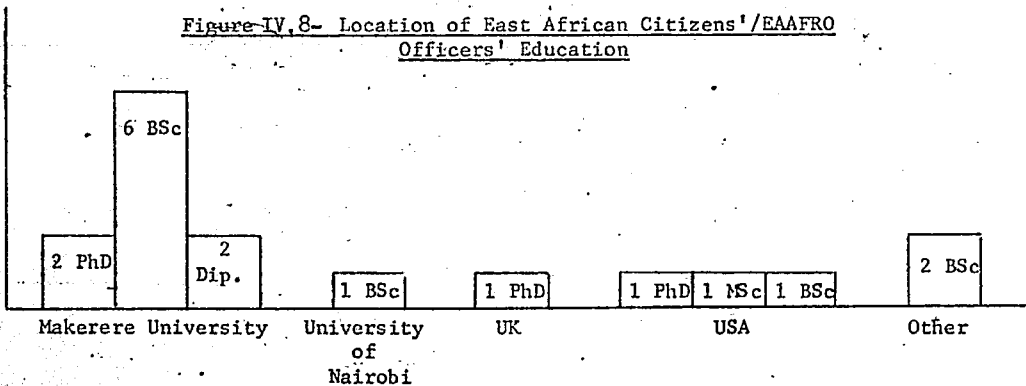
Number
of
EAAFRO
Officers

Figure IV.7- Experience at EAAFRO

Number
of
EAAFRO
OfficersFigure IV.8- Location of East African Citizens'/EAAFRO
Officers' EducationNumber
of
Citizen
EAAFRO
Degrees

shown in Figure IV.2--EAAFRO is still a foreign, white man's institution by a ratio of about two to one. Only one officer out of 37 was female--Figure IV.4.

The educational qualifications of the EAAFRO officers shown in Figure IV.5 seem to be quite high--20 officers had their Ph.D., 5 had an MA or MSc., seven had BSc or BA, and four had diploma degrees. Four of the 20 Ph.D.'s were Africans; the remainder were Europeans. Likewise, the amount of research experience of the EAAFRO officers, shown in Figure IV.6, also seems quite impressive. Only nine of the 37 had less than five years of research experience. Interestingly, eight of those nine were recent university graduates--four of them were Africans, and four of them were from the United States working on the USAID cereals projects. Experience at EAAFRO--Figure IV.7--however, was understandably much less, with almost all officers ranging between one and ten years.

The last figure--Figure IV.8--shows the educational background of the EAAFRO officers who are citizens of East Africa. Eleven of the 17 degrees obtained were obtained in East Africa--ten at Makerere University and one at the University of Nairobi. Three degrees were obtained in the United States, only one in the U.K., and one each in Canada and India.

RESULTS

The entire methodological exercise of arriving at EAAFRO research and service priorities, and the regionality of EAAFRO research projects, is included as Appendix II to this study. The results will only be summarized here, as shown in Tables IV.2, IV.3, and IV.4 on subsequent pages. In interpreting these tables, a number of different symbols are used. Numerical symbols are used in a few instances in the Activity/Field Site column when specific numbers were available. It was more often the case, however, that general answers were given to questions concerning national-level relationships on particular projects, and these lent themselves more readily to subjective judgements represented by the following symbols used in all three tables: H=High; M=Medium; L=Low; O=Zero, Nothing. These symbols should be interpreted relatively within a particular project, and not between projects--i.e., the indicator under consideration may be ranked High for one Partner State compared to Medium or Low for the others on the same project, but a ranking of High for one Partner State in one project should not be compared to any ranking for any Partner State in any other project! The Zero symbol, however, does indicate that there was no amount of the specific indicator, as compared with some--however little that "some" might be. Check marks

were also used in the Origins columns to indicate the presence of a significant impetus to the original selection of the project. Question marks were used when it wasn't clear whether or not the variable applied to any of the Partner States, and N.A. followed by dash marks indicates that the indicator is Not Applicable for that particular project. H, M, and L have a special meaning in the Specialist Committee column--H indicates that the Specialist Committee System seemed to operate as it is officially described; M indicates that the System was consulted on project selection after the fact and gave their approval; L indicates that some other apparatus was used to formally signify national-level approval; and O indicates there was or seemed to be little or no role at all played by the Specialist Committee system--or other regional mechanism--in the project selection process. The Orientation Column tries to sum up all the previous indicators and gives each project one of the following classifications: R = Regional Oriented; k, u, or t = more oriented toward, respectively, Kenya, Uganda, or Tanzania, but still some regional basis for the project; K, U, or T = strongly oriented toward, respectively Kenya, Uganda, or Tanzania; and X = little or no regional or national orientation.

Table IV.4 on EAAFR0's scientific services follows much the same pattern. The columns on Involvement/Cooperation and Applicability refer to the same indicators previously discussed for Tables IV.2 and IV.3. It was found to be easier to estimate measures of Utilization--how much the individual Partner States actually used the service--in the case of Scientific Services, however, so this indicator is added to Table IV.4. Activities/Field Sites, on the other hand, did not seem to apply to Services nearly as much as it did to Research Projects so that indicator was dropped. The internal EAAFR0, foreign, or national origins of Scientific Services were not sought because many of the services began with the establishment of EAAFR0 and most of the others evolved out of EAAFR0's own research requirements; the Specialist Committee system was designed to select research projects--not services; and the regional or national orientation of the service was found to be redundant with the Utilization variable--therefore all these indicators were not included in Table IV.4.

In examining Table IV.2, the following description of the priority classifications were used:

Class I (Highest Priority)-One to three full-time⁹ EAAFR0 research

⁹"Full-time" means that the officer has only one major project he is working on -- he may have other, minor project activities as well, however.

Table IV.2: A SUMMARY OF EAAFRRO RESEARCH PROJECTS

Project Number	EAAFRRO Projects - Key Words	Activity Field Sites			Involvement/Cooperation			Applicability			Origins		Specialist Committees	Orientation			
		K	U	T	K	U	T	K	U	T	EAAFRRO	Foreign			K	U	T
I.1	Sugar Cane Breeding	I	I	I	H	H	L	H	H	H					H	?	R
I.2	Softwoods - Breeding	H	L	M	H	H	L	H	L	M					?	?	k
I.3	Sorghum Breeding	L	L	M	O	O	O	O	N	L					O	+	X
I.4	Maize Breeding	H	L	L	M	L	L	L	H	M					O	+	k
I.5	Legumes - Virus Survey	L	L	L	O	O	O	O	H	H					O	+	R
II.1	Millet Breeding	L	M	L	O	O	O	O	O	L					O	?	X
II.2	Water Resources/Land Use	2	O	O	N	L	L	H	H	M					?	?	k
II.3	Hard & Softwoods - Decay	L	H	H	O	L	H	H	H	H					M	+	R
II.4	Basic Research - Herbarium	N.A.	-	-	O	L	H	O	H	H					N.A.	-	R
III.1	Groundwater Resources	N.A.	-	-	N.A.	-	-	-	H	M					L	+	R
III.2	Maize - Soil Fertility	H	M	L	H	M	L	L	M	L					H	+	k
III.3	Horticultural Propagation - Quarantine	O	O	O	O	O	O	H	L	M					O	?	k
III.4	Tobacco - Virus	O	L	I	O	H	L	L	H	M					O	+	R
III.5	Rice - Nematode	H	L	H	H	L	L	H	H	H					O	?	R
III.6	Rangeland - Compensatory Growth	O	O	O	O	O	O	O	H	L					O	?	R
III.7	Rangeland - Nutrient Requirements	O	O	O	O	O	O	O	H	L					M	?	k, F
III.8	Softwoods - Insect	+	+	+	O	O	O	O	H	L					M	?	k, F
III.9	Softwoods - Root Rot	+	+	+	L	M	M	?	H	L					?	?	k
III.10	Sorghum/Millet - Agronomy	O	O	O	O	O	O	O	O	M					?	?	k
IV.1	Rangeland - Silage	O	O	O	O	O	O	O	H	L					M	+	k, F
IV.2	Rangeland - Cultivation	2	O	1	H	O	L	L	H	H					O	+	k
IV.3	Water Requirements - Selected Crops	2	O	1	H	O	M	O	H	L					L	+	k, F
IV.4	Pulp and Paper Industry	1	O	O	H	O	O	O	H	L					H	+	k
IV.5	Charcoal/Steel Industry	O	1	O	O	H	O	L	H	L					H	+	U
IV.6	Softwood - Woolly Aphid	+	+	+	H	H	H	H	H	L					O	+	k
IV.7	Bean, Citrus, & Banana - Nematodes	M	O	+	H	O	H	O	H	H					?	+	R
IV.8	Bean Nematode	+	O	+	H	O	O	O	H	L					?	+	R
IV.9	Horticulture Cuttings - Quarantine	O	O	O	O	O	O	O	H	L					O	+	k
IV.10	Sugar Cane - Chemical Control	O	L	O	O	O	O	O	H	H					M	-	R
IV.11	Basic Research - Herbarium	+	+	+	L	O	L	L	H	H					N.A.	-	R
V.1	Wheat - Trace Elements	O	O	L	O	O	H	H	M	L					O	+	L
V.2	Mechanical Cultivation - Seed Bed	O	O	O	O	O	O	O	H	H					O	+	R
V.3	Natural Forests - Pin Hole Borer	O	H	O	O	H	O	O	L	H					M	?	U
V.4	Softwoods - Cypress Canker	M	O	O	O	M	O	O	H	L					?	?	k
V.5	Rangeland - Body Composition	M	O	O	M	O	O	O	H	L					O	+	k

officers plus extensive supporting staff involved; projects in operation four years or more;

Class II-One or two full-time and/or part-time EAAFRO officers plus varying support staff involved; projects in operation for varying lengths of time greater than one-two years;

Class III-One full-time or a few part-time EAAFRO officers plus varying support staff involved; projects of relatively recent origin and could become more important in the future;

Class IV-One part-time EAAFRO officer plus some support staff involved; these are very minor projects but still seem to be EAAFRO projects as opposed to those in Class V;

Class V-One part-time EAAFRO officer involved; these are very minor projects, some of which appear to be of personal interest to the EAAFRO officer.

In examining the highest priority, Class I research projects shown in Table IV.2 certain trends begin to appear. Kenya appears to have more Activity/Field Sites than either Uganda or Tanzania do, and the projects in Class I appear to be more applicable to Kenya (with the exception of sorghum breeding) than to either Uganda or Tanzania. There is no national-level Involvement (cooperation) at all on two of the five projects in Class I, and in the remaining three the amount of this variable is very great in the case of Kenya and Uganda as compared to that of Tanzania. Four out of these five projects had at least part of their origins from internal EAAFRO sources. Only two of them--Sugar Cane Breeding and the Legume-Virus Survey--seemed to have had part of their origins from all three Partner States. Two projects had part of their origins from foreign sources, and in both of these cases there does not seem to have been any initiative from the Partner States. Sorghum Breeding, in fact, scores very low on Applicability and Involvement/Cooperation, and only slightly better on Activity/Field Sites due to the Variety Trials Program. Although maize is the most important food crop in Kenya and Tanzania, and one of the most important food crops in Uganda, the applicability of the results of the Maize Breeding program is more relevant to Kenya than to the others because of the locale specific nature of the resultant varieties and the capability of their national program to utilize the resultant breeding methods. This latter factor--Kenya's relatively greater capabilities in this area--has been partly caused by the location of the EAAFRO Maize Genetics Division on the same site as their national maize breeding program, and this condition also is partly responsible for the relatively greater amount of Activity/Field Sites and Involvement/Cooperation that is assigned to Kenya. Kenya seems to have had a special national interest involved in the origins of the Softwoods-Tree Breeding Project, and this is also reflective of the greater Applicability

and Activity/Field Sites that she enjoys. The official Specialist Committee system for project selection seems to have operated in only one case--Sugar Cane Breeding--where it did, however, operate as it was officially described. In three cases this system did not operate at all, and one case was uncertain.

Overall in Class I, the Sugar-Cane Breeding and Legume-Virus Survey projects seem to be reasonably regionally oriented; the Softwoods-Tree Breeding and Maize Breeding projects are oriented more toward Kenya than to the other two Partner States, but still do have some regional basis; and there seems to be no basis at all for the sorghum breeding project in Kenya, little in Tanzania, and only slightly more in Uganda. The project selection process in Class I seems to be more oriented toward internal EAAFR0 and foreign origins, although there are two very regional cases in which all three Partner States seem to have originally participated.

In Class II research projects, the Basic Research in the Herbarium on taxonomic revisions is in a case by itself--the activity is done entirely within the Herbarium with no national involvement or cooperation; as basic research on plant classifications it is fundamentally applicable to all Partner States; and it is an on-going project in any Herbarium that keeps its plant collection up-to-date; without specific origins or going through any selection process. For the other three projects in Class II, as a group there do not seem to be any remarkable national differences with respect to Activity/Field Sites, Involvement/Cooperation, or Applicability. Millet Breeding again displays a relatively low rating in these three variables and its origins are from internal EAAFR0 and Foreign sources. The origins of the water catchment area project (Water Resources/Land Use) are somewhat obscure, and although Activity/Field Sites and Involvement/Cooperation are more oriented toward Kenya than the other Partner States, this was due to situations beyond EAAFR0's control--the original design did call for field sites in cooperation with both Uganda and Tanzania. Although the applicability of the results of this project will be somewhat locale specific to Kenya, the issue of water resources/land use does seem to be crucial in all Partner States and the techniques developed in this project should be applicable in all of them. The work on Decay in Hardwoods and Softwoods specifically originated with Tanzania and Uganda, and although the principal activity and cooperation has been with those two countries, the results on softwood decay should also be very applicable to Kenya.

Overall in Class II, the work on Hard and Softwoods-Decay, and Basic Research-Herbarium seems to be reasonably regionally oriented; the work on Water Resources/Land Use seems to be oriented more towards Kenya but still has some regional basis; and the Millet Breeding project has some basis only in Uganda and is not regional or national oriented. The Specialist Committee system seemed to have clearly operated only in the case of one project in Class II, and that only involved after-the-fact approval.

About half of the projects in Class III do not involve any Activity/Field Sites of Involvement/Cooperation on the part of any of the Partner States. In one case--Groundwater Resources--consideration of these variables is not appropriate yet because the project is in such an early stage, and in another case--Softwoods-Root Rot--whether there was any national level Involvement/Cooperation or not was not clear. The two projects on Rangeland research took place on EAAFR0's own Athi River Ranch without any national involvement; the project on the Propagation of Horticultural and other crops takes place entirely within the Quarantine Station, and the Sorghum/Millet Agronomy Project displays the general low level of national interest that has already characterized these crops. The Maize-Soil Fertility project has had much greater activity in and involvement with Kenya than Tanzania, with Uganda coming somewhere in the middle, but EAAFR0 also displayed a lack of interest in this project for a time due to a manpower shortage. Tanzania was the sole cooperator and had the only field site for the Tobacco-Virus project, and a personal problem appeared to have been responsible for Uganda's low scores for the Rice-Nematode project. There was national-level activity/field sites for both the Softwoods-Insect and Softwoods-Root Rot projects in all three Partner States, but no indication of relative amounts among them. The Involvement/Cooperation indicator measure for Softwoods-Insect is a bit shaky. It was reported that there was more formal cooperation on this project with Uganda and Tanzania than Kenya, because the latter's Forest Department was so close and capable that they didn't need to cooperate whereas the others did. One suspects, however, that informal cooperation with the Kenya Forest Department was quite high.

In the Applicability columns for Class III projects, Groundwater Resources has a higher score for Kenya and Tanzania because of their larger amounts of semi-arid land, although such resources are also important even in the high-rainfall areas of Uganda. This project has part of its origins within EAAFR0 and part from all three Partner States through the mechanism of the national Chief Research Officers--not the Specialist Committee system. The Maize-Soil Fertility project

appeared to have been selected as an EAAFR0 project through the Specialist Committee system as officially described, but in this case--interestingly enough--the weakness of the Specialist Committee system was apparent and the project failed on a regional basis. Specialist Committees have no real power--they can allocate no funds. They can only advise the EAC and the national governments on what they should do, and in this case the national governments decided they couldn't afford to carry out their part of the project. The applicability of the results should be slightly higher in Kenya because most of the cooperative testing is going on there, but in any case they probably won't be that important for awhile. All three countries should be equally receptive to the results of the Horticultural Propagation project in the Quarantine Station, except for the fact that because of Kenya's closeness to the Station the results will be slightly more applicable there. The Tobacco-Virus project was specifically requested by Tanzania and seems to have a greater applicability there because that is the principal location of the disease. The Rice-Nematode project is an interesting one because its origin is a case of a response to a crisis. Except for the personality problem referred to earlier, activity and cooperation would probably have been high, from all three Partner States, and the applicability is lower in the case of Uganda only because of the lack of confirmation of the extent of the nematode in that country. The two Rangeland projects are not very applicable in Uganda, as compared with Tanzania and Kenya, because of the relatively less amount of ecological rangeland there. In both cases, the overall orientation of the Animal Production Division toward rangeland research apparently was discussed by the Specialist Committee System, but these specific projects were only approved after the fact. It is interesting to note that, according to reliable sources, it was Uganda which influenced the Wasawo Commission to recommend that the functions of this Animal Production Division become a national responsibility. After the subsequent deterioration of the Division in the absence of any clear-cut decision on the matter, there were only two main projects that remained. The applicability of the two projects on softwoods in Class II is once again greater for Kenya, although the origins are not clear, and the Sorghum/Millet Agronomy project exhibits the same characteristics discussed above for these crops.

Overall, it would seem that only the Groundwater Resources and Rice-Nematode projects in Class III are reasonably regionally oriented; four of them--Maize Soil Fertility, Horticultural Propagation-Quarantine, Softwoods-Insect, and Softwoods-Root Rot--are more oriented toward Kenya but still have some regional basis; two of them concerning Rangeland are oriented toward Kenya and Tanzania, but not

Uganda; the Tobacco-Virus project is heavily oriented towards Tanzania; and the Sorghum/Millet Agronomy project is neither regionally nor nationally oriented. The official Specialist Committee system appeared to have operated effectively only once, and then couldn't implement its selection. It approved two projects after-the-fact, but otherwise it was not apparent that it operated at all.

In Class IV, many of the projects listed involve crops or activities that have already been discussed with regard to Table I, or they are oriented towards problem-requests from specific Partner States. With regard to the Rangeland-Silage project, the previous general discussions on rangeland apply. In the case of the Rangeland-Cultivation project, however, there is quite extensive Involvement/Cooperation with the Kenya wheat breeding station at two field sites, and some cooperation with Tanzania at one field site. This project was, in fact directly initiated by the Kenya station and it did not appear to involve the official Specialist Committee system at all. The applicability of the results of the Water Requirements for Selected Crops project is somewhat related to the need to conserve water and the amount of semi-arid land in a country, and therefore Kenya and Tanzania score higher than Uganda on this project. All of the Activity/Field Sites and Involvement/Cooperation also occur in or with Kenya and--to a lesser extent--Tanzania. The project seemed to originate with EAAFR0, but it was reportedly approved by the Natural Resources Research Council of the EAC. The Pulp and Paper Industry project was specifically initiated by Kenya; it is principally applicable in Kenya which is the only Partner State to have advanced plans for such an industry, and the only field site and cooperation occur in and with Kenya. Just about the exact same thing is true with respect to Uganda in the Charcoal/Steel Industry Project. The Softwood-Wooly Aphid project is another case of a response to a crisis. The initiative for this project came from both EAAFR0 and the Kenya Forest Department when the insect pest was discovered on forests around Muguga, but cooperation and data from field sites in all Partner States, was immediately forthcoming. The applicability of this softwood project, however, is higher for Kenya. In the case of the Nematode Survey on Bean, Citrus, and Banana, the lack of any Activity Field Sites or Involvement/Cooperation in Uganda is probably due to the personality problem that was referred to earlier. It was reported that all three Partner States, as well as EAAFR0, were involved in the origins of the survey--although not the specific crops listed--and the results should also be highly applicable in Uganda. The particular Bean Nematode project, however, was directly initiated by Kenya, and although it could have some applicability in Uganda and Tanzania, all the field sites and cooperation are in and with Kenya. The Horticultural Cuttings-Quarantine Project measures shown are due to the same influences that were previously discussed for the other Quarantine project

in Class II: Although there is Activity/Field Sites only in Uganda, and no national level Involvement/Cooperation at all, the applicability of the Sugar-Cane Chemical Control project still remains high in all Partner States. Its origins come from within EAAFR0. And, finally, the Basic Research-Herbarium project in Class IV does do some plant collecting in all of the Partner States, but the little cooperation that exists appears to be with Kenya and Tanzania. The results, however, are fundamentally applicable to all of East Africa.

Overall in Class IV it would seem that the Nematode Survey of Beans, Citrus, and Bananas project and the Sugar-Cane-Chemical Control and Basic Research-Herbarium projects are reasonably regionally oriented; that three projects on Rangeland-Cultivation, Softwood-Woolly Aphid, and Horticultural Cuttings-Quarantine are more oriented towards Kenya but still have some regional basis; that two projects on Rangeland-Silage and Water Requirements are oriented toward Kenya and Tanzania and not Uganda; and that two projects--Pulp and Paper Industry and Bean Nematode--are strongly oriented toward Kenya and one--Charcoal/Steel Industry--twoard Uganda. The official Specialist Committee system appeared to operate as it is officially described in two cases, and was consulted for approval after-the-fact in two other cases. In another case this system was not applicable, and in the remaining projects it did not appear to have operated at all.

The remaining five projects are in the lowest category of EAAFR0 priorities, and it will only be pointed out that one of them--Mechanical Cultivation-Seed Bed--is reasonably regionally oriented; that two are oriented toward Kenya and one toward Tanzania, but still have some regional basis; and that one is strongly oriented toward Uganda. Most of these projects were in very initial stages and hadn't gone through the Specialist Committee system yet.

In looking at the results of this analysis as shown in the Orientation column of Table IV,2, it is apparent that there is a slight bias in Kenya's favor in the top two priority classes of EAAFR0 research projects. With the exception of the Sorghum and Millet Breeding Projects, which have little or no regional or national basis, all of the remaining seven projects have some regional basis and four seem to be principally regionally oriented. When the remaining lower priority classes are examined, however, it does seem that there is a definite bias toward Kenya in EAAFR0's projects over both Uganda and Tanzania, but that Tanzania is definitely higher on the scale than Uganda. In other words, the balance (or imbalance) of EAAFR0's research projects, particularly in the mid- and lower-priority classes, is mostly in favor of Kenya, then Tanzania in the middle, and least in favor of Uganda.

Another interpretation of the results in Table IV.2 is provided by examining all of the projects when they are grouped according to EAAFRD Division rather than priority classification, as is shown in Table IV.3. The Sugar Cane Breeding Division, is, of course, dominated by that one principal project. Except in the case of Involvement/Cooperation with Tanzania, the division is pretty well balanced across the board, and it seems to have the best Specialist Committee operations. The Forestry Division is dominated by softwood projects, and this tends to bias it toward Kenya-oriented projects. Only one of their projects is reasonably regionally oriented, and three others are largely oriented toward specific Partner States--two toward Uganda and one toward Kenya. Nevertheless, this Division also seems to have a relatively active Specialist Committee with only one project in which the Specialist Committee was not utilized at all, and that was a very special response to crisis case. The other indicators seem to be fairly well-balanced among the Partner States, given the bias toward softwoods mentioned above. The Sorghum and Millet Division can be characterized by a heavy foreign influence in the origins of its project selection, and little--if any-- interest from any of the Partner States. What little activity there is at the national level is included in the Variety Trials Program--which is mainly concerned with maize--and the applicability that does exist is confined to parts of Uganda and Tanzania. The Maize Genetics Division is composed entirely of the maize breeding project, and, although it also seems to have had a dominant foreign influence in its selection, it is reasonably regionally oriented. Its location just next to the Kenya national Maize breeding program does give that country some advantage, however. The Plant Pathology and Nematology Division is principally doing some basic survey work and responding to specific problems as they arise. In the latter category, one of the problems was a crisis that potentially existed on a regional basis, but the other two problems were largely oriented toward specific Partner States--one toward Kenya and one toward Tanzania. Activity/Field Sites in and Involvement/Cooperation with Uganda seems to have been relatively low, but Applicability and Origins seems to be reasonably well-balanced among the Partner States. It is doubtful that this Division utilized the Specialist Committee system at all. Uganda definitely scores lower in the Physics and Chemistry Division. Only two of its projects are reasonably regionally oriented, and the remainder are all oriented more towards Kenya and--to a lesser extent--Tanzania. Many of the projects in this Division seem to have had their origins from within

Table IV.3 EAAFR0 PROJECTS BY DIVISION

EAAFR0 Division	Research Projects	Activity Field Sites			Involvement/Cooperation			Applicability			Origins			Specialist Committee	Orientation					
		K	U	T	K	U	T	K	U	T	K	U	T			Foreign	EAAFR0	+	+	+
Sugar Cane Breeding	I.1 Sugar Cane Breeding IV.10 Sugar Cane - Chemical Control	1	1	1	H	H	L	H	H	H	H	H		+				H	R	
		0	L	0	0	0	0	0	H	H	H	H		+				M	R	
Forestry	I.2 Softwoods - Breeding II.3 Hard & Softwoods - Decay III.8 Softwoods - Insect III.9 Softwoods - Root Rot IV.4 Pulp and Paper Industry IV.5 Charcoal/Steel Industry IV.6 Softwood - Woolly Aphid V.3 Natural Forests - Pin Hole Borer V.4 Softwoods - Cypress Canker	H	L	M	H	H	L	H	L	M	H	L	M		+			?	R	R
		L	H	H	L	L	H	H	H	H	H	H	H	M		+		M	R	R
		+	+	+	+	+	+	+	?	?	?	?	?	M		+		?	R	R
		+	+	+	+	+	+	+	?	?	?	?	?	M		+		?	R	R
		1	0	0	H	0	H	0	H	L	L	L	L	M		+		H	R	R
		+	+	+	H	H	H	H	H	L	L	L	L	M		+		O	R	R
Sorghum & Millet	I.3 Sorghum Breeding II.1 Millet Breeding III.10 Sorghum/Millet Agronomy	L	M	L	0	0	0	0	0	0	0	0	L		+			0	X	
		0	0	0	0	0	0	0	0	0	0	0	0	L		+		0	X	
Maize Genetics	I.4 Maize Breeding	H	L	L	M	L	L	L	M	M					+			0	k	
		+	+	+	0	0	0	0	0	0	0	0	M	L		+		0	X	
Plant Pathology and Nematology	I.5 Legumes - Virus Survey III.4 Tobacco - Virus III.5 Rice - Nematode IV.7 Bean, Citrus, & Banana - Nematodes IV.8 Bean Nematode	+	+	+	0	0	0	0	0	0	0	0	H	H	H			0	R	
		0	0	1	0	0	0	0	0	0	0	0	0	H	L	H		0	T	
		H	L	H	H	L	H	H	H	M	H				?			0	R	
		+	0	+	H	0	H	0	H	M	L				+			?	R	
Physics & Chemistry	II.2 Water Resources/Land Use III.1 Groundwater Resources III.2 Maize - Soil Fertility IV.1 Rangeland - Sludge IV.2 Rangeland - Cultivation IV.3 Water Requirements - Selected Crops V.1 Wheat - Trace Elements V.2 Mechanical Cultivation - Seed Bed	2	0	0	H	L	L	H	M	M	H	M	H		?			?	k	
		N.A.	-	-	N.A.	-	-	-	H	M	M	H	M		+			L	R	
		H	M	L	H	M	L	L	H	L	L	H	H		+			H	R	
		2	0	1	H	0	0	L	H	L	H	H			+			M	k	
		2	0	1	H	0	M	H	H	M	H	H			+			L	k	
		0	0	0	0	0	0	0	H	M	L	H			+			0	t	
Plant Quarantine Service	III.3 Horticultural Propagation IV.9 Horticultural Cuttings	0	0	0	0	0	0	0	0	0	0	0	H	H	M			0	k	
		0	0	0	0	0	0	0	0	0	0	0	0	H	M	M		0	k	
Animal Production	III.6 Rangeland - Compensatory III.7 Rangeland - Nutrient Requirements V.5 Rangeland - Body Composition	0	0	0	0	0	0	0	0	0	0	0	H	L	H			M	k	
		0	0	0	0	0	0	0	0	0	0	0	0	H	L	H		M	k	
Herbarium	II.4 Basic Research - Herbarium IV.11 Basic Research - Herbarium	N.A.	-	+	0	0	0	0	0	0	0	0	H	H	H			N.A.	R	
		+	+	+	L	0	0	L	H	H	H							N.A.	R	

EAAFRRO, although a few have been through the Specialist Committee system. Both projects in the Plant Quarantine Services are done entirely at the Quarantine Station. They were both selected internally according to the perceived needs of the Service without going through the Specialist Committee system.¹⁰ The slight bias toward Kenya of these projects is caused solely by the location of the Service within Kenya. The Animal Production Division is oriented toward rangeland research, which means it is oriented towards Kenya and Tanzania. Activity/Field Sites and Involvement/Cooperation with all Partner States is very low, however. Finally, the basic research performed by the Herbarium is regional in nature due to its fundamental applicability to all of East Africa.

A summary of the reported reasons behind the distribution of these variables of EAAFRRO's research projects would have to begin with the effects of location. Having the headquarters of EAAFRRO located in Kenya does seem to have contributed in many instances to the slight Kenya bias in projects which still have some regional basis. Those projects which are principally oriented toward one specific Partner State do not seem to depend on distance or location, but are a direct result of a specific problem in a request from that Partner State. Another factor that seems to have contributed to this bias is the capacity and willingness of the Kenya national agricultural and forestry research system to cooperate. In the case of Tanzania, there would appear to be both a national feeling of uncooperativeness with EAAFRRO in some cases but not in others and a general constraint of a relative lack of capacity in their national agricultural and forestry research system to cooperate on EAAFRRO projects which should be applicable to their country. Tanzania is also the largest Partner State and transport facilities are relatively poor, so location and distance work against such relationships also. The case of Uganda is more complicated. Both a general willingness and capacity to cooperate with EAAFRRO appeared to be evident, but EAAFRRO seems to be the least oriented towards Uganda of any of the Partner States. Partly this is probably because Tanzania and Kenya are more ecologically similar to each other than either are to Uganda, so that "regional" projects affecting at least two of the Partner States more often than not are oriented toward Kenya and Tanzania and not toward Uganda. Uganda's border is also further away than Tanzania's, and, although it is a much smaller country, transportation facilities are also relatively poor here. Although there are too few cases to generalize from, both location/distance effects and the willingness of national research systems to

¹⁰ Although the Standing Technical Committee on Plant Imports and Exports does not seem to have been active in research project selection, it reportedly is active--and relatively effective--in developing recommendations and setting policy for the Plant Quarantine Service.

cooperate seem to be at least partially overcome in response to crises--even though the crisis may be more critical in one Partner State than another. One note of caution--this paragraph is based on raw data provided by EAAFRO sources only! The national viewpoint will be provided in following chapters.

The priorities shown in Table IV.4 regarding EAAFRO's scientific services are also based on EAAFRO's manpower commitments to those services. In looking at the results shown in Table IV.4, several trends are evident. Firstly, most of these services are highly applicable in all Partner States, and the exceptions do not seem to fit into any particular pattern; the armyworm does not seem to be critical threat in Uganda; there is no Field Trials Officer in

TABLE IV.4: A SUMMARY OF EAAFRO SCIENTIFIC SERVICES

Scientific Service	Involvement/ Cooperation			Applicability			Utilization		
	K	U	T	K	U	T	K	U	T
I.1 Quarantine	H	M	M	H	H	H	H	M	M
I.2 Library	O	O	O	H	H	H	H	L	L
I.3 E.A.L.S.	O	O	O	H	H	H	H	H	H
I.4 Herbarium	M	L	H	H	H	H	H	L	H
II.1 Armyworm	H	M	H	H	L	H	H	L	H
II.2 Journal	?	?	?	H	H	H	?	?	?
II.3 Statistics	O	O	O	H	H	H	H	L	L
II.4 Machinery Coordination	H	H	H	H	H	H	H	H	H
II.5 Liaison - Cereals	O	H	H	O	H	H	O	H	H
II.6 Assistance - Cereals	H	M	M	H	H	H	H	H	H
III.1 Soil & Plant Analysis	O	O	O	H	H	H	H	L	H
III.2 Feed & Animal Analysis	O	O	O	H	L	H	H	L	H
IV.1 Fungi Collection	H	O	O	H	H	H	N.A.	-	-
IV.2 Insect Collection	H	H	L	H	H	H	H	H	L
IV.3 Virus Collection	O	O	O	H	H	H	L	O	O
IV.4 Nematode Collection	O	O	O	H	H	H	N.A.	-	-
V.1 Carcass Analysis	O	O	O	H	H	H	H	H	H
V.2 Experimental Animals	O	O	O	H	L	H	M	L	L
V.3 Quarantine Facilities	L	O	O	H	L	L	L	O	O

Kenya to perform a liaison function with the Kenya cereals program; the analyses of feed and animal samples and the provision of experimental animals services are not as applicable to Uganda because these services have been oriented towards rangeland experiments and Uganda has relatively little rangeland; and the provision of quarantine facilities to carry out experiments is largely applicable only in Kenya because the facilities are located there. For the most part, the services are generally applicable in nature, dealing with basic information, analytical, or advisory services that all Partner States should need.

One of the principal factors that affects the national Involvement/Cooperation with and Utilization of these Services is EAAFR0's location and the distance from it, however. The slight edge given to Kenya for the Plant Quarantine Service in both these variables, for example, is due to Kenya's ability to take advantage of this service for unplanned plant arrivals at her airport, which is relatively close to the Quarantine Station. Although there is no national Involvement/Cooperation in the operations of the joint EAAFR0/EAVRO Library, the national Utilization of the Library's services is heavily oriented in Kenya's favor because one must utilize these services usually at the Library itself -- which means that distance is a governing factor. The services of the Statistics Division also seem to be heavily oriented towards Kenya at least partly because of the distance factor. The relationship that seems to be necessary for the provision of this service is one of a great deal of interaction between the national level recipient and the EAAFR0 provider -- a relationship that is more difficult to develop over greater distances. This effect is reinforced by communications difficulties and by the fact that internal EAAFR0 demands on this statistical service are quite heavy. It may also be true, however, that -- particularly in the case of Tanzania -- a national research system may have less of a capacity or need for this service if its own efforts are chaotic and disorganized anyway. The slight edge that Kenya has over the other two Partner States in the Utilization of the Virus Reference Collection, the Provision of Experimental Animals, and the Provision of Quarantine Facilities services also seems to be due to the location factor, but these services are very low in importance anyway.

Most of the other imbalances seem to be more reasonable. The reason Uganda reportedly doesn't utilize the Herbarium's services or the Soil and Plant Analyses service is that she has the capacity to carry these out herself. Since the armyworm does not usually invade Uganda, there is less need for her to utilize the Armyworm Forecasting Service, and since the main EAAFR0 cereals unit of interest -- the Maize Genetics Division -- is located at the same site as Kenya's national maize breeding program, there was no need to create a special Field Trials Officer for liaison with Kenya. There is the one case of the Forest Insect Reference Collection where both the Involvement/Cooperation and Utilization variables are

relatively low for Tanzania and where the cause would appear to be a hostile attitude on the part of Tanzania. This reflects some similar cases in Forestry Research Projects, but, again, it must be remembered that these results are based on raw data from EAAFRRO sources only.

In sum, it would appear to be fair to say that EAAFRRO's scientific services are generally oriented in theory to the entire region, but due to location and distance effects, some of the most important ones are utilized in Kenya more than in the other two Partner States.

Before this part of the chapter is completed, a few concluding remarks about the EAAFRRO interview are in order. Many of the interview questions concerning communications details, the national utilization of research results, etc. did not work out as usable indicators in quantitative terms. Nevertheless, they did, at times, provide additional information on EAAFRRO's projects and services, and several generalizations can be made. Communication from EAAFRRO Headquarters is much easier to Kenya than to either Uganda or Tanzania, obviously because of the location factor. Telephone calls are possible -- although sometimes difficult -- in Kenya and are utilized as a medium of communication. Telephone calls to Uganda or Tanzania are very difficult and only rarely attempted. In the case of Kenya, the nation's capital -- Nairobi -- and governmental ministries are only a half hour drive, so face-to-face communication can be and is utilized much more than can be done with either Tanzania or Uganda. Letters through the postal system are the principal means of EAAFRRO communication with Tanzania and Uganda, but these can take varying periods of time to be delivered, and once arrived, a letter can be easily ignored or caught up in a bureaucratic tangle.

There were so few EAAFRRO research projects that had some definite interim or final results, that results from answers to this question cannot be stated conclusively. Nevertheless, it does appear that outside of personal written communication of the results to national-level collaborators or cooperators, the only means used to disseminate this information in general is through the East African Agricultural and Forestry Journal. Although the Journal is widely read in East Africa, there is a time lag between the results and their publication, and little -- if any -- attempt appears to be made to communicate results directly to specific national researchers who might be working in the same area. General or public relations oriented stories about EAAFRRO activities appear in the monthly EAAFRRO Newsletter, but this is not the same thing.

Another question that stood out because of the lack of response to it was the one on actual instances of national level utilization of EAAFRRO research results. The potential utilization or applicability of research results was usually commented on quite extensively by EAAFRRO officers, but responses about actual utilization were much less frequent.

The question that asked EAAFRO respondents the names of all the national-level researchers they knew did not work out because the number of possibilities was too great for memories to recall. Officers with much experience in East Africa claimed to know up to 200 such people, but couldn't, of course, name them all. Recent turnovers of expatriate scientific personnel in the Partner States was a complicating factor -- some of the names mentioned were last heard of two or three years past. Race did not appear to be an important factor in the response to this question -- i.e., in only a very few cases did it appear that EAAFRO white expatriate officers knew almost only white expatriate national researchers, or that EAAFRO African officers knew almost only national African officers.

EAAFRO officers who had been in East Africa for only short periods of time didn't know as many national-level researchers, of course, and researchers who had had national level experience in one of the Partner States before coming to EAAFRO tended to know more researchers in that Partner State than in the others. EAAFRO officers who were stationed at decentralized locations in Uganda and Kenya also knew more national researchers in those Partner States due to that factor. Finally, for those EAAFRO officers who were citizens of one of the Partner States, this factor also seemed to influence the number of researchers they knew from that country. Overall, it appeared that more Kenyan than Tanzanian or Ugandan national researchers were known by EAAFRO officers, but then there are more Kenyan national researchers to know -- as will be pointed out in more detail in subsequent chapters of this study. And, it did not appear that location or distance had much to do with this Kenya bias. Instead, it appeared that outside of the collaborative/cooperative arrangements that existed with national researchers, there was a general lack of knowledge of who national researchers were -- even those located only 18 miles away in Nairobi.

The Specialist Committee System is discussed in more detail in subsequent chapters, and it will only be commented on briefly here. According to the comments of the EAAFRO officers, only three of the Specialist Committees -- in Forestry, Agricultural Engineering, and Sugar Cane Breeding fields -- are perceived to be active in the project selection process in their fields. A fourth, the Standing Committee on Plant Imports and Exports -- is reportedly active and effective in setting policy for the Plant Quarantine Service, but not in project selection. The Sugar Cane Specialist Committee appeared as well to have the most power in implementing its project selection decisions. The Agricultural Engineering and Sugar Cane Specialist Committees in addition were the only two which reportedly had significant non-scientific representation from industry, which may have been an important factor. The remainder of the Specialist Committees mentioned -- Insecticides and Entomology, Soil Fertility, Crop Nutrition, Agricultural Botany,

and Animal Nutrition, Breeding, and Physiology -- were in varying states of activity, but all appeared to function more as scientific conferences to report research results than to make decisions on project selection. Many of the EAAFRO officers concerned still perceived these Specialist Committees to be important for that very reason, however, and were sorry that some had become totally inactive.

Finally, this section of the chapter will discuss some of the important themes which appeared in the responses of EAAFRO officers to the question on improvements needed to make EAAFRO-national scientific relationships better. Interestingly enough, only two officers thought that relations could be improved if there were more resources -- manpower -- in their division so they could meet national requests for service better, and this was for the Herbarium. The lack of similar responses in the more applied research oriented divisions of EAAFRO when a lack of resources is a common complaint of scientific research in developing countries in general would seem to indicate to this author that EAAFRO officers recognize that this is not the real answer to the problems of regional-national relationships. Neither do they seem to think that public relations types of activities would improve this situation. Only two officers again made comments to this effect, and they were more concerned with the special characteristics of the Quarantine Service and the need to fully enforce quarantine regulations.

Most of the major themes repeated suggest the officers' belief that superficial remedies will not improve regional-national relationships. One major improvement they would suggest is greatly increased face-to-face communication with national researchers. The need for personal contacts, better liaison, travel funds, etc. is often repeated, but mainly with the idea of letting the national researchers know what EAAFRO is doing -- i.e., one-way communication down. The need for EAAFRO officers to learn something about what is going on in national research is not usually included in their comments about the lack of communication.

Problems with Tanzania seem to have stimulated two major themes on national attitude and national capabilities. The general uncooperative and sometimes even hostile attitude of Tanzania is often cited -- they don't send representatives to our meetings, they don't answer our letters, they don't even tell us what they want us to do, etc. The improvement needed for these complaints is a change in Tanzania's attitude. There is no thought mentioned that EAAFRO might be doing something to improve relationships with Tanzania when their attitude is at fault. Only two officers -- both African -- suggested that there were problems with regards to EAAFRO's attitudes toward the Partner States, and that improvements were needed internally. They cited a tendency for EAAFRO officers to look down on national researchers -- especially in Tanzania -- and to tell them what to do rather than listen. Tanzania was often cited again because of the lack of a capacity to have

any kind of relationship with EAAFRO. Their system was not only chaotic and disorganized, their researchers just didn't have the capacity to utilize EAAFRO's work or cooperate. This was particularly stressed with respect to sugar cane and maize. And, once again, the only improvement possible was for Tanzania to straighten itself out--EAAFRO could do nothing to improve relationships until that happened.

A less widespread theme, but still important, was that EAAFRO did need to do more work on what the Partner States really needed and wanted. These officers--mainly African--made remarks that some work was done only because it interested the EAAFRO officer doing it, and there were explicit admissions that EAAFRO was too oriented towards Kenya. These officers were less certain about how to improve this situation, but several did mention the need to decentralize EAAFRO's operations so that more activity would take place in Tanzania and Uganda. One counter theme was that the Partner States also needed to pay more attention to work EAAFRO officers had done specifically at their request.

The final major theme concerned the chaotic bureaucratic mess of the EAC which affected EAAFRO adversely and--implicitly--kept it from going ahead and satisfying the needs and desires of the Partner States. There was some taking into account of the problems caused by the move of EAC headquarters from Nairobi to Arusha (Tanzania), but all kinds of EAAFRO officers were in agreement in wishing that the EAC would get organized. The need for some kind of person or directorate in charge of research was mentioned so that decisions could be made instead of interminably delayed. More direction from the EAC in choosing projects--with a national veto power only--was another related improvement suggested to the implementation of the recommendations of the Specialist Committee system.

Overall, the perhaps natural tendency was for EAAFRO officers to seek improvements in regional-national scientific relationships from the Partner States beneath them or the EAC above them--and not from within their own institution. This was coupled with a "this-is-a-fact-of-life-and-what-can-you-do-about-it" attitude toward the location and distance effects that they recognized to exist from being located in Kenya.

NATIONAL PRIORITIES

The second major effort involved in the methodology for "objectively" determining the balance of EAAFRO's direct output benefits among the Partner

States is the determination of the different 'Partner States' own agricultural and forestry priorities. The primary source of information for this effort was the national 5-year development plans of each of the Partner States.¹¹ Although there may be some difficulties in equating plans developed for different five-year periods, the discrepancy is not believed large enough to significantly affect the following interpretations. And in order to assess national priorities, certainly the national development plans are the logical and primary source of information.¹²

Three different types of information were sought in the plans:

- (1) The overall agricultural and forestry development expenditure plans;
- (2) the agricultural and forestry R&D budget plans; and
- (3) data on agricultural or forestry production at the times the plans were developed and expected, or target, goals for such production.

This author would contend that any one of these measures by itself might prove to be misleading, and that a judicious interpretation of a combination of all three measures would more accurately reflect reality. For example, a consideration of only the first measure above might reflect a country's "opportunity-seeking" priorities, but not its "potential disaster prevention" priorities. An already extremely valuable natural resource or resource developed through past governmental investments might not be perceived as a good focus for further developmental investment, but might well be a highest priority focus for research if some disease or insect pest threatened what was already there.¹³ In another case, examining only the country's R&D

¹¹ Republic of Kenya, Development Plan 1970-1974, Government Printer, Nairobi, 1969; Republic of Uganda, Uganda's Plan III-Third Five-Year Development Plan 1971/2-1975/6, Government Printer, Kampala, 1972; The United Republic of Tanzania, Tanzania Second Five-Year Plan for Economic and Social Development 1st July 1969-30th June 1974, Government Printer, Dar es Salaam--Volume I: General Analysis, 1969; Volume II: The Programmes, 1969; Volume III: Regional Perspectives, 1970; Volume IV: Survey of the High and Middle Level Manpower Requirements and Resources, 1969.

¹² As it turned out, however, it was impossible to develop national priorities for scientific services.

¹³ Tanzania's national plan explicitly recognizes this difficulty: "The crop policies are composed of two elements: a set of production aims and a set of Government actions designed to achieve these aims. These two elements are inter-related but it is useful to distinguish between them. The output of some crops can be rapidly increased with very little Government contribution (e.g., cashews), whereas others require support from the whole range of instruments which the Government can use to encourage agricultural expansion. Equally, a particular form of public action (e.g., research to combat Coffee Berry Disease) may be of high priority although little or no increase in production is aimed at for the crop in question." (The United Republic of Tanzania, Volume I, op. cit., p. 42)

budget plans (the second measure above) might be misleading since, if the research were already being done by some other non-national body, it would be only prudent for the country not to duplicate it. Therefore, a combination of all three of the above measures will be used as indicators of national priorities in agriculture and forestry.

When appropriate, foreign aid support will be included in these measures. It could be argued that in many cases foreign aid represents the perceived priorities of the donor country as to what the needs of the recipient developing country are, rather than the priorities of the developing country itself. Nevertheless, since most foreign aid is applied to projects which the developing countries at least agree upon, to some extent this aid is a national governmental resource that can reflect their own priorities as well. Therefore, if foreign aid funds are included in development plans and devoted to specific projects or subjects in agriculture or forestry, they will be included in these measures. In the category of overall agricultural and forestry development expenditures, it should also be noted that manufacturing expenditures were included for processing or other operations directly related to particular agricultural products. As in the case of EAAFR0 priorities, the subject matter of particular national priorities centered around specific crops or other agricultural products, with exceptions for such non-crop-specific functional areas as farm mechanization or water resources/land use planning. Whereas EAAFR0 priorities usually identified particular aspects of the crop research that EAAFR0 was doing--e.g., sugar can breeding, legumes-virus survey--national priorities are usually limited to the crop or product since those are the terms in which production figures and targets and other data are given.

The entire, detailed effort that was gone through to arrive at national priorities is included in this study as Appendix III. In this chapter, Tables IV.5, IV.6, and IV.7 summarize the results for Kenya, Uganda, and Tanzania. In explanation of the figures, development expenditures were included only when they were specifically designated for an item or items in the Table--general or all-purpose expenditures are not included. The principal criterion for determining the rankings was column 1, Central Government Development Expenditures (excluding research), but other criteria shown such as research expenditures, expected gross value, expected rate of increase, expected export value, or expected industrial value, were also deemed to be relevant to determining

national priorities and entered into the judgments. And finally, the non-quantifiable development plan discussions of the specific topics inevitably played a part in arriving at the final decisions. (For a more thorough explanation of the tables, footnotes are included which refer to the detailed information given in Appendix III.)

In summary form, Kenya's Class I top priorities concern Rangeland/Livestock, Maize, Sugar Cane, Tea, and Plantation Softwoods; the Class II priorities concern Dairy development, Coffee, Horticultural Crops (Pineapples), Rice, and Wheat; the Class III priorities concern Cotton, and Pyrethrum; Class IV priorities concern Sisal, Legumes, Oil Seeds, Potatoes, Wattle, Cashew Nuts, Coconuts, Tobacco, Farm Mechanization, and Indigenous hardwoods; Class V¹⁴ priorities concern Water Resources/Land Use and all other crops mentioned but never specifically designated for any purposes, such as sorghum and millet, barley, oats, poultry, pigs, etc.

A summary of Uganda's national agricultural priorities, similar to Kenya's, shows that Uganda's Class I highest priorities concern cotton, sugar, and tea; Class II concerns coffee, tobacco, and beef development; Class III concerns horticultural crops, plantation softwoods, water resources/land use, dairy development, and farm mechanization; Class IV concerns groundnuts, cocoa, kenaf, rice, beans, maize, and sorghum/millet; and Class V concerns silk, sisim, and all others.

The analysis of Tanzania's national agricultural priorities--similar to those for Kenya and Uganda--was the hardest one for distinguishing between priority classes, but the results are as follows: The Class I highest priorities concern Cotton, Wheat, Dairy Development, Softwoods, Tea, and Flue-Cured Tobacco; Class II concern Sugar, Sisal, and Maize; Class III concern Cashewnuts, Coffee, Rice, Groundnuts and Oil Seeds/Beans, Horticultural Crops, Rangeland Development, Beef Development, Hardwoods; Class IV concern Coconuts, Kenaf; Farm Mechanization, Water Resources/Land Use, Pyrethrum, and Fire-Cured Tobacco; and Class V concern Sorshum/Millet, Bananas, and all other.¹⁴

¹⁴This analysis and the resultant priorities are generally supported by a USAID Appendix to their own study on Agricultural Research Need of Tanzania, "Agricultural Aspects of the Second Five-Year Plan," Appendix B. In particular, the development expenditure figures agree pretty closely with those in Table 42. See H.B. Sprague, et al, The Agricultural Research Needs of Tanzania, United States Agency for International Development, Washington, D.C., April 1971, pp. 179-188.

TABLE IV.5
KENYA'S NATIONAL AGRICULTURAL AND FORESTRY PRIORITIES

Priority Class	Project/Activity	Central Government Development Expenditures, Excluding Research (\$ '000,000)	Central Government Development Expenditures On Research (\$ '000)	Expected Gross Farm Returns in 1974 (\$ '000,000)	Expected Annual Growth Rate of Gross Farm Revenue, 1967-1974 (%)	Expected Value of Exports in 1974 (\$ '000,000)	Expected Value Added to Gross Product by Industry (g) (\$ '000,000)
I	Rangeland/Livestock	9.4(a)	145	14.5(k)	4.5(k)	4.0	1.2(r)
	Maize	0.6(b)	45	10.3	13.6	7.6	2.1(s)
	Sugar Cane	4.1(c)	105	4.0	14.1	---	1.7(t)
	Tea	1.2(d)	---	17.9	10.4	15.9	---
	Plantation Softwoods	3.1(e)	---	0.2(l)	---	1.9(p)	7.8
II	Dairy Dvlpmt.	0.5(f)	167	9.3	5.0	1.0	1.6
	Coffee	---	112(d)	16.8	2.6	20.0	---
	Horticultural Crops	---	154	2.2(m)	12.1	3.1	0.6
	Rice	1.8(g)	---	1.0	14.2	0.6	0.6
	Wheat	0.2(b)	---	6.5	5.1	1.6	2.1(s)
III	Cotton	0.5(g)	49	0.9	6.7	0.9	0.2
	Pyrethrum	---	---	3.1	1.9	3.6	---
	Sisal	---	---	2.1	1.8	1.7	0.7
	Legumes	---	128	0.6	3.7	---	---
	Oil Seeds	---	90	0.7	7.8	---	---
IV	Potatoes	---	56	0.4	4.8	---	---
	Wattle	---	---	0.7	---	0.7	---
	Cashew Nuts	---	---	0.5	3.7	---	---
	Coconuts	---	---	0.5	1.4	---	---
	Tobacco Farm	---	100	---	21.9	---	---
V	Indigenous Hardwoods	---	---	---	---	---	---
	Water Reser./Land Use	0.6(e)	---	---	---	---	---
	Other	---	---	---	---	---	---

See Footnotes Following Page

Footnotes From Table IV.5

- (a) £5.2 million from Table 8; plus £4.2 million from land adjudication, see Table 5.
- (b) See Table 5 and the discussion of maize
- (c) This figure is taken from Table 5, but see the discussion on sugar cane to note that the expenditures could be as high as £5.6 million.
- (d) See Table 5.
- (e) See the discussion of forestry development expenditures.
- (f) See the discussion on dairy development expenditures.
- (g) See the discussion on irrigation.
- (h) See Table 9.
- (i) See footnote (a) in Table 9.
- (j) See Table 6 and Table 11.
- (k) This figure is for total "Cattle for Slaughter" and so may be too high.
- (l) This is expected revenue to the government from sawn timber, which may not be comparable with the other figures.
- (m) "Pineapples and Other Fruits" plus "Vegetables" in Table 11.
- (n) See Table 12.
- (o) This figure is for total "Meat Products" and so is too high.
- (p) "Wood Products" only from Table 12; "Paper and Printing" is not included.
- (q) See Table 13.
- (r) This figure is for total "Meat Processing" and so is too high.
- (s) "Grain Milling" and "Bakery Products" industries in Table 13 includes both wheat and maize. In the absence of any indication of the relative proportions of these grains, the total figure of £4.2 million is divided in half.
- (t) Includes both the "Sugar" and the "Confectionary" industries listed in Table 13.
- (u) "Wood Products," "Furniture and Fixtures," and "Pulp and Paper" industries in Table 13 are included. See the discussion of Table 13.

TABLE IV.6

UGANDA'S NATIONAL AGRICULTURAL AND FORESTRY PRIORITIES

Priority Class	Product/Activity	Specific Central Gov't. Development Expenditures, Excluding Research (e) (m. shs.)	Specific Central Gov't. Development Expenditures on Research (h) (m. shs.)	Specific Product Mentioned in Connection with a General Agricultural Project (number of projects)	Expected Production of Selected Commodities in 1976 (i) ('000 tons)	Expected Annual Average Growth Rate of Selected Commodities 1967/69 to 1976 (i) (%)	Expected Value of Exports in 1976 (k) (m. shs.)
I	Cotton	46.4		3	600 - 1,000 (j)	5.3 - 12.2	433
	Sugar	63.0			240 - 250	6.7	47
	Tea	42.0			38.4	12.8	205
II	Arabica Coffee	-----			20.0	4.9	132
	Robusta Coffee				160.0	-0.4	762
	Fire-Cured Tobacco	38.1	1.3	1	.003	10.0	50
	Flue-Cured Tobacco	65.5	4.0	3	.005	9.0	
III	Beef Development		2.1	2			
	Agricultural Crops (b)	5.0 (f)		3			
	Plantation Softwoods	16.0					
	Water Resources/Land Use (c)	1.5	9.5				
	Dairy Development (a)	65.6		3			
	Farm Mechanization	32.2 (g)					
IV	Groundnuts	1.5		2			
	Cocoa	10.0					
	Kenaf	12.0					
	Rice	10.0		2			
	Beans	2.5		3			
V	Maize	-----		4			
	Sorghum/Millet	-----		3			
	Silk	0.5					
	Sim-Sim	1.0					
	Others (d)	0 to 2.5					

See Footnotes Following Page

Footnotes from Table IV.6

- (a) This does not include general expenditures on animal health or animal husbandry.
- (b) Fruits and Vegetables.
- (c) This does not include irrigation projects in order to be consistent with the analysis for Kenya. In Kenya's case, irrigation projects were identified with specific crops; in Uganda's case, most of the irrigation projects have the objective of developing irrigation techniques and no specific crops are mentioned.
- (d) Others, which were barely mentioned, included wheat, pasture grasses, hardwoods, hides and skins, cassava, plantains (bananas), pyrethrum, senna, bagarua, pigs, goats, bee-keeping, and poultry.
- (e) See Table 23 for Rural Product Expenditures and Table 25 for Manufacturing Expenditures.
- (f) Includes the 2.0 m. shs. allocated to citrus in Table 23.
- (g) 1.2 m. shs. for the National College of Agricultural Mechanization is included in this figure.
- (h) See Table 23 for Rural Products research expenditures and Table 26 for Water Resources research expenditures.
- (i) See Table 24.
- (j) This figure is in terms of '000 bales.
- (k) See Table 22.

Table IV.7

TANZANIA NATIONAL AGRICULTURAL PRIORITIES

Class	Product/ Activity	Specific Central Gov't. Development Expenditures, Including Research (b) (m. shs.)	Expected Annual Growth Rate During Plan Period (c) (%)	Specifically Mentioned Expected Change in Annual Growth Rate (d) (H = Increasing) (M = Stay Same) (L = Decreasing)	Expected Relative Importance in 1973/74 (e) (%)	Parastatal Investment Expenditures (f) (m. shs.)	Agricultural Credit Allowances (h) (m. shs.)	Specifically Mentioned as "High Priority Crop" (k) (X)
I	Cotton	2.2	9.0	H	26.7	12.0	(1) (j)	X
	Wheat	20.1	16.0	H	4.3	21.2	(j)	X
	Dairy Dvlppt.	36.5	---	H	---	14.1	5.0	X
	Softwoods	48.2	---	---	---	31.2 (g)	---	X
	Tea	---	9.0	H	4.9	88.5	38.0 (1)	X
	Flue-Cured Tobacco	7.0	25.0	H	8.8	7.1	98.0 (j)	X
II	Sugar	---	7.0	M	7.8	94.0	(j)	---
	Sisal	---	-2.0	L	10.5	460.9	---	---
	Maize	---	---	M	---	7.6	(j)	---
III	Cashewnuts	1.5	10.0	H	8.3	0.6	---	X
	Coffe	---	6.0	L	18.1	---	(j)	X
	Rice	4.9	10.0	H	4.1	6.6	---	X
	Groundnuts & Oil Seeds/Beans	6.6	7.0	H	3.8	0.9	---	X
	Horticultural Crops (e)	2.6	---	H (e)	---	3.0	---	X (e)
	Rangeland Dvlppt.	34.9	---	---	---	---	---	---
	Beef Development	18.0	---	H	---	---	(j)	---
	Hardwoods	17.5	---	H	---	31.2 (g)	---	---
	COCONUTS	10.2	---	---	---	7.6	---	---
	Kanaf	---	---	H	---	25.0	---	---
IV	Farm Mech. Water Resources/ Land Use	6.4	---	---	---	---	---	---
	Pyrethrum	21.0	4.0	---	---	---	---	---
	Flue-Cured Tobacco	---	5.0	L	0.6	---	---	---
	Sorghum/Millet	---	---	M	---	---	---	---
V	Bananas All Others	---	---	M	---	---	---	---

See Footnotes Following Page

Footnotes From Table IV.7

- (a) Includes grapes.
- (b) See Tables 35, 36, 37, 38, and 39.
- (c) See Table 30.
- (d) See Discussion of Table 30.
- (e) Only for selected horticultural crops.
- (f) See Tables 40 and 41.
- (g) 31.2 m. shs. in the Parastatal investment in general forestry activities without being able to distinguish between hardwoods and softwoods.
- (h) See the discussion just prior to this Table.
- (i) An additional 38 m. shs. is to be allowed for cotton ginneries and tea factories.
- (j) An additional 51 m. shs. is to be allowed for farm machinery for cotton, coffee, maize, wheat, and tobacco.
- (k) See the discussion just prior to Table 30.

A Comparison of National and EAAFRO Priorities

Tables IV.8,9,10, and 11 on the following pages are used to compare the national agricultural and forestry priorities of Kenya, Uganda, and Tanzania, as analyzed from their respective national development plans, to EAAFRO's own research priorities. In Table IV.8, EAAFRO's research projects are listed in their order of priority, just as they were previously. The national priorities that Kenya, Uganda, and Tanzania place on that project--as analyzed above--are then listed across the table. A final column labeled the Balance of National Interest attempts to summarize which Partner State or States appear to have more of an interest in the project due to their own priorities. Arabic number symbols are used instead of Roman Numerals to indicate the national priorities but the highest priority is still indicated by the number one. The symbols used in the final column have much the same meaning as they did in previous tables: R means that all three countries are interested in this project to about the same degree (note that this common interest can be high or low) or that the interest is regionally balanced; k, u, and t mean that, respectively, Kenya, Uganda, or Tanzania is slightly more interested in this project than the other Partner State or States, but that there is still some regional balance to it; K, U, and T mean that, respectively, Kenya, Uganda, or Tanzania is much more interested in this Project than the other Partner State or States, and that regional imbalance is fairly great.¹⁵

In looking at EAAFRO's highest priority Class I projects, the first thing noticeable is that two of the five projects in this class are of medium to very low priority in all three Partner States! None of the national development plans has much of anything to say about sorghum, and legumes--although mentioned and discussed--are not assigned to a high priority. Therefore, two of the projects in Class I that have regionally balanced interest in them actually are balanced because of a common low or dis-interest on the part of the Partner

¹⁵Combinations of capital and small letters--e.g., K,t--refer to combinations of meanings--e.g., Kenya has much interest in a project, Tanzania has slight interest, and Uganda has no interest at all.

Table IV.8

A COMPARISON OF EAFRO AND NATIONAL PRIORITIES
BY EAFRO PROJECTS IN PRIORITY ORDER

EAFRO Research Projects In Order of EAFRO Priorities		Kenya's Priorities	Uganda's Priorities	Tanzania's Priorities	Balance of National Interest
I.1	Sugar Cane Breeding	1	1	2	R
I.2	Softwoods - Breeding	1	3	1	K,t
I.3	Sorghum Breeding	5	4	5	R
I.4	Maize Breeding	1	4	2	k,t
I.5	Legumes - Virus Survey	4	4	3	R
II.1	Millet Breeding	5	4	5	R
II.2	Water Resources/Land Use	5	3	4	u
II.3	Hard & Softwoods - Decay	2.5	4	2	k,t
II.4	Basic Research - Herbarium	NA	---	---	---
III.1	Groundwater Resources	5	3	4	u
III.2	Maize - Soil Fertility	1	4	2	k,t
III.3	Horticultural Propagation - Quarantine	2	3	3	R
III.4	Tobacco - Virus	4	2	1	u,t
III.5	Rice - Nematode	2	4	3	k
III.6	Rangeland - Compensatory Growth	1	5	3	K,t
III.7	Rangeland - Nutrient Requirements	1	5	3	K,t
III.8	Softwoods - Insect	1	3	1	k,t
III.9	Softwoods - Root Rot	1	3	1	k,t
III.10	Sorghum/Millet Agronomy	5	4	5	R
IV.1	Rangeland - Silage	1	5	3	K,t
IV.2	Rangeland - Cultivation	1	5	3	K,t
IV.3	Water Requirements - Selected Crops	5	3	4	u
IV.4	Pulp and Paper Industry	X	---	---	K
IV.5	Charcoal/Steel Industry	---	X	---	u
IV.6	Softwoods - Woolly Aphid	1	3	1	k,t
IV.7	Bean, Citrus & Banana - Nematode	?	?	?	R
IV.8	Bean - Nematode	2	3	3	R
IV.9	Horticultural Cuttings - Quarantine	2	3	3	R
IV.10	Sugar Cane - Chemical Control	1	1	2	R
IV.11	Basic Research - Herbarium	NA	---	---	---
V.1	Wheat - Tract Elements	2	5	1	K,t
V.2	Mechanized Cultivation - Seed Bed	4	3	4	R
V.3	Natural Forest - Pin Hole Borer	5	5	3	t
V.4	Softwoods - Cypress Canker	1	3	1	k,t
V.5	Rangeland - Body Composition	1	5	3	K,t

States. Of the three remaining projects in Class I, Kenya and Tanzania seem to have more interest in two of them, Softwood Tree Breeding and Maize Breeding, than Uganda does. Both these projects are given a high priority by both Kenya and Tanzania, however. Only one Class I project, Sugar Cane Breeding, exhibits a regionally balanced and high priority interest from all Partner States.

Of the three eligible projects in Class II, only one of them, Millet Breeding, exhibits regionally balanced interest by the Partner States, but this is again another case of their common disinterest as shown by the low priority they all assigned to this crop. Uganda seems to be more interested in water resources/land use research than Tanzania or Kenya, but even their assigned priority is not high. The national priority scores for the Hard and Softwoods-Decay projects are the averages of the separate hardwood and softwood priorities. While the effect of the inclusion of hardwoods has been to lower the national priority scores from their higher softwoods level, the balance of interest in this forestry research has stayed the same: Kenya and Tanzania appear to be more interested in this project than Uganda. Although the latter two projects exhibit some imbalance in the national interest shown in them, there is still some common regional interest shown.

Class III projects nearly all exhibit some degree of national interest imbalance. The only exceptions are the common disinterest already shown for sorghum and millet, Sorghum/Millet Agronomy, and the common medium-to-high interest shown for horticultural crops: Horticultural Propagation. In projects on crops or activities which have already been commented on, the work on Ground-water Resources again appears to be of more interest to Uganda than to Kenya or Tanzania; the Soil Fertility work with Maize again appears to be of more interest to Kenya and Tanzania than to Uganda; and the two softwoods projects on insect defoliators and root rot disease also again appear to be of more interest to Kenya and Tanzania than to Uganda. Tobacco is a research subject that only has a medium EAAFRO priority, but both Uganda and Tanzania have assigned it a high priority and are thus more interested in it than Kenya is. Rice, on the other hand, is another medium EAAFRO priority item in which Kenya appears to be more interested than either Uganda or Tanzania. Kenya exhibits a much greater interest in the rangeland research Projects than does Uganda, with Tanzania in the middle.

Most of the national priority bases for Class IV projects have already been discussed above. In the case of project IV.3, Water Requirements - Selected Crops, the national priorities for water resources research were used instead of averaging

the priorities for the four crops investigated in this project. This was because the discussion of the project in Appendix II seemed to orient it more towards the need to conserve water in the dryer areas of East Africa than to the specific crops themselves. Both projects IV.4 and IV.5 are oriented toward industrial rather than agricultural or forestry priorities, so the national priorities developed in this chapter are not applicable to them. However, Kenya had allocated quite a substantial sum of money to developing a pulp and paper industry in the Broderick Falls area in their Development Plan, and this appeared to be a quite high priority project for them. Tanzania and Uganda, on the other hand, only mentioned the general opportunity for developing such an industry, but allocated no funds and had no specific plans. Therefore, it is indicated for project IV.4, Pulp and Paper Industry, that Kenya appears to be much more interested in it than either Uganda or Tanzania. Similarly, Uganda's Development Plan is the only one which discusses the need for a charcoal/steel industry. No money is allocated, however, and so Uganda's interest in this project is still probably quite low. Therefore, Uganda is indicated to be only slightly more interested in this project than are Tanzania and Kenya. The national priorities for the nematode survey which has focused on bean, citrus, and banana are impossible to score by averaging priorities for the individual crops. It is believed, however, that these national priorities would be low in all cases and so the national interest would be regionally balanced. The national priorities for horticultural crops are used for the Bean-Nematode project instead of the soya bean or legume priorities, because it is the vegetable bean for canning and export that seems to be the subject of this project.

Class V EAAFRO projects are so insignificant that the national interest in them is not so important. The only project concerning wheat is in this class, and both Kenya and Tanzania appear to have a much greater interest in this crop than Uganda does. All three countries appear to have a medium-to-low interest in mechanized cultivation. Although this is the only research project EAAFRO carries out in this area, it should be remembered that the services of the Machinery Coordinating Unit are quite extensive. National priorities for hardwoods are used for the Natural Forest project, because the two terms almost always refer to the same conditions. Tanzania appears to have more interest in these indigenous natural forest hardwoods than do either Kenya or Uganda, although even Tanzania's priority is still only at a medium level.

Summing up Table IV.8, when those projects in the top two priority classes that are of common disinterest are eliminated from consideration, it appears that both Kenya and Tanzania exhibit more interest in EAAFR0's top priority projects than Uganda, due principally to their greater priorities assigned to softwoods and maize. The only project in these classes which exhibits a common high priority interest on the part of all Partner States is Sugar Cane Breeding. In Class III, this regional imbalance is reinforced, and due to the greater Kenyan interest in rangeland research and rice, Kenya appears to have more interest in these medium-priority EAAFR0 projects than Tanzania does. Tanzania, however, still appears to have more interest in this class than Uganda. Much the same is also true in Classes IV and V. Therefore, two points can be made: Based on an analysis of national agricultural and forestry priorities from their Development Plans, (1) some of EAAFR0's top priority research projects do not seem to be of much interest to any of the Partner States, and (2) Kenya and Tanzania exhibit more interest in EAAFR0's projects than Uganda, with Kenya's interest becoming more disproportionately greater as the EAAFR0 priority level goes down.

Another, perhaps better, way to summarize these results is to examine Table IV.9 below. All of EAAFR0's research projects have been combined into

Table IV.9

A Comparison of EAAFR0 and National Priorities
By EAAFR0 Priorities

Priority Class	EAAFR0 Research Pool	Kenya Priorities	Uganda Priorities	Tanzania Priorities	Balance of National Interest
I	Softwoods	1	3	1	k,t
	Sorghum & Millet	5	4	5	R
II	Rangeland	1	5	3	K,t
	Sugar Cane	1	1	2	R
III	Water Resources/ Land Use	5	3	4	u
	Maize	1	4	2	k,t
	Horticultural Crops	2	3	3	R
	Legumes	4	4	3	R
	Tobacco	4	2	1	u,t
IV	Rice	2	4	3	k
	Hardwoods	4	5	3	t
	Wheat	2	5	1	K,T
V	Farm Mechanization	4	3	4	R
	Other	-	-	-	-

Research Foci and ranked once again into five priority classes on the basis of the manpower devoted to the research projects on each particular focus. Thus, four or more EAAFR0 officers were working on softwoods oriented projects; three to four officers were working on Sorghum and Millet, Rangeland, and Sugar Cane projects; one-and-a-half to three officers were working on Water Resources/Land Use, Maize, Horticultural Crops, and Legumes; one officer was working on Tobacco, Rice, and Hardwoods; and less than one officer was working on Wheat and Farm Mechanization. The conclusions from Table IV.9 are much the same as from Table IV.8, except that a greater interest on the part of Kenya is shown more in the top than the medium priority projects due to the combining of relatively many medium to low priority EAAFR0 projects into a Class II priority focus.

Table IV.10 simply rearranges EAAFR0's projects and their national priority scores into EAAFR0 divisions. In several cases, where there are only a few projects in a division which all concern the same crop or activity, that one factor dominates the balance of national interest in the whole division. Thus, the entire Sugar Cane Division exhibits high interest from all Partner States; the entire Sorghum and Millet Division exhibits low interest from all Partner States; the entire Maize Genetics Division is of more interest to Kenya and Tanzania than to Uganda, but still exhibits some regional interest; the entire Plant Quarantine Service research exhibits medium interest from all Partner States; and the entire Animal Production Division exhibits great interest from Kenya, less from Tanzania, and even less from Uganda. In the Forestry Division, the dominance of projects oriented towards softwoods has influenced the greater interest exhibited by Kenya and Tanzania. The Plant Pathology and Nematology and the Physics and Chemistry Divisions both do work on a variety of crops and/or activities, and both divisions also seem to exhibit a reasonably well-balanced interest from among the Partner States.

Table IV.11 on a subsequent page attempts to compare regional and national agriculture priorities from the national viewpoint; i.e., the national priorities as analyzed in this chapter are listed and the EAAFR0 research priority assigned to the particular focus in Table IV.9 is then shown along side. If the national crop or activity is not covered at all by EAAFR0, the symbol 0 (zero) is used; otherwise, numbers are used to represent the Roman numeral priority classes. If any other regional oriented research agency or group besides EAAFR0 is doing research in the specific crop or activity, that is also indicated, since what will be looked for in this table are gaps where no regional institution is doing research on a crop or activity of some interest to the individual Partner States.

Table IV.10

A COMPARISON OF EAAFPD AND NATIONAL PRIORITIES
BY EAAFPD DIVISION

Sector Group	EAAFPD Research Projects By Division	Kenya's Priorities	Uganda's Priorities	Tanzania's Priorities	Balance of	
					National	Interest
Sugar Cane Breeding	I.1 Sugar Cane Breeding	1	1	2	R	R
	IV.10 Sugar Cane - Chemical Control	1	1	2	R	R
	I.2 Softwoods - Breeding	1	3	1	K,L	K,L
	II.3 Hard & Softwoods - Dessy	2,5	4	2	K,t	K,t
Forestry	III.8 Softwoods - Insects	1	3	1	K,t	K,t
	III.9 Softwoods - Root Rot	1	3	1	K,t	K,t
	IV.4 Pulp and Paper Industry	K	---	---	K	K
	IV.5 Charcoal/Steel Industry	---	---	---	u	u
Sorghum and Millet	IV.6 Softwood - Weevily Aphid	1	3	1	K,t	K,t
	V.3 Natural Forests - Pin Hole Borer	5	5	3	t	t
	V.4 Softwood - Cypress Canker	1	3	1	K,t	K,t
	I.3 Sorghum Breeding	3	4	5	R	R
Maize Genetics	III.1 Millet Breeding	5	5	5	R	R
	III.10 Sorghum/Millet Agronomy	5	4	5	R	R
	I.4 Maize Breeding	1	4	2	K,t	K,t
	I.5 Legumes - Virus Survey	4	4	3	R	R
Plant Pathology and Nematology	III.4 Tobacco - Virus	4	2	1	u,t	u,t
	III.5 Rice - Nematode	2	4	3	K	K
	IV.7 Bean, Citrus, Banana - Nematode	?	?	?	R	R
	IV.8 Bean Nematode	2	3	3	R	R
Physics and Chemistry	II.2 Water Resources/Land Use	5	3	4	u	u
	III.1 Groundwater Resources	5	3	4	u	u
	III.2 Maize - Soil Fertility	1	4	2	K,t	K,t
	IV.1 Rangeland - Silage	1	5	3	K,t	K,t
Plant Quarantine Service	IV.2 Rangeland - Cultivation	1	5	3	K,t	K,t
	IV.3 Water Requirements - Selected Crops	5	3	4	U	U
	V.1 Wheat - Trace Elements	2	5	1	K,T	K,T
	V.2 Mechanical Cultivation - Seed Bed	4	3	4	R	R
Animal Production	III.3 Horticultural Propagation	2	3	3	R	R
	IV.9 Horticultural Cuttings	2	3	3	R	R
	III.6 Rangeland - Compensatory Growth	1	5	3	K,t	K,t
	III.7 Rangeland - Nutrient Requirements	1	5	3	K,t	K,t
Herbarium	V.5 Rangeland - Body Composition	1	5	3	K,t	K,t
	II.4 Basic Research - Herbarium	NA	---	---	---	---
	IV.11 Basic Research - Herbarium	NA	---	---	---	---

Table IV.11.

A COMPARISON OF NATIONAL AND REGIONAL PRIORITIES
BY NATIONAL PRIORITIES.

National Priority Classes	Kenya	EAAFRD Research Priority	Other Research Agency	Uganda	EAAFRD Research Priority	Other Research Agency	Tanzania	EAAFRD Research Priority	Other Research Agency
I	Rangeland	2	UNDP	Cotton	0	CRC	Cotton	0	CRC
	Maize	3		Sugar	2		Wheat	5	CIDA
	Sugar Cane	2		Tea	0	TRI	Dairy	0	EAVRO
	Tea	0	TRI				Softwoods	1	
	Softwoods	1					Tea	0	TRI
II	Dairy	0	EAVRO	Coffee	0	CRC	Flue-Cured Tobacco	4	
	Coffee	0	CRC	Tobacco	4		Sugar	2	
	Horticulture Crops	3		Beef	0	EAVRO	Sisal	0	
	Rice	4					Maize	3	
	Wheat	5	CIDA						
III	Cotton	0	CRC	Horticulture Crops	3		Cashewnuts	0	
	Pyrethrum	0		Softwoods	1		Coffee	0	CRC
				Water Resources/Land Use	3	UN-IHD	Rice	4	
				Dairy	0	EAVRO	Legumes/Oil Crops	3	
				Farm Mechanization	5		Horticultural Crops	3	
IV	Sisal	0		Legumes/Oil Crops	3		Rangeland	2	
	Legumes/Oil Crops	3		Cocoa	0		Hardwoods	0	EAVRO
	Potatoes	0		Kenaf	0		'Coconuts	4	
	Wattle	0		Rice	4		Kenaf	0	
	Cashewnuts	0		Maize	3		Farm Mechanization	5	
V	Coconut	0		Sorghum/Millet	2		Water Resources/Land Use	3	UN-IHD
	Tobacco	4					Pyrethrum	0	
	Farm Mechanization	5					Flue-Cured Tobacco	0	
	Hardwoods	4							
	Water Resources/Land Use	3	UN-IHD	Silk	0		Sorghum/Millet	2	
Others			Slim-Slim	0		Bananas	0		
			Others			Others			

UNDP=United Nations Development Program - Range Management Program
 TRI =Tea Research Institute
 EAVRO=East African Veterinary Research Organization

CRC=Coffee Research Foundation
 CIDA=Canadian International Development Agency
 CRC=Cotton Research Corporation
 UN-IHD=United Nations - International Hydrological Decade

In examining Table IV.11, it appears that Kenya's Class I, top priority needs, are reasonably well covered. EAAFR0 is doing medium to high priority work in four of the five areas, and the remaining crop, tea, is covered by the Tea Research Institute of East Africa, which is located right in Kenya at Kericho. Uganda's three top priority crops also seem covered, but perhaps to a lesser degree. EAAFR0 is working on only one of them -- sugar cane -- and cotton is well covered by the Cotton Research Corporation's research unit at Namulonge. But although the Tea Research Institute of East Africa does try to do work on a regional basis, their efforts are heavily oriented towards their headquarters location in Kenya. Tanzania definitely has some gaps for its top priority crops. Flue-cured tobacco is a low priority crop for EAAFR0, and no one else is working on it. Similarly, wheat is a low priority crop for EAAFR0; and although a Canadian aid team has been attempting to do wheat research on a regional basis, so far most of their efforts have been confined to Kenya. The Tea Research Institute suffers from the same limitations in Tanzania as were described above for Uganda. The Cotton Research Corporation does have a strong research unit stationed at Ukiriguru in Tanzania, so that is reasonably well covered, and research work on Dairy topics would be more appropriately done by EAVRO. Out of Tanzania's six top priority crops or activities, however, EAAFR0 is doing some high priority work on only one of them: softwoods.

In the Partner States' Class II priorities, few gaps seem apparent. Both Horticultural Crops and Rice for Kenya are only medium or low priorities for EAAFR0, but there is some work being done. The Canadian wheat research unit at Njoro is adequately covering that crop; EAVRO would more appropriately be concerned with beef research, and the Coffee Research Foundation located at Ruiru in Kenya should cover that crop reasonably well. In Uganda's Class II priorities, the tobacco gap emerges again and, although the Coffee Research Foundation is meant to be a regional institution, it is heavily oriented towards Kenya where it is located. Two of Tanzania's three Class II priority crops, Sugar and Maize, are being worked on by EAAFR0, and the third, sisal, is a declining crop that is still important to Tanzania. More research on sisal, however, would not likely be advocated even by Tanzania, because its future is not bright.

For Class III, Kenya's medium priorities on cotton and pyrethrum are partially covered by a small unit of the Cotton Research Corporation stationed there and national research on pyrethrum. Four of Uganda's five Class III priorities are worked on by EAAFR0, although Farm Mechanization is a very low

priority for EAAFRO, and no one else is working on it. The International Hydrological Decade of the United Nations is also doing some work in East Africa on water resources/land use. Cashewnuts research is Tanzania's largest gap in Class III; neither EAAFRO nor anyone else is working on this crop. Coffee is covered to some extent by the Coffee Research Foundation, although this institution is heavily oriented toward Kenya. With the exception of beef, which EAVRO should be covering to some extent, all the remaining crops or activities, Rice, Legumes/Oil Crops, Horticultural Crops, Rangeland, and Hardwoods, are worked on to some degree by EAAFRO, although its priorities for Rice and Hardwoods are low.

In the medium-to-high national priorities of the three Partner States, therefore, there seem to be only a few gaps that might need filling: research on pyrethrum and cashewnuts for, respectively, Kenya and Tanzania, might be considered; and it could be very important that work being done on coffee, tea, and wheat by other regionally-oriented institutions be expanded or the results be distributed to ensure that they operate on regional basis. Many Class IV national priorities concern new crops or activities which cannot be considered to be nearly as important to the nation as the already established or proven successful ones. Nevertheless, these new crops or activities are mentioned in the development plans and some are allocated small sums of funding; they represent opportunities for which research is especially important. In examining Class IV, some of the crops listed on which no EAAFRO or other agency research is being done are as follows: Potatoes, Wattle, Cashewnuts, Coconuts, Cocoa, and Kenaf. Work on these crops might be considered. EAAFRO is already doing some medium-priority work on Legumes/Oil Crops, and this might well be expanded also.

Chapter V

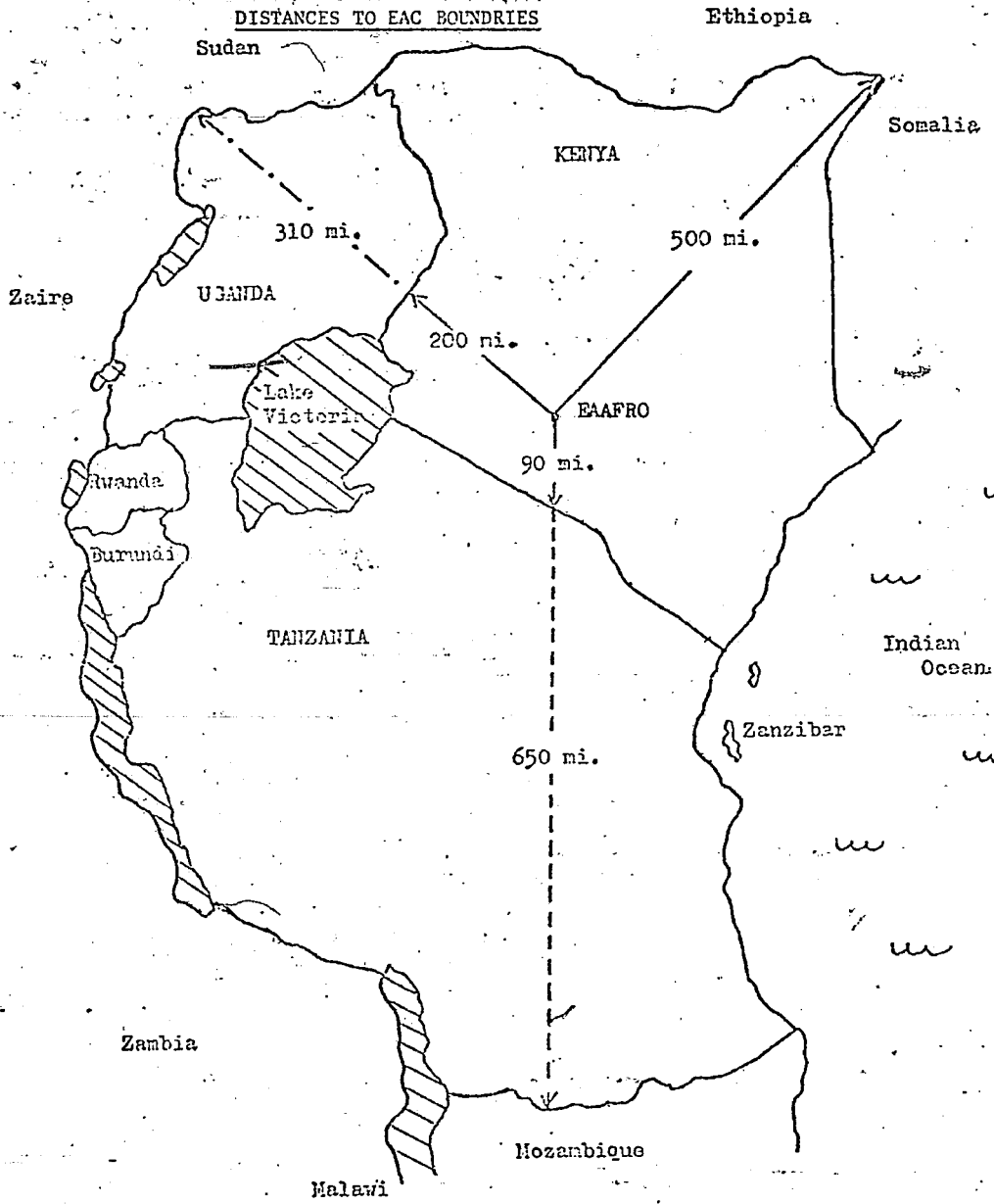
The Interactions between Distance and Transactions in East Africa

As has been pointed out in the previous chapter, the ideal situation for any multi-national institution would be that over a period of years each participating country should receive equal or proportionally fair--according to its contribution--benefits from that institution. Although the direct contributions of the Partner States to the General Fund Services of the East African Community (EAC), which supports the Community's research institutions, are not equal, this inequality was perceived--and intended--to be a redistributive device among the Partner States, compensating those States which had benefited the least--or may have even been harmed--from the operations of the Community. With this in mind, it is probably correct to say that an equal distribution of the benefits of agricultural and forestry research among the Partner States, over a period of years, would be the ideal situation from an EAC point of view, where neither geographic distance nor national boundaries affected that distribution--i.e., if one were to travel on a straight line in any direction away from EAAFRO to the border of the regional Community, the benefits from EAAFRO would not decrease, even as national boundaries were crossed.¹ (See Figure V.1)

Figure V.2 (a) on the subsequent page is intended to be representation of that idealized situation. The distance from EAAFRO--in all directions--is plotted on the abscissa. EAAFRO is located in Kenya, about 18 miles northwest of Nairobi at Muguga--See Figure V.1. In order to understand Figure V.1 and V.2, one has to imagine three lines all drawn outward from EAAFRO to the furthest away points in Kenya, Uganda, and Tanzania. A ratio scale of EAAFRO's Benefits/Activities is plotted on the ordinate, and as one travels outward along any of these lines in V.2(a) this value would not change as the distance from EAAFRO increases or as the Tanzanian and Ugandan borders are crossed. This is only as long as one stayed within East Africa, however--the tail ends of the curves off to the right represents a small amount of scientific benefits/activities from EAAFRO which accrues to countries outside of East Africa.

¹ Obviously this idealized situation does not represent physical, ecological reality. At any particular distance away from EAAFRO, one might find himself in semi-desert areas, on snow-covered mountains, or in the middle of Lake Victoria where the benefits from EAAFRO would approach zero. But the operating variable in this case is not distance per se but physical and ecological conditions at that particular distance.

153.
Figure V.1

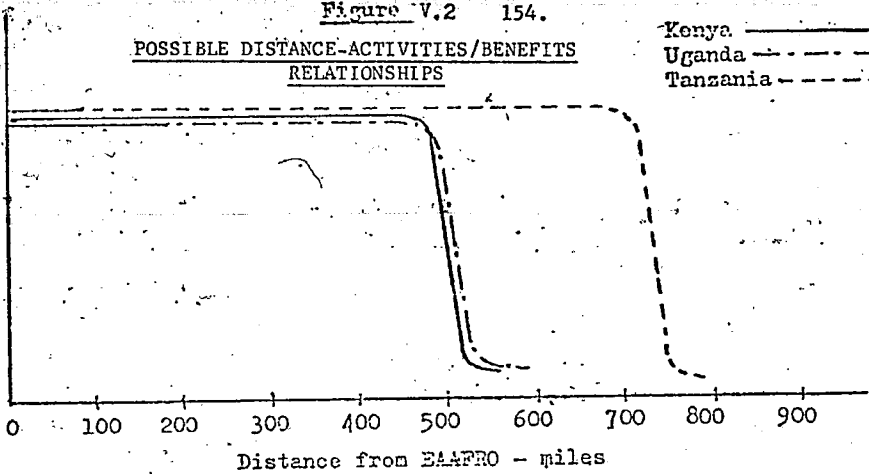


POSSIBLE DISTANCE-ACTIVITIES/BENEFITS RELATIONSHIPS

Kenya —————
 Uganda - - - - -
 Tanzania - - - - -

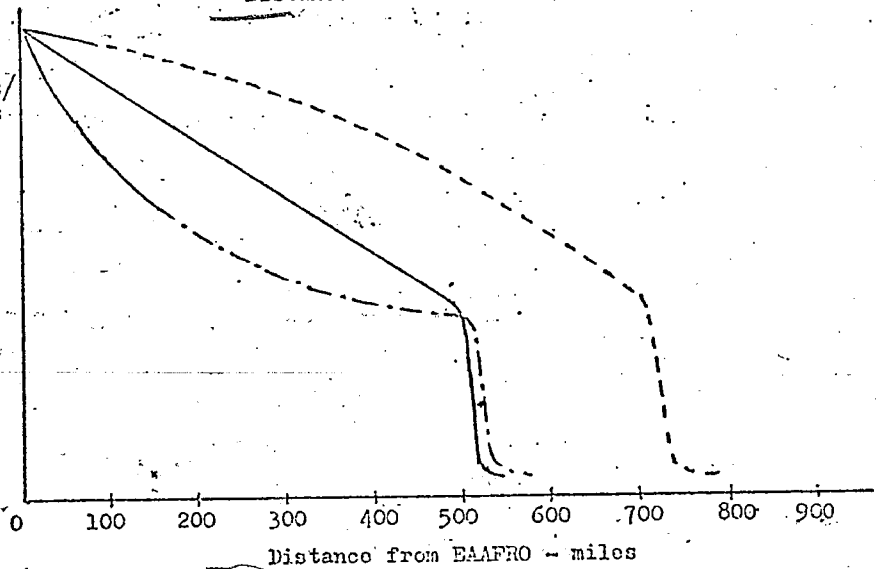
EAAFR0
 Benefits/
 Activities

(a)



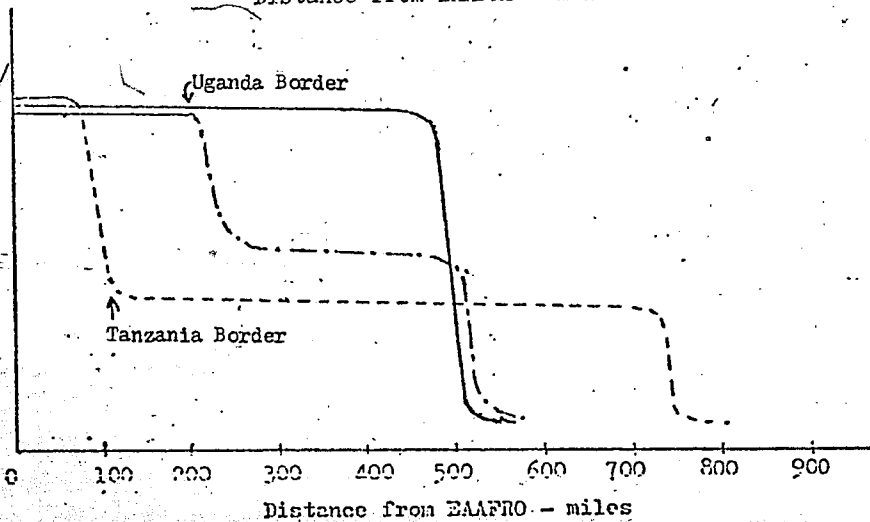
EAAFR0
 Benefits/
 Activities

(b)



EAAFR0
 Benefits/
 Activities

(c)



The phrase "Benefits/Activities" is used for the ordinate scale instead of just "Benefits" because it is very difficult to measure the benefits from a scientific research institute, let alone the benefits at a given distance away from that institute. Therefore, we instead use measurable indicators which are logically associated with benefits -- e.g., activities that can be counted and ordered in some fashion. Not all EAAFR0 activities, of course, can logically be expected to fit the idealized conditions of Figure V.2(a) For example, most -- if not all -- laboratory work will have to be done at the central headquarters laboratories at Muguga. But if a research project on some aspect of soils was underway, one could expect that the range and number of soil samples from, or field sites in, each Partner-State should approach equality -- depending, perhaps, on the range of different soil types in each of the three countries.

Figure V.2(b) represents what geographers would call "isotropic conditions" within East Africa -- a featureless plain with an even distribution of resources and equal ease of movement in all directions.²⁾ Under these conditions, the normally expected relationship between distance and activities would be a fairly regular and decreasing linear or some kind of curvilinear functional relationship as shown. But neither of the situations pictured in V.2 (a) or (b) may conform to the reality of the real world. In discussing the concept of territoriality as it relates to human beings, Soja suggests the following:

One major dimension of territoriality, therefore, appears to be the existence of an identifiable disruption of a distance-ordered regularity in activity patterns caused by social as opposed to physical phenomena (such as environmental barriers). Assuming some form of social organization exists, we can also infer that these disruptions will shape and channel spatial interaction even under isotropic conditions.... What is essentially being proposed is that territoriality produces discontinuities and "plateaus" in normally expected patterns of spatial interaction and activity... abrupt drops in activity at particular points and broad distance zones in which the intensity of activity is approximately the same throughout. (Soja, op.cit., pp. 26-27)

This situation is pictured in Figure V.1(c) As one travels away from EAAFR0 along the solid line within Kenya, the rate of EAAFR0's benefits/activities should remain constant until the Kenyan border is crossed into Ethiopia/Somalia at just over 500 miles away, where it then drops off sharply to almost nothing. Going towards the furthest away point in Uganda, the benefit/activity rate remains at the same constant value while one stays within Kenya, but when the Ugandan border is crossed at a distance of about 200 miles it decreases suddenly

²⁾Edward W. Soja, "The Political Organization of Space," Association of American Geographers, Resource Paper No. 8, 1971, p. 26.

and levels off again--somewhere in the middle--until the Zaire/Sudan border is crossed where it drops off sharply again to almost nothing. Going southward, the Tanzanian border is crossed at a distance of about 90 miles where the benefits/activities rate similarly decreases suddenly and levels off as one travels through Tanzania, until the Mozambique border is crossed at a distance of about 740 miles. Under the idealized isotropic conditions and with no social boundaries or territoriality, nature would expect EAAFRO's activities/benefits to be distributed according to Figure V.2 (b); the EAC, EAAFRO, and other EAC research institutions would probably claim that--although they aren't perfect in their efforts--the total distribution of their activities/benefits more nearly approaches Figure V.2(a)--the goal toward which they are striving; and Uganda and Tanzania would probably claim that the reality of EAAFRO's activities/benefits distribution looks more like Figure V.2 (c) and that it doesn't even come close to equality.

Which of these alternative patterns EAAFRO's benefits/activities distribution most closely approximates is the question that this chapter addresses. The general theory of transaction analysis and its use as an indicator of political integration, as expounded by Karl Deutsch and others, has been discussed in Chapter III. In this chapter, some important transactions between EAAFRO and the Partner States of the East African Community will be analyzed to provide an indication of the balance of EAAFRO's activities/benefits among the Partner States of Kenya, Uganda and Tanzania.

Although many possible transactions between EAAFR0 and national agriculture and forestry systems in the Partner States were initially considered, most of them proved to be unfeasible -- phone calls, for example, were so difficult to Tanzania and Uganda that they were very rarely utilized; postal correspondence could not be measured from EAAFR0 interview responses, and EAC permission was not granted to go through files; any other indicators that depended upon EAAFR0 interview responses -- such as asking EAAFR0 officers to name all the national researchers they could -- also proved to be unsatisfactory measures. Fortunately, two more objective transaction indicators were found in the EAAFR0 Newsletter: monthly lists of "Safaris" and "Visitors." Under "Safaris," the research-associated visits of EAAFR0 officers to national locations were listed; under "Visitors," the people who visited EAAFR0 headquarters at Muguga and where they came from were listed. In a later chapter, the importance of personal contact -- as opposed to telephone or written media messages -- in the technology or information transfer process is discussed, and it is just as likely that personal contact is by far the most important way to develop personal or social, as well as scientific, relationships. Therefore, these two personal contact measures are likely to be among the best possible indicators for this transaction analysis.

This is not to say that the data from the EAAFR0 Newsletter is without fault, especially in the case of EAAFR0 safari visits to national locations. For one thing, it is probably the case that short visits to national locations in Kenya close to EAAFR0 headquarters were simply not all listed because they were regarded as an ordinary, every-day activity rather than an official "Safari" to distant places or across national borders. Therefore, the number of EAAFR0 research visits to Kenya sites is probably under-stated. On the other hand, the factor of time is not taken into account in this indicator -- i.e., a visit of two days would logically seem to be more important than a visit of two hours, but there is no way to tell from the data how long the visits were. Since safaris to Uganda and Tanzania, and the more distant parts of Kenya, would probably tend to last longer than the ones close to headquarters, the importance of the visits to Uganda and Tanzania is probably understated.

Also, this data is presented in the form of safaris -- i.e., trips -- and whereas an EAAFR0 officer might make one trip to one nearby Kenya location and another trip to another such location, he would tend to make one longer trip to

Uganda or Tanzania and visit several locations en route. Since all of the locations or institutions visited on these longer trips were listed, this difficulty was overcome by measuring the number of times individual locations or institutions were visited and not just the number of trips. A number of different institutions, however, can exist in one geographic area or location, and the scores for all such institutions or places included in an area are all added together to form the score for that particular location.

Two major problems were resolved with difficulty. In a few instances, instead of listing specific EAAFRRO officers or specific places visited, the Newsletter used phrases like "members of the Animal Production Division" and "visited forestry areas in Kenya and Uganda." The number of these instances was not large relative to the total number of people and places listed, but since they seemed to disproportionately fall into the Animal Production and Forestry Divisions, a compensating factor for them was taken into account.¹⁾ Another difficulty was that a few specific places mentioned could simply not be found! Since there were again a very few cases of this and they seemed to be reasonably distributed among the Partner States and EAAFRRO Divisions, these cases were simply dropped.

An unresolvable problem was presented by EAAFRRO's decentralized divisions located at different national research stations. In the case of the Sugar Cane Breeding and Sorghum and Millet Divisions, some visits these officers made to national locations outside of the ones in which they were stationed did appear in the Newsletter. No visits like this were recorded for the Maize Genetics Division, however, and this probably was a matter that they weren't reported as such rather than they didn't happen. Being stationed at these national locations full-time did not count as a visit. Visits from EAAFRRO headquarters to these particular national locations did count, however, no matter whether the intended object of the visit was the national institution or the decentralized division located there. It is also likely that visits by officers from units like the Machinery Coordination Unit went unreported, and there is nothing that could be done in those cases.

The distances used in this chapter are straight line, "as-the-crow-flies" rather than road distances. Part of the reason for this was that alternative routes were possible in some cases, depending on how many places were being visited on a particular safari. And if two sites, for example, were being visited on one trip, should the distance traveled be divided between them or what? In order to avoid all these questions -- and the difficulty of measuring road distances to out-of-the-way places from maps, the straight-line distance concept of the isotropic plain was used.

³⁾ One officer was assumed to be involved, and a few -- not all -- of the major product areas concerned were assumed to have been visited.

With the above qualifications in mind, it was still felt that the data did provide some indication of the balance of EAAFRO's activities/benefits. The numerical results for each of the Partner States, by EAAFRO Division, are shown in Table V.1:

Table V.1

EAAFRO Safaris to National Location -
By EAAFRO Division

EAAFRO Division	Visits to:			Total Visits for Division
	Kenya	Uganda	Tanzania	
Administration	12	10	9	31
Animal Production	75	7	24	106
Forestry	114	43	26	183
Physics & Chemistry	49	24	13	86
Sugar Cane Breeding	--	9	1	10
Plant Pathology and Nematology	27	6	16	49
Sorghum and Millet	--	1	8	9
Maize Genetics	--	--	--	--
Plant Quarantine	1	--	--	1
Herbarium	7	--	1	8
Machinery Coordinator	2	--	1	3
Statistician	3	5	4	12
Armyworm	12	--	15	27
Total for Country	302	105	118	525

All of these results are for the Newsletter period from January 1970 to April 1972 -- the period when copies of all Newsletters were available to this author. In terms of country totals, Kenya locations were visited just about three times as much as locations in Uganda or Tanzania -- 302 visits to Kenya, to 105 visits to Uganda and 118 visits to Tanzania. In terms of Division totals, the Forestry Division stands out with the greatest number of visits -- 183, more than one-third of the total -- with the Animal Production (106) and Physics and Chemistry (86) Divisions being the other significant contributors. Since the time when most of these transactions took place, however, the Animal Production Division has almost gone out of existence in the wake of the Wasawo Report, so the Forestry Division is probably currently even more outstanding in making visits to national locations. There may be, of course, logical reasons for this in that some scientific research requires more field work than others.

Forestry is also one of the prime contributors to the imbalance of EAAFRO visits to Kenya locations. Almost all of the divisions show this bias, but it is most marked for Forestry, Animal Production, and Physics and Chemistry. This bias may reflect distance, but it also fairly well reflects the analyses in the previous chapters which showed that -- for one reason or another -- much of the research work in these divisions was more oriented toward Kenya than the other Partner States. One should note, however, that even with the Kenya imbalance that the Forestry Division alone accounts for almost half of the total EAAFRO visits to Uganda, and that the Forestry and Animal Production Division together account for almost half of the total EAAFRO visits to Tanzania.

The total number of visits to each country is broken down by locations and the approximate distances to get to them in kilometers in Table V.2 on the following pages. All of the different institutions, towns, or places included within a given location are listed underneath it. The locations within a country are presented in distance order -- the shortest distance appearing first.

Table V.2

Number of EAAFRO Visits
to Different National Locations

Kenya:

Nairobi-Metropolitan Area	approximately 25 Km.	25 visits
includes the University of Nairobi; all government Ministries including Agriculture and Forestry; East African Meteorological Department; East African Industrial Research Organization; Kenya National Agricultural Laboratories; Ruiru Coffee Research Foundation; Kerita and Uplands Forest Stations; USAID and other foreign aid agencies; UNESCO, IBRD, and all international agencies;		

Table V.2-Continued

Kenya (cont.)

Nairobi Metropolitan Area (cont.) - Limuru; Kikuyu; Kabete; private firms; etc.		
Thika - includes Kenya Horticultural Re- search Station, Kenya Cannery;	approximately 60 Km.	12 visits
Machakos - includes Katumani Agricultural Research Station, forest station;	" 80 Km.	7 visits
Aberdeers - includes South Kinangop forest station; Kinale forest; Kinakia forest/water catchment area; Naivasha; National Animal Husbandry Research Station	" 80 Km.	40 visits
Narok -	" 80 Km.	10 visits
Nakuru - includes Akira and Cole Ranches; Lanet Beef Research Station; Njoro Wheat Re- search Station; Egerton College; Kenya Pyrethrum Research Station; Molo; El- burgon, Likia, and Londiani Forest Stations; etc.	" 130 Km.	42 visits
Keekorok - Masai Mara Game Reserve	" 140 Km.	2 visits
Mt. Kenya - includes Chogoria, Kiandongo, Zaina, Rogati, Cheke, and Hombe forest areas; Ontulili and Nanyuki forest stations; Nyeri; Meru; Embu; Embu agricultural research station; Mwea Irrigation Scheme; Nanyuki; Kalkipia district ranches; etc.	" 160 Km.	37 visits
Kericho - includes Tea Research Institute; Kisii Agricultural research station.	" 170 Km.	25 visits
Amboselli - Amboselli National Game Park	" 210 Km.	1 visit
Eldoret - includes Elgeyo, Kaptagat, Nabkoi, Turbo, and West Rift Valley Forests; East African Tanning and Extract Co.	" 240 Km.	23 visits
Maralal - Maralal forest areas	" 270 Km.	1 visit
Kisumu -	" 280 Km.	7 visits

Table V.2-Continued

Kenya (cont.)			
Kisumu (cont.)			
Includes Kibos Sugar Research Station; Chemelil and Muhuroni Sugar Companies; Akero Irrigation Scheme; Mumias Sugar Scheme; Kakamega Agricultural Research Station.			
Kitale -	Kenya National Agricultural Research Station; Nzola and Mt. Elgon Forests.	approximately 310 Km.	19 visits
Garissa -		" 360 Km.	1 visit
Galole -		" 380 Km.	1 visit
Malindi -	Includes Galana Ranch; Jilore Forest Station;	" 450 Km.	17 visits
Mombasa -	Includes Kwale Forest Station; Coast Agricultural Research Station.	" 460 Km.	18 visits
Lamu -		" 490 Km.	2 visits
Mandera -		" 820 Km.	2 visits
Uganda:			
Tororo -	includes Mt. Elgon forest areas; East African Trypanosomiasis Research Organization.	" 350 Km.	7 visits
Jinja -	includes Kakira Sugar Estates; Lugazi Sugar Estates;	" 420 Km.	9 visits
Serere -	Serere Agricultural Research Station.	" 460 Km.	14 visits
Koroto -	Atumatek (Karamoja) Water Catchment Area;	" 480 Km.	6 visits
Kampala Metropolitan Area -	Includes Entebbe and all government Ministries, including Agriculture and Forestry; Makerere University; Kawanda Agricultural Research Station; Namulonge Cotton Research Station; Nakawa Forest Research Station; East African Virus Research Institute; Commonwealth Biological Control Center; etc.	" 480 Km.	36 visits

Table V.2-Continued

Uganda (cont.)			
Masindi -	approximately	630 Km.	8 visits
includes forest stations; Murchison Falls National Park.			
Gulu -	"	650 Km.	5 visits
includes Northern Region forest stations; FAO Beef Project;			
Mbarara -	"	660 Km.	3 visits
includes south-western Uganda; forest stations.			
Fort Portal -	"	730 Km.	8 visits
includes western Uganda forest stations; Queen Elizabeth Na- tional Park;			
Arua -	"	790 Km.	9 visits
West Nile Region Forest Stations.			
Tanzania:			
Serengetti -	"	220 Km.	5 visits
includes Serengetti National Park; Serengetti Research Institute;			
Arusha-Moshi -	"	250 Km.	28 visits
includes Kilimanjaro forest areas and stations; Arusha National Park; Tropical Pesticides Research Insti- tute; Lyamunga Agricultural Research Station; etc.			
Mbulu -	"	330 Km.	3 visits
Basotu -	"	380 Km.	1 visit
Basotu Wheat Scheme;			
Mwanza -	"	430 Km.	7 visits
Ukiriguru Agricultural Research Station;			
Lushoto -	"	440 Km.	4 visits
Forestry Utilization Station;			
Bukoba -	"	520 Km.	8 visits
includes West Lake Region; Bukoba Cooperative Union; etc.			
Tanga -	"	520 Km.	5 visits
includes Mlingano Agricultural Research Station; Tanga Region;			
Tabora -	"	600 Km.	1 visit
Mpwapwa -	"	600 Km.	19 visits
includes Mpwapwa Livestock Research Station; Ilonga Agricultural Research Station (Kilosa); Dodoma;			

Table V.2-Continued

Tanzania (cont.)			
Morogoro - Faculty of Agriculture, University of Dar es Salaam;	approximately	640 Km.	10 visits
Dar es Salaam - includes all government Ministries, including Agriculture and Forestry; University of Dar es Salaam; Kibaha sugar research station; USAID; etc.;	"	700 Km.	13 visits
Iringa - includes Kilombelo Agricultural Research and Training Institute (KATRIN) - Ifakara; Kilombelo Sugar Estates; Sao Hill forest areas; Ruaha National Park.	"	760 Km.	13 visits
Nbeya - includes Mbeya forestry areas; Nordic agricultural research station;	"	930 Km.	1 visit

A geographic picture of Table 2 is shown in Figure 1 on the following page, in which the size of the circle surrounding the location is roughly proportional to the amount of visits that location received from EAAFRO.

Figures 2, 3, and 4 on the following pages graph the number of EAAFRO visits in each country against the distance from EAAFRO of each particular location. After much experimentation, 100 kilometer distance intervals were selected for the abscissa, and the following Table is the basis for these Figures:

Table 3
Number of EAAFRO Visits to National Locations
at 100 Km. Distance Intervals

	Distance in Kilometers									
	0-100	1-200	2-300	3-400	4-500	5-600	6-700	7-800	8-900	9-1,000
Kenya	94	106	32	21	37	0	0	0	1	0
Uganda	0	0	0	7	65	0	16	17	0	0
Tanzania	0	0	33	4	11	13	30	26	0	1

Since EAAFRO is located in Kenya and the closest points in Tanzania and Uganda are approximately 150 and 320 kilometers away, the graph for Kenya is superimposed in dashed lines on the graphs of Uganda and Tanzania in order to be able to see how distance and national boundaries interact in affecting the number of EAAFRO visits to national locations.

Figure V.3—EAFRO Visits to Different National Locations

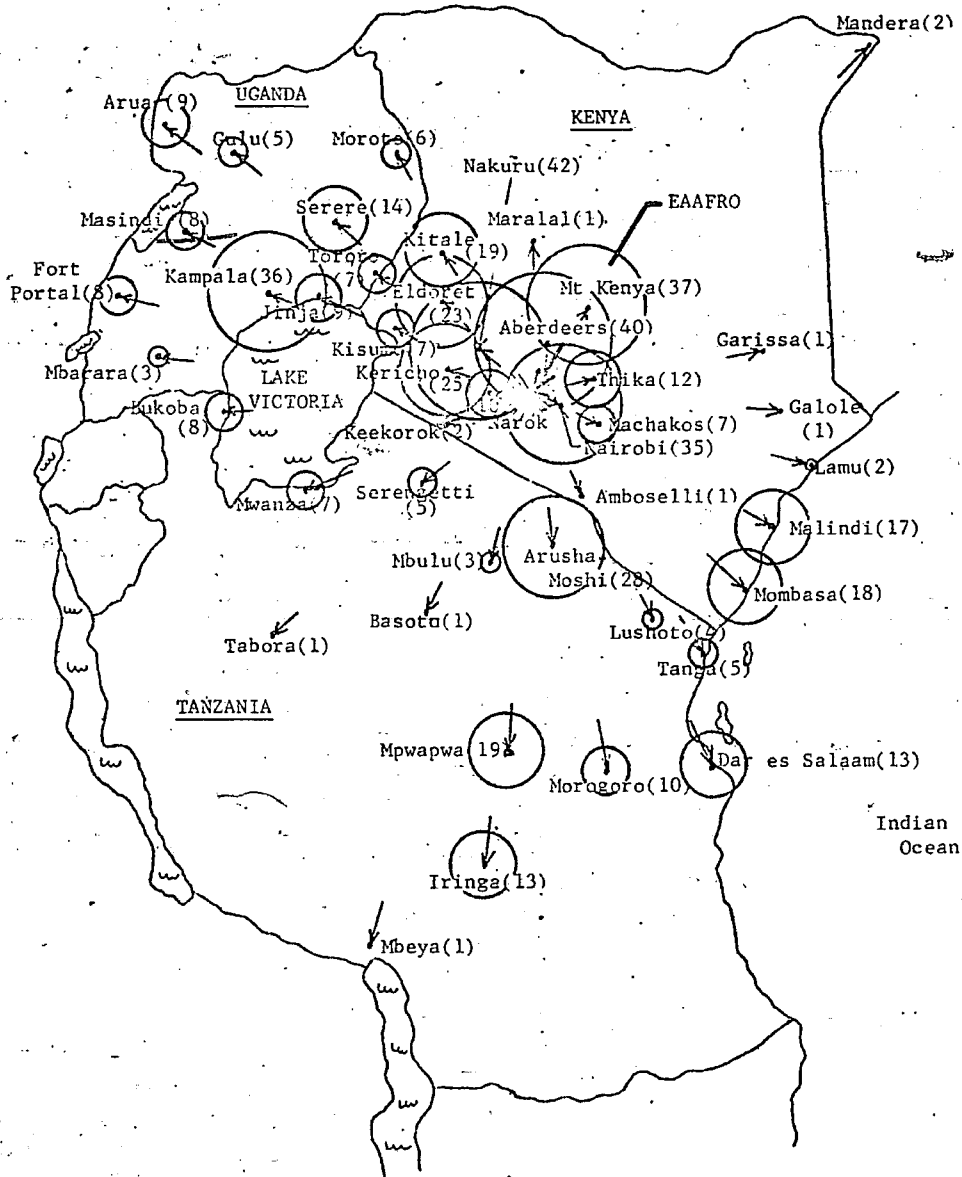


FIGURE V.4—Distance of EAAFRRO Visits to Kenya Locations

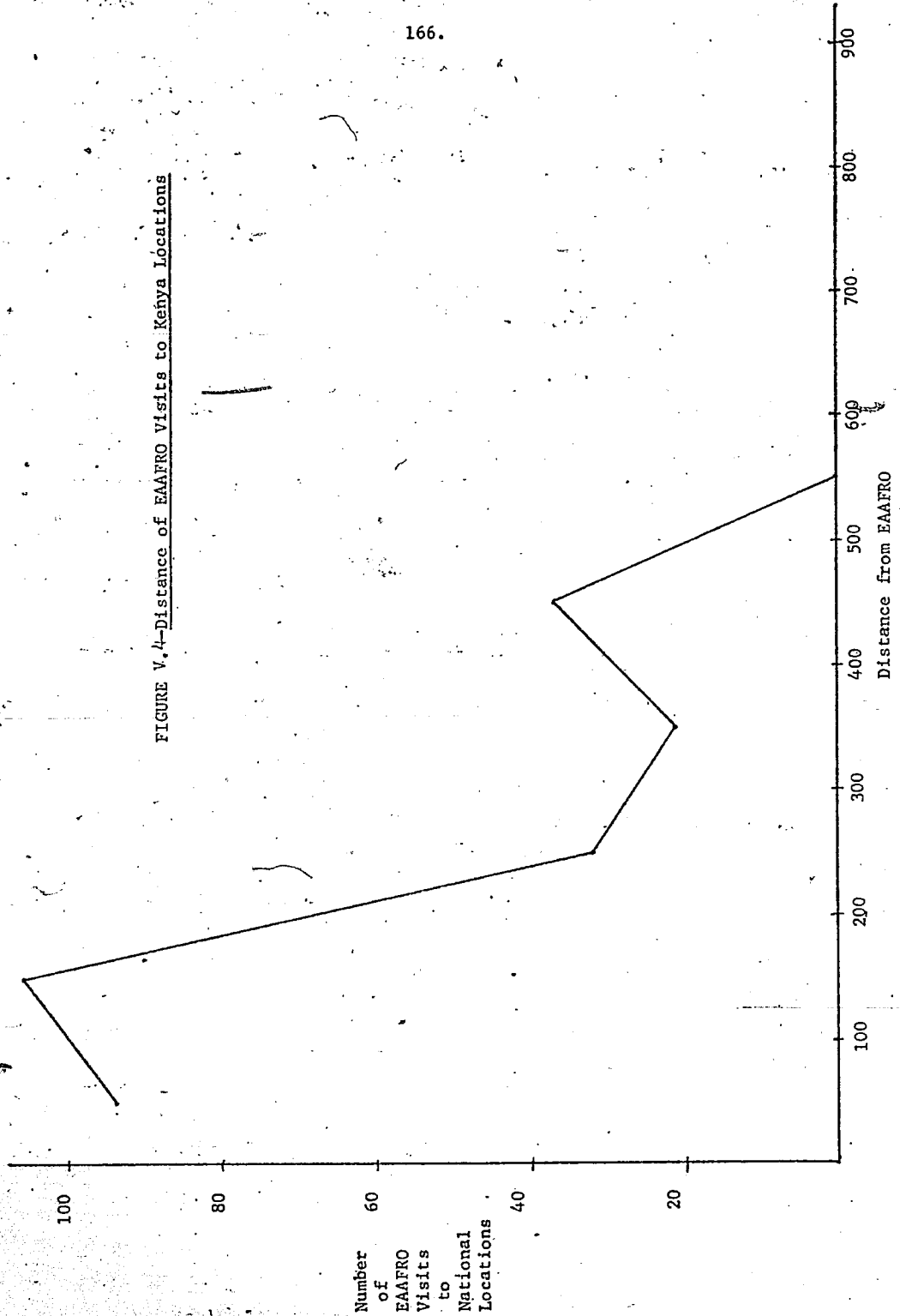


FIGURE V. 5- Distance of EAAFR0 Visits to Uganda Locations

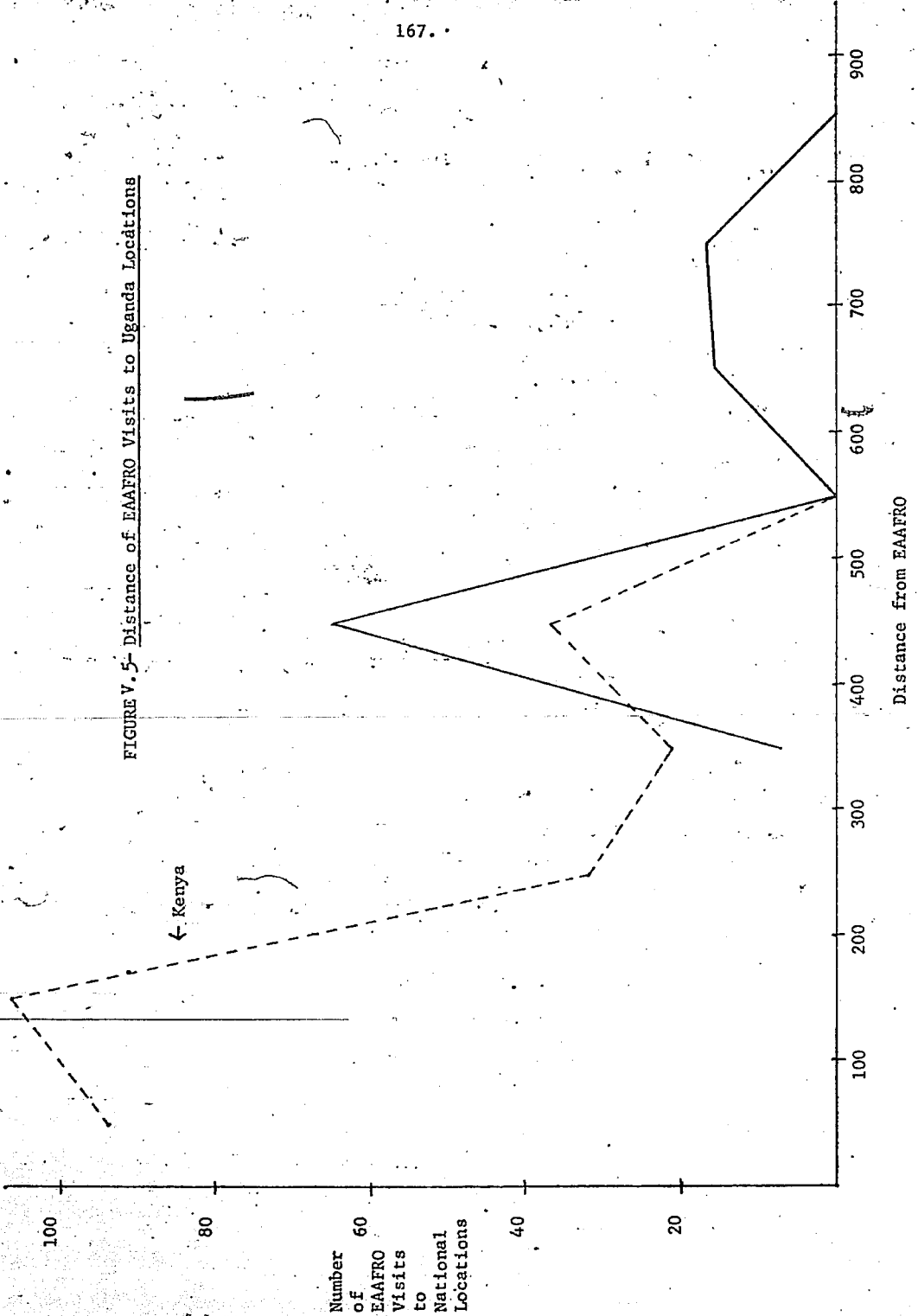
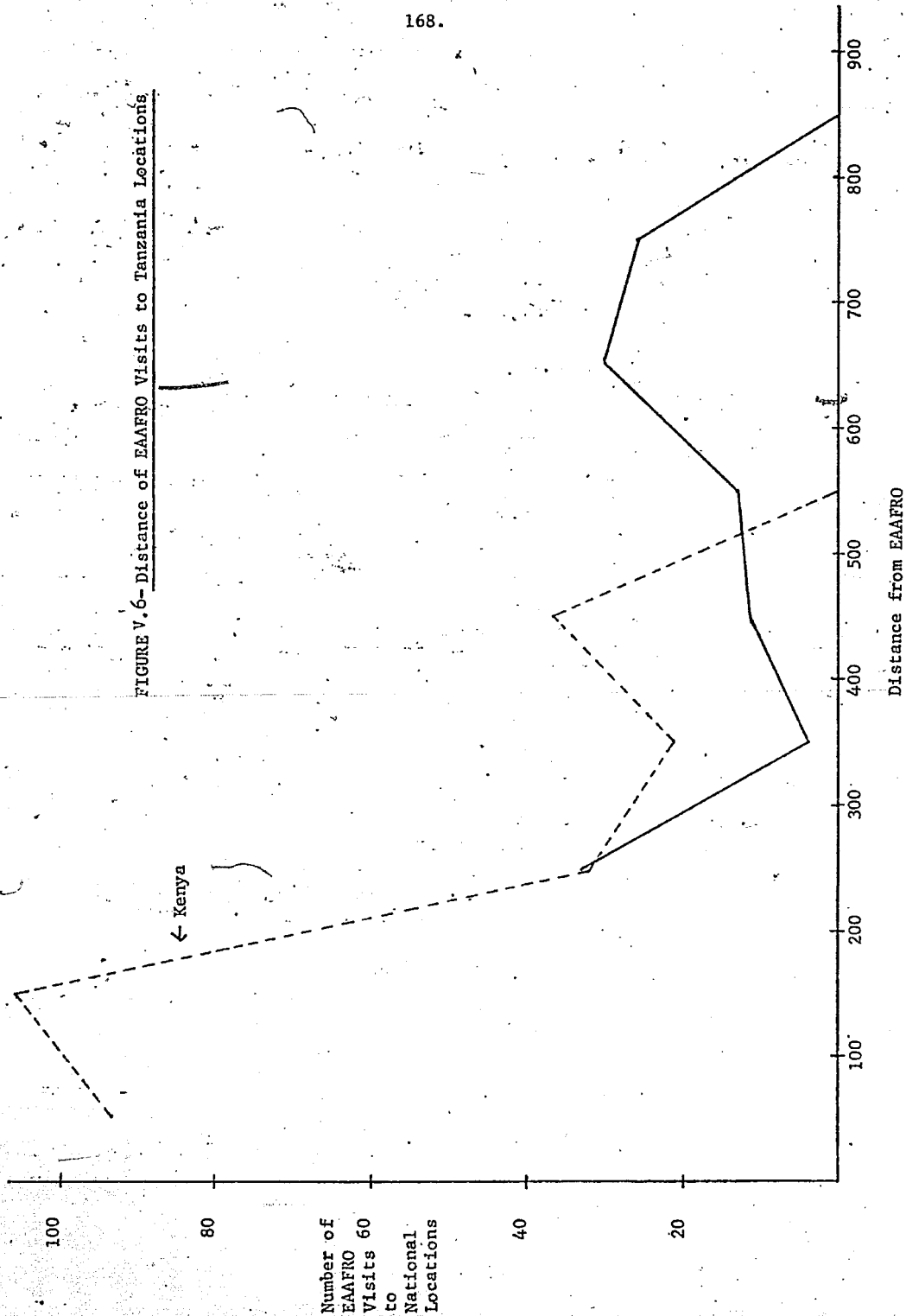


FIGURE V.6- Distance of EAAFRO Visits to Tanzania Locations



← Kenya

In examining Figures V.4, 5, and 6 although it is obvious that Kenya locations are visited more than locations in Uganda and Tanzania, this may be due as much to the factor of distance as to anything else. It is also obvious that East Africa is far from the "isotropic plain" described in an earlier chapter and that ecological or population center factors at certain distances may account for differences in the number of EAAFRRO visits. For example, the Arusha-Moshi area in Tanzania is a fertile agricultural belt and that interval of from 2-300 kilometers receives about the same number of visits from EAAFRRO in Tanzania as well as Kenya. Just past Arusha-Moshi, however, one runs into a stretch of dryer and less fertile land that could do much to explain the relative lack of visits in the 3-400 kilometer interval in Tanzania. The most striking thing in Figure V.5 for Uganda is the concentration of visits in the 4-500 kilometer interval, which is mostly due to the presence of the Kampala metropolitan area in that belt. Not only are all the government ministries and departments located there, but two of the three principal agricultural research stations are located in that area, as is all of the forestry research. The third principal agricultural research station is not in the same area, but happens to be in the same 4-500 kilometer interval. Practically all of the EAAFRRO visits to greater distance locations are made by forestry officers to forests in the western areas of Uganda. Therefore, although there is a great imbalance between the number of EAAFRRO visits to Kenya and the number to Uganda and Tanzania, it is difficult to determine if this is due to the effect of national boundaries or of distance.

The data on "Visitors" to EAAFRRO also suffers from certain limitations. For one thing, it includes only those visitors who signed the guest book, and from personal experience this author knows that frequent visitors from close by do not usually bother to sign it. Therefore, the number of visitors from, for example, the Kenya Forest Research Station located only two miles away is likely to be understated. This data also only covers visitors to EAAFRRO headquarters at Muguga-- there is no account made for visitors to EAAFRRO's decentralized divisions.

Among all the people listed as visitors, certain categories were excluded from consideration in the data analysis: foreigners were included only if they were "permanently" stationed in East Africa -- foreign visitors were not; East African Community people were included only if they were members of a Community research organization -- EAC administrators were not.

The overall results of the Visitors data are shown in Table V.4 on the following page. The pattern shown in the previous pages on EAAFRRO visits to national locations is even more pronounced here -- Kenya provides more than four times as many visitors to EAAFRRO as do either Uganda or Tanzania. The imbalance in the number of East African Governmental personnel is particularly striking. The imbalance from East African universities and scientific research organizations isn't quite as

bad, although still pronounced, and the imbalance from Foreign Aid Organizations can perhaps be explained by the fact that most of the international aid organizations -- and some of the national -- for the entire region are located in Nairobi. There aren't many visitors from private industry to being with, but that imbalance also can be explained by the fact that most industry in East Africa is located in Nairobi.

Table v.4

National Visitors to EAAFRRO HeadquartersBy Type of Organization ⁴⁾

	<u>Kenya</u>	<u>Uganda</u>	<u>Tanzania</u>
East African Governmental (excluding government research)	47	4	2
East African Universities (and other educational institutions)	37	24	14
Scientific Research Organizations	55	13	23
Foreign Aid Organizations (national and international)	46	1	6
Private Industry	14	0	1
Other	8	3	2
TOTALS	207	45	48

Table V.5 below lists the national locations from which these visitors came and their approximate distances in kilometers. The places included in each location shown in Table V.2 are also included here.

Table V.5

Number of Visitors from DifferentNational Locations to EAAFRRO

Kenya:

Nairobi Metropolitan Area -	approximately 25 Km.	170 visits
Thika -	" 60 Km.	1 visit
Nakuru -	" 120 Km.	7 visits
Mt. Kenya -	" 160 Km.	4 visits
Kericho -	" 170 Km.	5 visits
Eldoret -	" 240 Km.	3 visits
Kisumu -	" 280 Km.	4 visits

⁴⁾ In addition to the numbers of individual visitors listed here, several groups of visitors were listed: 11 from Kenya, two from Uganda, and 2 from Tanzania. Most of these groups were students from Egerton College, Londiani Forest Training School, Makerere University, etc.

Table V. 5-Continued

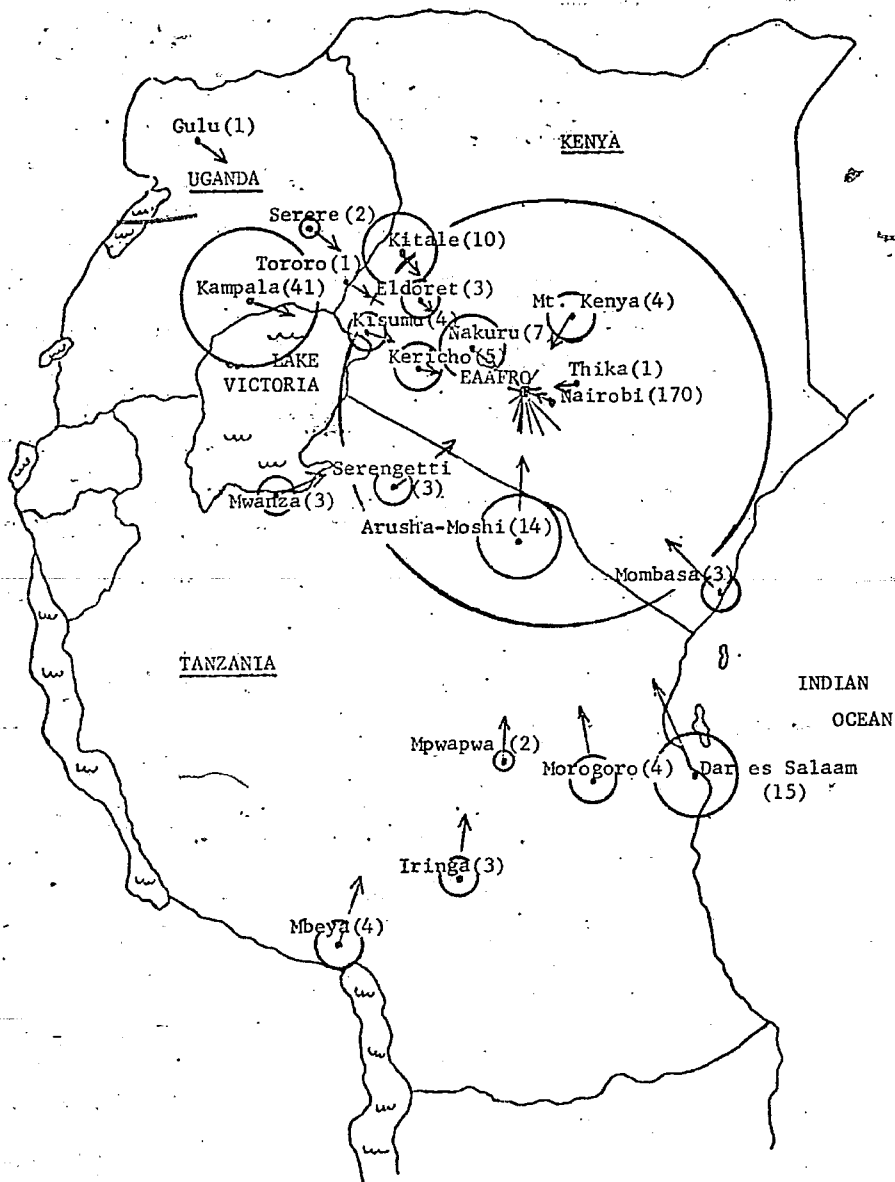
Kenya (cont.)			
Kitale -	approximately	310 Km.	10 visits
Mombasa -	"	460 Km.	3 visits
Uganda:			
Tororo -	"	350 Km.	1 visit
Serere -	"	460 Km.	2 visits
Kampala Metropolitan Area -	"	480 Km.	41 visits
Gulu -	"	650 Km.	1 visit
Tanzania:			
Serengetti -	"	220 Km.	3 visits
Arusha-Moshi -	"	250 Km.	14 visits
Nwanza -	"	430 Km.	3 visits
Mpwapwa -	"	600 Km.	2 visits
Morogoro -	"	640 Km.	4 visits
Dar es Salaam -	"	700 Km.	15 visits
Iringa -	"	760 Km.	3 visits
Mbeya -	"	930 Km.	4 visits

A geographic picture of Table V. 5 is again shown in Figure V. 7 on the following page, in which the size of the circle surrounding the national location is roughly proportional to the number of visitors to EAAFRO that came from there.

Graphs will not be drawn for this data because of the obvious overwhelming effect of population centers on the national locations of visitors to EAAFRO -- i.e., 170 out of 207 visitors from Kenya come from the Nairobi metropolitan area; 41 out of 45 visitors from Uganda come from the Kampala metropolitan area; and 29 out of 48 visitors from Tanzania come from the Arusha-Moshi and the Dar es Salaam areas. It is probably true that Nairobi's closeness to EAAFRO is an important factor in its predominance over other national capitals as a source of visitors to EAAFRO, but it is difficult to say that either national borders or distance affects the number of visitors from other national locations. There is more of a concentration of these transactions in Uganda in the Kampala metropolitan area than in Tanzania where they are more spread out.

In summarizing the results of this chapter, it is apparent that Kenya is a partner to a great many more personal contact transactions with EAAFRO than either Tanzania or Uganda. Nairobi's location only approximately 25 kilometers away is undoubtedly an advantage in the overwhelming number of transactions in which it participates, but the effect of it being the population/industrial/governmental center for the entire region also undoubtedly plays a part. Other population

FIGURE V.7-Visits from National Locations to EAAFR0



centers that exhibit more transactions than other areas in the countries concerned are the Kampala area in Uganda and the Arusha-Moshi and Dar es Salaam areas in Tanzania. In all locations, distance undoubtedly plays some part in the number of transactions, but it is not possible to say that national borders do.

Chapter VI

The Structuring of National Opinions Toward EAAFRO

The second section of this research concerns perceptions and other forms of data from the national level -- from governmental agricultural and forestry research systems in Kenya, Uganda, and Tanzania. As has been pointed out in earlier chapters, the crucial factor which politically makes or breaks a multi-national arrangement or institution is whether or not each nation in the arrangement believes that she is receiving an equal or fair share of the benefits from that arrangement and its institutions. The objective truth about the distribution of benefits -- if it could ever be determined, which is doubtful -- is not as important in this case as what people believe or perceive to be the truth! The focus of this research study is the relationships between regional and national scientific research systems in agriculture and forestry in East Africa, and this chapter will structure the variables and propositions that were tested with respect to individual agricultural and forestry research scientists in the three Partner States.

There are 12 scientific research institutions in the East African Community, of which EAAFRRO -- the East African Agriculture and Forestry Research Organization -- is only one.¹⁾ EAAFRRO is by far the largest of these institutions, however, in terms of both scientific manpower and its budget allocation -- reflecting the importance of agriculture in the East African economies -- and this is one reason EAAFRRO was the institutional subject of this study. Another reason was that sizable national research systems existed in the fields of agriculture and forestry, but not in -- for example -- freshwater fisheries or vector-borne diseases.

Not only did these national systems exist, but there were official and documented historical relationships between them and EAAFRRO. These formal functional relationships were first stated by B. F. Keen, Director of EAAFRRO, at the time it moved from Arani in Tanganyika to Muguga in Kenya just after World War II. In the following quotation, "Research Organization" refers to EAAFRRO:

It is desirable, however, to set out clearly the respective functions of the Research Organization and the territorial Departments in the three phases of the sequence. The first phase, basic research, is normally the responsibility of the Research Organization, because the men engaged on it

¹⁾ The other EAC research institutes are as follows: the East African Veterinary Research Organization (EAVRO), also at Muguga, Kenya; the East African Marine Fisheries Research Organization (EAMFO) at Zanzibar; the East African Freshwater Fisheries Research Organization (EAFRO) at Jinja, Uganda; the East African Institute for Medical Research at Mwanza, Tanzania; the East African Virus Research Institute (EAVRI) at Entebbe, Uganda; the East African Trypanosomiasis Research Organization (EATRO) at Tororo, Uganda; the East African Leprosy Research Centre at Alupe, almost directly on the Kenya-Uganda border; the East African Tuberculosis Investigation Centre at Nairobi; the East African Industrial Research Organization (EAIRO) in Nairobi; and the Tropical Pesticides Research Institute at Arusha, Tanzania. In addition, the East African Meteorological Department carries on research throughout East Africa but has its research headquarters in Nairobi.

need to be physicists, chemists, plant physiologists and the like rather than agriculturalists. The third stage is, obviously, the responsibility of the territorial Departments, whose administrative organization is designed, and whose agricultural, forestry and veterinary officers are trained, for the task of introducing, proved and tested results into practice. To do this, they must have available the results from the second or technological stage. Similarly, the Research Organization must carry any results of its basic researches into the technological stage, otherwise these results might remain little more than scientific curiosities. Therefore, as the Departments and the Organization are equally interested in the technological stage, there are many opportunities for joint investigation and teamwork by the specialist officers in the Departments and the research staff of the Organization.²⁾

The same theme was echoed in 1952 by the Scientific Secretary to the East African High Commission, Mr. E. B. Worthington:

It is, however, possible to make a broad definition of the functional relationship between the regional organization and the territorial department working in the same general subject. There are three main stages in science; firstly, there is fundamental or long-range research which is designed to discover new principles; secondly, there is the technological stage in which a new principle is tested in a variety of local conditions in order to determine how far it is applicable and to adapt the technique to local circumstances; thirdly comes the application of the new principle in farming, medicine, industry or whatever the subject may be. The regional research organization is concerned with the first two, the fundamental and technological stages; it is not usually concerned with the application to practice. The territorial department, on the other hand, is primarily concerned with the application of the new knowledge and all the executive work which is thereby entailed, but it has also to take a large share in the technological stage of the trial in local conditions. It is thus in the second or technological stage that the functions overlap and there is need for the closest collaboration.

This distinction of functions has, of course, many variants.³⁾

By 1961, the report of the Frazer Commission -- the recommendations of which served as the basis for the present regional research administrative set-up -- perceived the functional relationship between regional and national research to be as follows:

East African research is organized on the basis of inter-territorial and territorial research groups. They are complementary to each other and it is essential that they should work together. Both groups may undertake

²⁾ B. A. Kean, "The East African Agricultural and Forestry Research Organization -- Its Origin and Objects," Printed by East African Standard Limited, Nairobi, no date, pp. 7-8.

³⁾ E. B. Worthington, A Survey of Research and Scientific Services in East Africa, 1947-1956, East African High Commission, Nairobi, 1952, p.14. Mr. Worthington also stated the following about the territorial role in scientific research: "Nevertheless most territorial departments of agriculture, veterinary services, medical services, etc. find it necessary to maintain groups of specialist officers for routine work and for investigations of a short-term kind on problems with which the department is directly concerned." (Ibid, p.14).

short-term and long-term work . . . in general, the territorial research groups are more concerned with immediate problems and give invaluable assistance in field work to the interterritorial research groups, which should concentrate their efforts mainly on longer-term studies. The territorial research services also provide the link with the extension services which are responsible for the application of the research findings. 4)

In a 1966 publication on Research Services in East Africa, it was stated that:

The principal functions of EAAFRO are to undertake research work that is either longer-termed than is easily undertaken by the Territorial Departments of Agriculture and Forestry, or which requires highly specialized equipment or Research Officers, which can only be justified in a central East African laboratory. EAAFRO is only concerned with problems of local interest when specially invited by a Territorial Department and its function then is to supplement and supply the background to the work of the territorial research workers. 5)

The most recent annual report of EAAFRO includes most of the above functional role description, but adds the following:

. . . EAAFRO is not an advisory organization as such, though scientific advice and guidance are readily given by the research staff on request to national and other research workers . . . research at EAAFRO is as much concerned with the solution of problems as it is with the acquisition of new knowledge, and also that much of the research consists of projects carried out with the cooperation of other research institutes. 6)

There has been, therefore, a certain amount of concern shown for the research relationships between EAAFRO and national agricultural and forestry research systems, and there has also been some ambiguity and confusion about what role EAAFRO should play vis-a-vis these national systems and vice-versa.

There is yet another reason why EAAFRO was the regional institution chosen for this study. It is no secret that regional scientific research -- and EAAFRO in particular -- has been a relatively controversial common service of the Community. One need only read the Hansard of the East African Legislative Assembly debates on appropriations for EAC research institutions to become aware of this situation. National sources in Tanzania and Uganda have made claims that EAAFRO is mainly working for the benefit of Kenya, and sources in all three Partner States complain about the cost of their contributions to it compared with the benefits they perceive their countries to be receiving. In 1969, a Working Party on Research Priorities and Research Administration under the Chairmanship of Prof. David Nassau of the University of Nairobi studied and reported on the research institutions of

4) Report of the Commission on the Most Suitable Structure for the Management, Direction, and Financing of Research on an East African Basis, Prof. A. C. Fraser, Chairman, Government Printer, Nairobi, 1961, p. 25.

5) East African Academy, Research Services in East Africa, East African Publishing House, Nairobi, 1966, p. 45.

6) EAAFRO, Record of Research - Annual Report 1969, East African Community, Nairobi, 1970, p. 2.

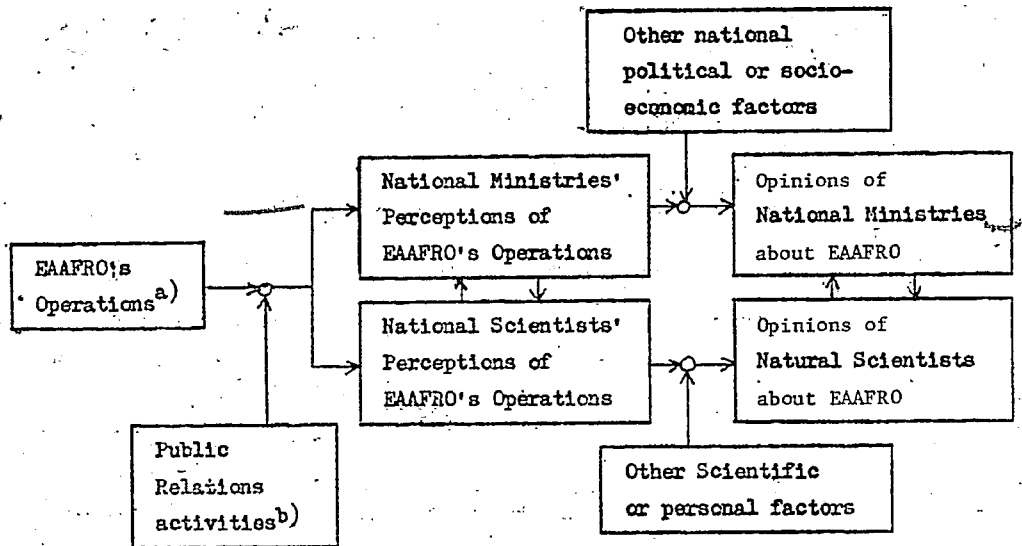
the East African Community. This "Wasawo Report" has remained confidential, however, and has not been implemented while a further report on the financial implications of the Wasawo Report has been prepared and is being considered. EAAFRQ and the whole EAC research system have been existing in this state of flux and uncertainty since that time, but it would seem likely that at least some changes will be made in the EAC's research system during the next few years. It is hoped that the results of this study will be of some use to national and regional decision-makers concerned with this issue.

Although national ministerial people were consulted about what the important variables were, in their opinion, for this section of the study, the subject Respondents were national-level research scientists and/or administrators of the rank of research officer or above in governmental agricultural or forestry research institutions in all three Partner States of the Community. It is realized that the real-world people who are crucial to the continued existence of regional scientific activities may not be working national-level scientists but the political decision-makers in the national ministries concerned. To have focused on the opinions and perceptions of these people, however, even if clearance and access could have been gained, which is unlikely, might have elicited responses more dependent on national political or socio-economic factors than national scientific research factors. (See Figure VI.1 below) This is not to say that national political relationships are unimportant -- they are, indeed, one of the most important factors for the EAC and also, therefore, for EAAFRQ -- but rather that this author was not the appropriate person to investigate such relationships between independent African governments. Insofar as these political relationships influence and affect regional-national scientific relationships, however, they are one of the important variables investigated from the viewpoint of the national-level researcher.

The actual farmer is also not the subject of this study. One problem which research institutes in general face is the tendency to judge them by an increase in production (or some other measure such as life-expectancy) in which they played an instrumental role -- e.g., the value of the research which developed a new breed of maize is not likely to be widely appreciated until maize production has multiplied x times. Between the final research result and the utilization of it, however, are any number of factors which -- in agriculture -- are the responsibility of the "extension" services or other agencies in the national ministries. Therefore, it would be highly unreliable to form conclusions about agricultural research on the basis of opinions expressed by actual farmers, since it often seems to be the case that it is the extension services which have been the "bottlenecks" in the utilization

Figure VI.1

Response-Relationships between National Ministries of Agriculture/Forestry and Working National Agricultural/Forestry Scientists



- a) "Operations" includes not only the actual scientific experimental work done by EAAFR0, but all operations -- e.g., information searching, communication and/or transfer of results operations, etc. -- connected with its primary function of undertaking research in the fields of agriculture and forestry.
- b) "Public Relations Activities" are those EAAFR0 activities (which may or may not exist) which are not directly connected with EAAFR0's functions or operations, but which seek to publicize or explain them.

7)
process.

What this author was trying to do was answer the following research question: "How is the regional research institution of EAAFR0 relating to national agriculture and forestry research systems in Kenya, Uganda, and Tanzania, and what are some of the factors causing these relationships?" Scientists and administrators from national agricultural and forestry research institutions form a unique set of Respondents to help in answering it. It was expected that more so than any other group of people, they should be aware of what EAAFR0 was doing and the worth of its activities. Being professionally committed to scientific objectivity, they were expected to be more inclined to give objective and honest responses and opinions, and being experimentally cause and effect oriented they were also expected to be better able to explain and give reasons for their responses and opinions. Finally, an analysis of their collective responses and opinions were expected to carry some weight with the political decision-makers in governmental ministries and secretariates, and it is these latter people for whom this study should be a useful input. Political factors are not ignored in this study, but they are only investigated insofar as they affect scientific relationships, as revealed through the responses and opinions of the national-level Respondents.

In Chapter III of this study, many of the general theories on economic and political integration in developed and developing countries were summarized. In this chapter, adaptations or analogues of specific general theories are presented in propositional form with reference to the regional and national agricultural and forestry research communities in East Africa. Measurements of the variables contained in these propositions were obtained principally through an interview instrument which is also discussed in this chapter. Where possible, chi square statistical tests were performed on the data to test these propositions, and the results and their interpretations are presented in the following chapters.

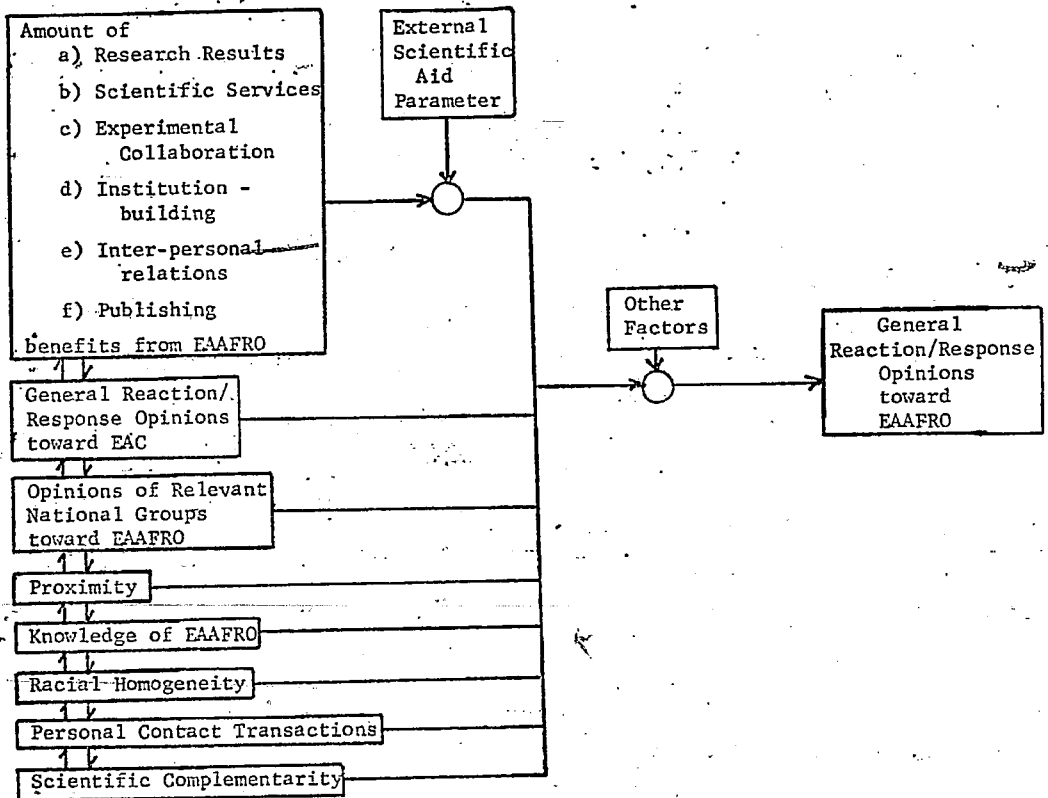
Economic or political integration - or any other form of integration - is not the primary focus of this study. Nevertheless, EAAFR0 is one regional institution

7) The traditional view is that it is not the function of an agricultural research institute to ensure that its research results are being applied by the farmers of the country, but it is their responsibility to see that their results are fully transferred to the extension services, and it is the responsibility of the extension services to transfer these results to the farmer and to feed-back to the research institution information on how those results worked in actual practice. This close functional relationship between agricultural research and extension services is sometimes not recognized in the organizational design of national ministries, however. There are some calls for putting agricultural science policy, agricultural research, and extension services under one organizational umbrella (see "The Relationship Between Research and Planning in Development," by Ian Livingston, Economic Research Bureau, University of Dar es Salaam).

in a regional system that was established to integrate the three British colonial territories of Kenya, Uganda, and Tanganyika in certain limited functional areas, and at one point in history was to have become an East African Federation.* EAAFRO, therefore, in a real sense has been and is an integrating agent for agricultural and forestry research in East Africa (with no implication as to the success or failure of its integrative function). In this situation, it was felt that integration theory might offer some insights into the primary focus of this study - the relationships between EAAFRO and national agriculture and forestry research systems in East Africa. The attempt here is to take general theory and apply it to a specific and specialized functional activity which is somewhat different from the original purpose for which the theory was developed, and to see if it can lead to insights into and explanations for human behavior relating to the specific activity.

Figure VI.2 below is the basic model for this section of the study. The primary dependent variable is the general reaction or response opinions that individual national researchers have about EAAFRO, positive or negative as measured on a continuum scale. The attempt here is to get at what these national researchers feel about EAAFRO rather than what they might "objectively" conclude after going through some internalized reasoning process, since it is thought that these feelings are a much more important factor in regional-national relationships. In particular, it is these initial reactions of people to an institution such as EAAFRO which seem to do much to create a public mood or feeling toward it - a factor that can greatly influence the success of a multi-national institution - especially when the people are in positions perceived to be credible and when the reaction receives publicity through the newspaper or other media. In addition, individual opinions are the only real way to get at what people perceive or believe about EAAFRO. In Chapter IV, an "objective" methodology was used to analyze the balance of the distribution of EAAFRO's benefits among the Partner States, but the extent to which any such methodology can be used to counteract people's beliefs is very limited. And any such methodology is also usually limited to printed or verbal information that may be relatively superficial. If a multinational institution such as EAAFRO is going to really be examined and understood, somewhere along the line knowledgeable national people are going to have to be asked to react

*See the Appendix to this study on "A Short History of Regionalism in East Africa."

Figure VI.2 - National Opinions Toward EAAFRO

or respond to it at the gut level, and that reaction or response is going to have to be followed up with probing questions about the real usefulness of EAAFRO research and EAAFRO services - and other such issues - along with the reasons why.

As shown in Figure VI.2, the general opinions of national level researchers about EAAFRO are expected to vary along a positive-negative continuum, and the relationships of the possible explanatory independent variables shown with the dependent variable form the basis for this section of the study. The importance of the benefits from a multi-national institution to its acceptance and support by the member states which make up the multi-national grouping has already been stressed. Most of the benefits discussed in this context, however, operate at the national level,⁸⁾ while Figure VI.2 shows a series of benefits that might accrue to individual national level researchers in East Africa from EAAFRO. One general hypothesis then is that the existence and amount of these benefits that the national researcher receives from EAAFRO will directly influence his general opinion about that institution.

Research results are, of course, the principal output of any research institution, and these should flow to the national researcher along the lines of Figure IV.1 in Chapter IV and -- officially -- according to the criteria established in the functional relationship statements quoted earlier in this chapter.

8) For example, in speaking of the smaller and less scientifically developed countries of Europe, UNESCO says: "It is therefore only natural that the smaller countries of Europe would require to be satisfied, before embarking upon or pursuing such ventures of European scientific research cooperation, that the institution chosen as the vehicle for such cooperation be so designed that the participating states can count on a level of expenditure which is both moderate and predictable, and on operational methods which secure reasonable scientific returns to all participants. Certainly, this twofold problem of reasonable cost and of reasonable return must be solved.... (UNESCO, Science Policy and the European States, Conference of Ministers of the European Member States Responsible for Science Policy, Paris, 22-27 June 1970, p. 153.) In another UNESCO document dealing directly with developing countries, the following "tenet" of regional science programmes is mentioned: "The principle of national distribution. No nation would, or should agree to a regional science plan that diminishes the quality and effectiveness of the scientific programme within its borders. On the contrary, each nation should benefit by marked improvement of its scientific and technical infrastructure as well as improved science services supplied by regional institutions." (UNESCO, "Contribution of UNESCO to Stage II of the World Plan of Action for the Application of Science and Technology to Development," UNESCO/NS/ROU/191 prev. 1, Paris, February 1970, p. 91). Some of the advantages which regional science should give the developing countries, UNESCO says, are "(i) Having all Scientific and Technological activities performed for the country at the highest level of quality; (ii) Having within the country one or more internationally recognized centres of scientific excellence; (iii) Decreasing dependence on scientific and technological capabilities outside the region; (iv) Obtaining these benefits without an outflow of cash or increased reliance on foreign aid." (Ibid, p. 91)

Scientific services are another output of research institutions, and eight scientific services that EAAFRO potentially offered to national researchers were investigated: the Plant Quarantine Service, the joint EAAFRO/EAVRO Library, the East African Literature Service, the Herbarium's plant identification service, Statistical advisory services, the Machinery Coordination service, Chemical Analyses, and miscellaneous Reference Collection services.⁹⁾

External scientific aid might, however, be a parameter operating in the case of specific EAAFRO projects or services supported by it. The impact of this aid on EAAFRO is considerable. Table VI.1 below shows that approximately 30% of the

Table VI.1 - Natural Resources Research --
Source of Contribution for 1969-70*

<u>Contributor</u>	<u>Amount in Shillings</u>
East African Community	
General Fund	8,644,741.80
Rents and Sundry Revenue	3,375,213.61
Partner States	
Kenya	140,311.89
Uganda	140,311.89
Tanzania	140,311.89
United Kingdom Government	
Direct Grants	141,903.17
Over-Seas Aid Scheme	255,284.97
Research Schemes	3,805,723.80
Other Foreign Sources	
U.S. Dept. of Agriculture	134,077.33
U.S.A.I.D.	519,993.94
Rockefeller Foundation	266,499.96
WHO	<u>33,767.42</u>
TOTAL	17,602,141.67

*Taken from East African Community, Financial Statements for 1969/70 and Reports thereon by the Auditor-General and Accountant-General (General Fund Services), EAC, Arusha, 1971.

9) In comparing this list with Table IV.4, several differences can be noted: the Armyworm Forecasting Service is left out because this output goes only and directly to farmers; the Liaison and Advisory Assistance services to national Cereals programs are also left out because they were not operationally distinguishable from cereals research results; Soil and Plant Analyses and Feed and Animal Analyses are combined into one category called "Chemical Analyses" -- in practice, national veterinary

funds supplied to the five regional research institutions under the National Resources Research Council of the EAC (EAAFRO, EAVRO, TPRI, EAFFO, and EAMFO -- See Footnote No. 1) came from foreign sources, and most of this aid went to EAAFRO. There are three effects which this parameter could have on a national-level researcher. Firstly, he might appreciate the work that is being done, but identify it more with the foreign source of funds rather than EAAFRO and respond accordingly. Second, he might resent foreign aid in general and/or scientific aid in particular because of a perceived loss of indigenous control over the activity and respond accordingly. And, finally, he might believe that some of the aid funds would have gone to his own national research system if EAAFRO hadn't received them and respond accordingly.

There are additional benefits from EAAFRO that an individual national-level researcher might receive. First of all, there might be actual collaboration on joint scientific experiments between himself and EAAFRO researchers. In cases where the collaboration is such that the national-level researcher merely utilizes the results of some of EAAFRO's research experiments or scientific services in his own scientific research, this is already included in the above two benefits. Collaboration in this context refers more to those cooperative situations where EAAFRO and national level researchers are actively working together on a joint project. Always with the qualification that these EAAFRO activities are really beneficial -- and not divisive -- experiences, this cooperation should be a benefit to the national-level collaborator.

Another benefit shown in Figure VI.2 is labeled "Institution-Building." Decentralized divisions of EAAFRO exist which carry out research on specific crops at certain national research institutions, and which involve EAAFRO research officers stationed full-time at those institutions. This benefit is something different from Experimental Collaboration. In some cases, the EAAFRO division is working in cooperation with national projects at those stations -- e.g., maize -- and in some cases it is not -- e.g., sorghum and millet -- but in either case this situation might be perceived as an EAAFRO institution-building activity by the national-level researchers at those particular national institutions. "Institution-building" is a difficult concept to define, but what is meant by it in this study is the contribution that an individual or unit makes

researchers were not subjects of this study and so only Soil and Plant Analyses were really considered; all four reference collections were considered together as "Miscellaneous Reference Collections," and the three lowest priority services were dropped because they were so unimportant.

to the total institution of which he or it is a part. Part of this contribution can be in the form of physical buildings or equipment, or in the form of research results which add to the reputation of the institution, but there is something more than that --- an individual or unit may be isolated in their building with their equipment doing their research rather than interacting with the rest of the institution and contributing to those intangible but important institutional qualities of harmony, morale, spirit, etc.¹⁰⁾

There are three decentralized divisions of EAAFR0: The Sorghum and Millet Division at Serere Research Station in Uganda, the Maize Genetics Division at Kitale National Agricultural Research Station in Kenya, and the Sugar Cane Breeding Division with a breeding station at the Coast (Mtwapa) Research Station in Kenya¹¹⁾ and a Sugar Cane Disease unit at Kawanda Research Station in Uganda. The extent of the potential institution-building in each particular place might best be indicated by the number of full-time EAAFR0 officers working in these divisions. At the time when the EAAFR0 interviews were carried out, there were four officers stationed at Serere in Sorghum and Millet, one stationed at Kitale in maize, and one each stationed at Mtwapa, Kawanda, and Kibaha in Sugar Cane Breeding. Since two of these decentralized divisions -- Sorghum and Millet and Maize Genetics -- are, however, almost entirely supported by external scientific aid, this parameter must be kept in mind.

Another possible benefit to the individual national-level scientific researcher from EAAFR0 might be positive interpersonal relations between EAAFR0 researchers and himself. These positive interpersonal relationships could range all the way from professional respect for a scientific colleague up to very warm and personal friendships. The existence of "Old Boys Networks" of expatriate researchers -- particularly in colonial days -- which combined professional and social relationships is one aspect of this benefit which will be discussed further.

Finally, a highly valued personal benefit for any researcher -- regional or national -- is to have his papers published. Not only are there the rewards of

10) This is the only institution-building benefit of EAAFR0 that was found. It was believed for awhile that there might be a second way in which EAAFR0 helped to build up the national scientific and technological infrastructure -- through the training of national researchers. It now appears, however, that EAAFR0 has no formal training program for national researchers, although some training does go on informally.

11) The Coast Research Station is the temporary site of the regional sugar cane breeding project while the permanent site at Kibaha (Tanzania) is under construction.

prestige and reputation amongst one's professional peers, but these may easily be translatable into monetary or other material rewards later on. The East African Agricultural and Forestry Journal is published quarterly as an EAAFRO service, and some of its articles are written by national-level researchers. Even if there were no other benefits from EAAFRO of use to an individual national-level researcher, his opinion of EAAFRO might be very positive if they had published his work or were going to do so.

In summary then, one of the principal propositions being investigated in this section of the study -- as shown in Figure VI.2 -- can be stated as follows:

1. The degree of positiveness of the general reaction/response opinions of national researchers toward EAAFRO will be directly related to their perceptions of the benefits they have received from EAAFRO in the past -- i.e., to the amount of Research Results and/or Scientific Services and/or Experimental Collaboration and/or Institution-Building and/or Interpersonal Relations and/or Publishing benefits, dependent in some cases on an External Scientific Aid parameter as described.

It should perhaps be noted here that these benefits from EAAFRO are not necessarily independent of each other. For example, both Experimental Collaboration and Institution-Building probably influence Inter-Personal Relations with the EAAFRO officers involved in the collaboration or working in their decentralized divisions.

There are several alternative hypotheses mentioned in the integration literature, however, which are relevant to explanations of the general opinion of individual national-level researchers toward EAAFRO. It has been pointed out in this literature on integration, for example, that an individual's opinion toward any one specific integrative activity or institution may be influenced by his opinion toward the larger integrative framework within which the specific action or institution exists. The regional research institutions in East Africa are all part of the East African Community, and the general opinions of national-level scientific researchers toward EAAFRO may be directly related to their opinions toward the Community in general.

The list of benefits in Figure VI.2 were all outputs of EAAFRO, but as has been mentioned earlier, there may be other sources of benefits which may influence the opinions the individual national researcher has toward EAAFRO and these other sources must be considered. In talking about attitudes and values which individuals

have toward integration, Philip Jacob says that an individual's personality and life experience, the attitudes and values of the social groups within the community at large, and the attitudes and values of the social groups within the community with which he associates will all influence his own attitudes and values.¹²⁾ In East Africa, the attitudes and values which the Partner States (or the national ministries of agriculture and/or forestry) or other relevant social or ethnic groups (or relevant individuals within them) hold toward EAAFRO and the EAC in general may also be influencing the national researcher's general opinion toward EAAFRO.

Proximity is another explanatory independent variable that might be directly affecting the opinions that national researchers have toward EAAFRO. The natural effect of distance under isotropic conditions was discussed in Chapter V. To a great extent, proximity is a function of geographic distance and the transportation time needed to travel that distance. Distance also affects other modes of communication in that, for example, phone calls or mail service may take longer or be less reliable at greater distances. Another aspect of proximity is the existence of alternative choice points between EAAFRO and the individual national researcher. Many of these aspects of proximity and distance are discussed further with respect to other variables.

Another factor that integration theory suggests might be influencing opinions that national researchers hold toward EAAFRO is knowledge about this regional institution. As with many of these variables, however, the effect depends upon the positive or negative nature of the association -- i.e., knowledge about EAAFRO could either be favorable or unfavorable knowledge, which would probably affect a general opinion toward EAAFRO the same way. There are many indicators that one might use to measure knowledge of EAAFRO, but some of the most important would be knowledge about what kind of research EAAFRO is doing and who EAAFRO professional personnel are.

Homogeneity or social homogeneity is another factor mentioned in Chapter III, and although many possible indicators were listed to measure this variable, the one that is most relevant in the East African context is Racial Homogeneity. Although many people in East Africa might prefer to think that race doesn't matter or that Europeans -- i.e., whites -- are not the objects of a certain amount of resentment and hostility from Africans because of past history and the general present situation

12) Philip E. Jacob, "The Influence of Values in Political Integration," in The Integration of Political Communities, op cit. p. 228.

of relative wealth and expertise/power, this is not true, even in the case of science. Actually, it isn't entirely racial -- there is a certain "colonial mentality" that not all Europeans have which is perhaps more important. The existence of this factor was most explicitly expressed by an African EAAFRO officer, during some exploratory questions when he was trying to explain some of the deeper reasons behind some of EAAFRO's difficulties with the Partner States. According to this source, as some of the national governments Africanized their own research staffs, they found that EAAFRO was hiring some of the very same Europeans they had just let go. EAAFRO, in other words, was remaining a white man's institution. Moreover, some of the first Europeans to be let go were the ones that the Africans liked the least because of their racial attitudes, and apparently some of these were among the officers that EAAFRO had hired. It takes no extra-perceptive observer in East Africa to see that still today there are Europeans -- scientists and non-scientists -- who are racially prejudiced against Africans and that this factor affects all aspects of socio-economic life.

In addition to examining the influence that a national researcher's race might have on his general opinions toward EAAFRO, the status of new indigenous African and old expatriate "Old Boys Networks" in the scientific community of East Africa should be an important factor in the relationship between EAAFRO and national agricultural and forestry research systems. These "Old Boys Networks" are particularly relevant in the context of the official functional inter-relationships between regional and national research systems as documented at the beginning of this chapter - i.e., if a system in which the more basic research in a particular field is performed regionally and the more applied research in the same field is performed nationally is to succeed, there must be communication and information or technology transfer between regional and national levels.

In 1961, the Frazer Commission reported that of 80 regional scientists in East Africa in 1960, one was African, one was Asian, and 78 were Europeans -- mostly expatriates from Britain. Likewise, of 54 trained technicians in regional research, there were no Africans, three Asians, and 51 Europeans -- again mostly expatriates from Britain. (Frazer Report, pp. 35 and 38) The dominance of British expatriate influence on science in East Africa has had many consequences for the present, not the least of which is the effect of an "Old Boys Network." "Old Boys" are -- strictly speaking -- classmates who have graduated from the same

educational institution and who keep in touch in much the same manner as an alumni association. In colonial East Africa, however, European scientists often formed informal associations along professional and racial lines, informal networks of British expatriates who often knew -- or had heard of -- one another even before coming out to East Africa and, in the restricted social culture of colonial East Africa, became (if they weren't already) social as well as professional acquaintances. These networks were relatively effective in transmitting information among the "Old Boys" in East Africa and other colonial territories all over the world. If one scientist didn't know the answer to some problem, he knew who he could contact to find out more about it. And, as some have observed, sometimes a lot more scientific information gets communicated over a whiskey or on a golf course than at a scientific conference.

But with independence and increasing numbers of scientifically trained East Africans being graduated, the Old Boys Network of the expatriates has begun to break down. All three Partner States and the Community itself are committed to Africanization, but differential rates of Africanization have occurred in the three countries due to the still limited supply of trained African scientists and other circumstances. Events have occurred which have affected this process -- for example in Tanzania where a dispute between the government and British expatriates over their pensions led many of the latter to quit in the mid- to late-1960's.

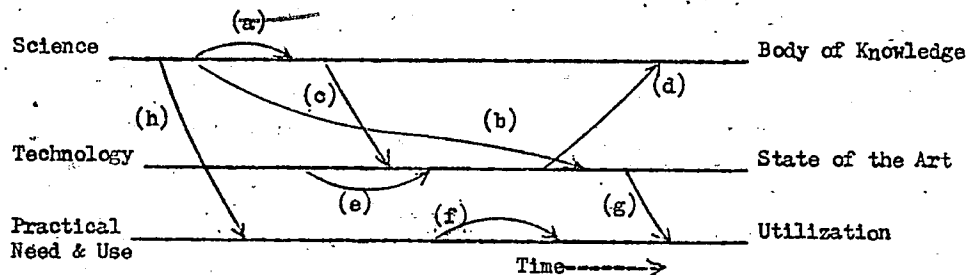
As more Africans enter research positions in East Africa, a new "old Boys Network" of African scientists may emerge among regional and national agricultural and forestry institutes, perhaps around a nucleus of Makerere University graduates. In the present stage of transition this may not have developed far enough to be an effective means of scientific communication throughout East Africa, but the extent of such a network was investigated in the study.

In addition to the analysis of transactions at the level of EAAFRO and the Partner States which was performed in Chapter V, transactions between EAAFRO and individual national researchers might also be an important influence on the general opinions which those national researchers have toward EAAFRO. Once again, however, these transactions variable will focus on Personal Contact Transactions because of the importance of personal contacts to communications and information or technology transfer. Information and/or technology transfer or dissemination is a complex problem and deserving of research in its own right. This study will not begin to attempt to cover this area, but Figure VI.3 below should give some idea of

the scope of the problem. Eight different loci of transfer are shown in Figure VI.3, all of which have many examples in the real world. In this study, the a, b, c, d, or e loci could be operating with respect to the relationships between EAAFRO and national agricultural and forestry research systems in East Africa, depending on the specific situation. What is of importance is that to transfer

Figure VI.3

Science - Technology - Utilization Topology Model*



*Taken from the Introduction to Factors in the Transfer of Technology, William H. Gruber and Donald G. Manquis (ed.), MIT Press, Cambridge, 1969, p. 5.

either scientific information or technology, some form of communication must take place. Multi-national scientific efforts in Europe depend on cooperation and communication, UNESCO states, and adds the following:

In addition to the rather slow means of formal international communication in fundamental research -- i.e., the publication of results in the literature -- faster methods, such as personal letters, the circulation of manuscripts, the telegraph, telex, and telephone, are increasingly employed to speed up the flow of information. At least within the more rapidly expanding fields, the significance of such rapid and efficient personal contacts can hardly be overrated. (UNESCO, June 1970, p. 140)

Although there are many forms of communications transactions, the most important seems to be the mobility of scientists. In an article in Factors in the Transfer of Technology,¹³⁾ Tom Burns explores some thoughts along these lines. What is to be transferred, he says, is an idea or piece of information which is able to generate its subsequent utilization -- to be transmissible, however, it must

13) Tom Burns, "Models, Images, and Myths," in Factors in the Transfer of Technology, Gruber and Marquis (ed.), MIT Press, Cambridge, 1969.

be given an appropriate form in words, symbols, drawings, etc. These are the mechanisms of transfer. In the past, the planned transfer of ideas or information or technologies has tended to concentrate on these mechanical "gimmicks" which record, store, retrieve, disseminate, etc., the technology --

... all the thinking which has gone into attempts to expedite and widen the range of communication processes is implicit with the notion of some real or reified object which is transferred from one set of individuals or institutions to a different set of individuals or institutions...

Technology transfer is still envisaged as the passage of disembodied "ideas and method," endowed with some quasi-independence in the manner of genes, from one state of existence or from one milieu, or from one order of quantity, to another. (Burns, pp. 13-15)

Burnes emphasizes

... a simple, clarifying notion. It is that the mechanism of technological transfer is one of agents, not agencies; of the movement of people among establishments, rather than of the routing of information through communications systems . . . that people (the "human factor") accomplish technology transfer, not merely in the sense of communication or transfer process itself involving the displacement of persons rather than concepts, but requiring carriage by scientists and engineers rather than by publications or other messages. (Burns, pp. 12 and 21)

The movement of people who are scientifically or technically trained into situations where their competence in a special field can be utilized in adjacent -- but different -- fields; or the movement from a research activity to a task which demands a scientific search for alternative solutions in a similar technical area but with different objectives and institutional circumstances -- these are general examples of technology transfer by people who might be called "consultants." Although Burns thus considers technology transfer to be a matter of scientists' mobility, he also says that institutional means must be devised to facilitate and expedite this mobility. Here he claims to run into an inevitable contradiction, however, because any institutional means so devised will, eventually, act as a barrier to the objective it was designed to achieve.¹⁴⁾

13) Tom Burns, "Models, Images, and Myths," in Factors in the Transfer of Technology, Bruber and Marquis (ed.), MIT Press, Cambridge, 1969.

14) Indeed, this is what has happened in the past, he claims, as institutional confines have grown up around such activities as academic research, engineering technology, and manufacturing: "The same development, in short, which is necessary the effective exploitation and growth of knowledge and skill once they have become organized into systematic modes of understanding, or to exploiting the physical or social environment, is also that which interposes the constraints and barriers to the transfer of innovation from one system to another... It is the institutional framework which interposes immaterial but effective constraints on the transportation of ideas and methods between them in the manner which was possible in the past and assumed as feasible in so many of the policy formulations and administrative mechanisms designed to facilitate it now." (Ibid, p. 20)

Admittedly, the idea that the mobility of scientists is a key point in information of technology transfer is not all that new. The Frazer Report, which formed the basis for East African research institutes, stated the following in 1961:

A research organization cannot thrive for long in isolation. Continual interchange of ideas with other research organizations, colleges and universities is essential. This cannot be achieved merely by circulation of scientific publications, although good library facilities are especially important to isolated institutes. Contact with other scientists at a personal level is necessary ... frequent exchange of people and ideas between one research group and another. It is this exchange that gives rise to new ideas and facilitates progress.

UNESCO also confirms the importance of this factor:

Even more important, perhaps, than the free and efficient flow of information is the mobility of European scientists engaged in fundamental research. Improved facilities for travel and communication, especially in the last two decades, have immensely increased the mobility of scientists. It is generally acknowledged that increased mobility of researchers often parallels increased creativity. International exchanges tend to favour the spreading of valid scientific ideas and concepts, and thereby to limit the dangers of intellectual in-breeding -- dangers to which the smaller countries, and more especially the smaller research and education centres, are otherwise particularly exposed. (UNESCO, June 1970, p. 142)

Personal, face-to-face visits and communications between EAAFRO and national-level researchers may therefore be a very important factor in this study influencing the general opinions of national researchers toward EAAFRO. The personal visits of EAAFRO researchers to national institutions should be of special importance because -- apart from the information or technology that may be transferred -- such visits may convey a feeling of EAAFRO interest and concern for what the national institute is doing. Visits of national researchers to EAAFRO headquarters at Muguga and meetings between EAAFRO and national researchers at scientific conferences or seminars would also be forms of Personal Contact transactions to measure.

One special form of personal contact between regional and national researchers which will also be examined is the EAAFRO officer who is an official liaison agent. There are two kinds of official liaison agents which EAAFRO has at present: a "Coordinator" for the East African Machinery Coordinating Unit and two Field Trials Officers working with the cereals breeding programs in Uganda and Tanzania. EAAFRO does no research on agricultural machinery itself, so the Coordinator is mainly concerned with liaison between the three Partner States on all aspects of farm and farm products processing mechanization in East Africa. The Coordinator makes

two to four trips around each of the Partner States in a year, visiting from seven to twelve machinery-connected agricultural organizations in each country. As he does so, he carries information from place to place and puts people in touch with each other concerning their problems and potential solutions. Many of the people the Coordinator deals with, however, are not scientists in national agricultural and forestry research institutes but working engineers and managers on actual farms.

The EAAFR0 Maize Genetics division stationed at Kitale Research Station (Kenya) does research on developing new breeding methodologies for high-yielding varieties of maize in East Africa, and the Sorghum and Millet Division at Serere Research Station (Uganda) does breeding and agronomic work in these crops. Once the varieties have been developed, however, they must be field tested under the different soil, altitude, and rainfall conditions that exist in the three Partner States. In order to ensure that there are adequate field testing programs in Tanzania and Uganda, EAAFR0 stationed full-time Field Trials Officers in their Ministries of Agriculture. The Field Trials Officer to Tanzania was stationed at the Ministry in Dar es Salaam in 1970, and the Field Trials Officer to Uganda was stationed at Serere Research Station in 1971. These officers are supposed to develop the Variety Trials Programs in these two countries and serve as the mechanism for maintaining contact between the regional breeding and these national testing programs.

The final independent variable shown back in Figure VI.2 was labeled Scientific Complementarity. This refers back to the discussion of the "convergence of functional interest" in Chapter III, and is adapted here to the research the individual national researcher is carrying out and how much EAAFR0's research program complements it. With limited resources, EAAFR0 cannot be doing experimental research in every field or on every agricultural crop. Therefore, one would expect to find some national researchers in fields where EAAFR0 was doing little or no research -- e.g., cotton -- and some in fields where EAAFR0 was doing quite a lot -- e.g., softwoods. The more work EAAFR0 is doing which complements what the national researcher is doing -- e.g., working on the same crop, the same control process, etc. -- the more he might be influenced in his general opinions toward EAAFR0.

The propositions for the remaining seven independent variables shown on Figure VI.2, other than the one concerning benefits from EAAFR0, are listed below:

2. The degree of positiveness of the general reaction/response opinions that national researchers have toward EAAFRO will be directly related to their general reaction/response opinions toward the EAC.
3. The degree of positiveness of the general reaction/response opinions that national researchers have toward EAAFRO will be directly related to the opinions their relevant national groups have toward EAAFRO.
4. The degree of positiveness of the general reaction/response opinions that national researchers have toward EAAFRO will be directly related to their Proximity to EAAFRO.
5. The degree of positiveness of the general reaction/response opinions that national researchers have toward EAAFRO will be directly related to the extent of their knowledge of EAAFRO.
6. The degree of positiveness of the general reaction/response opinions that national researchers have toward EAAFRO will be directly related to the Race of the national researcher.
7. The degree of positiveness of the general reaction/response opinions that national researchers have toward EAAFRO will be directly related to the amount of Personal Contact Transactions they have with EAAFRO research officers.
8. The degree of positiveness of the general reaction/response opinions that national researchers have toward EAAFRO will be directly related to the extent that EAAFRO's Scientific work Complements their own.

In addition to these propositions, a number of the variables - e.g., Knowledge of EAAFRO, Personal Contact Transactions, etc. - should be directly related to the length of time a national researcher has been working in East Africa or at his station, and these propositions are also tested.

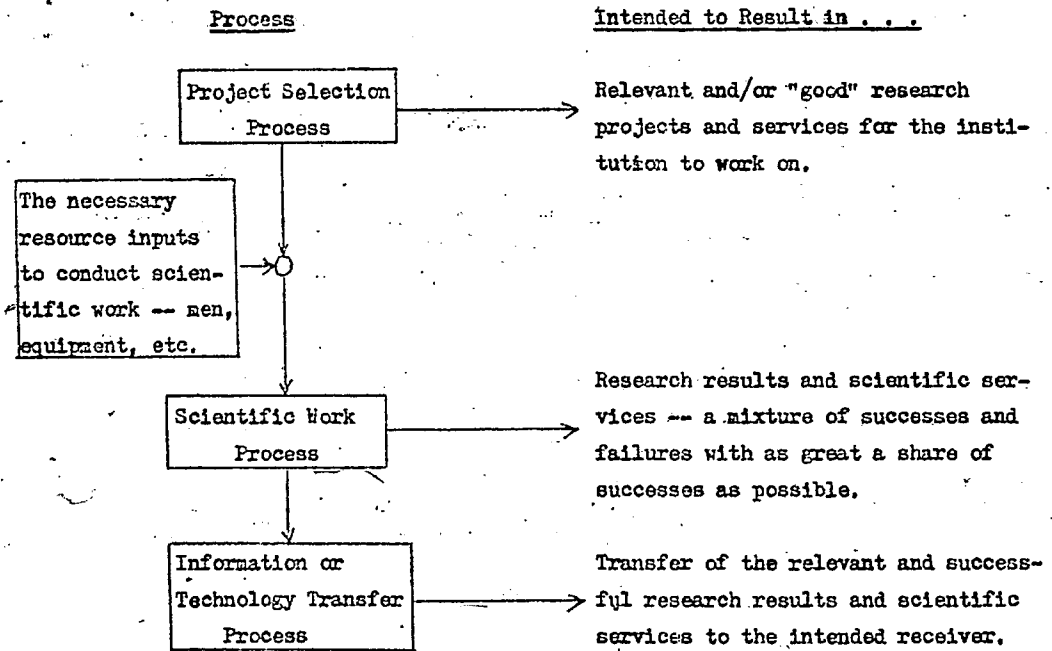
Finally, the two-way arrows between the independent variables in Figure VI.2 refer to the fact that many of these variables are most probably inter-dependent amongst themselves. For example, it might well be true that Proximity, Racial Homogeneity, and Personal Contact Transactions all interact upon Knowledge of EAAFRO in influencing the General Reaction/Response Opinion of the individual national researcher toward EAAFRO as has been suggested in the integration literature,¹⁵⁾ and many other interaction combinations could be logically proposed. Some of these

15) The hypothesis here is that mutual knowledge or understanding among people and groups of people is essential to their functioning together as a political community. As a matter of fact, the argument for the integrative influence of all three of the previously discussed factors -- proximity, homogeneity, and transactions -- rests upon an assumption that they will induce greater mutual acquaintance and understanding which in turn will encourage a community association." (Jacob & Teune, op cit, p. 27)

combinations are also tested in this study, particularly ones which involve Proximity and Knowledge of EAAFRO.

Since the principal designated outputs of a scientific research institution are research results and/or scientific services, the responses of the national researchers to whether or not they received any of these output benefits are examined further in this study. In Figure VI.4 below, a very simplified picture of the important processes which any scientific research institution must perform is shown.

Figure VI.4
The Important Processes of any Scientific
Research Institution and Their Intended Results



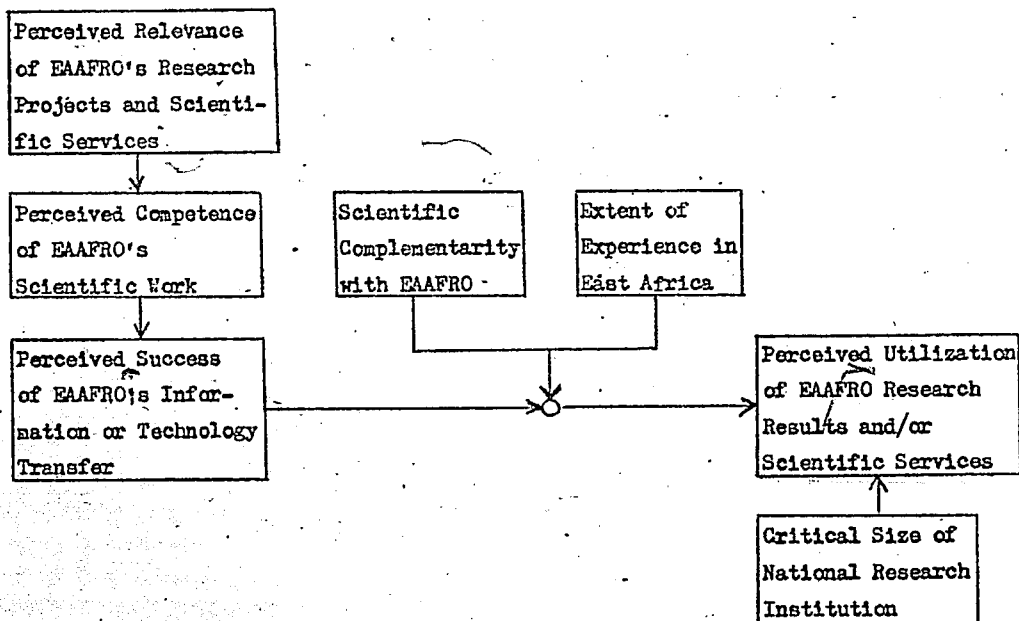
A fatal break-down could occur in any of these process steps and negate everything done currently before or after. For example, if irrelevant or trivial research projects or services are selected to work on, it will make no difference how good the actual research or service work is or how well the results are transferred to the intended receiver; similarly, even if the projects or services selected are

relevant and "good," and the institute is able to transfer any results it gets, this will be of no consequence unless the scientific work process is able to produce some results; and finally, the most relevant projects selected and the best results obtainable are no good within the institute -- they must be transferred to some intended receiver, whether it be a peasant farmer, an industrial plant, or another research institution.

Perceptions of national researchers about these three processes as they are performed within EAAFRO form the basis of Figure VI.5, which seeks to explain why EAAFRO research results and/or scientific services are not being utilized -- if such is the case -- by national researchers. If there is a breakdown, however, it may not necessarily occur within EAAFRO. Given that EAAFRO has selected relevant projects, has produced some good research results, and has transferred those results to a national research system or researcher, the flow process may still end there in failure if the national research system or researcher does not have the capacity to utilize those results. EAAFRO cannot be said to be in any direct way at fault if this is the case, and it was pointed out in another part of this study that many EAAFRO officers thought that this variable was crucial in East Africa,

Figure VI.5

Some Factors Affecting the National Utilization
of EAAFRO Research Results and Scientific Services



particularly in the case of Tanzania. But they are not alone in this reasoning. The Frazer Report referred to this factor in 1961:

We have been impressed with the difficulties that arise when territorial research is inadequately developed in any particular field; under such circumstances the interterritorial research group finds itself isolated and thus unable to cooperate effectively with people in the territories. (Frazer Report, p. 25)

Even in Europe this problem can exist according to UNESCO:

In this connexion, a question well worth discussing . . . is the situation of the smaller and the scientifically less advanced countries in Europe. Sometimes, in fact, the anomalous situation is reached in which the country which is least prepared at the national level -- and which therefore stands in greatest need of benefit from the communal activities -- finds itself, on the contrary, unable to assimilate the results of these activities. (UNESCO, June 1970, p. 152)

This idea is expressed at the institute as well as the national level in the concept of "critical size." The basic idea is that above some critical threshold, the whole of a research institution becomes greater than the sum of its scientific parts -- that ten scientists working separately and in different locations will not accomplish as much as those same ten scientists working and interacting in one institution. There is the creative stimuli from scientific interaction of course, but also the organizational and resource (equipment, technical manpower, library, etc.) efficiencies which accrue to research institutes above the critical threshold. It is possible for a research institute to become too large and complex and for inefficiencies and "red tape" to set in, but it is doubted that this is the cause of any such inefficiencies in national research institutes in East Africa. The actual critical size of any institute may vary from scientific field to scientific field or from situation to situation, but at some point -- according to this theory -- it will reach "take-off" and there will be a sharp jump in scientific productivity. 16)

There are two important intervening variables operating here for the individual national researcher, however -- the nature of his own scientific work and the extent to which it is complemented by EAAFR0 research results or scientific services, and

16) Since this discussion might seem to indicate that the larger the national institution is as it approaches critical size, the more its researchers will be able to utilize EAAFR0's results and services, and, therefore, the more positive their general opinions toward EAAFR0 would be, it should be pointed out that there is a reasonable counter-argument to this. This counter-hypothesis reasons that individual researchers in the smaller and less capable national research institutions will need and therefore appreciate, in particular, EAAFR0's scientific services more than those national researchers in the larger and more capable institutions, or that an inverse relationship exists between critical size and the general opinion of the national researcher toward EAAFR0.

the extent of his research experience in East Africa. Clearly the opportunities for utilizing these EAAFRO benefits of results and services are greater for the national researchers who have a greater scientific complementarity with EAAFRO. And, just as clearly, the national researcher who has not been involved in research in East Africa for very long may not have had a chance to utilize EAAFRO's research results or scientific services yet.

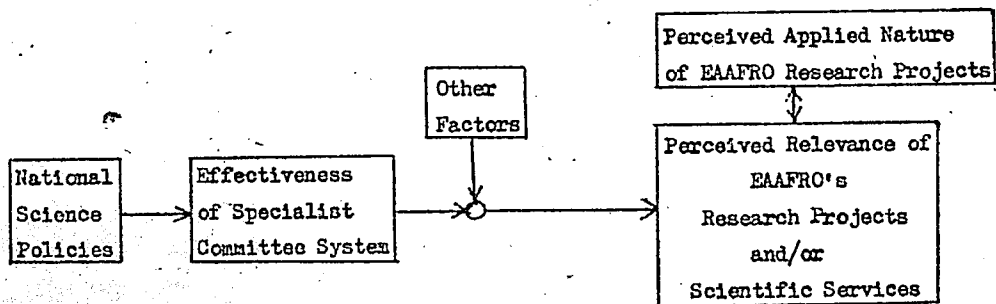
The above discussions on Figure VI.5 can therefore be summarized in the following propositions:

9. The perceived utilization of the EAAFRO output benefits of research results and/or scientific services by national researchers will be directly related to their perceptions of the relevance of EAAFRO's projects and services and/or the competence of EAAFRO's scientific work and/or the success of EAAFRO's information/technology transfer effort.
10. The perceived utilization of the EAAFRO output benefits of research results and/or scientific services by national researchers will be directly related to the extent of their experience at their national station and/or to the extent that EAAFRO's scientific work complements their own.
11. The perceived utilization of the EAAFRO output benefits of research results and/or scientific services by national researchers will be directly related to the capacity of the national institution of which they are a part to utilize those results and/or services.

The perceived relevance of EAAFRO's research and services by national researchers is thought to be an important variable, perhaps influencing other variables, so it is examined a bit further in this study. Figure VI.6 below examines the perceived relevance of EAAFRO's research projects and scientific services in more detail. One variable that might be affecting this perceived relevance -- and vice-versa -- is the perception of the national researcher about the "applied

Figure VI.6

Some Factors Affecting the Perceived Relevance
of EAAFRO's Projects and Services



nature" of EAAFRRO's research projects. It is a very difficult task to operationally categorize research into fundamental/basic/pure and applied categories because of the confusion surrounding the terms,¹⁷⁾ but it is usually possible to compare research projects and judge whether one is more fundamental or more applied than another. The official functional relationships between regional and national research systems quoted earlier in this chapter thus expresses the viewpoint that regional research should be of a more fundamental nature, that territorial research should be of a more practical and applied nature, and that at the boundary in between these two extremes there would be some overlap between regional and territorial research. This viewpoint has changed somewhat as territories became nations, but much of it remains.

The literature that exists also suggests that the more fundamental research may be more appropriate for regional schemes than the more applied research.

UNESCO endorses the statement that fundamental or basic research constitutes

... a most suitable choice for intra-European cooperation.

for both the political and the scientific points of view. (UNESCO, June 1970, p. 133)

They argue that fundamental research is essentially international anyway -- ignoring national boundaries with a common scientific language and special lines of communication among scientists of different nationalities. And the impact and effects of fundamental scientific discoveries are felt ... almost all over the world. In a Europe divided into different Eastern and Western ideological and socio-economic systems, moreover, cooperative schemes in applied research crossing this division have failed to materialize. Such applied research is usually supported by partners who are willing to invest their money only if they share in the industrial exploitation of the research results. However,

The field of knowledge covered by the basic sciences is broad enough to allow room for areas in which communication between scientists, and the publication of research results, could take place free from all restrictions

¹⁷⁾ UNESCO has categorized research according to the following terms:

1. Fundamental research (oriented or non-oriented): Any activity directed towards the increase of scientific knowledge or the discovery of new fields of investigation, without any specific practical objective;
2. Applied research: Any activity directed towards the increase of scientific knowledge, with a specific practical aim/in view;
3. Experimental Development: Systematic use of the results of fundamental and applied research and of empirical knowledge directed towards the introduction of new materials, products, devices, processes and methods or the improvement of existing ones, including the development of prototypes and pilot plants;

It would appear from the discussions in the first section of this study that only a very few of EAAFRRO's research projects might be considered "fundamental research." It is probably true, however, that many people in developing countries are referring to the final category of experimental development when they speak of applied research.

thus permitting optimal collaboration in research between countries with different socio-economic systems. (Ibid., p. 133)

One of the recurring themes about scientific research in developing countries, however, concerns the importance of its being "applied research." For example, the World Plan of Action for the Application of Science and Technology to Development states the following:

Another generalization is that the research and development infrastructure in developing countries should be weighted towards the practical problems of production and application rather than towards basic or fundamental work in pure research or science.¹⁸⁾

In developing countries fundamental research is usually thought to be a luxury that cannot be afforded. Research that isn't perceived to be immediately applicable to some national problem is often attacked as being a waste of money, and opinions toward EAAFR0 may even be affected by perceptions regarding this quality of their work. This is an issue on which many people can become very excited, with accusations of science for science's sake while people are starving, and that sort of thing. And in the past, when scientists were given much more freedom in running their research operations, such accusations may have had some merit -- and may still have some today. Yet, the inherent contradiction exists for a regional research institute that research of the most practical and problem-solving nature may often be applicable -- and of interest -- to only one Partner State.

What Figure VI.6 is meant to suggest is not only that perceptions about the applied nature of EAAFR0 research affects perceptions about its relevance, but also the reverse -- that perceptions of relevance may be affecting perceptions of the applied nature of research -- i.e., that the distinction between relevant and applied research is not being made. For example, if pyrethrum were to be considered a very potentially important crop for East Africa and if no scientific research on pyrethrum were being done elsewhere in the world, then one can imagine some very relevant and valuable scientific research being done on the fundamental nature of the plant, with no specific practical objective in mind -- what might be called "mission-oriented fundamental research." And, it is also possible to imagine that some extremely irrelevant applied scientific research could be done in East Africa on the practical problems of igloo construction.

18) Economic and Social Council, World Plan of Action for the Application of Science and Technology to Development, United Nations, New York, 1971, p. 44.

The theoretical project selection process for Community research organizations -- and EAAFRO in particular -- is described as follows in EAAFRO's Annual Report for 1969:

Research requirements are first discussed by the Specialist Research Committees, which may be standing or ad hoc, and which are convened and chaired by EAAFRO specialists. These Specialist Committees are composed of research workers in the appropriate disciplines

The recommendations of these committees are submitted for approval to the appropriate Research Coordinating Committees

The recommendations of the Coordinating Committees are duly considered by the Research Council, but the implementation of the programs approved by the Council is dependent on financial provision being granted by the East African Legislative Assembly. (EAAFRO, 1970, pp. 2-3).

As originally envisaged by the Frazer Commission, it was the function of the Coordinating Committees to determine research priorities, and so the point was emphasized that territorial representation was essential:

... if coordination is to be fully successful, it is essential that the Territories should be represented by senior technical officers having authority to implement agreements which the Committee may arrive at (Frazer Report, p. 51)

Today it is still pointed out by EAAFRO that the membership of these Coordinating Committees includes

... the appropriate Directors or Commissioner of Agriculture and Veterinary Services, the Chief Conservators of Forests and representatives of the wildlife organizations of the three National Governments. (EAAFRO, 1970, p. 3)

There are only four coordinating committees, however, in fields which are connected with EAAFRO interests: Agriculture, Animal Industry, Forestry, and Wildlife. Therefore -- particularly for the Agricultural Coordinating Committee which encompasses a wide variety of subjects -- in order for the Coordinating Committees to be able to function properly, the Frazer Commission deemed it necessary that they should have the power to appoint Specialist Subcommittees with the following terms of references:

- (a) to report upon the scientific and technical issues involved in problems submitted to it either by the Coordinating Committee or by its own members; and
- (b) to recommend problems for inclusion in territorial or inter-territorial research programmes. (Frazer Report, p. 52)

In 1969, EAAFRO scientists were responsible for convening and chairing the following Specialist Research Committees: Agricultural Botany, Agricultural Meteorology,

Agricultural Machinery, Pasture Research, Rangeland Research, Herbicides, Entomology and Insecticides, Coffee, Sugar Cane, Soil Fertility, Forestry, Wildlife, and Statistics. (EAAFR0, 1970, pp. 2-3)

It was the intention of the Frazer Report that the "coordinating machinery" described above would keep the regional research institutes in touch with the needs of the three territories. This machinery, however, seems to have functioned at varying rates of effectiveness. The starting point of the project selection process is the Specialist Committees, and they have met at different frequencies, at different sites, with different agendas, for different lengths of time, and with different memberships. There seems to also have been different philosophical perceptions of their objectives -- some have functioned as active and searching bodies, including many different elements from national organizations in order to arrive at a broad consensus of what research should be undertaken in a certain field; others have functioned as more of a narrowly scientific group -- closed meetings of scientific specialists who read strictly scientific papers and produce a scientific report. In cases where the Specialist Committee has been active in recommending research priorities based on national discussions, the Coordinating Committee also appears either to be actively functioning or more or less going along with the Specialist Committee's recommendations; in other cases, the Coordinating Committees seem to have become inactive. There has been some indication that the Specialist Committees have suspended operations in the wake of the Wasawo Report referred to earlier, but this is not true in all cases and their previous operations were not all the same anyway.

Another important factor here is the presence or absence of a national science policy. As UNESCO said for European scientific cooperation:

No European country can reasonably hope to draw significant and lasting benefits from regional scientific cooperation if its participation has not been planned and coordinated within the framework of a purposeful and integrated national science policy. (UNESCO, June 1970, p. 136)

This theme has been echoed for the developing countries and East Africa by UNESCO and by people associated with regional research in East Africa. Its main thrust is that national representatives in regional groups such as Specialist Committees will not be able to express their national interest in a concerted and coordinated fashion unless they have a national science policy to guide them. This factor, however, is not a differentiating one in East Africa as yet because none of the three countries can be said to have a national science policy at present. National efforts to this end are taking place, however -- with Uganda probably the

furthest and Kenya the least advanced -- and this factor could be of importance in the future.

One proposition from Figure VI.6 will be tested as follows:

12. The perceptions of national researchers about the relevance and the applied nature of EAAFRO's scientific work will be directly inter-related. In addition, the roles of different Specialist Committees will be investigated with respect to their possible impact on EAAFRO's project selection process.

Another important variable was thought to be the perceived success of EAAFRO's information or technology transfer efforts by national researchers. The two most important variables thought to be influencing it - Proximity and Personal Contact Transactions - have already been discussed, so the proposition can be directly stated as follows:

13. The perceived success of EAAFRO's information or technology transfer efforts by national researchers will be directly related to their Proximity to EAAFRO and/or to the amount of Personal Contact Transactions they have had with EAAFRO officers.

The National Interview

Before going into the interview itself, a few brief points should be mentioned in general. The interview was pilot tested on only five national researchers at the National Agricultural Laboratories in Nairobi, Kenya, in December of 1971. Much experience had been previously gained, however, in administering a -- in some respects -- similar interview to EAAFRO regional research officers, and this interviewer felt quite comfortable with the national one. Also, in view of time constraints imposed by approaching holidays and a field trip to Uganda scheduled for the first part of January, 1972, it was decided that the limited number of pilot tests was enough of a basis to proceed on. And with one exception it did turn out to be a successful interview -- eliciting the information wanted and arranged to keep most of the national researchers interested in the questions and in the final output to come from the study.

The interview itself was relatively long -- from one to three-and-a-half hours depending on how much relevant experience and interest the national researcher had, with most Respondents taking about two hours. Thus, a maximum of four interviews in a day could be managed, but usually three was the limit due to scheduling problems on the one hand, and this interviewer's attention span and fatigue on the other. For several reasons, it was decided rather early not to even attempt to use a tape recorder for these interviews. The subject matter in the questions was often quite sensitive, involving information, opinions and perceptions of scientific colleagues and other research institutions, and it was

often quite difficult to build a rapport of trust and confidence even without a recorder. With the recorder on it was felt that it would always be in the back of the national researchers' minds, even though they might give their permission for its use. In any event, using the recorder would have been impossible without secretarial assistance for transcribing the tapes, and even then some of the accents would have made this operation extremely difficult.

It was originally estimated that there were only about 130 national research officers in agriculture and forestry in East Africa -- about 70 in Kenya, 30 in Uganda, and 30 in Tanzania -- and so it was decided to try to interview as many of them as possible rather than taking a random sample. One reason for this was that in order to keep the numbers reasonably high at least half of them would have to be interviewed anyway, and doing the entire set didn't seem to be that much more work compared with what had already been invested in time, diplomacy, and background studies. And, if one were to travel long distances to national research stations, it seemed wasteful to talk to only half the officers there -- some of the more isolated stations having as few as two research officers -- instead of all of them. As it turned out, the numbers of research officers in Kenya and Uganda were under-estimated, but the study has followed through on this intention. Any results that do come out of the study should be more conclusive if they are based on 70-80% of the total national research officer population rather than a random sample of 50% -- assuming the missing 20-30% are absent due to factors such as being on leave which should have no relation to their responses.

The decision to use a personal interview for gathering the data rather than some other instrument such as a questionnaire was also based on several considerations. No matter how firm the assurance of confidentiality given in the introduction, it was felt that the national researcher would be much more free in talking about sensitive issues than in writing down his answers and signing his name. And, indeed, this did seem to be the case when several Respondents would preface their remarks with phrases such as "Just between you and me . . ." or "This is off the record now . . ." A colleague in the Institute for Development Studies also advised against the use of a questionnaire because of the loss of control over it by the interviewer. He cautioned that the intelligent Respondent had a tendency to spend more time in thinking about why a certain question was asked in a questionnaire -- and perhaps deciding that it was a stupid question and ignoring it -- rather than thinking about his answer. A personally administered interview could help to keep the Respondent on the right track, so to speak. But the most important reason for this decision to use the personal interview was

the need for follow-up questions -- both to obtain in full the desired information and to check on whether the question had been understood correctly. And the follow-up questions were, indeed, necessary for these reasons, and in addition helped to maintain a more conversational atmosphere.¹⁹⁾

In administering the interview, the first sheet of the EAAFRO interview was also used at the national level for writing down most of the background information about the national researcher, since it was easily duplicated and seemed to work well for this purpose. This background sheet covered questions one through nine. Questions 10 through 35 were written on 3x5 cards and asked from them, and the responses were written down on plain, lined paper. In this way there was no set space for any question and as much space could be used as the given information required -- without crowding or writing between the lines -- before going on to the next question. The use of cards also seemed to give the national researcher something physical to focus on in those awkward moments when the last part of his answer was still being written down and he had nothing to do but wait -- and watch the next card being slowly turned over.

With these general points out of the way, the interview itself will be presented below with the actual words of the interviewer single-spaced to indicate quotation, and remarks on the particular question following it.

The typical introduction to the interview went as follows:

Hello, Mr./Dr. _____, You have seen the memo which Mr./Dr. (Officer-in-Charge) has sent around, but let me explain a little bit more about who I am and what I'm doing here before we begin this exercise.

My name is Ted Schlie, and at the moment I'm with the Institute for Development Studies at the University of Nairobi. I'm over here on grants from Ford Foundation and National Science Foundation in the States to do my own PhD research.²⁰⁾ Back in the States, I'm at Northwestern University in a Department of Industrial Engineering and Management Sciences where we have a group of people who are interested in all the aspects of scientific research -- except that we don't actually do that type of research ourselves. We're interested in the organization of research, in its management and administration, in technology transfer and dissemination of information -- that type of thing.

¹⁹⁾ One danger, of course, is that in asking follow-up questions new elements are added to the responses of these Respondents and not to the others.

²⁰⁾ Many of the African Respondents are working on their own MSc or PhD research, and this helped to gain a certain amount of empathy.

About two-and-a-half years ago I was working for the Office for Science and Technology of the United Nations in New York, which is where I first became really interested in this issue of regional research institutes.²¹⁾ Because at that time, all of the reports I had to deal with had sections in them about these regional research institutes -- positive recommendations that they should be established in developing countries. Their arguments were usually based on an economic principle of a more efficient use of scarce national resources, but none of the authors really knew much about these institutes -- about the problems they faced or how they operated. Some of them were talking about continental-wide institutions, others about smaller groupings of countries like the East African Community, but no studies or references were able to be cited and, in fact, no real work has been done on them. And, there aren't very many of these institutions around -- East Africa is probably the only place in the developing world where a set of these multi-national institutions exist!²²⁾

So I decided that this would be a worthwhile topic for me to do my own research on, and other people thought so too -- I was able to sell the idea to the granting agencies and arrived out here last February, about a year ago.

Since then, I have been doing most of my work out at Muguga, trying to get a feel for the situation in East Africa from EAAFR's point of view, but I have also made a trip to Uganda last July to talk to people in the Department of Agriculture and the National Research Council and get their ideas of what I should be looking at, and their permission to do the research, and I have made a similar trip to Dar es Salaam and, of course, have talked to the national people right there in Nairobi.²³⁾

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- 21) These comments are intended both to gain stature and legitimacy, and to honestly explain how this author did end up working on this research project. Many researchers did inquire about this latter factor when this explanation was not included.
- 22) If the national researcher seemed to indicate some interest in this last remark, this author went on to mention how the CACM industrial research institute in Guatemala and the CENIT institute in Iran really weren't working out; how the French system of research stations in their former colonies was still centralized in Paris; and how EURATOM was also having trouble in the developed part of the world.
- 23) This paragraph would be for a Respondent in Uganda -- a suitable shift in emphasis is made for Respondents in Kenya or Tanzania. The purpose of this paragraph was to convey to the national researcher that this was not just another quick trip research job -- that this author had been on the scene for at least a year and appreciated the need for getting to know the situation -- from both regional and national viewpoints -- before he began the actual data gathering. The conveying of this sense of appreciation that East Africa was not the United States and that one must be in East Africa for a certain length of time in order to understand the complexities of the situation was very important because many researchers -- indigenous and ex-patriate -- are quite cynical about the foreign "expert" or researcher who flies in and flies out and -- they feel -- only touches the surface.

Now that I have talked to these people and have done some background studying of the situation, I feel that I know what are the important variables I want to be looking at, and you are the people I am asking for information. It is my intention to give this interview to as many national agricultural and forestry research officers in Kenya, Uganda, and Tanzania as possible. I am talking to you because, on the one hand, I can't talk to the farmer -- there are too many intervening variables between research and him. And on the other hand, although I have talked to them to get their ideas, I'm afraid that the responses of the Ministry people would be too politically oriented for what I want. But I am hoping that you national scientists should be able to give relatively well-informed and objective information.²⁴⁾

Decisions on regional research organizations will, of course, be made by political decision-makers, and I perceive my study to be an input to them -- both in the national ministries and the Community secretariats -- in making the decisions regarding regional research that will be made in the next few years; provided, of course, that they want to use my results. Copies of my final report will be made available in any case.²⁵⁾

This interview then, involves a certain amount of background information about you and your work, and then some personal opinions and perceptions regarding how you and your work link together with EAAFPRO people and their work. As this does involve personal opinions and perceptions, all of your answers -- as will those of everybody else -- will be strictly confidential. No response will be identifiable or attributable to any specific person -- I am more interested in over-all patterns of answers rather than individual responses.

Do you have any questions about me before we begin?²⁶⁾

The interview then began as follows:

1. Institute - Name and location:

This information was filled in by the interviewer before the interview began. The location will be the basis for figuring out the geographic distance from the Respondent's institute to EAAFPRO headquarters at Muguga -- the indicator for the Proximity Variable.

The Distance away from EAAFPRO is the most feasible indicator for this variable, and one very good geographical representation of all the possible regional national relationships that might exist for a particular crop are shown in Figure VI.7 for sugar cane. Although it makes sense that a national research institute 500 miles away from EAAFPRO would have much less opportunity to develop a wide

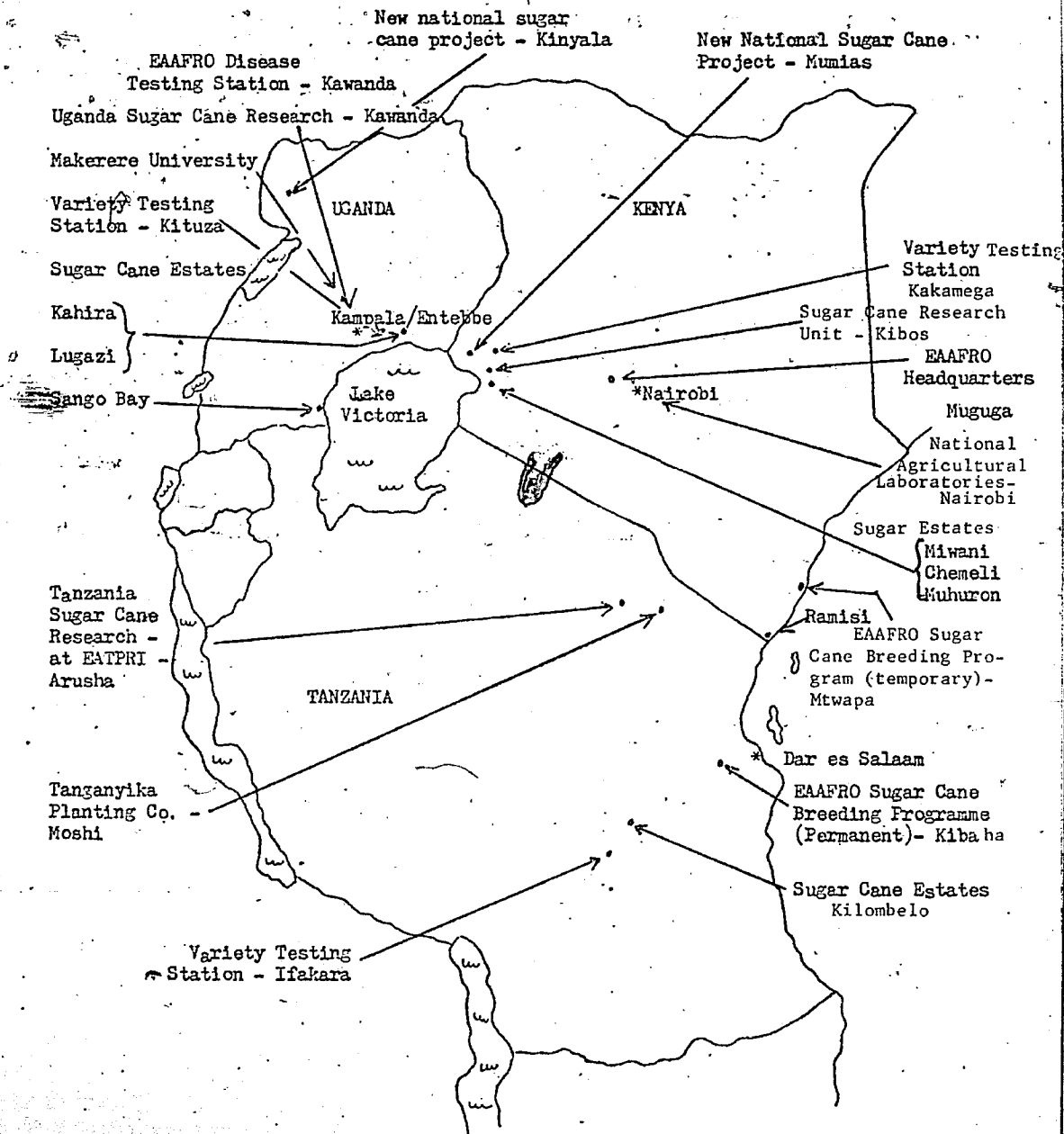
²⁴⁾ This was another question often asked by the Respondents when this explanation wasn't included -- "Why ask me?"

²⁵⁾ Once again, due to their past experience with foreign researchers, it was felt to be necessary to assure the researchers that the results of this project would be available to the relevant people in East Africa and not locked up on some library shelf in America. See also comments which end the interview on this point.

²⁶⁾ Usually there were no questions. The matter of research clearance from the government was usually taken for granted once the Officer-in-Charge had expressed his own satisfaction with that requirement. (See the remarks following Question #2)

Figure VI.7

The East African Sugar Cane Breeding Programme*



*This figure was obtained from the office of Mr. Simbwa-Bunnys, EAAFRO officer in charge of the Sugar Cane Disease Unit Station in Uganda.

range of relational linkages with it than another national research institute only five or 50 miles away, there is one other aspect of Proximity that is considered in a later question and that is the presence of alternative choice points. The most likely case for the existence of this type of situation occurs in Uganda where the Faculty of Agriculture at Makerere University might logically be a convenient alternative to EAAFRO for Kawanda and Namulonge Research Stations. If this is so, then their "Proximity" to EAAFRO is less than what would be indicated by distance alone.

2. Name of Respondent

The names of the research officers at a particular station were obtained from the Officer-in-Charge of that station in the normal introductory meeting with him when the project was generally explained and the cooperation needed was outlined. The typical case was that the Officer-in-Charge would send around a brief memo to all research officers about the project and that it had official clearance, and that he hoped they would cooperate. It was then up to this author to meet the various officers -- tea time proved a good means for this -- and arrange appointments to meet with them. After the introduction above, the interview usually began by spelling out the national researcher's name to be sure that it had been received correctly from the Officer-in-Charge. This was particularly important for the African names, and gave both the Respondent and the Interviewer something easy to do in getting the interview started. And, with some of the difficult African names, this question often provided the opportunity for a few relaxing laughs.

3. What is your official rank or title -- and what organizational division or section are you in here at this institute?

This question was mainly for general information purposes, but it was also thought that it might be important later in identifying specific types of national organizational divisions which responded in different ways to questions about EAAFRO.

4. You are a citizen of . . . ?

As part of question No. 4, the race and sex of the Respondent were also observed and recorded. The racial information provided the indicator for the variable of Racial Homogeneity and the categories used were the main ones used in East Africa -- African, Asian, and European.²⁷⁾ The nationality of national

27) European is synonymous with white, African with black, and the Asian with the Indian/Pakistani/Goan people which immigrated to East Africa. Other racial identities were written out as they were apparent.

researchers who were citizens of East Africa -- Kenya, Uganda, or Tanzania -- was used as the indicator for the Opinions of Relevant National Groups variables. It was felt that there was no feasible way to measure "national attitudes," but if the general opinions toward EAAFRO of national researchers who were citizens of East Africa clustered together around their nationality -- in any order -- that should have indicated that "national attitudes" of some kind were operating. The information on the national researcher's sex is not related to any variable and is only to be used in developing a general profile of the population of Respondents.

5. What is the highest degree²⁸⁾ which you have? Where and when did you receive this?

This information was elicited just in case the academic level of the national researchers should significantly relate to other variables, but it was not hypothesized that this should necessarily be so. If the Respondent was African or Asian, and if the information had not already been gained above, the following additional question was asked:

Where did you receive your BSc education? What years were you there? It was expected that many of these indigenous national researchers would have been educated at Makerere University -- or the University of East Africa as it was formerly called -- and this information was to be used in attempting to see if a new "Old Boys Network" of indigenous scientists in East Africa was beginning to develop around Makerere graduates.

6. How long have you been doing research?²⁹⁾
How long have you been at this institute?

If the respondent indicated above that he had done research at other institutes in East Africa besides the present one, he was then asked:

Have you done research work elsewhere in East Africa?
If Yes, Where? When? Doing What?

and if the answer to this was No, he was asked:

Where did you work prior to coming to this institute? How long were you there? Doing what?

Some of this information was used only in developing a profile of these national research Respondents, but the appropriate specific information was also used as indicators for the Research Experience and for the Critical Size indicators for the

28) In the British education system, post-BSc "Diploma" degrees in forestry, entomology, etc. were included in this information.

29) The national researcher was allowed to include research for academic degrees in this measure of experience as long as he considered it to have been research. This was particularly necessary in those cases where African research officers were working on their MSc or PhD research at the national stations, either in addition to or incorporated with their national research.

Research Experience and for the Critical Size of the National Institute variables. In the latter case, questions were asked in pilot testing on other potential indicators -- the previous year's budget and the total number of publications coming out of an institute -- but these proved to be unfeasible as indicators. Differences between capital and operating expenditures and the impact of foreign technical aid reduced the usefulness of the budgetary measure, and one ex-patriate by himself who had been in East Africa for many years might have more publications than a large institute where many of the research officers were relatively new Africans. Likewise, indicators regarding scientific equipment and facilities might vary according to the type of experimental work being done and not reflect the institute's critical size. It was decided that there were really two dimensions which meaningfully reflected the critical size of any institute -- the number of research officers there and the continuity of the work being done there. Therefore, the combination indicator used was the total number of man-years of research officer work experience at a certain institute, which could be derived from this background data. A later question, No. 10, was asked only to guard against the possibility that recent sharp fluctuations in the size of staff at an institute had occurred which might throw this measure off -- a possibility that had to be taken into account in the light of the Tanzanian experience in the mid- and late-1960's when many ex-patriates left due to a dispute over pension benefits.

7. Are you at all supported by any external scientific or technical aid? If Yes, What is the aid source or scheme? About what proportion of your salary, benefits, equipment, etc. come under this aid?

If the answer was No, it was assumed that the Respondent was entirely supported by the national government of the Partner State, and the question was often answered in those terms. --Part of the reason for asking this question -- and certain others later on -- was to attempt to measure the extent of the influence which foreign technical aid plays in research in East Africa. This is a matter of general interest and will be the subject of a separate analysis and paper by this author

8. In terms of your duties here, is it possible for you to categorize them in terms of a rough percentage of how much is administration and how much is the actual scientific work?

"Scientific work" was deliberately used instead of "scientific research" because a three-way categorization of research, services and administration was desired -- see the next question, No. 9. A definition of "administration" and what it was or included was avoided; instead, if asked, it was stressed that -- with the one limitation regarding services -- it was what they felt was "admini-

stration" which counted. This got around a definitional problem for which it was felt there was no consistent solution. The amount of administrative work a national researcher had was thought to be of interest inasmuch as it might relate to the nature and amount of contacts he would have with EAAFRO, but since the two questions didn't work out well, this proposition was dropped.

9. Could you please now give me a brief description of your scientific work, in terms of projects and project objectives if possible?

Once again "scientific work" was used instead of "scientific research," but if the national researcher only mentioned research-oriented projects, the following question was asked:

Do you do any work of a service nature? That is, scientific work which is perhaps more routine, and is done for some other purpose besides your own experimental research? You can include scientific advisory services in this category.

After enough follow-up questions to reasonably ensure that the national researcher's range of scientific activities was fully covered, the research projects and scientific services were summed up in titles by the interviewer -- which was usually possible even in cases where the replies were fragmented and in bits and pieces -- and read aloud for his approval:

Now then, perhaps we could sum up your work by saying that you have a research project on (title) . . . and do a service of (title)
Would you agree with that?

If he didn't agree, of course, it was changed to meet his objections.

There were a few reasons why time was spent on this work description when it may not seem to be directly related to a study of regional-national scientific relationships. One was that the information gained could be used to develop an indicator for the Scientific Complementarity with EAAFRO variable. Comparing the national researcher's scientific work with the work going on at EAAFRO, this author could rank the respondents as follows: H = High, M = Medium, and L = Low, scientific complementarity with EAAFRO. In addition, rapport with the national researcher was aided by this particular discussion, giving the interviewer a chance to express interest in him and his work. The national researcher also became used to talking in answering this question -- in explaining what he said so that the interviewer understood what he meant, and in giving reasons for and justifying what he was doing. The ease he gained in talking about his own work -- where he was usually on firm and familiar ground -- was well worth the time spent, it is believed, because when subsequent questions proved to be more complicated and ambiguous for him, he could still try and answer rather than just giving up.

After this the Respondent was asked the following:

Taking only your scientific work now, about how much -- in rough percentages -- of your time is spent on the research work and how much on the service work?

As mentioned earlier, the administration and service categories were often confused and the services answer was often given as a fraction of the administrative duties.

A final aspect of this question was as follows:

Using your own definitions of what is called fundamental research and applied research, is it possible for you to categorize your own research work in terms of rough percentages of how much is of an applied nature?

This was a difficult question for many national researchers to answer, but once they were able to do so they found it much easier to answer a later question regarding EAAFRO's research, which was more important to the study. In many cases, the interviewer had to add the following comments to the above question in order to elicit a response:

Now I realize that these are not good categories, but they're used so much we're kind of stuck with them. But they mean different things to different people, and they're essentially undefinable in operational terms -- that's why I'm stressing that you should use your own definitions, it's what you think that I'm after -- how much of your research, in your own mind, is fundamental and how much is applied?

With this urging, it was usually possible to get a response from even the most hesitant and unsure of national researchers.

10. Is the present number of research officers here at this institute about its normal or usual size -- or have there been recent changes?

This question was asked only to Officers-in Charge of research stations, and its purpose was to verify the indicator that was used to measure the Critical Size of the National Institute variable -- the capacity of the receiving national institute to utilize EAAFRO research results.

Up to this point, EAAFRO had been mentioned only briefly in the introduction -- no questions as yet pertained to EAAFRO and it was hoped that the introductory references to EAAFRO would have momentarily left the national researcher's mind as he discussed his own work and answered the previous questions. Some instructions prefaced the next question:

Now as I mentioned at the beginning, there are a certain number of opinion and perception questions, and all of these will follow the same general pattern in which there will be five categories or levels.³⁰⁾ of

30) A five-level range of responses was chosen on the advice of Dr. Joseph Ashcroft of the Institute for Development Studies at the University of Nairobi on the basis of psychological studies which showed that people have trouble making choices of this nature when more than five or six levels of answers are involved.

answers ranging from a very high answer mentioned first, then a high, then a middle or medium answer, then a low, and finally a very low answer. The specific words for each level of answer will be mentioned with the question, but this general pattern will be the same throughout.

And then, since these questions are not the type of question which can easily be answered in absolute terms, after you have placed your answer in one of the categories, I will ask you for the reason or reasons why you answered the way you did. This will give you a chance to explain your answer, or to qualify it -- to mention the if's, and's and but's.

The reasons behind the answer were just as important as the answer itself in many cases. Besides information related to other variables, if a question was misunderstood it usually came out in the reasons and the confusion could be cleared up. And, if the statistical results of this study were not significant, it was expected that the explanations could still provide some worthwhile information.

The principal indicator question to measure the major dependent variable of general reaction/response opinions toward EAAFRO, was then immediately asked:

11. What is your immediate reaction to the East African Agricultural and Forestry Research Organization -- or EAAFRO as it's called? Would you say your immediate reaction is . . .

- A. Very Favorable
- B. Favorable
- C. Neutral
- D. Unfavorable
- E. Very Unfavorable

Is there any specific reason or reasons why you answered the way you did?³¹⁾

- (X. Doesn't have any reaction or opinion
- Y. Doesn't want to answer)³²⁾

Although the X and Y categories were available, they hardly ever had to be used as most Respondents ventured an opinion after a suitable period of waiting. The reason after the answer provided a good escape valve for the national researchers, and besides the other uses mentioned above, it is doubtful if some Respondents would have answered at all if they couldn't have explained "why" and seen that their explanations were being written down along with their answer. It must be stressed that the question referred to EAAFRO in general. Many national researchers based their reactions on the division or divisions of EAAFRO they were most familiar with, however, in their explanations.

12. In general, how much would you say you know about EAAFRO -- about its people, its programs, what it does, etc.? Would you say you know . . .
"Why?"

- A. Almost Everything
- B. Quite a Lot
- C. Some
- D. Just a Little
- E. Almost Nothing

³¹⁾ From now on in this paper, this question will be abbreviated to just "Why?"

³²⁾ X and Y categories are not read aloud to the Respondents -- they are just used by the interviewer when appropriate. In the remainder of these types of questions, X and Y will not be shown -- but the option of using them is still there. One technique which seemed to help in asking these kinds of questions involved the use of the interviewer's arm. When going over the answers from "Very Favorable" to "Very Unfavorable" as above, the hand was moved horizontally as each step was read out, each time a little bit lower down. The national researcher's eyes seemed to focus on this movement and he seemed more easily able to grasp the implications of the response levels.

There were two principal reasons for asking this question. First of all, this perceived knowledge is one of the indicators to be used as a measure of the knowledge of EAAFRO variable. Secondly, however, the answers to question No. 12 were useful in reassuring national researchers -- particularly the ones who answered "Some" or "lower" -- that their opinions and perceptions, based on their self-admitted incomplete knowledge, were still worthwhile. The following sentences were used after question No. 12 as a preface to the remainder of the opinion and perception questions:

Now the reason I asked you about this knowledge you have right now is that all of your answers will be interpreted in this light. I now know that you think you know only some/just a little/almost nothing* about EAAFRO, but I still want you to try and answer the remaining questions on the basis of what you do know or think you know. It's your impressions and perceptions and opinions that I'm after -- not your completely documented conclusions. After all, if you and everybody here "knew" everything about EAAFRO, there would be little or no use in me even starting this project!³³⁾

The next three questions all tried to explore the national researcher's initial reaction/response to EAAFRO from slightly different points of view:

13. How do you react to the following statement: "EAAFRO is a truly regional, East African institution." Would you say that you . . .
- | | |
|--|----------------------|
| | A. Strongly Agree |
| | B. Agree |
| | C. are Neutral |
| | D. Disagree |
| | E. Strongly Disagree |
- "Why?"

14. Are there any particular projects or programs of EAAFRO which stand out in your mind as having been of benefit to Kenya/Uganda/Tanzania?* What are they and why?

Alternatively, are there any particular projects or programs of EAAFRO which stand out in your mind because they have not been of benefit to Kenya/Uganda/Tanzania?* What are they and why?

15. It has been estimated that the Government of Kenya directly contributed approximately two million shillings/Uganda directly contributed approximately one million shillings/Tanzania directly contributed approximately one million and five hundred thousand shillings* to EAAFRO's budget in fiscal year 1970-71. Now how much of this amount -- if any -- would you prefer to see taken away from EAAFRO and applied to Kenya's/Uganda's/Tanzania's* own national agricultural and forestry research program?
- "Why?"

Question No. 13 is attempting to get at the extent to which the widely-held, or at least widely expressed, belief that EAAFRO is more oriented toward solving

³³⁾As can be gathered from the tone of this paragraph, it was found in pilot testing that these scientist Respondents were very reluctant to express (especially critical) reactions or opinions based on their incomplete knowledge of the situation. Still, almost all of them did try after this reassurance.

*Use the correct alternative for the particular Respondent.

Kenya's problems -- where it is located -- than to solving Uganda's or Tanzania's is held among national researchers. This Regionality Statement question will be used as another measure of the general opinions toward EAAFRO dependent variable.

Question No. 14 was first tested and used in the following form:

What percentage of EAAFRO's total program do you think has been of benefit to Kenya/Uganda/Tanzania?* "Why?"

What percentage of EAAFRO's total program do you think has not been of benefit to Kenya/Uganda/Tanzania?* "Why?"

Somehow, the pilot testing did not catch the problems inherent in this question, and it was changed to its present form after about half of the Ugandan researchers had been interviewed. It was found that many national researchers simply would not or could not give percentage answers. The absolute nature of a number answer to the question of "percentage of EAAFRO's total program" when they didn't know EAAFRO's total program conflicted too much with their sense of caution in answering questions they weren't sure about. Many of those who did try and answer did so by mentioning the projects which they thought had been of benefit to Uganda, and this led to the present form of the question which did work better.

Question No. 15 tries to get at the same general opinions by setting up a hypothetical resource allocation situation -- based on real monetary estimates -- in which the worth of EAAFRO is directly compared to the worth of what the national researchers perceive could be done with that money in the nation's own research programs. In some ways, this gets to the heart of the matter because the willingness to spend national money on a regional research institute should be the ultimate test of whether the Partner States of the EAC really want these regional institutes or if they are merely relics from a colonial past. Most of the national researchers answered this question after some thought, but a few would not answer until they were given additional information on the contributions of the other Partner States or on the size of EAAFRO's total budget. Since it would seem that different criteria may have been used by these researchers in answering, their responses to this question may not be measuring the same variables.

All three of the measures used in these three questions were to be used as additional measures of the general reaction/response opinions of the national researchers toward EAAFRO, but only those from Question 13 will be tested for reasons given above. The information from Question 14 above, however, along with answers to the recurrent question of "Why?" after many of these opinion/perception questions, may be used to develop another indicator for the Knowledge of EAAFRO variable.

The next question was asked only of Respondents at Serere Agricultural Research Station (Uganda), Kawanda Agricultural Research Station (Uganda), Kitale National Agricultural Research Station (Kenya); and Coast Agricultural Research Station (Kenya) where EAAFRO has decentralized divisions placed at these national institutes:

16. In this next question I'm going to be referring to a concept called "institution-building." By this, I mean the contribution that a person or unit makes to the total institution of which he or it is a part. Now part of this contribution can come from the scientific research this person or unit produces, but this is something more than that -- it's also the interaction with the rest of the institution, the part the person or unit plays in helping out on problems, that sort of thing.

Nor then, in your opinion, how much has the EAAFRO Division on _____, which is based here at this institute, contributed to the building up of this institution; (name) Agricultural Research Station? Would you say it has contributed . . .

- A. Very Much
- B. Quite a lot
- C. Some
- D. Just a little
- E. Almost Nothing

"Why?"

This question provided the measure for the Institution-Building variable, one of EAAFRO's potential benefits discussed earlier.

Question No. 17 was used for a couple of purposes:

17. To the best of your knowledge, is EAAFRO doing any experimental research in your own field of _____?

If Yes, What -- in brief -- are they doing?

Are there any other projects in your field that you think EAAFRO should be working on -- either in addition to or rather than the ones they are already working on?

If Yes, What -- in brief -- are they, and why should EAAFRO be working on them?

If No, Do you think EAAFRO should be doing any experimental research in your field?

If Yes, What projects and why?

If No, Why not?

If there was some correct knowledge of EAAFRO's research activities in the national researcher's field that hadn't yet surfaced, this was to be taken into account in the development of the Knowledge of EAAFRO measure referred to earlier. The answers -- or lack of them -- could also be used to check on judgments made by this author in developing the Scientific Complementarity with EAAFRO indicator referred to earlier. The last parts to question No. 17 on specific research projects which EAAFRO "should" be doing was asked just to gain more information.

18. Are you collaborating with EAAFR0 or EAAFR0 researchers on any joint projects -- or have you done so in the past?

If Yes, (and for each instance of collaboration) Who was this collaboration with, and on what project? What was the nature of the collaboration -- what did he/they do and what did you do? When did this collaboration take place? Who initiated the collaboration, or how did it start? What means of communication were used to carry on the collaboration?

19. Have you personally ever used the results of any EAAFR0 experimental research in your own research? By results I mean techniques and methodologies that they may have developed, as well as data results.

If Yes, What kind of research results were these, and how did you use them in your work? How were these results communicated to you?

And finally, how useful were these results to you in your own work? Would you say they were of . . .

- A. Very Great Use
- B. Much Use
- C. Some Use
- D. Little Use
- E. No Use

"Why?"

Question No. 18 explored different aspects of research collaboration between EAAFR0 and national researchers, and the responses to it are used as the measure for the Experimental Collaboration variable -- another one of EAAFR0's potential benefits. Similarly, question No. 19 inquired about the utilization of EAAFR0's research results -- what might be expected to be their most important benefit -- and these responses are used as the measure for the Research Results variable. There may be some overlap in these questions in that collaboration may mean a mutual utilization of each others work, but any such overlapping information elicited in response to one question was bypassed in the others.

The principal measure for the Perceived Relevance of EAAFR0's Research Projects and Scientific Services was provided in Question No. 20:

20. Before, I asked you about EAAFR0 projects which have been of benefits to Kenya/Uganda/Tanzania,* I am now more concerned with EAAFR0's current projects or programs and the relevance of their project selection process.

In your opinion, how relevant to Kenya/Uganda/Tanzania* are the current research projects which EAAFR0 has selected to work on? Would you say that they are of . . .

- A. Very Great Relevance
- B. Much Relevance
- C. Some Relevance
- D. Little Relevance
- E. No Relevance

"Why?"

In pilot testing, there was some overlap and confusion between this question and question No. 14, which is the reason for the prefacing remark. It might also be mentioned here that if reasons on the "Why?" part of the question begin to be repeated, that "Why? -- Other than reasons you've already mentioned," was used.

A further check on the answer to this question is provided in a second part of it:

Again, before I asked you about specific projects in your field which you thought EAAFR0 should be working on. Now, in the whole field of agriculture or forestry, are there any general project areas which you think EAAFR0 should be working on -- either in addition to or rather than what they are doing -- which would perhaps be of more relevance to Kenya/Uganda/Tanzania?*

"Why?"

The second general institute process after project selection was the actual doing of the scientific work itself, as was outlined earlier.

- | | |
|--|-----------------------|
| 21. In your opinion, how competent -- in terms of scientific quality -- is the research which EAAFR0 officers are doing? Would you say that they are . . . | A. Very Competent |
| | B. Competent |
| | C. Just about Average |
| | D. Incompetent |
| | E. Very Incompetent |

"Why?"

And the third general institute process was the transferring or disseminating of the results of experimental research and scientific services:

- | | |
|---|-----------------------|
| 22. In your opinion, how successful do you think EAAFR0 is in transferring or disseminating the results of its scientific research to national scientists -- like yourself -- or to other national people in the ministries and so forth -- <u>not to the farmer or final utilizer!</u> Would you say EAAFR0 is . . . | A. Very Successful |
| | B. Successful |
| | C. Just about Average |
| | D. Unsuccessful |
| | E. Very Unsuccessful |

"Why?"

These questions provided measures for, respectively, the Perceived Competence of EAAFR0's Scientific Work and the Perceived Success of EAAFR0's Information or Technology Transfer variables.

The last question is followed up by asking a series of questions about the three specific printed means of communication which EAAFR0 uses to disseminate information: the EAAFR0 Newsletter, a monthly cyclostyled two-page summary of some interesting research news and activities (such as visits); the EAAFR0 Annual Report -- Record of Research, which gives fairly detailed summaries of the year's scientific work; and the EAAFR0 Agricultural and Forestry Journal, a quarterly publication for research done anywhere in East Africa.³⁴⁾

23. Do you -- or have you ever -- read the EAAFR0 Newsletter/Annual Report/Journal?*

If Yes, About how often or how regularly or how thoroughly do you read this Newsletter/Annual Report/Journal?*

34) Because the EAAFR0 Journal disseminates scientific information from any source -- not just for EAAFR0 -- throughout East Africa, there is a strong case for considering this to be an EAAFR0 service and including it in question No. 25. Since it does disseminate its own scientific information, however, it will be included here.

How good do you find this Newsletter/Annual Report/Journal* as a means of disseminating information to you? Do you find it to be
 "Why?"

- A. Very Good
- B. Good
- C. Just about Average
- D. Not so Good
- E. No Good at All

It should be noted that since the Newsletter, for example, is not intended to disseminate detailed scientific information but rather more of the feature highlights and social activities of EAAFR0, that the last part of the above question was worded "as a means of disseminating information" and not "as a means of disseminating scientific information" or "scientific results." In this way it was hoped that the national researcher would be free to apply whatever criteria he wanted in answering the last part and would then explain his criteria in answering "Why?". As a final wrap up to this question, it was then asked:

Have there been any other special kinds of reports or documents -- written publications of any kind -- from EAAFR0 which you have come into contact with which conveyed scientific information to you?

If Yes, What were they and how often do or did you come into contact with them? How useful were they?

In this part it was intended that any other written means of communication for disseminating scientific information from EAAFR0 should be identified.

Question No. 24 referred to EAAFR0's fundamental vs. applied research balance:

24. Now once again using your own definitions of what is fundamental and what is applied research, in your opinion -- and on the basis of what you do know -- what percentage of EAAFR0's research program do you consider to be of a fundamental nature and what percentage of an applied nature?

Now, do you think this _____ balance of fundamental and applied research is about right for EAAFR0 the way it is, or do you think it should be changed?

If about right, Why?

If it should be changed, Which way and Why?

The perception of how much applied research EAAFR0 is doing is used as a self-anchoring basis for opinions on what the balance of fundamental vs. applied research for EAAFR0 should be. Thus the measure of the number of national researchers who think EAAFR0's research should be more applied or more fundamental or is about right can be derived.

EAAFR0 provides several scientific services which theoretically are available to national researchers, and the following questions are asked about each of the following services: the East African Literature Service; the EAAFR0 Library (direct use and inter-library loan service); Chemical Analyses service; Statistical Advisory services; the East Africa Herbarium (plant identification service); the East African Plant Quarantine Service (plant imports and exports); the EAAFR0

Machinery Coordination service; and finally a number of Miscellaneous Reference Collections of such things as viruses, menatodes, etc. (identification service).

25. Now there are a number of services which EAAFRO offers, and I'm going to be asking you a few questions on each of them.

Have you ever used the _____ service?

If Yes, About how often or how regularly do you use it?

If Yes, How useful do you find this service: Do you find it of ...

A. Very Great Use
B. Much Use
C. Some Use
D. Little Use
E. No Use

"Why?"

If Yes or No, And finally, is there any other alternative source from where you do -- or could -- receive this service? Or haven't you needed it?

A total score from all of these services is used as the measure for the amount of the Scientific Services variable. The last part of this question was asked to identify alternative choice points for obtaining the same service as offered by EAAFRO, such as Makerere University for Ugandan Respondents.

The main question regarding personal, face-to-face contact transactions with EAAFRO researchers was the following:

25. Has anyone from EAAFRO visited you here, at this institute, in the past two years?

If Yes, Who were they? How many visits have they made? How long did they stay with you? Was this just a general visit on their part or was it for a specific scientific reason?

The two-year time span was chosen because it seemed a reasonable length of time to expect national researchers to be able to remember such visits. If, however, the Respondent had been doing research in East Africa for less than two years -- which was often the case, especially for the African Respondents -- the two-year qualification was dropped altogether. Also, if national researchers volunteered information about visits prior to the previous two years, this information was also recorded. The emphasis on the "visited you" sometimes had to be explained in terms of the criteria that general, look-around visits were to be included -- as well, of course, as the specific scientific visits to the national researcher -- if the EAAFRO visitor did call on them and did speak with them, for however short a time, but not if he didn't. The national researchers at Serere, Kawanda, Kitale, and Coast research stations -- where EAAFRO has decentralized divisions -- could not include those EAAFRO officers who were stationed there full-time, but all were reminded that visits from EAAFRO officers of the decentralized divisions did count as long as those officers were not from their own station.

The second part of this question was as follows:

Have you ever visited EAAFRO - Muguga?

If Yes, How many visits have you made? When were they and how long did you stay? Were these general visits, or did you see specific people about scientific matters? What specific people?

Originally, the two-year time span was also applied to this part of the question, but it was found in testing that most national researchers had been to Muguga so few times that they could remember the details of the visits very far back in time.

These were the main measures for Personal Contact Transactions, but a final part was added on to question No. 26 to find out in general how much face-to-face contact was supplied by scientific meetings, conferences, seminars, etc. not held at Muguga or at the Respondent's institute:

Have you met EAAFRO people at other conferences, seminars, meetings, etc.?

If Yes, What kind of meeting were they? Where and when were they held?

A measure of the effects of Official EAAFRO Liaison Agents was provided by the perceptions of appropriate national researchers to these men and their positions. The first part of question No. 27 refers to the Field Trials Officers and was thus asked only in Uganda and Tanzania:

27. Recently, EAAFRO has established a new position of Field Trials Officer in Uganda/Tanzania* to see that their cereals varieties are adequately field tested at the Variety Trial Centers. How do you regard this new position of the Field Trials Officer?

Would you say you regard it . . .

"Why?"

- A. Very Favorably
- B. Favorably
- C. Neutral
- D. Unfavorably
- E. Very Unfavorably

The emphasis was placed on the "position" to try and distinguish the liaison function from the person filling the position.

The questions concerning the Machinery Coordinator were more indirect. Information regarding this service had already been gained from question No. 25 regarding scientific services and so the following questions were really supplementary and even slightly repetitive:

Do you have any direct connection with agricultural or forestry machinery in your own scientific work?

If Yes, What kinds of machinery and in what way are you connected with it? Have you ever had important problems with this machinery in which you needed or could have used some advice or guidance? What kinds of problems were these?

Finally, have you ever come into contact with Mr. Dick Minto of EAAFRO?³⁵⁾

If Yes, Has he ever assisted you in any way with regard to machinery? Could you explain how he has assisted you and how useful his assistance was?

Unlike the recency of the position of Field Trials Officer, the Machinery Coordinator has been part of EAAFRO since 1962 when the High Commission was replaced by the Common Services Organization and the regional East African Machinery Testing Unit was broken up into separate national units. Much of the liaison and coordination which is included in this position, however, is done with regard to actual agricultural machinery utilization and not to national agricultural research stations -- i.e., for state-run farms and agricultural settlement schemes, plowing matches, etc. Therefore, rather than ask for opinions about the position of Machinery Coordinator, these questions sought to find out how much connection national agricultural research had with agricultural machinery and with Mr. Minto, the actual Machinery Coordinator.

Question No. 28 once again, includes the measures for several variables:

28. Now, would you please name as many EAAFRO research officers or administrators as you can? Let's see, you've already mentioned _____ . . .

Would you consider any of these people you mentioned to be personal friends as well as scientific colleagues? Which ones?

Did any of these people you mentioned go to school or college or university with you? Which ones?

These questions are directly related to the discussion of the functions of a scientific "Old Boys Network" in East Africa. Although the number of EAAFRO research officers or administrators a national researcher could name was undoubtedly influenced somewhat by his ability to remember names, almost all of the researchers interviewed uniformly complained about their inability to do this, and this quantitative measure is to be kept as one measure of the Knowledge of EAAFRO variable. The number of "friends" a national researcher has among EAAFRO Officers will provide the measure of the Inter-personal Relations variable, and the existence of common educational experiences with EAAFRO officers will be explored in the context of assessing the extent of an indigenous scientific "Old Boys Network" in East Africa.

³⁵⁾ Mr. Minto is EAAFRO Machinery Coordinator.

Information provided in response to this question is also to be used in a general discussion of the effects of the Racial Homogeneity variable on personal contacts and interpersonal relations with EAAFRO officers. All names were recorded, and no mention was made in the question of past or present staff, but only those officers recently or currently on EAAFRO's staff at that time were counted for the indicator measure. All national researchers were reminded that officers at EAAFRO's decentralized divisions were included in this question, and that even EAAFRO officers at the same station -- Serere, Kawanda, Kitale, and the Coast -- could be mentioned.

In the second part of this question, the definition of what was a "personal friend" was left up to the national researcher again. If he asked about it, he was told "friends" were those people who he considered to be personal friends according to his own feelings about them. In the last part of the question, the initial question was asked in terms of "school-mates," but in testing it was discovered that this usually referred only to secondary school and not to "university-mates" in the British system. Therefore, the wording above was used instead to avoid any confusion.

Question No. 29 is to be used as the indicator for the Publishing variable -- the final EAAFRO potential benefit considered:

29. Have you ever had any articles of your own published in the EAAFRO Agricultural and Forestry Journal?

If Yes, How many, and when were they published?

The official functions of the Specialist Committees which operate under EAAFRO in the process of project selection for EAAFRO have been described earlier. Information from question No. 30 is to be used in investigating the effectiveness of the Specialist Committee System:

30. Are you a member of any of the Specialist Committees which operate under EAAFRO, or have you attended any of their meetings?

If Yes, Which Committee or Committees?

For each committee, How many meetings have you attended, and where and when did they meet?

And finally, what is your opinion of the effectiveness of this Committee and its meetings? Would you say it was of...

In what ways was it effective, or ineffective, and why?

- A. Very Great Effectiveness
- B. Much Effectiveness
- C. Some Effectiveness
- D. Little Effectiveness
- E. No Effectiveness

This question departed a bit from the usual format of the five-level answers in that criteria for judging "effectiveness" were deliberately left vague until the

answer level had been chosen, and then the Respondent was asked to identify his own criteria -- "in what ways" -- and explain why. If the Respondent did not mention the project selection for EAAFRO criterion at all, but instead referred to other criteria such as a good means of communication, getting to know people in the same field, etc., then it was assumed that this Committee was not performing this decision-making function. If this criterion was mentioned, however -- singly or in combination with others -- then the perceived level of effectiveness of the particular Specialist Committee could be one measure for the Effectiveness of the Specialist Committee system.

EAAFRO, however, is only one institution -- a small part -- of the total East African Community. The responses to question No. 31 are to be used as the measure for the national researcher's general reaction/response opinions toward the EAC:

- | | |
|--|---------------------|
| 31. What is your reaction to the | A. Very Favorable |
| East African Community <u>in general</u> ? | B. Favorable |
| Would you say that your reaction | C. Neutral |
| is . . . | D. Unfavorable |
| "Why?" | E. Very Unfavorable |

Sometimes the emphasis on the "East African Community in general" had to be repeated if the national research indicated he was only thinking of EAAFRO or of the EAC's other scientific institutions.

Question No. 32 referred to no specific variable but instead tried to elicit any pertinent information that somehow hadn't come out yet:

32. Are there any specific improvements that you can think of which could be made either at the regional EAAFRO level, or at the national level, in all or any of the Partner States, which would improve relationships in agricultural and forestry research between the two levels?

Often the answers to this question repeated points made earlier, but new facets of these points did emerge and sometimes brand new ideas were mentioned.

The remaining interview questions were not directly related to this study, but will be dealt with in other papers by this author. These questions were as follows:

33. Now do you think external scientific or technical aid -- not foreign aid in general, just the technical aid -- has affected science and research here in East Africa, or in Kenya/Uganda/Tanzania,* or in developing countries in general? I'm not so much concerned with the amount here, or that it's been responsible for establishing most of these institutions in East Africa -- I'm more concerned about the strategy behind the aid -- the way it's been given, the way it's been applied, the way it's been used, that sort of thing. What are some of the good and bad points about this aid that you can think of?

34. What do you understand to meant by the term "science policy?" Not what a science policy should be, but just what is this animal? What does it include or encompass?

Now at the moment there really aren't national science policies in any of the Partner States -- although efforts are being made in this direction -- and likewise there certainly isn't a regional science policy for the East African Community. But if these policies were to develop and come into existence, what do you think the relationships should be between a regional policy for the Community on the one hand, and the national policies for the Partner States on the other? How should they work together? How should they fit together?

35. As a scientist, what role do you think scientists should play in the formulation of a science policy, as opposed -- say -- to the role of a planner, statistician, politician, economist, sociologist, and so forth? And why?

Closing remarks of the interview attempted to thank the national researcher and to keep him interested in the project, both in case it was necessary to talk to him again about this study or for any other reason, and to leave him with a positive feeling to mention the experience to some national colleagues who had not yet been interviewed:

That's it -- we're all done. Thank you very much for your time -- I just hope the final output of this study will have been worth all of the time you and your colleagues are giving me.

In case you are interested in the final report, I will be sending a copy to Mr./Dr. (Officer-in-Charge) for your library here -- as well as to the ministry -- so you will be able to see how it all comes out if you wish.

Thank you again -- and Good Day.

In summing up this chapter, Table VI.2 below will list the proposition numbers as expressed in this chapter, the Variables involved in each chapter, the Indicators to be used in Measuring the specific variables, and the number of the question in the national interview from which the information for the indicator measure is derived.

Table VI.2 - Summary of Propositions, Variables, Indicator Measures, and Instrument Items

Proposition Number	Name's and Status of Variables	Indicator Measures	National Interview Question Number
1.	Dependent Variable:		
	- General Opinion toward EAAFRO	a) Direct question of favorable-unfavorable reaction b) Agreement with regionality statement	11 13
	Independent Variables:		
	- Research Results Utilized Benefit	a) Direct question to that effect	19
	- Scientific Services Utilized Benefit	a) Direct question to that effect for eight scientific services and a composite ranking of utilization scores	25
	- Existence of Experimental Collaboration benefit	a) Direct question to that effect	18
	- Existence of Institution Building Benefit	a) Direct question to that effect	16
	- Interpersonal-Relations Benefit	a) Number of EAAFRO officer "friends"	28
	- Publishing Benefit	a) Number of articles published in Journal	29
	Parameters:		
- External Scientific aid	a) Content analysis of Respondent discussions	19,25,18,16	
2.	Dependent Variables:		
	- General Opinion toward EAAFRO	See Above	See Above
	Independent Variable:		
	- General Opinion toward EAC	a) Direct question of favorable-unfavorable reaction	32

Proposition Number	Names and Status of Variables	Indicator Measures	National Interview Question Number
3.	Dependent Variable: - General Opinion toward EAAFRO	See Above	See above
	Independent Variable: - Opinions of Relevant National Groups	a) Clustering of East African citizens by nationality	4
4.	Dependent Variable: - General Opinion toward EAAFRO	See Above	See above
	Independent Variable: - Proximity	a) Geographic distance of national station from EAAFRO headquarters	1
5.	Dependent Variable: - General Opinion toward EAAFRO	See Above	See above
	Independent Variable: - Knowledge of EAAFRO	a) Perceived Knowledge - direct question to that effect b) Objective Knowledge - number of EAAFRO officers known	12 28
6.	Dependent Variable: - General Opinion toward EAAFRO	See Above	See above
	Independent Variable: - Racial Homogeneity	a) Observed race of national researcher	4
7.	Dependent Variable: - General Opinion toward EAAFRO	See Above	See above
	Independent Variable: - Personal Contact Transactions	a) Number of EAAFRO visits to national researcher and number of national researcher visits to EAAFRO	26

Proposition Number	Names and Status of Variables	Indicator Measures	National Interview Question Number
8.	Dependent Variable: - General Opinion toward EAAFRO	See Above	See above
	Independent Variable: - Scientific Complementarity with EAAFRO	a) Content analysis of national researchers' work compared with that of EAAFRO	9
9.	Dependent Variables: - Research Results Utilized	See Above	See above
	- Scientific Services Utilized	See Above	See above
	Independent Variables: - Perceived Relevance of EAAFRO's Projects & Services	a) Direct question to that effect	20
	- Perceived Competence of EAAFRO's Scientific work	a) Direct question to that effect	21
	- Perceived Success of EAAFRO's Transfer Effort	a) Direct question to that effect	22
10.	Dependent Variables: - Research Results Utilized	See Above	See above
	- Scientific Services Utilized	See Above	See above
	Independent Variables: - Extent of Experienced at National Station	a) Direct question to that effect	6
	- Scientific Complementarity with EAAFRO	See Above	See above
11.	Dependent Variables: - Research Results Utilized	See Above	See above
	- Scientific Services Utilized	See Above	see above
	Independent Variable: - Critical Size of National Institute	a) Number of man-years of research experience at the national institute	6

Proposition Number	Name and Status of Variables	Indicator Measures	National Inter- view Question Number
12.	Inter-Related Variables: - Perceived Relevance of EAAFRO's Projects of Services - Perceived Applied Nature of EAAFRO's Scientific Work	See Above a) Direct question to that effect based on self- anchored perception	See above 24
13.	Dependent Variable: - Perceived Success of EAAFRO's Transfer Efforts Independent Variables: - Proximity - Personal Contact Transactions	See Above See Above See Above	See above See above see above

Chapter VII

The National View of EAFRO;
Results from the National Interview

In this chapter, the results of the interviews with national researchers as outlined in the preceding chapter will be presented in tabular form and discussed. Insofar as it is possible, interpretations of this raw data as it relates to propositions or variables identified also in the preceding chapter will be attempted, but the statistical analysis will be covered in the subsequent -- and final -- chapter of this study.

The following national researchers were interviewed as part of this study:

<u>Name</u>	<u>Institute</u>	<u>Country</u>
Hamed, A. S.	Western Research & Training Institute, Ukiriguru	Tanzania
Mwasyoge, A. A.	"	"
Walton, I.	"	"
Langham, R.	"	"
Onwubuya, N.	"	"
Jackson, A.	"	"
Barantanda, J.	"	"
Ebbels, D.	"	"
Stiven, G. A.	"	"
Nikolov, N.	"	"
Samki, J.	"	"
Dave, M.	"	"
Lee, B.	"	"
Percy, H.	"	"
Sharma, R. D.	"	"
Newell, C.	Central Research & Training Institute, Ilonga	"
Manyafu, J. L.	"	"
Kirkby, R. A.	"	"
Finlay, R. C.	"	"
Hepworthy, H.	"	"
Oommen, D. K.	"	"
Tapola, R.	"	"
Vieweg, B.	KATRIN*	"

* Kilombero Agricultural Training and Research Institute, Ifakara

<u>Name</u>	<u>Institute</u>	<u>Country</u>
Wilms, W.	KATRIN*	Tanzania
Ringo, D. F. P.	"	"
Birk, A.	"	"
Masseri, Z. T.	Research & Training Institute, Mlingano	"
Robinson, P.	"	"
Gyurk, S.	"	"
Nandra, S. S.	"	"
Dancho, E.	"	"
Chande, S. B.	Research & Training Institute, Lyamungu	"
Sharma, Y. K.	"	"
Dargie, G.	"	"
Eid, S. A.	"	"
El-Gindy, M.	"	"
O'Connor, M. J.	"	"
Davis, W. E. P.	"	"
Semuguruka, G.	"	"
Mosha, A. S.	"	"
Bujulu, J.	"	"
McFadden, D.	"	"
Pfefferle, M.	"	"
Kalisti, B. A.	"	"
Nyonyi, J.	"	"
Bitarakwafe, A. L. M.	Nakawa Forest Station, Kampala	Uganda
Mabonga-Mwisaka, J.	"	"
Oloya, M.	"	"
Karani, P. K.	Forestry Department, Entebbe	"
White, R. G.	Kawanda Agricultural Research Station	"
Mafulira, T.	"	"
Mulindwa, D.	"	"
Mwaka, A.	"	"

* Kilombero Agricultural Training and Research Institute, Ifakara

<u>Name</u>	<u>Institute</u>	<u>Country</u>
Sangooba, T. N.	Kawanda Agricultural Research Station	Uganda
Kavuma, J. B. K.	"	"
Mwoga, V. N.	"	"
Byaruhanga, E. K.	"	"
Flores, G.	"	"
McNutt, D. N.	"	"
Kyeyune-Sendagi, A. L.	"	"
Rubaihayo, E. B.	"	"
Mukasa, S. K.	"	"
Foster, H. L.	"	"
Nyaira, Z. M.	"	"
Matovu, S.	"	"
Kibirige-Sebunya, I.	"	"
Machado, V.	"	"
Gridley, H. E.	Namulonge Agricultural Research Station*	"
Thorp, T. K.	"	"
Reed, W.	"	"
Innes, N. L.	"	"
Brown, S. J.	"	"
Tollervey, F. E.	"	"
Arnold, M. H.	"	"
Jones, E.	"	"
Fielding, J.	Serere Agricultural Research Station	"
White, P.	"	"
Fonesca, E.	"	"
Ogwang, J.	"	"
Bayunirwe-Butsya, E.	"	"
Koma-Alimo, F. X.	"	"
Davis, J. C.	"	"
Jones, G. B.	"	"

* Formerly the Namulonge Cotton Research Station of the Cotton Research Corporation. It was handed over to the Uganda Government in January, 1972.

<u>Name</u>	<u>Institute</u>	<u>Country</u>
Beraho, E. K.	Serere Agricultural Research Station	Uganda
Wanjala, S. M.	"	"
Hirji, N. H.	"	"
Laboke, E.	"	"
McWalter, A. R.	"	"
Otim, J.	"	"
Wanyeki, F. H. N.	Forest Department, Muguga	Kenya
Sang, F. K. A.	"	"
DePauw, R.	Plant Breeding Station, Njoro	"
Patel, V. P.	"	"
Owino, M. G.	"	"
Ongoma, G. B.	"	"
McMillan, A. D.	"	"
Poulson, K. K.	"	"
Cormack, M. W.	"	"
Helgason, S. B.	"	"
Goldson, J. R.	Coast Agricultural Research Station, Mtwapa	"
Adenya, H. L.	"	"
Seif, A. A.	"	"
Warui, C. M.	Mombasa Port Authority	"
Ottaro, W. G.	Pyrethrum Research Station, Molo	"
Mwakha, E.	"	"
Mbagaya, G. A.	Nyanza Agricultural Research Station, Kisii	"
Bungey, C. K.	National Sugar Station, Kibps	"
Obura, S. B.	"	"
Ouma, E. H. O.	"	"
Early, M. P.	"	"
Makafiani, J. B. S.	Western Agricultural Research Station, Kakamega	"
Pedersen, A.	"	"
Larkin, P.	National Agricultural Research Station, Kitale	"
Chabeda, A. E. O.	"	"

<u>Name</u>	<u>Institute</u>	<u>Country</u>
Boonman, J. G.	National Agricultural Research Station, Kitale	Kenya
Adalla, J. J.	"	"
Odhiambo, J. F.	"	"
Awili-Jandara, S. W.	"	"
Omolo, E.	"	"
Allan, A. Y.	"	"
Keya, N. C. O.	"	"
Cooper, P.	"	"
Nyamu, N. K.	"	"
Sheldrick, R. D.	"	"
Muigai, P. M.	"	"
Maroa, S. M.	"	"
Munyua, J. K.	"	"
Ogada, F.	"	"
Edwards, G. H.	"	"
Thairu, D. M.	"	"
Shamala, M.	National Agricultural Laboratories, Nairobi	"
Waihenya, W.	"	"
Muturi, S. N.	"	"
Gachoka, J. F.	"	"
Oloo, G. W.	"	"
Harris, D.	"	"
Muthigani, P.	"	"
Nyandat, N. N.	"	"
Wambugu, W.	"	"
Ondieki, J. J.	"	"
Robinson, R. A.	"	"
Kori, J.	"	"
Michieka	"	"
Bakker, W.	"	"
Robertson, D. G.	"	"

<u>Name</u>	<u>Institute</u>	<u>Country</u>
Shah, L. P.	National Agricultural Laboratories, Nairobi	Kenya
Ramos, A. H.	"	"
Muriru, N.	"	"
Njuguna, S. K.	"	"
Rens, G. R.	"	"
Hinga, G.	"	"
Brown, K. J.	"	"
Likimani, P. E.	"	"
Njeroge, I.	"	"
Rubui, A. M.	Embu Agricultural Research Station, Embu	"
Njeru, N.	"	"
Makau, B.	National Horticultural Research Station, Thika	"
Waithaka, J. H. G.	"	"
Warui, J. N.	"	"
Maganjo, M.	"	"
Gachanja, S. P.	"	"
Gathungu, C. N.	"	"
Shalitin, G.	"	"
Ballestrem, G.	"	"

It is estimated that approximately 74% of all the national researchers in East Africa in early 1972 were, in fact, interviewed - 70% of those in Kenya, 88% of those in Uganda, and 71% of those in Tanzania - see Table VII.1 below.

Table VII.1 - National Interviews in East Africa

	<u>Number of National Researchers Interviewed</u>	<u>Total Number of National Researchers in Late 1972</u>	<u>Percentage of Total Interviewed</u>
Kenya	75	107	70%
Uganda	44	50	88%
Tanzania	46	63	71%
East Africa	165	220	74%

With one exception, the national researchers not interviewed were missed for totally random reasons and so their absence should not interject any systematic bias into these results. Researchers in all three Partner States -- both African and European -- were missed because they were gone when this author arrived to do the interviewing or because it turned out to be unfeasible due to time and resource constraints to get to the last single research station. In this latter respect, Uganda proved to be easier than either Tanzania or Kenya because almost all its researchers were concentrated in three or four stations; Kenya had by far the largest number of researchers in its national system, with many of them concentrated in the main stations but also some widely scattered at different small testing stations; Tanzania proved to be difficult not only because of the widespread locations at greater distances with relatively poor roads in between, but also because of the lack of organization evident at several national stations. In addition, permission to conduct this research was not granted by the Tanzanian Forest Department, and so the responses of that entire segment of national researchers could not be included. Nevertheless, it is felt that the 165 extensive interviews conducted form an accurate and comprehensive picture of the national relationships in all three Partner States with EAAFRO.

Lists of the researchers in the total national agricultural and forestry research systems were obtained from national ministry officials once their interest and cooperation was gained. From these lists and on-the-scene information from the individual stations, a breakdown of those national researchers not interviewed is also possible:

Tanzania:

Mlingano	5 out of 7 interviewed
Ilonga	7 out of 10 interviewed
Katrin	4 out of 6 interviewed
Lyamungu	14 out of 15 interviewed
Ukiriguru	15 out of 16 interviewed
Mtwara	0 out of 6 interviewed
Mbeya	0 out of 3 interviewed
	45 out of 63 interviewed = 71%

Uganda:

Forestry Department	4 out of 5 interviewed
Namulonge	8 out of 8 interviewed
Kawanda	18 out of 23 interviewed
Serere	14 out of 14 interviewed
	44 out of 50 interviewed = 88%

Kenya:

Forestry Department	2 out of 4 interviewed
Njoro	8 out of 12 interviewed
Mtwapa	3 out of 4 interviewed
Mombasa (Port Authority)	1 out of 2 interviewed
Molo	2 out of 3 interviewed
Kisii	1 out of 1 interviewed
Kibos	4 out of 4 interviewed
Kakamega	2 out of 2 interviewed
Kitale	18 out of 21 interviewed
NAL	24 out of 39 interviewed
Embu	2 out of 2 interviewed
Katamani	0 out of 2 interviewed
Ol Joro Orok	0 out of 1 interviewed
Thika	<u>8</u> out of <u>10</u> interviewed

75 out of 107 interviewed = 70%

In the case of Tanzania, both Mtwara and Mbeya stations are located in the extreme southern portion of the country near the border of Portuguese Mozambique where a war of liberation was being pursued. Mtwara was located in a restricted area and permission was not granted to travel there, and it was strongly advised that Mbeya should also be avoided although it was considered safe. In Kenya, two of the smallest stations - Katamani and Ol Joro Orok - were missed because of time constraints, and a relatively low percentage of the researchers at Kenya's National Agricultural Laboratories were not interviewed for the same reason.

The approximate straight-line distances of these national stations from EAAAFRO headquarters at Muguga were measured and computed as follows:

Tanzania:

Ukiriguru	430 kilometers
Ilonga	630 kilometers
KATRIN	780 kilometers
Mlingano	520 kilometers
Lyamungu	250 kilometers

Uganda:

Forestry Department (Kampala)	480 kilometers
Namulonge	480 kilometers
Kawanda (Kampala)	480 kilometers
Sereré	460 kilometers

Kenya:

Forestry Department (Muguga)	2 kilometers
Njoro	120 kilometers
Coast (Mtwapa)	460 kilometers
Mombasa (Port Authority)	460 kilometers
Melo	140 kilometers
Kisii	210 kilometers
Kibos	280 kilometers
Kakamega	260 kilometers
Kitale	310 kilometers
NAL (Nairobi)	25 kilometers
Embu	130 kilometers
Thika	60 kilometers

For ranking the proximity variable, distance intervals of 150 kilometers are used in Table VII.2 below. The locations of these national institutes are

Table VII.2 - Proximity of National Researchers to EAAFRO

Number of National Researchers From -	Distance From EAAFRO (kilometers)					Total
	0-150	151-300	301-450	451-600	>600	
Kenya	46	7	18	4	--	75
Uganda	--	--	--	44	--	44
Tanzania	--	14	16	5	11	46
TOTAL	46	21	34	53	11	165

shown in Figure VII.1 on the following page.

The results of the citizenship variable for national researchers are shown below in Table VII.3. Two-thirds of Kenya's national researcher respondents were indigenous citizens as compared to only slightly over one-half for Uganda and slightly over one-third for Tanzania. In Tanzania and Kenya, these different situations seemed to be the result of conscious decisions made at the national policy level. Tanzania seemed to feel that it was more important to Africanize the administrative and decision-making positions in the government than the scientific research positions, and so capable indigenous researchers were frequently promoted to these administrative positions. In Kenya, the indigenous researchers were left in those scientific positions and the Africanization of other positions had to depend on some other source of trained manpower. In Uganda, there did not seem to be any conscious policy pattern in action on this point.

Figure VII.1-Locations of National Agricultural and Forestry Research
Institutions Visited in East Africa

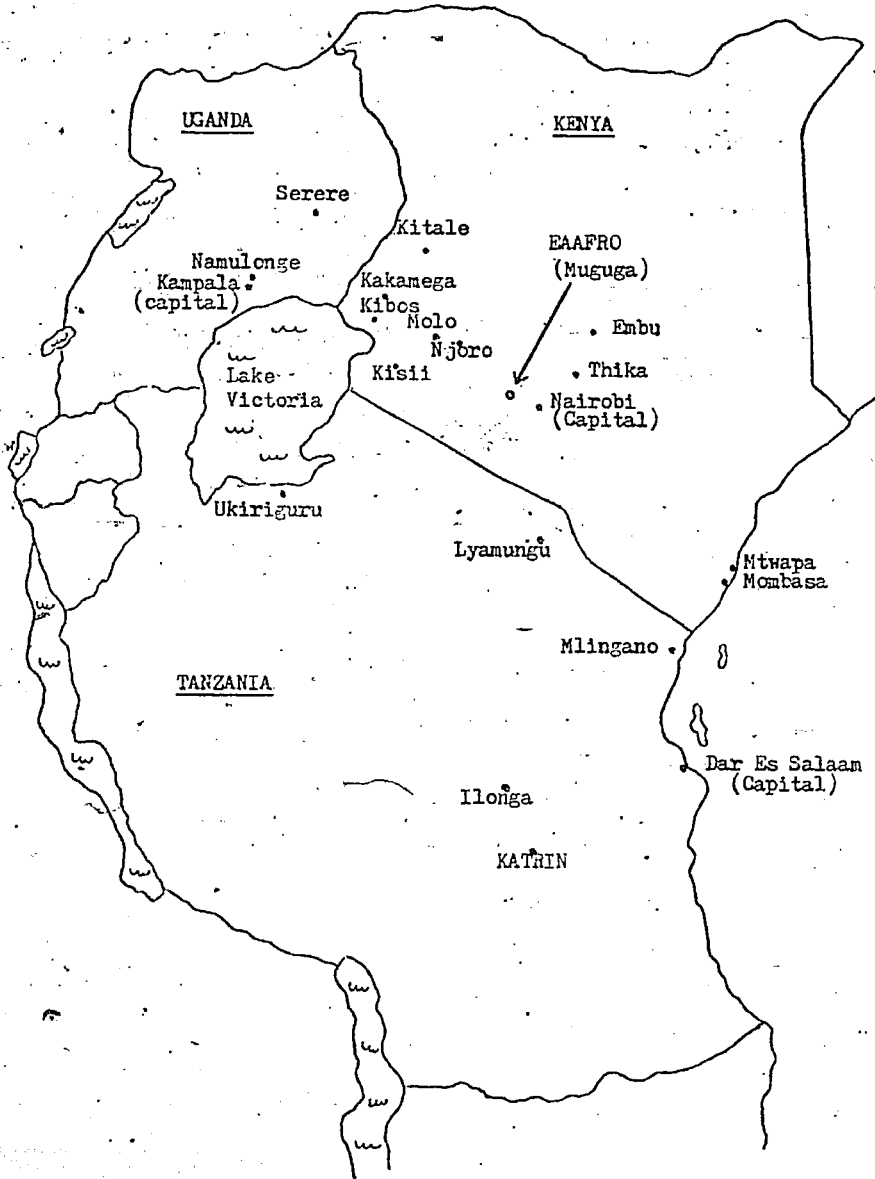


Table VII-3 - Citizenship of National Researchers in East Africa

No. of National Researchers from -	Citizenship									TOTAL
	Indigenous			Foreign						
	Ken.	Uga.	Tanz.	UK	Can.	India	West Ger.	Others	Total Foreign	
Kenya	50			12	4	1	2	6	25	75
Uganda		25		18			1		19	44
Tanzania			13	13	7	3	3	7	33	46
TOTAL	50	25	13	43	11	4	6	13	77	165

Most of the foreign researchers came from the UK, which reflects the pervasive influence of the ex-colonial ruler that is evident in many developing countries. But while Tanzania and Kenya have broadened their foreign sources to include researchers from places like Canada, West Germany, or India, Uganda still seems to rely almost entirely on British manpower in this area. The different nationalities represented in the category of Other Foreigners in Table VII.3 also reflect the different ideological and economic ways in which Tanzania and Kenya are trying to develop their societies: Tanzania has obtained other foreign researchers from Bulgaria, Hungary, the United Arab Republic, Yugoslavia, and Finland; Kenya has obtained other foreign researchers from the U.S.A., Denmark, the Netherlands, and Israel. There was only one U.S. citizen interviewed at the national level, which is perhaps reflective of the regional oriented aid policy of the U.S.A. referred to earlier.

Of the 43 British citizens working as national-level researchers in East Africa, 21 are employees of the Cotton Research Corporation (CRC)-- a private research organization for the cotton industry. Fifteen other British citizens are fully or partially supported by the British government under ODA or OSAS aid schemes.¹⁾ The 11 researchers from Canada were all part of a wheat project

1)

The Overseas Development Administration (ODA) aid scheme paid the entire salaries of the researcher, while the Overseas Aid Scheme (OSAS) only "topped off" the base salary paid by the East African government. Only CRC or other private British citizens were stationed in Tanzania -- all British government aid had been rejected by Tanzania following Britain's decision to sell arms to South Africa.

fully supported by CIDA, and six researchers were involved in volunteer schemes which cost the East African country little or nothing.²⁾ Although the few researchers from other foreign developed countries were supported to a large extent by their own governments, the researchers from India, Nigeria, the UAR, Bulgaria, etc. were paid entirely by the East African government in which they worked.

The racial composition of the national research officer work force in East Africa, shown below in Table VII.4 reflects the citizenship pattern with slight deviations due to the ambiguous position of many Asians (i.e., Indian nationals). Some of the Asians had become citizens of the East African country

Table VII.4 - Race of National Researchers in East Africa

Number of National Researchers From	Race				
	African	Asian	European	Arab	Total
Kenya	49	5	21	--	75
Uganda	24	4	16	--	44
Tanzania	<u>14</u>	<u>4</u>	<u>26</u>	<u>2</u>	<u>46</u>
TOTAL	87	13	63	2	165

in which they were residing, but others had retained their British passports. All of the British European researchers were expatriates of relatively recent arrival in East Africa rather than second or third generation settlers who also might have opted for East African citizenship.

There were four female research officers out of the 165 interviewed in these national research systems - three African female officers in Uganda and one Asian female officer in Kenya. This disproportionately low number of females is probably reflective of the greater educational opportunities that males have had in a situation where the capacity of the educational system at the secondary and university levels was sharply limited. The numbers are too small to predict any trend, but the fact that three of the four females came from and worked in Uganda where education was traditionally the strongest is probably not accidental.

2)

CIDA is the Canadian International Development Agency. The four volunteer schemes were as follows: Britains Voluntary Service Overseas (VSO); Canada's University Service Overseas (CUSO); the U.S. Peace Corps; and a volunteer program from Finland.

One way of measuring the quality of the national research systems in East Africa is by the highest academic degrees their officers have -- shown below in Table VII.5. The vast majority of the national researchers interviewed fall into the MSc/PGD* or BSc categories in all three Partner States. In Tanzania, there is also the tendency to have some research officers with only agricultural diplomas or even no degree at all. This seems to have occurred in situations where there was a crucial qualified manpower shortage and field officers with long experience in research were available.

Table VII.5 - Degree Qualifications of National Researchers in East Africa

Number of National Researchers From,-	Highest Degree Achieved					Total
	Ph.D.	MSc/PGD*	BSc	Diploma	None	
Kenya	8	41	24	2	--	75
Uganda	5	22	17	--	--	44
Tanzania	6	19	12	6	3	46
TOTAL	19	82	53	8	3	165

*Post Graduate Diploma

The educational background of citizens of East Africa is shown below in Table VII.6, including the universities of foreign countries in which academic degrees were obtained. In terms of total numbers of degrees, two patterns stand out: 1) the relatively low number of citizen researcher degrees in Tanzania and relatively high number in Kenya; and 2) the absence of any citizen researcher Ph.D. degrees in all the national research systems. The first pattern is once again reflective of the national policies toward Africanization and scientific manpower noted earlier, and the second is most probably the result again of a conscious decision by national governments to forego the greater training and qualifications of a Ph.D. for the immediate presence of an adequately trained MSc. Several national researchers noted -- some with bitterness -- that government policy was to educate indigenous researchers only to the MSc level. It seemed to be the feeling that Ph.D. training was only necessary for fundamental or academic research which the countries did not want anyway.

Table VII.6 - Educational Background of National Researchers Who Are
East African Citizens

University of Foreign Country from Which Degree was Obtained	Kenya Citizens					Uganda Citizens					Tanzania Citizens					To- tal
	PhD	MSc/ PGD	BSc	Dip	To- tal	PhD	MSc/ PGD	BSc	Dip	To- tal	PhD	MSc/ PGD	BSc	Dip	To- tal	
Makerere University	-	2	19	-	21	-	2	16	-	18	-	-	3	-	3	42
University of Nairobi	-	-	3	-	3						-	-	1	-	1	4
Canada	-	3	1	-	4						-	1	-	-	1	5
U. K.	-	5	1	-	6	-	6	3	-	9	-	1	-	-	1	16
Czechoslovakia	-	1	-	-	1						-	1	-	-	1	2
U.S.S.R. 3)	-	8	-	-	8											8
Australia	-	2	-	-	2											2
U.S.A.	-	6	9	-	15	-	6	3	-	9						24
India	-	-	3	-	3	-	-	4	-	4	-	1	-	-	1	8
New Zealand	-	1	1	-	2						-	-	1	-	1	3
Yugoslavia	-	1	-	-	1											1
Ethiopia	-	-	1	-	1						-	-	1	-	1	2
East Germany	-	1	1	-	2											2
Israel	-	-	-	1	1											1
Bulgaria	-	-	1	-	1											1
U.A.R.						-	-	1	-	1						1
Pakistan											-	-	1	-	1	1
Netherlands											-	-	-	1	1	1
Totals	0	30	40	1	71	0	14	27	0	41	0	4	7	1	12	124

3) Degrees from the U.S.S.R and Eastern European countries are the equivalent of the Western degrees listed in this table.

In referring to the sources of the education for citizen national researchers, Makerere University is once again the dominant indigenous institution for all three Partner States, as would be expected from its past history. For foreign sources of education, Kenya seems to have followed the most active and widespread policy of getting its citizens trained abroad. The U.S.A. was the most utilized foreign country, but many socialist countries as well as the U.K., Canada, etc. also educated Kenya researchers. In the case of Uganda, a sizable number of citizen researchers were educated abroad, but almost all in either the U.K. or the U.S.A. In Tanzania, there were only a few citizen researchers educated abroad, and not more than one in any single country. One perhaps surprising observation is that the U.K. did not dominate the foreign sources of scientific education as one might have thought the ex-colonial ruler would.

Another indicator of the quality of these national scientific research systems in East Africa is the total research experience which the researchers have had - see Table VII.7 below. The results shown in Table VII.7 for Tanzania

Table VII.7 - Total Research Experience of National Researchers in East Africa

Number of National Researchers From -	Total Experience in Years					Total
	1	1-2	3-5	6-10	10	
Kenya	14	9	16	24	12	75
Uganda	3	7	13	11	10	44
Tanzania	<u>2</u>	<u>11</u>	<u>5</u>	<u>11</u>	<u>17</u>	<u>46</u>
TOTAL	19	27	34	46	39	165

are somewhat misleading, however, in that their relatively large number of researchers with greater than 10 years of experience is partly composed of field officers who have been acting as research officers because of their long experience and the shortage of trained manpower, and partly of foreign Cotton Research Corporation and Canadian Wheat Team researchers. In fact, in all three Partner States the researchers with the most experience tend to be foreign ex-patriates because indigenous citizens have been really encouraged in this direction only since independence.

Another indicator to be considered is the research experience at the national institute where the researcher was located -- see Table VII.8 below. This indicator shows far less research experience due mainly to the impact of foreign;

Table VII.8 - Research Experience at the National Institute Where Located

Number of National Researchers from -	Experience at National Institute in Years					Total
	< 1	1-2	3-5	6-10	>10	
Kenya	23	21	15	15	1	75
Uganda	4	14	12	11	3	44
Tanzania	<u>11</u>	<u>22</u>	<u>9</u>	<u>2</u>	<u>2</u>	<u>46</u>
TOTAL	38	57	36	28	6	165

ex-patriates whose total research experience is relatively high, but whose turnover in East Africa is quite rapid compared to indigenous citizens whose home is there. Uganda, however, seems to stand out with the relatively high proportion of its researchers with more than three years of experience at their national station and the relatively low proportion with less than one year of experience. This may be due to two factors: 1) the effect of Makerere University in producing greater numbers of indigenous Ugandan researchers at an earlier point in time; and 2) the fact that there are only three national agricultural research stations in Uganda so that transfers among them might be less than in Kenya or Tanzania.

The critical size of a national institute was to be a measure of that institute's capacity to utilize the research and service outputs of EAAFR0, and the indicator for that variable was to be the number of man-years of research experience at a particular institute. Since some research officers were missed at some of the national stations, they were taken into account by assigning them the average experience at that institute of those officers who were interviewed. The approximate total and average scores are shown below in Table VII.9. Outside of two exceptions which had to be handled differently, the institutes were ranked for critical size according to this indicator as shown. The two exceptions were Lyamungu in Tanzania, which had an artificially high score due to the presence of field officers with long years of experience at Lyamungu but who were actually not researchers; and

Table VII.9 - Critical Size of National Research Institutes in East Africa

National Institute	Approximate Total Man-Years Experience	Average Experience	Rank Classification
NAL (Kenya)	123	4.18	1
Kawanda (Uganda)	114	4.95	1
Kitale (Kenya)	67	3.18	2
Namulonge (Uganda)	46	5.75	2
Serere (Uganda)	38	2.72	2
Uganda Forest Dept. (Uganda)	32	6.5	3
Ukiriguru (Tanzania)	31	1.96	3
Thika (Kenya)	31	3.21	3
Njoro (Kenya)	31	2.45	3
Kenya Forest Dept.*	4	0.87	3
Milingano (Tanzania)	19	2.8	4
Ilonga (Tanzania)	14	1.36	4
Mtwapa (Kenya)	13	3.16	4
KATRIN (Tanzania)	10	1.62	4
Molo (Kenya)	7	2.12	4
Lyamungu (Tanzania)*	61.75	4.41	4
Kibos (Kenya)	6	1.37	4
Kakamega (Kenya)	5	2.25	5
Embu (Kenya)	2	1	5
Kisii (Kenya)	1	1.25	5
Mombasa (Kenya)	1	1	5

* See explanation in discussion for these cases.

the Kenya Forest Department which had a higher total number of man-years experience than would have been indicated by the averaging score. In looking at Table VII.9, one should note that only one Tanzanian institute -- Ukiriguru -- falls into the top three classifications, while all four of Uganda's do and all of Kenya's principal stations do. On the other hand, only Kenya has a number of those very small testing stations that fall into the lowest classification.

Information gained from the national researchers' descriptions of their own work was used to rank how much EAAFRO's work complemented their own. Work on the same agricultural product -- e.g., maize -- and, to a lesser degree, in the same functional area -- e.g., plant breeding -- were utilized as indicators of complementarity, and on this basis all of the national researchers interviewed were categorized in terms of High, Medium, or Low Scientific Complementarity with EAAFRO. The results are shown below in Table VII.10. The relatively high number of researchers in all three Partner States in the Low

Table VII.10 - The Scientific Complementarity of National Researchers to the Work of EAAFRO

Number of National Researchers from -	Scientific Complementarity			Total
	High	Medium	Low	
Kenya	24	18	33	75
Uganda	11	10	23	44
Tanzania	8	11	27	46
TOTAL	43	39	83	165

Category can perhaps be explained by the fact that large numbers of national researchers are working on cotton, wheat, sesame, potatoes, horticultural crops, etc. -- crops that are basically not dealt with by EAAFRO. In these cases, there seems to be a complete division of labor along agricultural product lines, rather than the functional division described earlier where EAAFRO does the more fundamental research and the Partner States do the more applied. Only in the cases of maize, sugar cane, and some disease aspects of legumes do active, complementary EAAFRO and national research programs exist.

The fields that the national researchers interviewed were engaged in are listed below in Table VII.11. The total number here does not necessarily correspond to the total number of national researchers interviewed because administrators are left out of this list and some researchers were engaged in more than one research field.

Table VII.11 - Research Fields of National Researchers in East Africa

Kenya	Uganda	Tanzania
14 pastures - breeding	10 cotton - breeding	12 cotton - agronomy
- agronomy	- soil fertility	- breeding
- fodder crops	- entomology	- soil fertility
- systems	- agronomy	- entomology
- physiology	- physiology	- fibre quality
10 potatoes - breeding	5 sesame - breeding	6 wheat - breeding
- pathology	- agronomy	- agronomy
- agronomy	- entomology	- soil fertility
- soil fertility	- soil fertility	4 maize - breeding
9 maize - breeding	5 legumes - breeding	- soil fertility
- physiology	- entomology	- agronomy
- agronomy	4 coffee - breeding	4 legumes - breeding
- soil fertility	- pathology	- agronomy
6 wheat - breeding	- entomology	- pathology
- agronomy	- agronomy	2 rice - agronomy
- pathology	4 forestry - breeding	- soil fertility
5 citrus - agronomy	- utilization	2 coconuts - breeding
- soil fertility	- entomology	- soil fertility
5 sugar cane - breeding	4 soil fertility (general)	2 horticultural crops-trials
- pathology	2 cocoa - agronomy	2 soil fertility (in general)
- entomology	- pathology	2 stored products - entomology
- agronomy	2 maize - breeding	2 agricultural economics
5 horticultural crops (general)	2 pastures (general)	1 pastures (general)
3 legumes - agronomy	1 bananas - soil fertility	1 citrus (general)
- entomology	1 sugar cane - breeding	1 coffee (general)
3 macademia nuts (general)	1 groundnuts - breeding	
3 pyrethrum - breeding	1 livestock - breeding	
- pathology	1 stored products - entomology	
- agronomy	1 statistics	
2 cashews (general)		
2 soil surveys (general)		
2 cotton - breeding		
- entomology		

Table VII.11 - Research Fields of National Researchers in East Africa (continued)

Kenya	Uganda	Tanzania
2 forestry - breeding		
- pathology		
2 stored products - entomology		
2 oil seeds - agronomy		
2 non-citrus fruits (general)		
1 sunflower - breeding		
1 rice - entomology		
1 soil fertility (general)		

The distributions of the general opinions toward EAAFRRO which national researchers gave in response to question 11 -- the principal dependent variable -- are shown below in Table VII.12. Generally favorable to neutral opinions toward EAAFRRO are shown, with generally similar patterns in all Partner States. Since the opinions of national researchers who are citizens of East Africa may be much more important to the future of EAAFRRO and the East African Community than the opinions of expatriates, the response patterns for these two groups are distinguished in Table VII.12, and for appropriate subsequent interview data. No significantly different patterns of responses would seem to emerge when the data is broken down in this way, however -- neither the total citizen or expatriate patterns or the individual Partner State patterns for these two classes of national researchers seems to significantly depart from the general pattern.

The reasons that national researchers gave for responding the way they did could be categorized in several ways, but in the first instance they were divided into positive and negative comments. Any single national researcher could give more than one reason for responding the way he did, and the positive or negative nature of the comments did not necessarily correspond to the nature of their initial response -- i.e., many negative comments were added on as qualifications to positive reasons. The positive reasons were able to be grouped into the following principal categories:

the Official Economic argument -- the theoretical economic-scientific justifications for a centralization of effort, involving aspects such as the ability of the regional operation to do more expensive work on a larger scale, to avoid duplication of effort, etc.;

Table VII.12 - General Opinions Toward EAAFRO

Number of National Researchers from -	<u>Reaction/Responses to EAAFRO</u>						Total
	Very Favorable	Favorable	Neutral	Unfavorable	Very Unfavorable	No Answer	
Kenya	15	41	14	2	1	2	75
Uganda	4	30	7	2	-	1	44
Tanzania	5	20	12	2	-	7	46
Total	24	91	33	6	1	10	165
<u>Citizen Re- searchers</u>							
Kenya	10	27	9	2	1	1	50
Uganda	2	21	-	-	-	-	25
Tanzania	1	5	5	1	-	1	13
Total	13	53	16	3	1	2	88
<u>Ex-Patriate Researchers</u>							
Kenya	5	14	5	-	-	1	25
Uganda	2	9	5	2	-	1	19
Tanzania	4	15	7	1	-	6	33
Total	11	38	17	3	-	8	77

the Political Idealism argument -- the feeling or belief that it is somehow "good" for the three Partner States in East Africa to be working together, to be coordinating efforts, to be developing together, to be unified -- not for any particular economic or political benefit, but for its own sake;

the Benefits argument -- the citation of general or specific EAAFRO research or services that had been of benefit to the region or the Partner State.

Some positive version of the Official Economic argument was mentioned by 32 national researchers in explaining their general opinions toward EAAFRO;

19 mentioned the Political Idealism argument; and 99 mentioned the Benefits argument. There appears to be no significant national or citizenship pattern in the distribution of the Official Economic argument, but with one exception the Political Idealism argument is utilized solely by citizens of East Africa -- 9 from Kenya, 7 from Uganda, and 2 from Tanzania. Specific service benefits given as positive reasons for general opinions toward EAAFRO were mentioned by 27 researchers from Kenya, 12 from Uganda, and 14 from Tanzania. Reinforcing some conclusions from the previous section about the regional orientation of certain specific services of EAAFRO, although the quarantine service is specifically and positively referred to by 13 national researchers -- the highest number of any single service -- nine of them are from Kenya. Similarly, of the eight positive references to EAAFRO's statistical services, six were from Kenya. Other services prominently referred to in all three Partner States were the Literature Service and virus and nematode identification and advice. Specific research benefits given as positive reasons for opinions toward EAAFRO were mentioned by 10 researchers from Kenya, 10 from Uganda, but only one from Tanzania. EAAFRO's work on maize genetics was the most-mentioned research in this context, with the remaining references being split up among the work on sorghum and millet, sugar cane, armyworm, virus diseases, soil physics, crop water requirements, and forestry.

Other positive comments cited by national researchers as reasons for their general opinions toward EAAFRO included good cooperation/communication/contact with EAAFRO researchers; the higher scientific qualifications of EAAFRO's staff; the Journal as actual or potential publisher of their work; and the more fundamental nature of work EAAFRO was doing. Since many of these aspects of EAAFRO are dealt with more specifically in later interview questions, discussions of them will be deferred.

The most frequently mentioned negative comment about EAAFRO given in the context of justifying why a national researcher reacted to EAAFRO the way he did was the lack of personal contact with EAAFRO. This was not only the most important negative reason given, but it was also cited in all three Partner States and by national researchers only 25, as well as several hundred, kilometers away. Involved in this lack of personal contact was a feeling or impression -- often implicit -- that EAAFRO didn't care about what was happening at national institutes. Negative comments about the general or specific lack of usefulness of EAAFRO's work were also prominently mentioned by national

researchers in all three Partner States. Of the specific types of EAAFRO research mentioned in this context, only the sorghum/millet work attracted more than one reference, and this was significant for a subsequent variable because those few national researchers were stationed at the same location as this decentralized EAAFRO unit -- the Serere Research Station in Uganda -- and were quite vehement in their negative feelings toward the work that was being done by it. Negative comments concerning a lack of knowledge about EAAFRO were mentioned by some national researchers as reasons why they couldn't respond with a more favorable opinion toward EAAFRO than they did. There were usually two implicit implications behind this type of reason: 1) their own lack of knowledge was EAAFRO's fault and 2) they would have preferred to have responded more favorably. Ten national researchers also mentioned "politics" as a negative reason for responding the way they did to EAAFRO. In a real sense, this negative reason was directed more at the governments of the Partner States than toward EAAFRO or the East African Community. During the period when this research took place, Tanzania and Uganda were having obvious political differences, centered around the January 1971 coup of General Idi Amin in Uganda, which had brought some EAC activities to a standstill and threatened its future. This was only an addition, however, to a prior series of economic differences, principally between Tanzania and Kenya, in which separate national currencies had replaced a common East African currency, in which trade restrictions between the Partner States were raised, and in which travel between Partner States was also made more difficult. Just before the national interviewing took place, in fact, a dispute over the management (or mismanagement) of the East African Airways had raised new concerns in this area. This entire atmosphere of insecurity, fear, and hostility between the Partner States is what these national researchers were referring to in blaming "politics" for their general opinions toward EAAFRO. Surprisingly, only five national researchers -- two from Uganda and three from Tanzania -- made negative remarks about Kenya receiving more benefits than their own country, and only three -- all from Kenya -- made negative racial remarks about EAAFRO still being a "white man's institution."

Several themes begin to appear in the reasons national researchers gave for explaining their general opinions toward EAAFRO -- themes that will be repeated in the discussions of the answers to subsequent interview questions and themes that cannot all be quantified. These themes are as follows:

1. The importance of scientific services outputs from EAAFRO as compared to research results. Specific scientific services were mentioned two-and-a-half times as much as specific research results as positive reasons for the general opinions of national researchers toward EAAFRO;
2. The ambiguous response to EAAFRO's decentralized Sorghum and Millet Division located at Serere Agricultural Research Institute in Uganda. It must be remembered that any of EAAFRO's outputs or activities can tend to foster a negative as well as a positive opinion toward EAAFRO if an output or activity is perceived to be useless or even damaging by the national researcher. Although EAAFRO's sorghum and millet unit produced some general admiration throughout Uganda, especially for past successful work on sorghum breeding, at Serere itself some significant hostility was expressed toward the current operations and personnel of the unit by national researchers;
3. The national researchers in Uganda -- both citizens and expatriates -- generally appear to know more and have thought more about their relationship with EAAFRO than those in Kenya or Tanzania. Referring back to Table VII.8, Uganda's researchers appear to be proportionally more stable and settled at their national institutes. In Tanzania, both the citizen and expatriate researcher has been subject to frequent locational or job changes due to national policy that may have had nothing to do with agriculture or research, and many of their stations are relatively isolated from the rest of East Africa. In Kenya, a successful attempt to greatly expand the national research system has resulted in a large number of relatively young and inexperienced indigenous university graduates as national researchers. In addition, some of Kenya's researchers are spread out at very small testing stations, some of which are in remote locations and relatively isolated. In Uganda, the indigenous researchers have had more experience, -- i.e., there has not been as great a surge of new indigenous graduates recently joining the national research system -- probably due to Uganda's past colonial history and the presence of Makerere University. Moreover, they have been concentrated in the past at two principal stations -- Kawanda and Serere -- where greater interaction among themselves and with EAAFRO and/or Ugandan national figures might have fostered these kinds of considerations. The East African headquarters of the Cotton Research Corporation had been located at Namulonge, which is one reason that expatriates

in Uganda also appear to have had more experience at their station than those in Kenya or Tanzania;

4. Perhaps somewhat related to the above theme is the qualitative feeling that the citizen national researchers -- particularly in Uganda -- had more of a sympathy or hope for the ideals of East African unity as symbolized by the East African Community or EAAFRO than the expatriates. All but one of the national researchers who positively mentioned the Political Idealism argument in explaining their reaction/response to EAAFRO, for example, were East African citizens. Even when negative reactions to or comments about EAAFRO were mentioned by many of the African researchers, they seemed to be given more in sorrow than a cynical or calculatingly detached way. Many of the negative remarks about national politics seemed to emerge in this fashion.
5. The extent of the lack of perceived knowledge about EAAFRO by national researchers will become more apparent in the discussions of subsequent interview questions, but it already begins to appear here, especially in the form of a lack of personal contact with EAAFRO researchers.

The answers of national researchers to question 12 of how much they "knew" about EAAFRO are shown below in Table VII.13. In all three Partner States, there were relatively few national researchers who felt that they knew "Almost everything" or "Quite a lot" about EAAFRO -- most thought they knew "Some" or "Just a little." When the responses are broken down according to citizens and expatriates, there again seems to be no apparent significant differences between the patterns except that expatriates from Tanzania seem to believe they know less about EAAFRO than other groups.

But there was a very emphatic expression of opinion by the national researchers in all three Partner States that 1) they didn't know very much about EAAFRO, 2) it was EAAFRO's fault, and 3) they wanted to know more. Among the negative reasons given in explaining their responses to this question, the national researchers, particularly in Kenya and Tanzania but less so in Uganda, strongly expressed the feeling that EAAFRO wasn't communicating or publicizing what they were doing -- that EAAFRO wasn't trying to relate to them. Even many of those who answered relatively high on the scale qualified their response by adding that their knowledge was restricted to their own field only. Only a very few researchers -- two from Uganda and one from Tanzania -- said their low level of knowledge was due to EAAFRO's bias towards Kenya, and one researcher from Kenya reasoned that his lack of knowledge was because EAAFRO was staffed by foreign whites.

Table VII.13 -- Perceived Self-knowledge of National Researchers about EAAFR0

Number of National Researchers from -	Almost Everything	Perceived Self-knowledge				Almost Nothing	No Answer	Totals
		Quite a Lot	Some	Just a Little				
Kenya	1	10	36	18	9	1	75	
Uganda	1	9	25	9	-	-	44	
Tanzania	-	3	19	16	5	3	46	
Total	2	22	80	43	14	4	165	
Citizen Researchers								
Kenya	-	7	23	13	6	1	50	
Uganda	1	5	12	7	-	-	25	
Tanzania	-	2	8	3	-	-	13	
Total	1	14	43	23	6	1	88	
Ex-Patriate Researchers								
Kenya	1	3	13	5	3	-	25	
Uganda	-	4	13	2	-	-	19	
Tanzania	-	1	11	13	5	3	33	
Total	1	8	37	20	8	3	77	

There were other reasons mentioned for having little knowledge that did not directly blame EAAFR0. Several expatriate researchers in all three Partner States who were working on cotton or wheat suggested that the low level of knowledge might be due to the fact that they were working on different agricultural crops than EAAFR0 was. A few researchers suggested it was because of their short length of time in East Africa, a few -- four from Uganda and one from Tanzania -- suggested it might be the national government's or their own fault, and only a very few suggested that distance was a factor.

Among those who gave positive reasons for knowing what they did about EAAFR0, personal contacts and friendships were mentioned by a few researchers

from each Partner State. A significant reason for knowledge in Uganda and Kenya was the presence of decentralized EAAFRO units, but again there were some negative remarks made about the sorghum and millet unit at Serere in this context. Four Specialist Committees were mentioned as positive reasons -- Forestry, Entomology and Insecticides, Sugar Cane, and Soil Fertility -- but all but two of these remarks came from Kenya researchers. Finally, two researchers had worked at EAAFRO for a time, and two had worked for the national Chief Research Officer, and therefore thought they knew more about EAAFRO.

Interview question 13 tried to directly address the national researchers' perceptions about the balance of EAAFRO's benefits among the Partner States in order to obtain another measure that closely and directly related to their general opinions toward EAAFRO. The national researchers were asked to respond to the statement that "EAAFRO was a truly regional, East African institution," and their answers are shown below in Table VII.14. According to the patterns shown, it does appear that Kenya researchers proportionally perceived EAAFRO to be more regional than those in Uganda or Tanzania, and that Tanzanian researchers proportionally perceived EAAFRO to be less regional than the others. More researchers from Tanzania and Uganda were neutral or disagreed with the statement than agreed with it. Most of the people who are in the No Answer category thought the question referred to "truly East African" as opposed to international or foreign, and so their answers did not reflect the correct variable.

In examining the response patterns of citizen and expatriate national researchers, it seems that expatriate researchers in all three countries proportionally perceive EAAFRO to be less regional than do citizen researchers. The over-all majority of those who agree in Table VII.14 over those who are neutral or disagree is due largely to the impact of Kenya citizen researchers.

In the explanatory remarks that followed the responses, 12 researchers from Kenya, 15 from Uganda, and 14 from Tanzania specifically mentioned that EAAFRO was of more benefit to Kenya than the other two countries -- and this explanation was about evenly divided between citizen and expatriate researchers in all three Partner States. One researcher from Kenya thought EAAFRO was of more benefit to Uganda because of the sorghum and millet unit located at Serere, but this was the only case where a reversal like this occurred.

Table VII.14 - Perceived Regionality of EAAFRO

Number of National Researchers from -	<u>Perceived Regionality</u>						Total
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	No Answer	
Kenya	9	40	14	5	-	7	75
Uganda	2	16	12	11	-	3	44
Tanzania	<u>2</u>	<u>9</u>	<u>16</u>	<u>12</u>	<u>-</u>	<u>7</u>	<u>46</u>
Total	13	65	42	28	0	17	165
<u>Citizen Re- searchers</u>							
Kenya	8	28	5	4	-	5	50
Uganda	1	12	6	4	-	2	25
Tanzania	<u>1</u>	<u>4</u>	<u>5</u>	<u>2</u>	<u>-</u>	<u>1</u>	<u>13</u>
Total	10	44	16	10	0	8	88
<u>Ex-Patriate Researchers</u>							
Kenya	1	12	9	1	-	2	25
Uganda	<u>1</u>	<u>4</u>	<u>6</u>	<u>7</u>	<u>-</u>	<u>1</u>	<u>19</u>
Tanzania	<u>1</u>	<u>5</u>	<u>11</u>	<u>10</u>	<u>-</u>	<u>6</u>	<u>33</u>
Total	3	21	26	18	0	9	77

Reflecting the over-all pattern established above, Kenya researchers stated many more positive reasons in explaining their responses than did researchers from Uganda or Tanzania. For example, 11 researchers from Kenya positively reasoned that EAAFRO's operations -- such as the sorghum and millet unit at Serere, which was most often referred to -- were spread out around East Africa and that EAAFRO was therefore regional while seven negatively reasoned that EAAFRO's operations were so concentrated in Kenya that it couldn't be so regional. This pattern was reversed in the other two Partner States -- seven from Uganda responded positively on this point, but 13 responded negatively; only one from Tanzania responded positively and seven negatively. The negative reasons in

terms of EAAFRO's operational activities were closely related to reasons given in terms of benefits -- i.e., most of EAAFRO's work was located in Kenya and was therefore of no use to Uganda or Tanzania. Once again in this case, more researchers from Kenya mentioned that EAAFRO's work was of regional interest than those who didn't, and the reverse was true in Uganda and Tanzania.

Some national researchers explained their response to this question in terms of specific research or services of EAAFRO -- positively or negatively. EAAFRO's maize work was positively mentioned by some national researchers but was also cited in a negative context by a few. The Plant Quarantine Service was also positively mentioned by some national researchers, most of them from Kenya, and negatively by a few. Other activities that received some scattered mention were the armyworm research and forecasting, forestry research, sugar research, agro-meteorology work, and virus research.

The nature of EAAFRO's professional staff was referred to in interesting ways in connection with this question. Five officers from Kenya and two from Uganda commented favorably about EAAFRO's regionality because its staff came from all three Partner States. On the other hand, three officers from Kenya and two from Uganda made unfavorable remarks in this context about the amount of expatriates on EAAFRO's staff, and one officer from Tanzania remarked negatively that EAAFRO's staff was almost all from Kenya. One officer in each of the three countries made positive comments about EAAFRO's regionality because all three countries financed it; one officer from Uganda and one from Tanzania made positive comments about EAAFRO meetings being held in their countries; two officers from Kenya and one from Uganda thought that the distance factor made EAAFRO less regional.

As mentioned earlier in Chapter VI, question 14, which asked for particular projects or programs of EAAFRO which stood out in the national researchers' minds because they had or had not been of benefit to the Partner State they worked in, grew out of an unsuccessful question which was changed to its present form midway during the Uganda interviews. Although the results cannot be included in any statistical analysis, Table VII.15 below does show some interesting data. (Note that one officer could have answered with more than one example, so that the numbers do not add up.)

About three-quarters of the national officers interviewed (125 -- 57 from Kenya, 32 from Uganda, and 36 from Tanzania) could not or would not answer any

Table VII.15 - Specific EAAFR0 Projects/Programs that Stand Out to National Researchers

EAAFR0 Division of Service that specific project/program is included in	Number of National Researchers from					
	Kenya		Uganda		Tanzania	
	Was of Benefit	Was Not of Benefit	Was of Benefit	Was Not of Benefit	Was of Benefit	Was Not of Benefit
Plant Pathology	18	1	5	-	5	1
Sorghum & Millet	5	3	15	3	2	1
Maize Genetics	16	1	11	-	5	2
Forestry	15	2	9	5	2	3
Physics & Chem.	15	3	3	-	3	2
Sugar Cane	1	-	6	-	1	-
Animal Prod.	13	2	-	1	1	-
<u>Services:</u>						
Armyworm Forecasts	14	-	3	-	7	-
Plant Quarantine	19	3	8	1	3	-
Others	6	1	8	-	13	-
Unable to answer	19	57	13	32	22	36

specific EAAFR0 project/program which they thought had not been of benefit to the Partner State they worked in. One must qualify this seeming national vote of confidence for EAAFR0, however, by noting the scientist's professional caution against making absolutist statements for the record and remarks which indicated their uncertainty that whatever examples they might be thinking of in that context could perhaps be of benefit in ways they didn't know about or perhaps be of benefit in the future. The other side of this coin is, of course, that one-third of the national officers interviewed (54 -- 19 from Kenya, 13 from Uganda, and 22 from Tanzania) could not answer any specific EAAFR0 project/program that stood out in their mind because it had been of benefit to the country they worked in.

Maize Genetics was the EAAFR0 division and project/program most often mentioned as being of benefit, by 16 officers from Kenya, 11 from Uganda, and five from Tanzania, but the Plant Pathology and Forestry divisions were not

far behind. The few negative remarks made about Maize Genetics concerned the assertions that Kenya's national maize program was doing the important work in this area -- not EAAFRO -- and the inappropriateness of Kenya's higher altitude for breeding maize to grow in Tanzania. No specific reasons were given for the two negative answers in the Plant Pathology division. The Forestry division received the highest number of negative answers for which no specific reasons were apparent. Some of the general reasons cited for EAAFRO activities which were not of benefit were poor results from the activity or results that were not applicable under local conditions, activities that only duplicated what the national programs were doing anyway, etc.

The general pattern operating in Table VII.15 at least for EAAFRO projects/ programs that were of benefit is that Kenya would have the most answers, followed by Uganda and Tanzania in varying order. The exceptions to this pattern are explainable. The larger number of national officers from Uganda who believed that the sorghum and millet division stood out as being of benefit were probably influenced by the fact that this division is located in Uganda and the extensive publicity that was given to the development of the new Sereena sorghum hybrid. The few negative answers for this division were made because the people didn't like the new hybrid as a food. There was practically no mention of millet in either context. The pattern for sugar cane, where Uganda dominates once again, is more puzzling. The Animal Production division seems to be regarded as being of benefit only in Kenya.

Among EAAFRO's scientific services specifically mentioned in this context, the Armyworm Forecasting and Plant Quarantine services received the highest numbers of national researchers' comments. The relatively low number of Ugandan officers who thought the armyworm forecasts stood out as being of benefit is probably because the armyworm is less of a pest in that country, and the publicity the forecasts were receiving during the armyworm outbreak season probably made all national officers relatively more aware of this service. The few officers who referred to the Plant Quarantine services as not being beneficial did so because of the tight restrictions that the regulations placed on their ability to import plant material. It was a bit surprising that the East African Literature Service wasn't mentioned more often in response to this question; it received no negative comments, but only six officers from Tanzania and two each from Kenya and Uganda specifically said it stood out as being of benefit.

Question 15 again tried to get at the opinions of the national researchers toward the regionality of EAAFRO through the setting up of a hypothetical resource allocation trade-off situation. In this situation, the national researcher could take away any amount of the funds contributed to EAAFRO the previous year by the Partner State in which he was working and apply that amount to the national agricultural and forestry system of which he was a part. The results are shown below in Table VII.16. The pattern shown seems to be generally similar in all three Partner States and among citizen and expatriate researchers in all three Partner States -- over half (91) of the national researchers would

Table VII.16 - Trade-off Funding Allocation by National Researchers

Number of National Researchers from	Would leave it all with EAAFRO	Take away only up to 1/3	Take away 1/3 to 2/3	Take away 2/3 to everything	Would take it all away	No Answer	Total
Kenya	40	5	7	1	3	19	75
Uganda	22	3	8	7	3	1	44
Tanzania	29	3	-	-	3	11	46
Total	91	11	15	8	9	31	165
<u>Citizen Researchers</u>							
Kenya	29	3	6	1	2	9	50
Uganda	12	2	7	3	1	-	25
Tanzania	10	2	-	-	1	-	13
Total	51	7	13	4	4	9	88
<u>Ex-patriate Researchers</u>							
Kenya	11	2	1	-	1	10	25
Uganda	10	1	1	4	2	1	19
Tanzania	19	1	-	-	2	11	33
Total	40	4	2	4	5	22	77

leave all their recent national contributions with EAAFRO and not take any away. This tendency to leave all the funds with EAAFRO was especially strong in Tanzania where 29 out of 35 answering would have done so. Uganda had the most national researchers (21) prepared to take money away, perhaps because their own national research program was unable to supply them with funds for the facilities and equipment they needed. Of the remaining researchers, the largest group (31) is made up of those who wouldn't or couldn't give an answer to this question, and this group is characterized by two puzzling anomalies: 1) over two-thirds of the people who couldn't or wouldn't answer this question were expatriates, when expatriates make up less than half of the total national researchers interviewed, and all of the citizen researchers who wouldn't or couldn't answer came from Kenya; 2) both Kenya and Tanzania had sizable numbers of researchers (19 and 11, respectively) who couldn't or wouldn't answer, but Uganda only had one! The only explanation able to be offered is for part of the first anomaly -- expatriates seemed to be sensitive to answering a question that involved a specific, even if hypothetical, internal political decision by the Partner States as newly independent developing countries and they wished to avoid it. Many of those who did decline to answer did so on three grounds: 1) their lack of knowledge about EAAFRO; 2) the question was too political to answer; and 3) they just couldn't handle a hypothetical question like this. The remaining national researchers (43) would have taken various amounts of money away from EAAFRO and applied it to their own national research programs.

But once again, qualifications and reasons added to the 91 answers to leave all the money with EAAFRO present a different picture and leave EAAFRO little cause to be self-satisfied. Of the 91 national researchers who would have left all their recent national contributions with EAAFRO instead of taking all or part of it away and applying it to their own national research programs,

- only 19 did so because they thought EAAFRO deserved it in some way (10 from Kenya, six from Uganda, and three from Tanzania);
- 11 did so because the amount involved was so small they didn't think it would make any difference (two from Kenya, six from Uganda, three from Tanzania);
- 11 did so because of the unorganized state of the national research system -- i.e., it wasn't that EAAFRO was so deserving but that the national system was so bad (three from Kenya, one from Uganda, and

seven from Tanzania, reflecting the chaotic state of that country's research system referred to earlier);

- 14 wanted to leave it there so EAAFRO could be improved (two from Kenya, four from Uganda, and seven from Tanzania);
- seven wanted to leave it there only because they would lose more than gain by pulling out (five from Kenya, one each from Uganda and Tanzania);
- six had idealistic or theoretical reasons that a regional organization should do a better job than national ones (two from Kenya, one from Uganda, and three from Tanzania);
- six took the fatalistic approach that the decision to fund the amounts mentioned had been made, so it must have been correct (two from each Partner State);
- six would let EAAFRO keep it all because their own national research programs were not short of funds (five from Kenya and one from Uganda);
- two (both from Kenya) would let EAAFRO keep it all because it needed the funds so badly; and
- two (both from Kenya again) would leave all the funds there because they wanted to keep all EAC activities going.

Of the 43 national researchers who wanted to take away all or part of the recent contributions to EAAFRO of the Partner State they were working in and apply it to their own national research programs,

- 18 would do so because their national research program needed the funds more than EAAFRO did or could use those funds more productively than EAAFRO would (seven from Kenya, nine from Uganda, and two from Tanzania);
- 14 would do so because EAAFRO's benefits weren't worth the cost (two from Kenya, ten from Uganda, and two from Tanzania);
- one (from Kenya) because Kenya was self-sufficient and didn't need EAAFRO.

The national pictures that are reinforced here is of Kenya having relatively higher research capabilities and funds; Uganda having relatively high research capabilities but little funds; and Tanzania having relatively little capability and little funds. The situation at Serere National Research Station in Uganda was aggravated by the perceived wealth and wastefulness of the EAAFRO sorghum and millet division there, which was, however, more a USAID than an EAAFRO characteristic.

Question 16 on institution-building was asked only at the national agricultural research stations where EAAFRo decentralized divisions were located: Serere and Kawanda stations in Uganda, and Kitale and Coast stations in Kenya. The results are shown below in Table VII.17. The over-all relatively negative opinions of the national researchers at Kawanda toward the EAAFRo sugar cane disease unit located there is somewhat surprising since the single EAAFRo officer in charge of the unit is a Ugandan citizen who formerly was a national research officer stationed at Kawanda. An examination of the reasons given by the Kawanda researchers for answering the way they did presents a more positive picture, however. Eight of the Kawanda researchers who gave middle to low opinions did so because the sugar cane disease unit was so young and therefore

Table VII.17 - Perceived Institution-Building Contributions of EAAFRo
by National Researchers at Affected Stations.

Number of National Researchers from -	<u>Perceived Institution-Building</u>						Totals
	Very Much	Quite a Lot	Some	Just a Little	Almost Nothing	No Answer	
Kawanda	-	4	5	6	2	1	18
Serere	3	5	4	1	1	-	14
Coast	-	1	-	-	1	1	3
Kitale	<u>6</u>	<u>8</u>	<u>1</u>	<u>-</u>	<u>-</u>	<u>3</u>	<u>18</u>
Totals	9	18	10	7	4	5	53
<u>Citizen*Re-</u>							
<u>searchers</u>							
Kawanda	-	3	4	3	1	1	12
Serere	2	5	2	-	-	-	9
Coast	-	-	-	-	1	1	2
Kitale	<u>3</u>	<u>6</u>	<u>1</u>	<u>-</u>	<u>-</u>	<u>2</u>	<u>12</u>
Totals	5	14	7	3	2	4	35
<u>Ex-Patriate</u>							
<u>Researchers</u>							
Kawanda	-	1	1	3	1	-	6
Serere	1	-	2	1	1	-	5
Coast	-	1	-	-	-	-	1
Kitale	<u>3</u>	<u>2</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>1</u>	<u>6</u>
Totals	4	4	3	4	2	1	18

hadn't been able to contribute much yet to the building up of their own institution; an additional three answered that way because no sugar cane research was going on at Kawanda to which the EAAFRO unit might contribute. Only four Kawanda researchers gave negative reasons for their low opinions -- three thought the EAAFRO unit was isolated from the rest of Kawanda, even though it was located there, and one didn't think the unit was doing good work. Of the positive reasons mentioned, two Kawanda researchers said that the unit was helping them out in their own research; one said the unit contributed to Kawanda simply because people identified it as part of Kawanda, one thought the unit's staff was capable, and one thought sugar was going to be an important crop in the future. Expatriate researchers at Kawanda seem to have a lower opinion of the EAAFRO unit than do the citizen researchers, but it is difficult to judge how significant the difference is.

A first glance at the results from Serere research station would indicate that the EAAFRO sorghum and millet division located there fares somewhat better in the opinions of the Serere researchers, but again the reasons given for having the opinions present a somewhat different picture. Of the opinions given, by far the largest number -- seven -- were because of the past work of Hugh Doggett on developing a new sorghum hybrid and the world-wide acclaim that had thereby been given to Serere. The past nature of this work was emphasized and, moreover, three additional Serere researchers mentioned that although the past work of this EAAFRO division had contributed to the Serere station, they now had to give a low opinion of its contribution because of their current staff. Only one Serere researcher thought the division was contributing through its good scientific work; only two mentioned the division's cooperation or help; three thought the academic qualifications of the division's staff contributed to Serere's capabilities; and finally, two mentioned the buildings that were built for the EAAFRO division but were a fixed addition to Serere's physical infrastructure. It also seems that the expatriate researchers had a lower opinion of the EAAFRO division at Serere than the citizen researchers did, but this seemed to be related to the high opinion held by the latter group toward Dr. Doggett. For most of the citizen researchers, Dr. Doggett's work and its subsequent world-wide recognition seemed to be the one achievement in agricultural research in Uganda that they could be proud of and identify with, and this achievement dominated over any critical feelings they might have about

the current situation. Although the expatriate researchers, on the other hand, had heard of Dr. Doggett's work and admired it, most of them hadn't been at Serere long enough to know him and they were from England where many such accomplishments in agricultural research had been achieved. Therefore, their critical feelings about the current situation with the sorghum and millet division dominated their responses to this question.

Only two national researchers at the Coast Agricultural Research Station in Kenya answered this question about EAAFRO's Sugar Cane Breeding Division located there, and their answers and reasons were directly opposite one another. The one theme that seemed to be responsible here again was the racial theme -- real or imagined racially related problems between the African citizen researcher and the white expatriate EAAFRO officer in charge of the division seemed to lie behind the low opinion of that division's contribution to the Coast station, while the white expatriate researcher working for the Kenya Government based his high opinion on other criteria such as the scientific contribution of the division to the Coast station.

EAAFRO's Maize Genetics Division located at Kitale National Agricultural Station in Kenya received a very positive response on this question from the national researchers there, from both citizen and expatriates alike. Ten Kitale researchers thought it contributed to their station through the good scientific work it was doing; six thought it contributed through cooperation or helping out in some way; two thought it added to Kitale's reputation; and two thought it contributed through the addition of physical buildings to the station. Only three negative remarks were made -- one that this division was isolated from the rest of the station, one that the maize research results were from Kenya's national program, not EAAFRO's, and one that the division was suspect because it was connected with foreign aid.

The indicator for only one variable was included in Question 17, although more information was involved. A subjective evaluation of the amount of information about EAAFRO projects and services expressed by national researchers primarily in response to questions 14 and 17 was supposed to provide one indicator of the knowledge of EAAFRO variable, but it turned out in practice that there was not enough information of this type expressed to be able to do so. Therefore, the number of EAAFRO officers known by national researchers as expressed in question 28 will be used as the sole objective indicator measure of this variable.

Part of this question, however, also involved an opinion as to whether EAAFR0 should or should not be doing more work in the respondent's own field, and these answers might be of interest -- see Table VII.18 below.

Table VII.18 - National Opinions on Scientific Fields in Which EAAFR0

Number of National Researchers from -	Should/Should Not Be Doing More Work										Totals
	EAAFR0 Should Be Doing More Work in										
	Cotton	Cereals	Entomology & Stored Products	Horticulture	Wheat	Forestry	Pastures/Animal Nutrition	Soils	Plant Pathology	Others	
Kenya	-	3	2	4	4	2	3	4	3	15	40
Uganda	-	1	3	1	-	3	2	6	1	8	25
Tanzania	1 ⁰	1	2	4	2	1	1	4	3	6	25
Totals	1	5	7	9	6	6	6	14	7	29	90**
	EAAFR0 Should Not Be Doing More Work in										
Kenya	1	2	3	1	3	-	5	4	4	12	35
Uganda	10	1	2	-	-	1	-	-	1	4	19
Tanzania	9	1	-	-	3	-	-	2	-	1	16
Totals	20	4	5	1	6	1	5	6	5	17	70**

* Others includes sesame, oil seeds, sunflower, groundnuts, general agronomy, rice, coffee, sugar, general plant physiology, livestock, potatoes, pyrethrum, legumes, etc.

** Five respondents did not answer.

In some fields, the national researchers are fairly evenly divided about whether or not EAAFR0 should be doing more work, the inclination that more work in the field might be needed or helpful competing with a possessiveness feeling that the national research program is already doing quite well so why should there be any duplication of effort or why should any credit be shared. Work on cereals (principally maize), general entomology and stored products, wheat, pastures/animal nutrition, general plant pathology, potatoes (Kenya only), livestock, etc. falls into this category. In other fields, the balance is heavily weighted one way or the other -- that EAAFR0 should or should not be doing more work. National cotton researchers, for example, are heavily against EAAFR0

entering this field at all since the Cotton Research Corporation is already adequately covering it. Although the emphasis is not as great because the numbers involved are much smaller, national pyrethrum researchers -- all from Kenya -- feel the same way. National researchers on horticultural crops, forestry, soils, legumes, rice, sugar, etc.; on the other hand, do think that EAAFRO should do more in these fields.

Both in question 17 and question 20, national researchers were asked to name specific projects or work that EAAFRO should be doing but wasn't, within (question 17) and outside (question 20) of their own field. The results to these two questions are combined below in Table VII.19 to give some idea of what fields national researchers might like to see EAAFRO move into. Too much emphasis should not be placed on these results because some national researchers responded with more than one project in the same field and more than one project but in different fields, in broad and narrow perspectives, etc. -- and some of the responses seemed to be projects that just came to mind rather than having been carefully thought through and considered. Nevertheless, far more projects were mentioned in the soils field than any other, with livestock, horticulture, and coffee fields following. There are a few fields in which only one of the Partner States is interested in a new product -- e.g., Kenya researchers in oil seeds, Ugandan researchers in sesame -- and a few general fields not related to any particular product -- e.g., plant physiology, plant pathology. Projects in some of the most important fields in East Africa -- e.g., maize/cereals, forestry -- were not mentioned much at all, leading to the speculation that these fields may be relatively well covered in East Africa. Looking at the "Others" category and the totals, the low number of responses from Tanzania shown in Table VII.19 is striking. It seemed as if the imagination of the national researchers in Tanzania was relatively stifled in terms of what projects -- within or outside their own field -- they thought EAAFRO should be working on. Whereas some researchers from Kenya and Uganda responded with new and unique items EAAFRO might investigate, no researchers from Tanzania did, and many traditional items that either or both Kenyan and Ugandan researchers mentioned were not mentioned at all by Tanzanian researchers.

Table VII.19 - Fields of Suggested Projects Which EAAFR0 Should Undertake

Fields of Research	Number of National Officers from			Total
	Kenya	Uganda	Tanzania	
Soils	9	10	4	23
Livestock	8	6	-	14
Horticulture	5	3	5	13
Coffee	5	2	4	11
Pastures/animal nutrition	5	5	-	10
Arid Lands	8	2	-	10
Oil seeds	9	-	-	9
Plant physiology	4	1	3	8
Plant pathology	4	1	3	8
Entomology/ stored products	2	1	4	7
Wheat	5	-	2	7
Sugar	6	1	-	7
Maize/cereals	-	2	2	4
Forestry	-	3	1	4
Tea	3	1	-	4
Sesame	-	4	-	4
Pyrethrum	3	-	-	3
Potatoes	3	-	-	3
Others*	<u>12</u>	<u>8</u>	<u>-</u>	<u>20</u>
Totals	91	50	28	169

*Includes grapes, sisal, kenaf, mushrooms, barley, sunflower, cotton, tobacco, legumes, floriculture, etc. -- fields mentioned by only one or two national researchers

Experimental collaboration with EAAFR0 is the first potential benefit the national researchers responded to, as addressed in question 18. The results are shown in Table VII.20 below. The most striking result shown is the fact that only 35 out of 165 national researchers in East Africa have ever

collaborated with EAAFRRO researchers in joint experimental efforts. Of the 35 national researchers who had collaborated, only five came from Tanzania while 16 and 4 respectively came from Kenya and Uganda; which again possibly indicates the relative stability and capability of their research systems compared to that of Tanzania. The pattern of collaboration does not appear to be influenced by the citizenship of the national researcher, however. Roughly similar patterns exist for both citizen and expatriate researcher collaboration in Table VII.20.

Table VII.20 - National Experimental Collaboration with EAAFRRO

Number of National Researchers from -	Past or Present Collaboration	Supervision of VTC's only*	No Collaboration	No Answer	Totals
<u>Kenya</u>	16	5	54	-	75
Uganda	14	2	28	-	44
Tanzania	<u>5</u>	<u>2</u>	<u>36</u>	<u>3</u>	<u>46</u>
Totals	35	9	118	3	165
<u>Citizen Researchers</u>					
Kenya	10	4	36	-	50
Uganda	7	1	17	-	25
Tanzania	<u>2</u>	-	<u>11</u>	-	<u>13</u>
Totals	19	5	64	-	88
<u>Expatriate Researchers</u>					
Kenya	6	1	18	-	25
Uganda	7	1	11	-	19
Tanzania	<u>3</u>	<u>2</u>	<u>25</u>	<u>3</u>	<u>33</u>
Totals	16	4	54	3	77

*In these cases, the national researcher only supervised the trials of new plant varieties developed by EAAFRRO located at their stations. These trials were conducted at various locations throughout East Africa to test the new variety under local conditions. If cooperative research activity in carrying out these trials was involved, then this was judged to be collaboration; if supervision of the trial sites was all that was involved, this was judged not to be collaboration but these cases are put in a column by themselves in Table VII.20.

Of the current collaborative experimental activities, seven were taking place in the field of maize breeding, six in forestry, six in soil chemistry or fertility, four in plant pathology, three in sugar cane breeding, and one in soil physics. Kenyan researchers dominated the collaboration in maize breeding; Ugandan researchers dominated the collaboration in forestry, and collaboration in the remaining fields was roughly balanced between two or three of the Partner States. Of the past collaborative experimental activities, four took place in the field of soil physics and agro meteorology, two in coffee pathology, two in potato virology, and one in the armyworm investigation. Kenyan researchers were the sole collaborators in the potato virus and armyworm cases, while both Kenyan and Ugandan researchers took part in the other collaborations.

A second potential benefit from EAAFRO -- research results -- was addressed and responded to in question 19, and the results are shown in Table VII.21 below. Once again, the most striking result shown is that only 48 out of 165 national researchers had ever utilized research work results done by EAAFRO in their own research. Half of those 48, however, had found those EAAFRO results to be of Very Great Use to them, and only four found the results to be of Little or No Use. Looking at the national patterns, the same trend occurs for research results as did for experimental collaboration, i.e., slightly more Kenyan researchers respond than Ugandan, and the number of Tanzanian researchers lags far behind. Proportionally, however, more Ugandan researchers have utilized EAAFRO research results than either Kenyan or Tanzanian. Patterns of the perceived usefulness of the results are roughly similar for Kenya and Uganda, with more than half of their responses in the Very Great Use category and practically all their responses in the top three categories. Tanzania's pattern in this respect is more evenly distributed, with only one response of Very Great Use and the remaining responses more evenly distributed among the various categories. Still, even in this case most of the responses are in the top three categories. The few Little or No Use responses that were given were because the EAAFRO results, for various reasons, had just not worked out for the national researcher and his own work. The few national researchers who had utilized EAAFRO research results in their own work but couldn't venture an opinion as to its usefulness were in situations where their work was still underway and it was too early to judge how useful the EAAFRO input would be.

Table VII.21 - National Research Utilization of EAAFR0 Research Results

Number of National Researchers from	Very Great Use	Had Used EAAFR0 Research Results					Sub Total	Not Used		Totals
		Much Use	Some Use	Little Use	No Use	No Answer		EAAFR0 Results	No Answer	
Kenya	13	4	2	-	-	2	21	54	-	75
Uganda	10	3	2	1	1	-	17	27	-	44
Tanzania	1	3	2	2	-	2	10	33	3	46
Totals	24	10	6	3	1	4	48	114	3	165
<u>Citizen Researchers</u>										
Kenya	12	1	1	-	-	1	15	35	-	50
Uganda	5	2	1	1	-	-	9	16	-	25
Tanzania	1	1	-	-	-	-	2	11	-	13
Totals	18	4	2	1	-	1	26	62	-	88
<u>Expatriate Researchers</u>										
Kenya	1	3	1	-	-	1	6	19	-	25
Uganda	5	1	1	-	1	-	8	11	-	19
Tanzania	-	2	2	2	-	2	8	22	3	33
Totals	6	6	4	2	1	3	22	52	3	77

The four Little or No Use responses all came in different fields: plant pathology, statistical methodology,* agro meteorology, and animal production. Most of the national utilizations in the top three categories were from EAAFR0's soils research: eight cases in soil physics/agro-meteorology, six in soil chemistry/fertility, and four in methodologies for soil analyses.* Eleven cases of national utilization in the top three categories were from EAAFR0's maize research; five from animal production research; three each from forestry, coffee and coffee berry disease, and sorghum research; and one or two cases each from sugar cane, statistical methodologies, plant quarantine and oil seeds research. Four national researchers (three from Uganda and one from Kenya) were able to respond to this question with two cases in which they had utilized EAAFR0 research results in their own work. In all four instances, the fields involved

*An aspect of research utilization rather than service utilization.

in the two cases were the same and the usefulness ratings were all in the top three categories. In ranking these four national researchers according to their responses to this question, they were all put into the highest category if they weren't there already.

The perceptions of the national researchers of the relevance of EAAFR0's current research to the Partner States was measured in question 20. The results are shown below in Table VII.22. One of the most noticeable aspects of the totals shown below is the almost complete lack of responses in the Little and No Relevance.

Table VII.22 - Perceived Relevance of EAAFR0 Research

Number of National Researchers from - 0	<u>EAAFR0 research perceived to be of</u>						Totals
	Very Great Relevance	Much Relevance	Some Relevance	Little Relevance	No Relevance	No Answer	
Kenya	11	22	15	-	-	27	75
Uganda	7	11	22	1	-	3	44
Tanzania	2	7	13	3	-	21	46
Totals	20	39	51	4	-	51	165
<u>Citizen Re-</u>							
<u>searchers</u>							
Kenya	6	16	10	-	-	18	50
Uganda	6	6	11	-	-	2	25
Tanzania	-	1	7	1	-	4	13
Totals	12	23	28	1	-	24	88
<u>Ex-Patriate</u>							
<u>Researchers</u>							
Kenya	5	6	5	-	-	9	25
Uganda	1	5	11	1	-	1	19
Tanzania	2	5	6	2	-	17	33
Totals	8	17	22	3	-	27	77

categories, and the relatively high number of national researchers who couldn't or wouldn't venture an opinion on this issue. Most of the national researchers in this latter category did not answer on the grounds that they didn't know enough about EAAFR0 to justify having an opinion of this sort, which may imply that they held unfavorable impressions about EAAFR0 on this matter but didn't want to express

them without some evidence to back up their opinion. It is interesting that Uganda had so few researchers who couldn't or wouldn't venture an opinion on this issue, while Tanzania, in proportional terms, had so many. Once again, this situation seems to reflect the conditions of the national research systems in the three Partner States, where Uganda appears to be the most stable and experienced, Kenya the largest but also less experienced due to recent staff expansion related to Africanization and less stable, and Tanzania the least stable and capable of all.

Even if all of the national researchers who couldn't or wouldn't answer did fall into the lower two categories in Table VII.24, however, most national researchers judge EAAFRO's research to be of at least "Some Relevance" and it would be difficult to severely question EAAFRO's relevance, as many people in East Africa tended to do, from these results. (This is not to say that the national researchers didn't believe that the relevance of EAAFRO's research should or could be improved, however.) There also do not seem to be any significant differences in the national patterns of responses to this question, or in the patterns of citizen as opposed to expatriate national researchers. Kenya's responses peak in the Much Relevance category, while Uganda's and Tanzania's peak one category lower at Some Relevance, and other minor differences occur, but nothing seems outstanding.

Most of the expressed reasons why national researchers responded the way they did centered around particular EAAFRO research projects or services which were used as examples to justify the response. The relevance of EAAFRO's maize research was mentioned the most often -- by eight national researchers from Kenya, seven from Uganda, and seven from Tanzania. Only one negative comment about the irrelevance of the maize research was made, by a Tanzanian researcher because of the altitude factor, but an additional three national researchers from Tanzania mentioned the relevance of EAAFRO's Field Trials Officer in that country who was mainly concerned with testing new maize varieties under local Tanzanian conditions. The relevance of EAAFRO's sorghum and millet research was also cited a number of times in the responses to this question, but the patterns in this case are more complex. Although 17 national researchers did cite the relevance of EAAFRO's sorghum research, only one of these came from Kenya and two from Tanzania. The dominant 14 favorable responses from Uganda may be because sorghum is a significant food crop only in that Partner State, because EAAFRO's decentralized Sorghum and Millet Division is located there, or because of the wide-spread favorable publicity

that resulted from the development of the new "Sereena" variety of sorghum. In addition, however, seven national researchers -- six from Uganda and one from Tanzania -- mentioned the lack of relevance of EAAFRO's sorghum research in explaining their response to this question. Their principal point was that although the new Sereena hybrid achieved much greater yields, the people didn't like the grain quality and wouldn't eat it. EAAFRO's millet research received as many unfavorable comments about its lack of relevance -- 11 -- as it did favorable about its relevance, and almost all of these citations came from Uganda once again. But if the distinction is made between finger and bullrush millets, seven of the 11 unfavorable comments specified bullrush millet as the reason for their response to this question while all of the remaining favorable and unfavorable comments referred to millet in general. These cereals as a whole probably are referred to so much in the context of relevance because they -- particularly maize -- are staple food crops for the overwhelming majority of the people in East Africa. Whereas EAAFRO's maize research is perceived to be relevant in all three Partner States with hardly any dissent, however, perceptions about the relevance of the sorghum and millet work are more evenly divided and are concentrated in Uganda.

The only other fields of EAAFRO activities that were significantly mentioned in the reasons for the responses to question 20 were forestry and sugar cane research. Eleven national researchers mentioned the relevance of EAAFRO's forestry research in explaining their responses, while only one unfavorable comment about its lack of relevance was made. EAAFRO's sugar cane research was cited by 12 national researchers for its relevance and no one mentioned it unfavorably as having a lack of relevance. Five national researchers cited the virus survey being carried out by EAAFRO's Plant Pathology and Nematology Division for its relevance, and EAAFRO's work on army worm, soil fertility, animal production, and soil physics research, and on the quarantine service, all received one or two favorable comments on their relevance.

Only a few favorable comments about the relevance of EAAFRO's projects brought up the issue of project selection. One national researcher from Uganda thought EAAFRO's projects were relevant because the national permanent secretaries in the Ministries of Agriculture selected them; two from Kenya because Specialist Committees for forestry and sugar cane selected them. From a more parochial viewpoint, four researchers from Kenya thought EAAFRO's projects were relevant because

the work was being done in Kenya, while three from Uganda thought the same with respect to EAAFR0's decentralized divisions. Two national researchers remarked that so little research had been done in East Africa that anything EAAFR0 was doing must be relevant, and two that with so much activity going on at EAAFR0 something must be relevant.

On the negative side, 14 national researchers remarked that their lack of knowledge about EAAFR0 must be due to the fact that nothing relevant was going on out there for them to hear about. Only four researchers from Uganda and one from Tanzania mentioned that EAAFR0 work being carried out in Kenya was therefore not relevant to their conditions; only two from Uganda and one from Kenya that EAAFR0 was only duplicating what their own national research programs were doing; only one from Uganda and one from Tanzania that EAAFR0's research was too fundamental to be relevant; only one from Tanzania that EAAFR0 officers chose their own projects for their own personal reasons; and only one from Tanzania that EAAFR0 just wasn't aware of Tanzania's problems. The biggest factor outside of specific research examples for doubts about the relevance of EAAFR0's projects among national researchers, therefore, is a lack of knowledge about what EAAFR0 is doing. There is no widespread negative feeling among national researchers toward EAAFR0's relevance based on any of the other reasons mentioned above.

The opinions of national researchers as to the scientific quality or competence of EAAFR0's research performance were obtained in question 21, and the results are shown below in Table VII.23. The overwhelming opinion in all three Partner States is that EAAFR0's research performance is Competent or Very Competent. Only 20 national researchers feel EAAFR0 research is Just About Average and two that it is Incompetent. Most of the national researchers who couldn't or wouldn't respond to this question did so on grounds of a lack of knowledge once again. There are slightly different response patterns for citizen and expatriate researchers from Kenya, but this is the only dissimilarity and it does not seem to be significant. EAAFR0's reputation as the quality agricultural and forestry research institution in East Africa remains intact among national researchers in the Partner States.

The principal reason why EAAFR0's research is so highly regarded among national researchers is their perceptions about the high quality of EAAFR0's staff -- the advanced degrees, the length of research experience, the high percentage of foreign expatriates from industrialized countries. Twenty researchers from Kenya, nine from Uganda, and seven from Tanzania cited this impression as the

Table VII.23 - Perceived Competence of EAAFRO Research

Number of National Researchers from -	EAAFRO research perceived to be						Totals
	Very Competent	Competent	Just 'About' Average	In- competent	Very 'In- competent	No Answer	
Kenya	20	38	9	-	-	8	75
Uganda	8	28	5	1	-	2	44
Tanzania	7	22	6	1	-	10	46
Totals	35	88	20	2	-	20	165
<u>Citizen Re- searchers</u>							
Kenya	9	32	5	-	-	4	50
Uganda	5	16	3	-	-	1	25
Tanzania	4	8	1	-	-	-	13
Totals	18	56	9	-	-	5	88
<u>Ex-Patriate Researchers</u>							
Kenya	11	6	4	-	-	4	25
Uganda	3	12	2	1	-	1	19
Tanzania	3	14	5	1	-	10	33
Totals	17	32	11	2	-	15	77

reason why they responded favorably to this question. African researchers were particularly impressed by the relatively high recruitment standards that were maintained by EAAFRO and by the advanced education and training that EAAFRO's African recruits often received. An additional number (25) of other national researchers cited the high quality or competence of specific EAAFRO officers they knew.

The results of EAAFRO's work was another frequently (39) mentioned reason national researchers gave to explain favorable responses to this question. EAAFRO's maize research was again cited the most of any specific field, with forestry, sorghum, and sugar cane work also being mentioned, but others just mentioned the high quality of EAAFRO's work in general without specifying any particular field. A number of additional national officers (28) mentioned their impressions from EAAFRO publications as the basis for their favorable opinion, which also refers to the results of EAAFRO's work. A few national researchers

responded favorably to this question because of EAAFRO's better equipment and facilities, its better financial structure, its international status and its stability. Two national researchers made a special point of the high quality of EAAFRO's past staff as the reason for their favorable response, and two responded favorably because all researchers are competent.

In this generally favorable atmosphere there weren't many negative remarks made about the quality or competence of EAAFRO's staff or results, but there were a few. Many (13) of these negative remarks came from Ugandan researchers, and they were mainly directed against the EAAFRO officers in the Sorghum and Millet Division located in Uganda. Some of the criticisms concerned aspects of the foreign aid system these officers operated under (e.g., high turnover in personnel), but most concerned personal characteristics, such as a lack of dedication and wastefulness, and conform to the general pattern of Ugandan reactions to this division. Only one national researcher from Kenya and two from Tanzania even questioned the scientific quality or competence of EAAFRO's staff. One specialized aspect of staff criticism that also appeared were reservations voiced about the quality of EAAFRO's newly recruited African officers. Five comments from Kenya, one from Uganda, and one from Tanzania did bring this matter up, but the remarks seemed to reflect experience rather than racial concerns since both European and African national officers were involved. There were also two relatively bitter allegations from African researchers in Kenya in this context, however, against expatriate officers at EAAFRO who were deliberately not training their African counterparts and obstructing them in their attempts to raise their level of scientific competence. Only a very few national researchers (10) made unfavorable comments about EAAFRO's work or results in explaining their responses to this question, and they were all in different fields.

National researchers' opinions on the third institutional function necessary to produce utilizable research results, the transferring or dissemination of EAAFRO's research results to themselves, were obtained in question 22 and the results are shown below in Table VII.24. Most of the responses to this question are bunched into the three middle categories, with Just About Average scoring slightly more than Successful, and Unsuccessful somewhat behind both but still significant. Although it would be difficult to conclude from these results that there are problems in the transfer of EAAFRO results to national researchers, it is apparent in examining the patterns shown in Tables VII.22, 23, and 24 that EAAFRO's transfer process scores lower than either its project selection

Table VII.24 - Perceived Success of Results Transfer

Number of National Researchers from -	EAAFRO Results Transfer perceived to be						Totals
	Very Successful	Successful	Just About Average	Unsuc- cessful	Very Unsuc- cessful	No Answer	
Kenya	4	22	28	14	4	3	75
Uganda	2	16	17	9	-	-	44
Tanzania	2	15	14	8	1	6	46
Totals	8	53	59	31	5	9	165
<u>Citizen Re- searchers</u>							
Kenya	2	16	21	8	3	-	50
Uganda	2	10	10	3	-	-	25
Tanzania	2	6	4	1	-	-	13
Totals	6	32	35	12	3	-	88
<u>Ex-patriate Researchers</u>							
Kenya	2	6	7	6	1	3	25
Uganda	-	6	7	6	-	-	19
Tanzania	-	9	10	7	1	6	33
Totals	2	21	24	19	2	9	77

or scientific work processes in the opinions of national researchers. This relatively lower pattern is also consistently maintained by all Partner States and by both citizen and expatriate researchers. In arriving at these responses, moreover, many national researchers internally compared what they perceived EAAFRO's success to be in fulfilling this function with the success of their own national systems -- a comparison that probably put EAAFRO's transfer performance in a somewhat better light.

In explaining their responses to this question, national researchers made many more negative remarks about EAAFRO than positive, even when they answered favorably. Most of them thought of their response to this question in terms of publications -- enough or not enough -- rather than personal contacts. Twenty-one national researchers thought EAAFRO adequately published its results in general terms, and an additional twenty-nine national researchers favorably

Table VII.25 - National Use of EAAFRO Newsletter

Number of National Researchers from -	Did Read Newsletter				Totals	Did Not Read Newsletter	No Answer	Totals
	High	Medium	Low	Totals				
Kenya	14	10	14	38	36	1	75	
Uganda	17	9	9	35	9	-	44	
Tanzania	12	6	10	28	15	3	46	
Totals	43	25	33	101	60	4	165	
<u>Citizen Re- searchers</u>								
Kenya	13	8	7	28	22	-	50	
Uganda	4	7	6	17	8	-	25	
Tanzania	9	1	-	10	3	-	13	
Totals	26	16	13	55	33	-	88	
<u>Expatriate Researchers</u>								
Kenya	1	2	7	10	14	1	25	
Uganda	13	2	3	18	1	-	19	
Tanzania	3	5	10	18	12	3	33	
Totals	17	9	20	46	27	4	77	

referred to the East African Agricultural and Forestry Journal in this context, an additional fifteen to EAAFRO's Annual Reports, and an additional eleven to the EAAFRO Newsletter. These responses were all reasonably well distributed among the Partner States.

Many national researchers felt differently, however. Fifty-five national researchers -- 38 from Kenya, 10 from Uganda, and seven from Tanzania -- indicated in responding to this question that the publication of EAAFRO results was inadequate or that they didn't ever see the results of EAAFRO's work. Why so many national researchers from Kenya compared to Uganda or Tanzania should fall into this category is hard to understand, but it might be that being so close they expected more from EAAFRO than researchers in the other Partner States. A few others criticized specific EAAFRO publications in explaining their responses. Eight national researchers cited the Journal for being two to three years out of

Table VII.26 - National Use of EAAFRO Annual Report

Number of National Researchers from	Did Read Annual Report				Totals	Did Not Read Annual Report	No Answer	Totals
	High	Medium	Low	Totals				
Kenya	24	11	14	49	25	1	75	
Uganda	12	8	14	34	10	-	44	
Tanzania	6	8	7	21	22	3	46	
Totals	42	27	35	104	57	4	165	

Citizen Researchers

Kenya	16	8	8	32	18	-	50
Uganda	4	3	9	16	9	-	25
Tanzania	3	4	-	7	6	-	13
Totals	23	15	17	55	33	-	88

Ex-Patriate Researchers

Kenya	8	3	6	17	7	1	25
Uganda	8	5	5	18	1	-	19
Tanzania	3	4	7	14	16	3	33
Totals	19	12	18	49	24	4	77

date in publishing results, for publishing low quality papers, or for publishing only in limited fields; a few cited the Newsletter for not being technical or detailed enough; a few cited the Annual Reports for being out of date and for being too long and detailed. All three publications were criticized by a few national researchers for arriving infrequently or not at all, but it was admitted by some that this might be a national problem rather than EAAFRO's. In fact, in recognition of the fact that a "transfer" implies a receiver as well as a sender, two researchers from Kenya, one from Uganda, and two from Tanzania blamed themselves and their colleagues for their unfavorable opinions about the transfer of EAAFRO results.

Closely related to the above unfavorable comments about EAAFRO's transfer efforts was another explanation given by 16 national researchers. Their point

was that although there were some EAAFRO publications transferring results, that EAAFRO essentially was a passive actor in the transfer process. If a national researcher made an inquiry or asked about specific results; he would most likely get a reply, but EAAFRO was not pushing their own results. Although the important factor of personal contacts in the transfer process was not brought up as much as publications, thirteen national researchers did mention the lack of such contacts in explaining their response, while only two mentioned the existence of such contacts in their reasons for a favorable response to this question. Specific fields of EAAFRO research were also referred to in a few cases as examples where successful transfer had taken place -- those most frequently mentioned being maize and armyworm research. One characteristic both these fields had in common was their almost total support by foreign aid sources and the provision in that support for conferences, seminars, and other transfer mechanisms.

Interview question 23 followed this up by asking a series of questions about each of the three EAAFRO publications -- the Newsletter, the Annual Report, and the Journal -- and about any other kinds of written documents from EAAFRO which might exist to transfer or disseminate information. The results are shown below in Tables VII.25, 26, and 27. Those researchers in the High category looked at almost every issue of the publication, reading all relevant material; those in the Medium category looked at occasional issues, when the opportunity presented itself, reading only a few articles; those in the Low category had only seen or looked at one or two issues, hardly ever reading anything. Of all the EAAFRO publications, only the Journal seems to be regularly and thoroughly read by large numbers of national researchers in all three Partner States. Very few national researchers had never read it and 96 were High readers, including both citizens and expatriates. The other two publications, however, are apparently having much less of an impact in the national systems. Only 43 national researchers were High readers of the Newsletter, and 60 had never read it at all; only 42 national researchers were High readers of the Annual Reports, and 57 had never read them at all. Some dissimilarities exist in the response patterns to this question. In the case of the Newsletter, for example, a disproportionate number of Kenyan researchers had never read it, and in Kenya and Tanzania the citizen researchers seem to read it more than do expatriate researchers while the reverse is true in Uganda.

Table VII.27 - National Use of East African Agriculture and Forestry Journal

Number of National Researchers from -	Did Read Journal				Total	Did Not Read Journal	No Answer	Totals
	High	Medium	Low					
Kenya	45	10	10	65	5	5	75	
Uganda	33	5	3	41	1	2	44	
Tanzania	18	11	8	37	6	3	46	
Totals	96	26	21	143	12	10	165	
<u>Citizen Re-</u> <u>searchers</u>								
Kenya	34	2	8	44	3	3	50	
Uganda	18	5	2	25	-	-	25	
Tanzania	9	3	-	12	1	-	13	
Totals	61	10	10	81	4	3	88	
<u>Expatriate</u> <u>Researchers</u>								
Kenya	11	8	2	21	2	2	25	
Uganda	15	-	1	16	1	2	19	
Tanzania	9	8	8	25	5	3	33	
Totals	35	16	11	62	8	7	77	

The national researchers who had read these EAAFRo publications also gave opinions on their worth as means of disseminating information, and the results for the High readers and all readers are shown in Tables VII.28 and VII.29 below. Of the three publications, the Journal is the most favorably regarded by national researchers -- in all three Partner States for both citizens and expatriates. The Newsletter receives the highest number of unfavorable responses, but is still regarded as average or higher by most of the national researchers who have read it, and the Annual Reports are regarded favorably by most national researchers but receive proportionally more Just About Average and less Very Good responses than does the Journal.

One of the biggest complaints national researchers mentioned in discussing their responses to this question was that these EAAFRo publications were not reaching them or their station. Thirty-six national researchers from all three Partner States specifically pointed out that the Newsletter wasn't reaching them; 24 from all Partner States that the Annual Reports were no longer reaching

Table VII.28 - Perceptions of Worth of EAAFRO Publications - High Readers

EAAFRO Publication	Publication Perceived to be						Totals High Readers
	Very Good	Good	Just About Average	Not So Good	No Good At All	No Answer	
Newsletter	6	18	13	5	1	-	43
Annual Report	12	19	10	1	-	-	42
Journal	45	41	7	3	-	-	96

Table VII.29 - Perceptions of Worth of EAAFRO Publications - All Readers

EAAFRO Publication	Publication Perceived to be						Totals All Readers
	Very Good	Good	Just About Average	Not So Good	No Good At All	No Answer	
News Letter	13	34	27	18	3	6	101
Annual Report	23	48	27	5	-	5	104
Journal	54	66	15	5	-	3	143

them; ten from Kenya and Tanzania that the Journal was no longer reaching them. This complaint principally came from national researchers who knew of the publication, had read it in the past, but were no longer able to do so and they didn't understand why. It appeared that the Newsletter, for example, was being sent to the larger stations in East Africa, but not to some of the smaller ones which existed in Kenya -- e.g., Kisii, Coast (Mtwapa), Kibos, Molo, etc. Furthermore, even to the large stations only one copy was being sent which often meant that 1) it went to the station library where people didn't see it and had no reason to ask for it, or 2) it was circulated among the officers and either lost or delayed en route. If the Newsletter is to become an effective means of communication with national researchers, the cost-benefits of sending a copy to each national officer might be examined. EAAFRO's Annual Report seems to be subject to a similar problem in that only a limited number of copies are printed and distributed due to their cost. The few that are sent to the national research systems go to Ministry of Agriculture headquarters and the larger stations once again, often to be buried in the libraries and never seen by many national researchers unless a particular event stimulates them to search for it. The Journal, however, is widely distributed throughout Kenya and Uganda, and being the only agricultural and forestry periodical published in the region it is

difficult to understand why some researchers in Kenya haven't read it or aren't able to read it. In Tanzania there were some reports that the Journal was being held up by the Ministry and simply wasn't being sent to the stations.

Many of the negative comments made about the Newsletter by national researchers seem to relate to a lack of recognition or acceptance of what function a Newsletter is designed to fulfill. There were many complaints in all three Partner States about its brevity, its lack of scientific detail, and the irrelevance of columns on staff movements, visitors, research trips, etc. A few did understand, however, and commented that for the limited purposes of a Newsletter this one was all right, and an additional few even praised it for highlighting issues while still being concise, for news on what the staff was doing, etc.

EAAFRO's Annual Report received many compliments for being well produced, well presented, well written -- a "professional" job -- in all Partner States. It was also cited favorably for its comprehensiveness in covering everything EAAFRO was doing, but at the same time some negative comments were also made about its shallowness and lack of scientific detail. Only a very few national researchers mentioned the usefulness of the Annual Report in giving them relevant information, but three from Tanzania and two from Kenya brought up specific cases in which they had followed up on the names of EAAFRO officers found in the Annual Report and obtained useful information in that way.

Although it is an EAAFRO publication, the East African Agricultural and Forestry Journal publishes articles from national, university, and private researchers as well. And although it is widely read and favorably regarded, there are still some specific criticisms that national researchers have which seem to be related to their attempts to publish their own work in it. As was indicated in the discussion of the previous question, the Journal is here again singled out for criticism for being out of date and for two to three year delays between submission and publication of articles. In Kenya, once again, the racial theme appeared as a few African national researchers complained that Africans had a harder time getting their work published in this white dominated Journal than did European researchers. On another side of this issue, there were a sizable number of national researchers who complained that the quality or standards of the Journal were falling -- that mediocre or poor research was being published and not enough editorial care and refereeing being done to maintain standards. A very few national researchers remarked in this vein that

the Journal was desirable because it was a place to have articles published that couldn't be published elsewhere.

The great strength of the Journal as perceived by national researchers in this discussion, is its relevance and usefulness to agriculture and forestry in East Africa. Partly this seems to be because of the perceived high quality of the work that is published, but partly also just because everything published is actually done locally in East Africa -- i.e., therefore, it has to be relevant and useful. The Journal is also favorably cited by a number of national researchers for its comprehensiveness in covering East African agriculture and forestry, for its scientific detail, and for being well produced and presented.

Finally, national researchers were asked in this question if there were any other documents or publications from EAAFRO containing scientific information which they had seen. About three-fourths of the national researchers said there were not. Of the national researchers who did know of other such documents, the largest number mentioned Specialist Committee reports or minutes of meetings. The Specialist Committees are discussed directly in a subsequent question, but it is significant that the only two Committees mentioned in this context were Forestry and Entomology and Insecticides. Both of these committees were chaired by the same EAAFRO officer, who appeared to be instrumental in their state of relative activeness and in their emphasis on communication and decision-making. Other types of EAAFRO documents mentioned in response to this question included reports from the sorghum and millet, maize, armyworm, and agro-meteorology projects, quarantine regulations and guidelines, and personal correspondence.

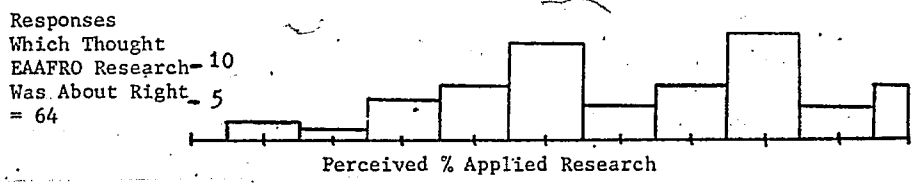
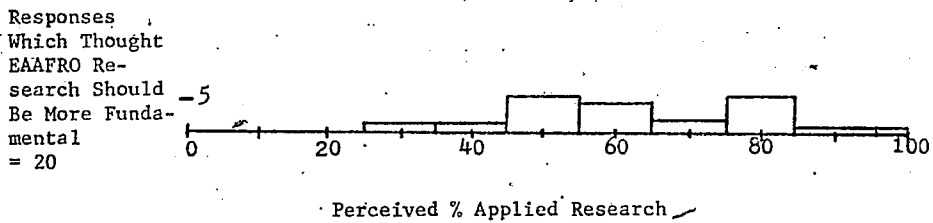
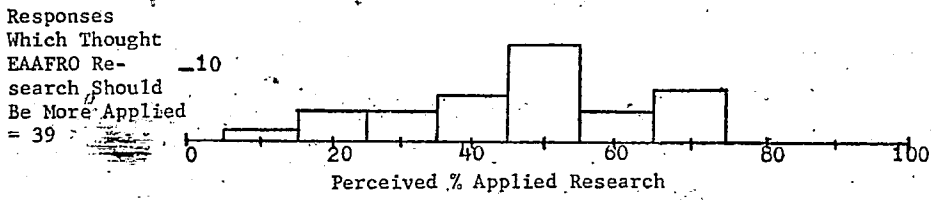
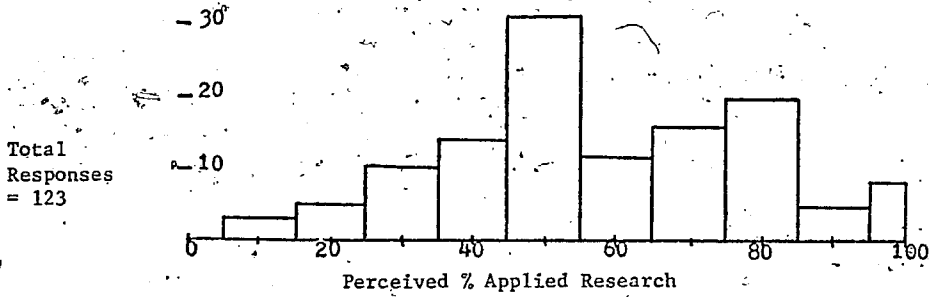
In question 24, the national researchers were asked to estimate the balance of EAAFRO's fundamental and applied research in percentage terms and to judge whether that perceived balance was about right or should be changed. The results are shown below in Table VII.30 and in Figure VII.2. The results shown in Table VII.30 are somewhat surprising in view of the often-expressed public opinion that EAAFRO's research is too academic or too fundamental and should be more applied to the obvious needs of East Africa. Of the 123 national researchers who were able to provide an estimate of what they thought the balance between fundamental and applied research was, over half (64) thought that this balance was about right! And, although the second largest number of national researchers (39) thought EAAFRO research should be more applied, a sizable number (20) also thought it should be more fundamental! The principal support for the viewpoint that EAAFRO is doing about the right amounts of fundamental and applied research

Table VII.30 - Normative Opinions of the Fundamental vs. Applied
Nature of EAAFRO Research

Number of National Researchers from -	Should be More Applied	Should be More Fundamental	Is About Right	No Answer	Totals
Kenya	14	9	32	20	75
Uganda	14	9	18	3	44
Tanzania	11	2	14	19	46
Totals	39	20	64	42	165
<u>Citizen Re-</u> <u>searchers</u>					
Kenya	11	7	21	11	50
Uganda	12	3	10	-	25
Tanzania	8	1	1	3	13
Totals	31	11	32	14	88
<u>Expatriate</u> <u>Researchers</u>					
Kenya	3	2	11	9	25
Uganda	2	6	8	3	19
Tanzania	3	1	13	16	33
Totals	8	9	32	28	77

comes from Kenya, with Uganda proportionally providing the least support. When the results are broken down by citizen and expatriate categories, more differences appear. Of the national researchers who think that the balance of EAAFRO's fundamental and applied research which they perceive should be changed, expatriate researchers are about evenly split whether the balance should be more applied or more fundamental, while citizen researchers are heavily of the opinion that it should be more applied. Even within these last statements, however, Kenya citizens are not nearly as emphatic that EAAFRO research should be more applied as are Tanzanian and Ugandan citizens, and although the expatriate totals on this point are about even, Uganda's expatriates largely believe EAAFRO's research should be more fundamental while Tanzania's believe it should be more applied. The large number of national researchers who couldn't respond to this question was due to the previously mentioned difficulty about defining what

Figure VII.2 - Perceived Amount of Applied Research Done by EAAFRO



is fundamental and what is applied research, compounded by the lack of knowledge about EAAFRO which many national researchers claimed. As was discussed in the previous chapter, definitions of these terms were deliberately avoided so the national researcher could self-anchor his perception of what this balance of EAAFRO's research was, and then give an opinion of what it should be. The relatively low number of Ugandan researchers who were not able to respond to this question seems once again to be related to their greater stability and research experience in East Africa.

An examination of Figure VII.2 produces some more information on this issue. The responses to this question were all translated into the perceived percentage of applied research and rounded up to the next ten percentile figure in order to arrive at Figure VII.2. The total range of perceptions about this characteristic of EAAFRO went from three national researchers who thought about 10% of EAAFRO's research was "applied" to eight who thought 100% was "applied." And there were no striking differences in patterns among Partner States or citizens and expatriate researchers. What seems to be true is that those national researchers who thought EAAFRO's research should be more applied perceived EAAFRO to be doing less applied research than did those who thought EAAFRO's research should be more fundamental. And, the majority of those national researchers who thought EAAFRO's fundamental and applied research balance was about right, perceive the amount of EAAFRO's applied research to be 50% of the total or greater.

Most of the national researchers who thought EAAFRO's research balance was about right or should even be more fundamental explained their responses in terms of defending fundamental research, thus perhaps indicating their awareness of popular opinion on this issue. They had two principal points: 1) that fundamental research is a necessary precursor to applied research; and 2) that EAAFRO as the centralized regional agricultural and forestry research institution in East Africa should be doing more fundamental work while leaving the applied work to the national systems in the Partner States. Those national researchers who thought EAAFRO should be doing more applied research had one principal argument: the need for applied research to solve as quickly as possible the obvious and apparent problems of poverty, hunger, etc. that exist in developing countries.

The utilization of EAAFRO's scientific services was addressed in question 25. National researchers were asked if they had ever utilized eight specific services that EAAFRO offered, and if so, how much they had used them and how

and how useful they were. The results in terms of just how many national researchers had ever utilized the eight services are shown below in Table VII.31. The pattern among Partner States is almost the same for all services: more Kenyan researchers utilize these services than do Ugandan or Tanzanian; but only in a few cases -- the Library, Statistical Advice, and the Herbarium -- do a disproportionately more number of Kenyans seem to utilize the services. It is perhaps

Table VII.31 - Utilization of Specific EAAFRO Services

EAAFRO Service	Number of researchers who have utilized from			Totals
	Kenya	Uganda	Tanzania	
Literature Service	53	34	33	120
Library	39	10	4	53
Plant Quarantine	18	11	11	40
Statistical Advice	23	10	5	38
Herbarium	23	5	6	34
Reference Collections	12	5	9	26
Chemical Analyses	10	4	5	19
Machinery Coordination	-	2	-	2

Table VII.32 - Perceptions of Usefulness of Specific EAAFRO Services -
High Users

EAAFRO Service	Number of High Users who Thought Service was of						Totals
	Very Great Use	Much Use	Some Use	Little Use	No Use	No Answer	
Literature Svc.	45	6	3	3	-	-	57
Library	12	-	1	-	-	1	14
Plant Quaran.	15	2	-	-	-	-	17
Statistical Adv.	4	1	1	-	-	-	6
Herbarium	10	-	-	-	-	-	10
Reference Col.	2	-	-	-	-	-	2
Chemical Analy.	1	1	-	-	-	1	3
Machinery Coord.	-	-	-	-	-	-	-

Table VII.33 - Perceptions of Usefulness of Specific EAAFRO Services-All Users

EAAFRO Service	Number of Users who thought Service was of						Totals
	Very Great Use	Much Use	Some Use	Little Use	No Use	No Answer	
Literature Service	76	21	15	5	2	1	120
Library	28	7	8	5	-	5	53
Plant Quarantine	29	4	2	2	-	3	40
Statistical Advice	18	5	6	7	1	1	38
Herbarium	26	3	4	-	-	1	34
Reference Collections	15	1	5	1	1	3	26
Chemical Analyses	7	4	4	1	2	1	19
Machinery Coordination	-	-	1	-	-	1	2

significant that the utilization of two of these three services -- Library and Statistical Advice -- almost requires face-to-face interaction between the source and recipient of the service, so that proximity is probably a factor in explaining Kenya's disproportionate response. Most of the other services can be and are carried on through the mail.

The East African Literature Service is by far the most heavily used EAAFRO service, and it is the most heavily used in all three Partner States. Moreover, the results from Tables VII.32 and 33 above indicate that an overwhelming proportion of users -- especially the High Users -- believe that this service is of Very Great Use to them. In explaining their favorable responses, most national researchers cited the lack of publications at their own national stations and therefore how necessary this service was to fill the void. In addition, there were no significant alternative sources to provide such a service in East Africa.

A sizable number of researchers in each Partner State did claim to be able to obtain a similar service from sources in Europe or North America, but these were almost all expatriates. The very few national researchers who responded unfavorably to the Literature Service made remarks about inefficiencies or delays in the service and the inability to choose relevant articles from a table of contents page only.

EAAFR0's library has been used by the second largest number of national researchers, but almost three-fourths of all users and all of the High Users were from Kenya. There is little doubt that the national researchers who frequently use this library find it of Very Great Use, but it is difficult to check material out and the Inter-Library Loan service was deliberately curtailed when the Literature Service came into effect, and therefore relatively few national researchers do use it frequently because of the distance involved. Even so, however, since it is the best agricultural and forestry library in East Africa, one might expect that more national researchers -- especially from Kenya -- would use it oftener than they apparently do. All of the favorable response explanations cite the high quality, comprehensiveness, and easy use of the library once they are there, and almost all of the unfavorable response explanations concern some variation of how difficult it is to get there.

In Tanzania, there was no significant alternative library source reported. The Ministry of Agriculture headquarters library in Dar es Salaam was mentioned a few times, but distance is almost just as much of an inhibiting factor to the utilization of that library as it is to the utilization of EAAFR0's. Moreover, there were several critical comments made about the quality of that library and the way it was being run. The library at the University of Dar es Salaam -- including the Faculty of Agriculture at Morogoro -- was also mentioned a few times by Tanzanian researchers, but distance again affected its utilization. Other libraries used included general municipal libraries in some of the larger cities and station libraries at other national research stations.

In Uganda, however, there was a significant alternative agricultural and forestry library at Makerere University. Thirty-eight of the 44 Ugandan national researchers reported using it, no doubt aided by the fact that two of the three agricultural research stations, and all the forestry researchers are located nearby. Being the oldest and best university in East Africa, Makerere's library is apparently of fairly high quality, and most of the African researchers in Uganda had gone to school there and were familiar with using it. Namulonge research station had specialized in cotton research and had also built up a fine library, on this crop in particular, during the time when it was owned and managed by the Cotton Research Corporation. Several Ugandan researchers from other stations therefore used that library for cotton information.

The Ministry of Agriculture headquarters library in Nairobi was mentioned by a significant number of Kenyan researchers as an alternative library source, but as often as not it was criticized for being inadequate and disorganized, so it is not clear that this is a preferred alternative. Slightly less Kenyan researchers mentioned using the library at the University of Nairobi, and most of these comments were favorable. The University of Nairobi is relatively young, so its library is not as good as that of Makerere, and it is not as strong an alternative source; still, the utilization of it is bound to grow as more young graduates enter the Kenyan national research system. Indeed, the Kenyan researchers who did mention using this library were almost all recent African graduates; expatriate and older African researchers hardly use it at all. Other alternative libraries used included the one at Egerton Agricultural College, several municipal libraries, and libraries at other national stations, but none were significant.

The only current alternative to the East African Plant Quarantine Service is to break the regulations and by-pass it. And yet, a few national researchers who had utilized this service mentioned doing just that because of the long time delays in getting plant material through quarantine. The Plant Quarantine Service

is applicable only to those national researchers who are involved with plant importations, so the total numbers involved are lower, but they are proportionally present in all three Partner States. Moreover, almost half of all the users (17 of 40) are in the High User category, and 15 of these thought the Service was of Very Great Use and the remaining two of Much Use. Even though the responses of the users of this Service are highly favorable, however, the explanations given for these responses center around the objectives of the Service and not its operations. East Africa is relatively free of many insect pests and plant diseases that cause great crop loss and other problems in other parts of the world, and the appreciation of the need to keep East Africa in that condition was almost certainly heightened by the fact that two examples of new pests had just recently been discovered. This appreciation, however, did not lessen the criticism by these same national researchers about the operations of the Service. Both Uganda and Tanzania were discussing the establishment of their own quarantine stations, and researchers from these countries expressed some belief that Kenya was getting more and better service to the detriment of Uganda and Tanzania. Kenyan researchers complained just as much -- if not more -- about the quarantine bottleneck, however.

The use of quarantine facilities for plant importations will logically rise the more that new crops are introduced into the region. One of the largest types of plant importations into East Africa recently has been horticultural crops, which have principally been established in Kenya. Still, both Uganda and Tanzania have expressed great interest in these crops in the past, and the cleared plant material is distributed to all three Partner States, so no one criticizes the Service on this account. As different Partner States emphasize diversification from traditional agricultural patterns through the introduction of selected new crops, however, national competition for the use of the quarantine facilities is bound to increase.

The utilization of statistical advice from EAAFRRO is mainly confined, once again, to Kenya. Not only the total pattern as indicated in Table VII.31, but five of six High Users and seven of 11 Medium Users also are from Kenya. Although most of the High Users find the service of Very Great Use, there is a sizable number of other users who found it of Little or No Use. Usually these unfavorable comments fell into two categories: 1) the advice was not presented clearly and it was not understood; and 2) national researchers have gone to the EAAFRRO statistician for advice, and he did not have the time to help.

This seems to account for why many Low Users have unfavorable responses to this service -- they have tried it once, received a negative impression, and have not gone back. When the advice has been helpful, however, it has usually simplified the national researcher's work a great deal, and this is the reason he then responds favorably to it.

In Tanzania, the expatriate Cotton Research Corporation researchers all reported being able to receive statistical advisory services from their headquarters in London, but this was the only significant alternative source mentioned. A sizable number of Tanzanian researchers did mention a statistical unit in the Ministry of Agriculture headquarters in Dar es Salaam, but only that they had heard of it rather than had trusted and used it.

In Uganda, the Cotton Research Corporation expatriate researchers again reported an access to statistical advisory services at their headquarters in London. A significant number of researchers also mentioned a statistician stationed at Kawanda as an alternative source for this kind of service, and although the position and statistician himself were new to Uganda research, several researchers reported utilizing his services. They recognized that his advice was not likely to be as statistically sophisticated as that which the EAAFRO statistician could perhaps provide, but this Uganda source was easily accessible and therefore was another alternative. Makerere University was also cited by a number of Ugandan researchers as an alternative source from which they obtained statistical advice.

A statistics unit had also recently been established at the National Agricultural Laboratories in Kenya, and a significant number of Kenyan researchers mentioned it as an alternative source of statistical advice for them. A few Kenyan researchers mentioned foreign sources of this service, but these were related to no single organization or specific foreign source. The University of Nairobi was only mentioned twice in this regard so it is not yet an effective source of statistical advice, although it could become so. Interestingly, five Kenyan researchers from Kitale mentioned that they were receiving statistical advice -- not from the EAAFRO statistician but from the EAAFRO maize geneticist stationed there.

Kenyan researchers again disproportionately dominate the utilization of the East African Herbarium's plant identification services, not only in totals as shown in Table VII.31, but also accounting for eight out of 10 High Users and 12 out of 15 Medium Users. Although it is true that plant material can

be -- and is -- sent through the mail for identification purposes, it still may be likely that distance is a factor and that national researchers tend to use the Herbarium more when they are close enough to take a plant there and find out what it is rather than send it. The users of this service overwhelmingly respond favorably to its usefulness, and ten of ten High Users say it is of Very Great Use to them. In explaining these favorable responses, almost all users mentioned some aspect of the good identification service they had received from the Herbarium. No significant alternative source of this service was reported in any of the Partner States, although the existence of small herbariums at Makerere University and Kawanda Research Station in Uganda and at the University of Nairobi in Kenya was mentioned by a few researchers in those countries.

The Reference Collections referred to in this question are just really being developed at EAAFRRO, so perhaps it was unfair to ask if national researchers were using them to help identify viruses, nematodes, forest insects, or forest fungi. Nevertheless, twenty-six reported that they had used one or more of these collections, although only two of them could be considered High Users. The virus and nematode collections had been used the most, and most of the users thought the service had been of Very Great Use. In the few instances in which this was not the case, the reasons seemed to be because of the results -- i.e., the specimen couldn't be identified (and may not have even been a virus or nematode at all) -- rather than some criticism of the service itself. No significant alternative source of this type of service was reported in any Partner State.

Chemical analyses services provided by EAAFRRO for such things as plant material, animal feed, and soil and water samples are not utilized as much by national researchers in any Partner State as might be expected. One reason is that there is a considerable amount of criticism about the service from past attempts made to obtain it. A few researchers in all three Partner States cited experiences they had had in sending samples of material to EAAFRRO for analysis and never hearing anything about them again. Another explanation is that the simplest -- and sometimes more complicated -- chemical analyses now seem to be performed within the national research system. Twenty-two Tanzanian researchers mentioned having this service performed at their own station, and 27 Ugandan researchers reported the same. Kenya has established a unit at the National Agricultural Labs to perform this service, and 50 Kenyan researchers mentioned using it. Kitale research station in Kenya also does

some of its own chemical analysis work. In Uganda, several researchers also mentioned Makerere University as an alternative source of this service, and some Cotton Research Corporation researchers in both Tanzania and Uganda mentioned their headquarters as a source. The Pyrethrum Board and the East African Industrial Research Organization were mentioned in a few special cases in Kenya.

From the results in Table VII.31, it is obvious that the Machinery Coordinating unit of EAAFRO is not providing a service to national agricultural and forestry research systems in East Africa, but then it was expected that this might be the case -- i.e., that such service would apply more to agricultural machinery stations or operational farms than to agricultural or forestry research. All three Partner States have recently established agricultural engineering stations which were referred to by a few national researchers in each Partner State in response to this question. The Agricultural Engineering department at Makerere University was mentioned by a few Ugandan researchers, and foreign sources and private firms were also mentioned by a few researchers in each Partner State. But all of these are examples of sources of agricultural machinery research or technology and more the subjects of coordination rather than a substitute for this EAAFRO service as it has been described.

In summing up the responses to these different EAAFRO services, perhaps a couple points should be made. For example, some national researchers in all Partner States would emphasize in discussing a particular service that they really needed this -- or more of this -- service and inquired how they might obtain it from EAAFRO. This occurred for statistical advisory, for chemical analyses, and for agricultural machinery advisory services. If national service needs are not met -- or if a service is not performed satisfactorily -- by a regional institution, national alternatives are bound to develop. To the extent that a particular service can be performed more easily or efficiently at the national level, this is an entirely reasonable prospect; but to the extent that a particular service can more logically be performed at a centralized and specialized regional institution, this is an undesirable development. The Literature Service is a good example of what a regional institution can do to benefit the entire region when it initiates and develops an active program. To date, however, the same amount of concern and effort does not seem to have gone into the planning and operation of other EAAFRO services.

In arriving at a composite ranking for the utilization of all EAAFRO scientific services by individual national researchers, a number of information

indices were combined. First was the matter if a service had been utilized or not, but if it had been utilized there were two other considerations taken into account: 1) whether the user was a High, Medium, or Low Utilizer of the service; and 2) how useful that service was to him. The High, Medium, and Low User categories for the different services were established on a relative basis -- i.e., ordering more than 20 reprints a year from the Literature Service was High for that service, while consulting the EAAFRO statistician more than five times with no time limitation was High for that service. Opinions on how useful the particular EAAFRO service was were taken into account in a directional sense so that unfavorable opinions on the worth of one service might cancel out favorable opinions on another. Minus scores were therefore possible, and the national researchers in the lowest rank did end up with negative total scores. The scores for each service were then added and the results ranked as shown below in Table VII.34. Although more Kenya researchers are shown to be utilizing EAAFRO services than Ugandan or Tanzanian, the national patterns are similar with the largest number of researchers falling into the Low Use category. Patterns for citizen and expatriate researchers in all three Partner States also show no significant differences.

Question 26 sought to measure some personal contact transactions between EAAFRO and national research officers. In the first part, national researchers were asked how many EAAFRO officers had visited them at their station in the preceding two years. The results are shown in Table VII.35 below. Almost half of the officers (72 out of 165) reported that they had not had one visit from an EAAFRO officer in the preceding two years! (Table VII.35 does not include visits by EAAFRO Field Trials Officers which are permanently stationed in Uganda and Tanzania as liaison agents, but it does include visits from EAAFRO officers in decentralized divisions to places other than the national stations where they are located.) This lack of contact was most pronounced in Tanzania, but also true to a significant extent in Kenya and Uganda. Only three Tanzanian researchers had received more than two EAAFRO officer visits at their stations in the preceding two years, which was quite disproportionately lower than the corresponding numbers for Kenya and Uganda. This tendency may be partly due to the distance factor, to the relative newness of many Tanzanian researchers, to travel or monetary restrictions between Kenya and Tanzania, or to other related reasons. In addition, at least some of EAAFRO officers' visits to Tanzanian research stations did not result in a favorable experience but just the opposite! More

Table VII.34 - Utilization of EAAFRO Scientific Services

Number of National Researchers from -	Composite Utilization of EAAFRO Services						No Answer	Totals
	Very High Use	High Use	Medium Use	Low Use	Very Low Use			
Kenya	5	14	16	26	14	-	75	
Uganda	-	2	12	23	7	-	44	
Tanzania	-	4	10	19	10	3	46	
Totals	5	20	38	68	31	3	165	
<u>Citizen Researchers</u>								
Kenya	2	11	12	18	7	-	50	
Uganda	-	1	5	16	3	-	25	
Tanzania	-	4	3	5	1	-	13	
Totals	2	16	20	39	11	-	88	
<u>Ex-patriate Researchers</u>								
Kenya	3	3	4	8	7	-	25	
Uganda	-	1	7	7	4	-	19	
Tanzania	-	-	7	14	9	3	33	
Totals	3	4	18	29	20	3	77	

Table VII.35 - EAAFRO Officer Visits to National Researchers

Number of National Researchers from -	Number of EAAFRO Officer Visits								No Answer	Totals
	>6	6	5	4	3	2	1	0		
Kenya	10	7	3	3	2	9	11	30	-	75
Uganda	2	3	2	4	4	3	7	19	-	44
Tanzania	-	1	-	1	1	5	12	23	3	46
Totals	12	11	5	8	7	17	30	72	3	165

than one Tanzanian officer remarked about the hurried and uncaring nature of some EAAFRO visits in which an officer flew in and out in one morning or stopped by for ten minutes between game parks. In Uganda, the greater number of researchers receiving more than two EAAFRO officer visits may have been due to their

relatively greater experience at their stations, and in Kenya this may have been due to proximity and/or the amount of cooperative research that was taking place. Particularly in the case of Kenyan officers at the National Agricultural Laboratories in Nairobi, it seemed that once a personal contact was made with an EAAFRO officer that many EAAFRO officer visits to that station subsequently took place -- i.e., once a relationship was established, it was able to be followed up because the two institutions were so close. Many Kenyan officers at the same station, however, also reported no EAAFRO officer visits to see them and this may be because that first contact was never established. Therefore, a certain minimal amount of visits seem to be made by EAAFRO officers to national stations in all Partner States, and if a national researcher reports no such visits to see him it may be due to the recency of his arrival or some other factor. Above this minimal amount, however, the number of EAAFRO officer visits may depend to a large extent on distance and other factors such as personal friendships.

Table VII.36 below shows the results to the second part of question 26 -- the total number of visits the national officers had made to EAAFRO headquarters at Muguga, just outside Nairobi in Kenya. It is apparent from this table that the largest numbers of national researchers have either not been to EAAFRO headquarters at all, or they have been there many times -- too many times to be able to remember. Moreover, it is the Kenyan researchers from the National Agricultural Laboratories in particular which make up almost the entire latter category, while Tanzanian and Ugandan researchers make up more than three-fourths of the former category.

Twenty-nine out of 46 Tanzanian researchers had never been to Muguga, and only four had been there more than twice in their life. Twenty out of 44 Ugandan researchers had never been there, but greater numbers had visited three and four times. Even 15 out of 75 Kenyan researchers had never been to Muguga, but this is a small proportion compared to the numbers which had visited a large number of times. Part of this lack of national travel from Tanzania and Uganda has undoubtedly been due to travel restrictions placed on national researchers by those governments in an effort to keep within tight budgets and conserve scarce foreign exchange, and part is also undoubtedly due to the distance involved. In Kenya, of course, there are no border restrictions for the national researchers and distances to EAAFRO are usually a lot less. Another partial explanatory factor appearing to operate in all three Partner States was the

Table VII.36 - National Officers' Visits to EAAFRO Headquarters

Number of National Researchers from -	<u>Total Number of Visits to EAAFRO Headquarters</u>							No Answer	Totals
	> 5	5	4	3	2	1	0		
Kenya	30	1	5	4	9	11	15	-	75
Uganda	2	1	2	2	8	9	20	-	44
Tanzania	-	-	2	2	2	8	29	3	46
Totals	32	2	9	8	19	28	64	3	165

recency of arrival of some national researchers to their positions. It should also be noted that many of the African national researchers who received their university education in East Africa visited EAAFRO at least once on class tours. The unique closeness of EAAFRO and Kenya's National Agricultural Laboratories might be noted also once again with respect to the relatively high numbers of national researchers from this institution who would casually visit EAAFRO large numbers of times just to use the library or visit socially with friends.

In addition to these visits to EAAFRO headquarters and national research stations, national researchers were asked in question 26 if they had met EAAFRO officers at conferences, seminars, or other kinds of meetings held at places other than their own station or EAAFRO headquarters. Forty-six researchers from Kenya, 30 from Uganda, and 18 from Tanzania reported one or more meetings of this nature. In Kenya and Uganda, specialist committee meetings were the most frequently mentioned, but in Tanzania, two special conferences the government had recently sponsored on land use and soil fertility, which an EAAFRO representative attended, were mentioned the most often. A few national researchers in each Partner State mentioned the East Africa Cereals conferences in this context -- conferences sponsored by USAID on cereals research in Greater East Africa. There was also some mention in Kenya of seminars sponsored by the National Agricultural Laboratories which EAAFRO officers attended. One meeting forum conspicuous for its absence in the discussions to this question was the East African Academy of Sciences.

A composite ranking for personal contact between the national researcher and EAAFRO research officers was developed which takes into account all of the information obtained in question 26. The basic measure is the number of EAAFRO officer visits the national researcher received in the preceding two years on a five-level scale once again, but this ranking could be altered by a significant

number of visits to EAAFRO headquarters or to meetings where EAAFRO officers also attended. The Very High and Very Low rankings were purposely made very restrictive so that the interaction with and isolation from EAAFRO of these national researchers could be emphasized. For example, in order to fall into the Very Low category, the national researcher had to report no visits from EAAFRO, no visits to EAAFRO, and no significant conference meetings. The composite results are shown in Table VII.37 below. Although the national patterns are somewhat similar in that they all peak in the Low category, Kenya again appears to have proportionally more contact with EAAFRO and Tanzania proportionally less, with Uganda in the middle. The patterns of citizen and expatriate researchers in each Partner State show no striking differences.

Table VII.37 - Personal Contact with EAAFRO

Number of National Researchers from -	Very High	High	Medium	Low	Very Low	No Ranking	Totals
Kenya	10	12	20	25	8	-	75
Uganda	2	6	7	17	12	-	44
Tanzania	-	-	3	27	13	3	46
Totals	12	18	30	69	33	3	165

<u>Citizen Researchers</u>							
	Very High	High	Medium	Low	Very Low	No Ranking	Totals
Kenya	6	8	13	17	6	-	50
Uganda	1	3	3	11	7	-	25
Tanzania	-	-	1	9	3	-	13
Totals	7	11	17	37	16	-	88

<u>Ex-patriate Researchers</u>							
	Very High	High	Medium	Low	Very Low	No Ranking	Totals
Kenya	4	4	7	8	2	-	25
Uganda	1	3	4	6	5	-	19
Tanzania	-	-	2	18	10	3	33
Totals	5	7	13	32	17	3	77

An analysis of the individual EAAFRO officers mentioned by national researchers for their visits to national research stations shows few surprises. As one might expect, EAAFRO administrative personnel were near the top of the list in all three Partner States for the number of national researchers who mentioned receiving visits from EAAFRO officers. Other non-administrative officers stood out in this context, especially in one case where the officer had just been with EAAFRO for one year prior to the study. The officers in the Plant Pathology and Nematology Division apparently have made more visits to national researchers than those in any other EAAFRO division, although for some reason they are conspicuously absent from the Uganda list. It is also probably true that other EAAFRO divisions - such as Forestry - might be under-represented on these lists because not enough national level counterparts in their field were interviewed.

Opinions about EAAFRO liaison agents were obtained in question 27. Field Trials Officers of EAAFRO are permanently stationed in Uganda and Tanzania to

coordinate and assist in the testing of new cereals varieties under varied local conditions. The opinions of national researchers in those two countries toward these officers are shown below in Table VII.38. The overwhelming opinion toward the Field Trials Officers in both countries is favorable and in the top two categories, but expatriate researchers in both countries seem to be more favorably inclined than do citizen researchers. There was also a high awareness of these relatively new positions, as only three Ugandan and four Tanzanian researchers had never heard of the position title or the individuals who filled it. The few unfavorable opinions that came from Uganda were related to feelings that

Table VII.38 - General Opinions toward EAAFRO Field Trials Officers

Number of National Researchers from -	<u>Field Trials Officers perceived</u>						Totals
	Very Favorably	Favorably	Neutral	Un- favorably	Very Un- favorably	No Answer	
Uganda	20	11	5	3	1	4	44
Tanzania	20	11	4	-	1	10	46
Totals	40	22	9	3	2	14	90
<u>Citizen Re- searchers</u>							
Uganda	8	7	4	1	1	4	25
Tanzania	4	4	3	-	1	1	13
Totals	12	11	7	1	2	5	38
<u>Ex-Patriate Researchers</u>							
Uganda	12	4	1	2	-	-	19
Tanzania	16	7	1	-	-	9	33
Totals	28	11	2	2	-	9	52

this position was only duplicating work already being done or that a citizen of Uganda should have been recruited to fill the position since high scientific qualifications were not required. The large number of favorable opinions, on the other hand, were mostly related to the need for rigorous field trials in testing new plant varieties under varied local conditions. It was explicitly or implicitly recognized by these national researchers that the national research systems hadn't been doing a fully adequate job in this respect and that regional help was needed. Only a very few national researchers cited the coordination or liaison between EAAFRO and the national system aspect of the Field Trials Officer in explaining a favorable response.

It was also discovered again in response to question 27 that agricultural machinery is only a very peripheral part of agricultural and forestry research in East Africa. National researchers use machinery for such things as carrying out field trials, of course, but usually not in an experimental sense. Fifty-seven national researchers in the Partner States did report some limited experimental connection with machinery, however, mainly with insecticidal spraying machinery, nut shellers, cotton gins, coconut oil extractors, etc. were also mentioned once or twice. The EAAFRO officer in charge of the Machinery Coordinating Service is virtually unknown in the national agricultural and forestry research systems of all three Partner States. Of all national researchers interviewed, only seven had met him, 21 had heard of but not met him, and 132 had not even heard of him.

In question 28, national researchers were asked to name as many EAAFRO researchers as they could. The numerical results are shown below in Table VII.39. Just over two-thirds of the national researchers were able to name between one and six EAAFRO research officers. Very few couldn't name any at all, but the largest single group was those that could name only from one to three. The national and citizens and expatriate patterns shown are all roughly similar, but Uganda's pattern peaks earlier in the middle category and proportionally more Ugandan researchers know greater numbers of EAAFRO officers than Kenyan or Tanzanian researchers do. This may indicate that experience in East Africa is a more important factor influencing this variable than proximity. Both greater distances and less experience could be influencing Tanzania's low score on this measure.

An analysis of the EAAFRO officers named by national researchers in response to question 28 also provides some interesting trends. Table VII.39 below groups the EAAFRO officers into racial sets of European and non-Europeans, and lists the officers in each group according to the total number of national researchers who knew them.* This total number of national researchers is then broken down into the numbers of European and non-European national researchers who knew that EAAFRO officer. In examining who the best-known EAAFRO officers are, one noticeable factor involved is the administrative functions that most of them have been associated with. Many of them have also had a relatively long tenure with EAAFRO, but other EAAFRO officers with just as much or more experience with EAAFRO are much less well-known.

*Actual names of EAAFRO officers will not be shown in Table VII.40 to preserve confidentiality and avoid any potential embarrassment to those concerned.

Table VII.39 - Number of EAAFRÖ Research Officers Known

Number of National Researchers from -	Number of EAAFRÖ research officers known					No Answer	Totals
	> 9	9 - 7	6 - 4	3 - 1	0		
Kenya	5	11	20	33	6	-	75
Uganda	4	13	18	9	0	-	44
Tanzania	1	3	11	20	8	3	46
Totals	10	27	49	62	14	3	165
<u>Citizen Re- searchers</u>							
Kenya	2	7	15	22	4	-	50
Uganda	1	7	10	7	-	-	25
Tanzania		2	4	6	1	-	13
Totals	3	16	29	35	5	-	88
<u>Expatriate Researchers</u>							
Kenya	3	4	5	11	2	-	25
Uganda	3	6	8	2	-	-	19
Tanzania	1	1	7	14	7	3	33
Totals	7	11	20	27	9	3	77

The difference seems to be due to the specialized nature of the research of the latter EAAFRÖ officers and/or their lack of travel and exposure around the region. Therefore, Forestry, Plant Quarantine, Herbarium, and Animal Production officers seem to be less well-known, for example, than do Plant Pathology and Nematology and Physics and Chemistry officers. A confounding factor in the above generalization, however, is the decentralized locations of some EAAFRÖ officers at large national stations -- Kawanda and Serere in Uganda, and Kitale in Kenya -- where they are known just because they are there. This seems to particularly affect how well known the Sorghum and Millet officers, the Sugar Cane Breeding officer, the Maize Genetics officer, and the Field Trials Officers are. When the locations of the national officers who knew these EAAFRÖ officers are examined, the strong influence of the Serere, Kawanda, and Kitale stations -- and of Uganda and Tanzania -- on how well known they are is apparent.

But the most important result shown in Table VII.40 is the division along racial lines of the EAAFRÖ officers that European and non-European national

Table VII.40 - Analysis of Knowledge of EAAFRO Officers
According to Racial Groupings

Name of EAAFRO Officer	Race	Total Number of National Researchers who knew Officer	Number of European National Researchers who knew Officer	Number of African and Asian National Researchers who knew Officer
1	European	48	28	20
2	"	44	18	26
3	"	30	17	13
4	"	30	10	20
5	"	29	15	14
6	"	27	15	12
7	"	26	13	13
8	"	25	11	14
9	"	22	14	8
10	"	21	10	11
11	"	20	9	11
12	"	19	7	12
13	"	16	5	11
14	"	16	5	11
15	"	16	6	10
16	"	15	5	10
17	"	14	14	8
18	"	14	7	7
19	"	10	4	6
20	"	10	6	4
21	"	9	6	3
22	"	7	1	6
23	"	5	4	1
24	"	3	1	2
25	"	2	2	-
26	"	1	-	1
27	"	1	-	1

Table VII.40 (continued)

Name of EAAFRO Officer	Race	Total Number of National Researchers who knew Officer	Number of European National Researchers who knew Officer	Number of African and Asian National Researchers who knew Officer
28	African	72	18	54
29	"	41	15	26
30	"	24	4	20
31	Asian	14	7	7
32	African	12	-	12
33	"	10	2	8
34	"	9	2	7
35	"	5	3	2
36	"	5	-	5
37	"	4	-	4
38	"	3	1	2
39	"	3	-	3
40	Asian	2	2	-

researchers know. Roughly similar numbers of European and non-European national researchers know European EAAFRO officers, but it appears that proportionally more non-European national researchers know non-European EAAFRO officers than do European national researchers. Two exceptions to the above generalization are Asian EAAFRO officers. One might attempt to explain this difference by the relatively recent arrival of some of the new African graduates joining EAAFRO's staff, but the numbers of national researchers who know EAAFRO's new African Director, who has over 10 years experience, show perhaps the largest discrepancy. Moreover, there are European officers on EAAFRO's staff who have arrived just as recently which are known by roughly similar numbers of European and non-European national researchers. This pattern also holds across EAAFRO divisions, except for one officer in the Herbarium.

National officers in question 28 were also asked to indicate which of these EAAFRO officers they considered to be personal friends as opposed to acquaintances or professional colleagues. Those results are shown below in Table VII.41. Well over half the national researchers considered none of the EAAFRO officers

Table VII.41 - Number of EAAFRO Research Officers as Personal Friends

Number of National Researchers from -	Number of EAAFRO Officer Friends						No Answer	Totals
	>4	4	3	2	1	0		
Kenya	1	1	3	11	15	44	-	75
Uganda	2	1	3	7	14	17	-	44
Tanzania	1	-	1	2	5	34	3	46
Totals	4	2	7	20	34	95	3	165
<u>Citizen Researchers</u>								
Kenya	1	1	1	6	8	33	-	50
Uganda	1	1	1	2	11	9	-	25
Tanzania	1	-	1	1	1	9	-	13
Totals	3	2	3	9	20	51	-	88
<u>Expatriate Researchers</u>								
Kenya	-	-	2	5	7	11	-	25
Uganda	1	-	2	5	3	8	-	19
Tanzania	-	-	-	1	4	25	3	33
Totals	1	-	4	11	14	44	3	77

they knew to be personal friends, and most of those who did have friends only had one or two. There does not appear to be that many personal friendships between regional and national researchers in East Africa. Ugandan researchers, however, once again appear to have proportionally more EAAFRO officer friends and Tanzanian researchers, to have proportionally less. Total patterns for citizen and expatriate researchers appear to be roughly similar, but interestingly enough a higher proportion of expatriate researchers in Kenya appear to have EAAFRO friends than do citizen researchers, while the opposite is true in Uganda.

An analysis of the EAAFRO officers considered by national researchers to be personal friends -- similar to the previous Table VII.40 -- is shown below in Table VII.42. If anything, the apparent difference between European and non-European national researchers is even more emphatic with respect to their personal friendships with EAAFRO officers than it was with their knowledge. Once again, roughly similar numbers of European and non-European national researchers consider

*Again, the actual names of the EAAFRO officers will not be shown in Table VII.42 to preserve confidentiality and avoid any potential embarrassment to those concerned.

Table VII.42 - Analysis of Personal Friendships with EAAFRO OfficersAccording to Racial Groupings

Name of EAAFRO Officer	Race	Total Number of National Researchers who considered a personal friend	Number of European National Researchers who considered a personal friend	Number of African/Asian National Researchers who considered a personal friend
1	European	13	6	7
2	"	7	4	3
3	"	7	5	2
4	"	6	6	2
5	"	6	4	2
6	"	5	1	4
7	"	5	2	3
8	"	4	2	2
9	"	4	3	1
10	"	4	2	2
11	"	3	3	2
12	"	3	3	-
13	"	3	1	2
14	"	2	-	2
15	"	2	1	1
16	"	2	1	1
17	"	2	-	2
18	"	2	1	1
19	"	1	-	1
20	"	1	1	-
21	"	1	1	-
22	African	13	1	12
23	"	7	1	6
24	"	7	-	7
25	"	3	-	3
26	"	3	-	3
27	"	3	-	3
28	"	2	-	2
29	Asian	2	-	2
30	African	2	-	2
31	"	1	-	1

European EAAFRO officers to be their personal friends, but only two European national researchers in total consider African/Asian EAAFRO officers to be personal friends! In examining the individual EAAFRO officers who are considered by larger numbers of national researchers to be personal friends, the effect of being permanently stationed in a decentralized location and/or doing a relatively great amount of traveling away from Muguga seem to be important factors. Nationality is also a factor that plays some part in African EAAFRO officer and African national researcher friendships, but how much is difficult to determine.

Finally, African national researchers were asked in question 28 to indicate any EAAFRO officers who had been their university "schoolmates" (but not necessarily the same class). The results are shown below in Table VII.43. Of the 29

Table VII.43 - Number of African EAAFRO Research Officers as Schoolmates

EAAFRO Officer	Number of African National Researcher Schoolmates from			Totals
	Kenya	Uganda	Tanzania	
C. Karue	6	-	1	7
F. J. Wangati	4	1	1	6
B. N. Majisu	3	2	1	6
M. Simbwa-Bunnya	1	2	-	3
F. Owino	2	-	-	2
T. Olembo	1	-	-	1
J. Kachacheba	-	-	1	1
Ngundo	1	-	-	1
C. Kabuye	1	-	-	1
J. Migunda	1	-	-	1
Totals	20	5	4	29

schoolmate situations, three African national researchers were classmates with African EAAFRO officers in India, two in the U.S.A., one in the U.K., one in Canada, two at the University of Nairobi, and 20 at Makerere University. To the extent that an indigenous network of regional-national research "old boys" has developed, it appears to have largely been based on university education at Makerere, but these linkages seem to be far more extensive in Kenya than in the other two Partner States. Moreover, these Makerere linkages do not exist for

the younger national researchers and will not exist for future researchers in Kenya and Tanzania because of the expansion of national universities in Nairobi and Dar es Salaam. Personal friendships among regional and national African researchers, however, have developed in some instances where Makerere University was not a factor -- the most notable example being M. Simbwa-Bunnya who had the largest number of African national researchers (12) who considered him a personal friend but who received his university education in India. In his case, however, he was a researcher in the Ugandan national system before becoming an EAAFRO officer and he is permanently stationed at Kawanda Research Station in Uganda in the decentralized Sugar Cane Breeding Division.

Therefore, in examining Tables VII.40, 42, and 43, it is difficult to determine how much of an "old boys" network has developed among indigenous regional and national researchers in East Africa, and how much further one is likely to develop in the future. It is likely that only the smallest beginnings of one has developed to date, based largely on education at Makerere University, and that further development is going to be difficult because of the establishment of separate national universities in each Partner State. Nevertheless, it is possible to develop the necessary knowledge of and friendships between regional and national researchers through other mechanisms such as those mentioned above in the case of M. Simbwa-Bunnya.

The last distinct potential EAAFRO benefit to individual national researchers -- the number of articles published in the East African Agricultural and Forestry Journal -- was measured in question 29, and the results are shown below in Table VII.44. Two things are immediately apparent: 1) a very low number (22) of national researchers have had articles published in the Journal; and 2) of that low number, a highly disproportionate number have been expatriates. Articles "in press" were included in this table, and still of the 165 national researchers in agriculture and forestry interviewed, only 17 from Kenya and five from Uganda had had articles published in this local agricultural and forestry journal! Not one national researcher from Tanzania could be found who could respond positively to this question.

It was noted in some of the discussions to previous questions that the issue of racism was brought up with regard to the operations of the Journal by some African researchers from Kenya, and the fact that only seven of the 22 national researchers who could respond positively to this question were African emphasizes their point, which was again raised in the discussions to

Table VII.44 - Number of Articles Published in Journal

Number of National Researchers from -	Number of Articles Published in Journal						No Answer	Totals
	>4	4	3	2	1	0		
Kenya	1	1	2	1	12	58	-	75
Uganda	1	2	-	-	2	39	-	44
Tanzania	-	-	-	-	-	43	3	46
Totals	2	3	2	1	14	140	3	165
<u>Citizen Researchers</u>								
Kenya	-	-	1	-	5	44	-	50
Uganda	-	-	-	-	1	24	-	25
Tanzania	-	-	-	-	-	13	1	13
Totals	-	-	1	-	6	81	1	88
<u>Ex-patriate Researchers</u>								
Kenya	1	1	1	1	7	14	-	25
Uganda	1	2	-	-	1	15	-	19
Tanzania	-	-	-	-	-	30	3	33
Totals	2	3	1	1	8	59	3	77

this question. It is true that many of the African researchers in Kenya's national research system were relatively recent graduates, but even some with much more experience were disgruntled with the alleged reception that papers from African researchers received in the Journal's editorial office.

Since publishing was the final potential EAAFRO benefit to be measured, and since most of the other benefits had not individually achieved widespread positive responses among national researchers, it was decided to develop a composite score for all six benefits that a national researcher might receive from EAAFRO: Institution-Building, Research Collaboration, Utilization of Research Results, Utilization of Scientific Services, Interpersonal Relations, and Publishing. A simple additive scoring system was developed in which all six benefits were equally weighted, but where the positive to negative opinion about the potential EAAFRO "benefit" was taken into account as well as the reception of it by the national researcher. The results are shown in Table VII.45 below. Reflecting the previous responses, Tanzanian researchers are shown to be

Table VII.45 - Composite EAAFRO Benefits Received by
National Researchers

Number of National Researchers from	<u>EAAFRO Benefits Received were</u>						Totals
	Very High	High	Medium	Low	Very Low	No Answer	
Kenya	6	15	29	7	18	-	75
Uganda	4	9	23	4	4	-	44
Tanzania	<u>1</u>	<u>1</u>	<u>12</u>	<u>8</u>	<u>21</u>	<u>3</u>	<u>46</u>
Totals	11	25	64	19	43	3	165
<u>Citizen Re- searchers</u>							
Kenya	3	8	23	5	11	-	50
Uganda	1	5	16	2	1	-	25
Tanzania	<u>1</u>	<u>-</u>	<u>5</u>	<u>2</u>	<u>5</u>	<u>-</u>	<u>13</u>
Totals	5	13	44	9	17	-	88
<u>Ex-patriate Researchers</u>							
Kenya	3	7	6	2	7	-	25
Uganda	3	4	7	2	3	-	19
Tanzania	<u>-</u>	<u>1</u>	<u>7</u>	<u>6</u>	<u>16</u>	<u>3</u>	<u>33</u>
Totals	6	12	20	10	26	3	77

absolutely and proportionally receiving the lowest composite benefit scores, and while Kenyan researchers receive the highest absolute number of composite benefit scores, Ugandan researchers score higher on a proportional basis. In examining the patterns of the citizen and expatriate national researchers on this measure, the only slight difference seems to be that expatriate researchers score less in the Medium and more in the Very Low category than do citizen researchers.

Question 30 addressed the subject of the Specialist Committees which are chaired by EAAFRO officers and are supposed to coordinate and make project selection recommendations for regional research in their particular field. The results are shown below in Table VII.46. Once again, the Uganda scores for this measure are disproportionately high and Tanzania's are disproportionately low. Those national researchers in the High category had attended more than five Specialist Committee meetings; those in the Medium category three to five meetings; and those in the Low category one or two meetings. In terms of totals,

Table VII.46 - Specialist Committee Meeting Attendance

Number of National Researchers from -	High	Medium	Low	Sub-Total	Had not attended any spec. Committee Meetings	No Answer	Totals
Kenya	2	9	17	28	47	-	75
Uganda	5	6	15	26	18	-	44
Tanzania	<u>1</u>	<u>1</u>	<u>6</u>	<u>8</u>	<u>35</u>	<u>3</u>	<u>46</u>
Totals	8	16	38	62	100	3	165
<u>Citizen Researchers</u>							
Kenya	<u>4</u>	5	13	19	31	-	50
Uganda	<u>1</u>	2	9	12	13	-	25
Tanzania	<u>1</u>	<u>1</u>	<u>2</u>	<u>4</u>	<u>9</u>	-	<u>13</u>
Totals	3	8	24	35	53	-	88
<u>Ex-Patriate Researchers</u>							
Kenya	1	4	4	9	16	-	25
Uganda	4	4	6	14	5	-	19
Tanzania	-	-	<u>4</u>	<u>4</u>	<u>26</u>	<u>3</u>	<u>33</u>
Totals	5	8	14	27	47	3	77

100 national researchers -- almost two-thirds! -- had not attended any Specialist Committee meetings at all, while of the 62 who had, 38 had only attended one or two, 16 had attended three to five, and only eight had attended more than five. The one factor that is again probably influencing this response is the length of time the national researcher has been working in East Africa. As was discussed earlier, many of the Specialist Committees hadn't met in the two years preceding this study because of uncertainties raised by the Wasawa Report and, most likely, their own inherent weaknesses. The response patterns shown for citizen and expatriate national researchers don't seem to differ too much, although expatriates in Uganda show higher responses than any other group.

Information regarding the specific Specialist Committees whose meetings were attended and opinions about the effectiveness of those meetings was also obtained, and those results are shown below in Table VII.47. The largest number

Table VII.47 - Attendance at and Perceived Effectiveness of Specific Specialist Committee Meetings

Name of Specialist Committee	Number of National Researchers who perceived effectiveness of Specialist Committee to be					No Opinion	Totals
	Very Great	Much	Some	Little	None		
Agricultural Botany	2	4	14	2	-	1	23
Entomology & Insecticides	2	6	6	-	-	-	14
Soil Fertility	3	6	3	-	-	-	12
Coffee	3	2	1	-	-	-	6
Plant Imports & Exports	3	1	2	-	-	-	16
Forestry Research	4	1	-	-	-	-	6
Sugar Cane	4	1	1	-	-	-	6
Animal Nutrition	-	2	1	-	-	1	4
Hydro Meteorology	1	1	-	-	-	1	3
Pastures/Rangeland	-	2	1	-	-	-	3

of national researchers had attended meetings of the Specialist Committee on Agricultural Botany, with significant numbers having attended meetings of the Entomology and Insecticides and the Soil Fertility Specialist Committees. Specialist Committees on Agricultural Machinery, Herbicides, Wildlife, and Statistics were listed in EAFRO's Annual Report, but these are not mentioned by national researchers at all which is perhaps not surprising in view of the tenuous links between some of these committees and agriculture or forestry.

Opinions on the effectiveness of these committee meetings is shown to be overwhelmingly favorable in Table VII.47, but the national researchers were allowed in the interview question to define "effectiveness" in any terms they desired, and later in follow-up questions these criteria of effectiveness were discussed. The objective for this study was to determine how many national researchers thought of these Specialist Committees in terms of coordination and decision-making with regard to research in a particular field in the region, and how many thought in terms of communication or information dissemination conferences. The results for the specific committees are fairly interesting. The Specialist Committee on Agricultural Botany received 17 favorable comments on its effectiveness in terms of communication, and five unfavorable comments

on a lack of decision-making; Soil Fertility received 12 favorable comments on communication and one favorable comment on decision-making; Coffee received six favorable comments, all on communication; Plant Imports and Exports received three favorable comments on decision-making; Forestry Research received three favorable comments on communication and three favorable comments on decision-making; Sugar Cane received two favorable comments on communication and four favorable comments on decision-making; Animal Nutrition received three favorable comments on communication and one unfavorable comment on a lack of decision-making; Hydro-Meteorology received two favorable comments, both on communication; and Pastures/Rangeland received three favorable comments, all on communication. These were not the only unfavorable or favorable comments made about the effectiveness of the Specialist Committees (other prominent unfavorable comments were made about the too large size of Agricultural Botany and Entomology and Insecticides and about the rushed and inefficient way their meetings were run), but this characteristic is largely thought of in terms of communication by national researchers. There is some awareness in Agricultural Botany and Entomology and Insecticides of a lack of decision-making, but the only Specialist Committees where significant decision-making and coordination activities are perceived to be taking place is in the fields of Plant Imports and Exports, Forestry Research, and Sugar Cane.

A general favorable or unfavorable opinion about the over-all East African community is obtained from the national researchers in question 31, and the results are shown below in Table VII.48. A special category had to be added to the table because of the many national researchers who in effect gave two opinions in response to this question -- a favorable opinion toward the EAC in theory or as an ideal, but qualified by an unfavorable opinion toward how the EAC was working in practice. As can be seen from Table VII.48, this type of dual opinion was used almost exclusively by expatriate and hardly at all by citizen national researchers. Relations between the three Partner States were somewhat strained during and just preceding the time this study was carried out, so this is not an unexpected reaction. The way in which almost all of these Special category responses were given suggested a feeling of deep disappointment in what was happening and some hopes -- however slim -- for a better future for the Community. In explaining their responses, the reasons given by national researchers for answering as they did were generally of three types: 1) favorable reasons of a practical nature for having an East

Table VII.48 - General Opinions About EAC

Number of National Researchers from -	Special Category*	Very Favorably	Favorably	Neutral	Un- Favorably	Very Un- Favorably	No Answer	Totals
Kenya	12	16	32	9	3	-	3	75
Uganda	6	13	16	8	-	1	-	44
Tanzania	5	12	13	5	2	1	8	46
Totals	23	41	61	22	5	2	11	165
<u>Citizen Re- searchers</u>								
Kenya	1	11	27	8	2	-	1	50
Uganda	1	10	10	4	-	-	-	25
Tanzania	-	7	4	2	-	-	-	13
Totals	2	28	41	14	2	-	1	88
<u>Expatriate Researchers</u>								
Kenya	11	5	5	1	1	-	2	25
Uganda	5	3	6	4	-	1	-	19
Tanzania	5	5	9	3	2	1	8	33
Totals	21	13	20	8	3	2	10	77

*Favorable in theory but unfavorable in practice.

African Community -- e.g., can do some things cheaper, better, etc.; 2) favorable reasons of an ideological nature in which unity and cooperation were desirable for their own sake; 3) unfavorable reasons concerned with national politics and the Community in which cooperation was declining and disputes were increasing.

In examining the totals in Table VII.48, the overwhelming majority of national researchers has a favorable opinion toward the EAC, with no significant differences in national patterns. The one large distinction between citizen and expatriate researchers has already been noted, and expatriate patterns in all three Partner States appear to be somewhat similar. In examining the national patterns for citizen researchers, however, it appears in proportional terms at least that Ugandan and Tanzanian citizens are slightly more favorably inclined toward the EAC than are Kenyan citizen researchers. This is a very slight difference, however, and would not be mentioned except for the intangible feeling by this author that at least in the case of Ugandan citizen researchers there is more of an

idealized yearning for the principles of unity and cooperation as expressed in the East African Community than there is in either Kenya or Tanzania. This is not to say that the same pattern would be true for the average citizen in East Africa. These citizen researchers are part of the intellectual elites of their Partner States and many of them were in the process of university or secondary education when the excitement over independence and the potential strength of an East African Federation was at its peak. Some cynicism has undoubtedly set in since that time, but there still appears to be a large reservoir of good will and hopes for the Community among this group of citizens, and particularly for Ugandan researchers.

As a final question for that part of the interview concerned with this study, national researchers were asked to mention any specific improvements that could be made with respect to regional and national scientific relationships in East Africa. The results to this question reinforce many of the themes that have already been mentioned. The largest number of national researchers in all three Partner States mentioned the need for better communications, and especially more visits and personal contact, with EAAFRO. A significant number in each Partner State also mentioned results and services that might be more useful to them, and the need for better political and economic relationships among the Partner States. A few researchers mentioned specific items: African national researchers thought that EAAFRO could provide some valuable training for them; further decentralization from Muguga was mentioned; the inactive status of certain Specialist Committees was questioned, etc. But perhaps the most interesting comments in this context were of the nature that EAAFRO should simply show more interest in national research, that they should feel less superior and make national researchers feel welcome. As one national researcher put it, "It is the Muguga image that is the obstacle."

Chapter VIII

Statistical Analysis of Results,
Interpretations and Evaluations

From the data presented in the preceding chapter, numerical measures on the variables listed below in Table VIII.1 were punched onto computer cards for statistical analysis.

Table VIII.1 - Acronyms for Computerized Indicator Measures

-
- NATLTY** = Nationality, the Partner State where the national researcher was working
- PROX** = Proximity, the ranked distance in kilometers from the national researcher's station at EAAFR0 headquarters at Muguga (Kenya)
- CITZRN** = Citizenship, whether the national researcher was a citizen or non-citizen of an East African country (this variable also served as a measure for the race of the national researcher, since with one or two exceptions citizens could be assumed to be black Africans and non-citizens to be white Europeans)
- EXPSTA** = Experience at Station, the ranked length of time a national researcher had been at his national station
- CRTSIZ** = Critical Size, the critical size of the national institute where the national researcher was stationed
- SCICOM** = Scientific complementarity, the extent to which EAAFR0's scientific work complemented that of the national researcher
- GENOP** = the General Opinion of the national researcher toward EAAFR0, favorable to unfavorable on a five-point scale
- PERKNL** = Perceived Knowledge, the amount of knowledge about EAAFR0 that a national researcher perceived himself to have
- REGST** = Regionality Statement, the agreement or disagreement of the national researcher with a statement that EAAFR0 was "truly regional, East African"
- INSTBL** = Institution-Building, whether or not the national researcher was located at a national research station where one of EAAFR0's decentralized divisions was also located
- COLLAB** = Experimental Collaboration, whether or not the national researcher was collaborating or had collaborated with EAAFR0 officers on any experimental projects
- RESUTL** = Research Utilization, whether or not the national researcher had ever utilized the results of EAAFR0 research in his own scientific work
- PERREL** = Perceived Relevance, the degree of relevance of EAAFR0's research and services as perceived by the national researcher
- PERCOM** = Perceived Competence, the degree of competence with which EAAFR0's scientific work was done as perceived by the national researcher
- PERTRN** = Perceived Transfer, the degree of success of EAAFR0's information or technology transfer efforts to the national researcher as perceived by the national researcher
- RESBAL** = Research Balance, whether the national researcher thought EAAFR0's research should be more applied, or thought it was about right the way it was or even be more fundamental
- SERUTL** = Service Utilization, the composite amount of EAAFR0's scientific services utilized by the national researcher

- TRANS = Transaction, the extent of personal contact or visits between EAAFRO and national researchers
- OBJKNL = Objective Knowledge, the ranked number of EAAFRO officers that the national researcher was able to name
- INTPRE = Inter-personal Relations, the ranked number of EAAFRO officers who were "friends" of the national researchers
- PUBSCH = Publishing, whether or not the national researcher had any of his own articles published in the East African Agricultural and Forestry Journal
- OPEAC = Opinion toward EAC, the general favorable-unfavorable opinion of the national researcher toward the East African Community
- COMPBN = Composite Benefits, a composite ranking for all six EAAFRO benefits potentially received by the national researcher (INSTBL, COLLAB, RESUTL, SERUTL, INTPRE, PUBSCH)

Although data was obtained for some of the variables listed above in terms of five-level response opinions pertaining to the amount of institution-building of EAAFRO's decentralized divisions (INSTBL) or the usefulness of EAAFRO research results utilized (RESUTL), as shown in the previous chapter, there was not enough of a positive response in these cases to cover the range of choices for the requirements of statistical analysis. Therefore, the data was reduced to two categories in which those national respondents who had utilized EAAFRO research results or were at national stations where EAAFRO decentralized divisions were located were differentiated from those who hadn't or weren't.

In performing chi square frequency distribution tests for significance between the above variables, many more tests were performed than were included in the 13 propositions listed in Chapter VI. As was mentioned in that chapter, the variable of the length of time the national researcher had been at his national station (EXPSTA) was to be tested with a number of other variables, and a number of the possible independent variables shown in Figure VI.2-particularly proximity (PROX) and knowledge of EAAFRO (OBJKNL and PERKNL)--were to be tested with each other to determine the extent of their inter-relationships. In addition, the two measures for the primary dependent variable of general opinions toward EAAFRO (GENOP and REEST) were tested with almost every other variable above that might conceivably have any relationship to them.

The full list of chi square tests performed is shown below, with the proposition numbers listed at the side in parentheses if the test relates to one of the 13 propositions from Chapter VI:

TABLE VIII.2-LIST OF CHI SQUARE TESTS PERFORMED

GENOP	with	RESUTL	(1)
"	"	SERUTL	(1)

TABLE VIII, 2-Continued

GENOP	with	COLLAB	(1)
"	"	INSTBL	(1)
"	"	INTPRE	(1)
"	"	PUBSCH	(1)
"	"	COMPBN	(1)
"	"	OPEAC	(2)
"	"	PROX	(4)
"	"	OBJKNL	(5)
"	"	PERKNL	(5)
"	"	TRANS	(7)
"	"	SCICOM	(8)
"	"	PERREL	
"	"	RESBAL	
"	"	PERCOM	
"	"	PERTRN	
"	"	CRISIZ	
"	"	EXPSTA	
GENOP	with	REGST	
REGST	with	RESULT	(1)
"	"	SERUTL	(1)
"	"	COLLAB	(1)
"	"	INSTBL	(1)
"	"	INTPRE	(1)
"	"	PUBSCH	(1)
"	"	COMPBN	(1)
"	"	OPEAC	(2)
"	"	PROX	(4)
"	"	OBJKNL	(5)
"	"	PERKNL	(5)
"	"	TRANS	(7)
"	"	SCICOM	(8)
"	"	CRISIZ	
"	"	EXPSTA	
RESULT	with	PERREL	(9)
"	"	PERCOM	(9)
"	"	PERTRN	(9)
"	"	EXPSTA	(10)
"	"	SCICOM	(10)
"	"	CRISIZ	(11)
"	"	PROX	
SERUTL	with	PERREL	(9)
"	"	PERCOM	(9)
"	"	PERTRN	(9)
"	"	EXPSTA	(10)
"	"	SCICOM	(10)
"	"	CRISIZ	(11)
"	"	PROX	

*TABLE VIII.2-Continued

COMPBN	with	PROX
"	"	SCICOM
"	"	CRTSIZ
PERREL	with	RESBAL (12)
PERTRN	with	PROX (13)
"	"	SCICOM (13)
"	"	TRANS
PROX	With	COLLAB
"	"	INTPRE
"	"	OBJKNL
"	"	PERKNL
"	"	TRANS
"	"	PERREL
"	"	RESBAL
"	"	PERCOM
OBJKNL	with	PERKNL
"	"	EXPSTA
"	"	SCICOM
PERKNL	with	RESUTL
"	"	SERUTL
"	"	EXPSTA
"	"	SCICOM
EXPSTA	with	TRANS
"	"	INTPRE
SCICOM	with	COLLAB
"	"	INTPRE
"	"	TRANS
INTPRE	with	TRANS.
CRTSIZ	with	COLLAB

All the above tests were performed for all national researchers responding, for all citizen national researchers responding, for all non-citizen national researchers responding, for all of Kenya's national researchers responding, for all of Uganda's national researchers responding, and for all of Tanzania's national researchers responding. Unfortunately, there were usually not enough responses to cover the range of cells and attain expected values higher than five for the national categories. Even in the cases for citizen, non-citizen, and the entire sample categories, the original significance score was often quite shaky because of the low expected value in a number of cells. In these cases, row and/or column categories were collapsed into each other when possible so as to attain

a lesser number of cells but a greater expected value in each. When this was done and the result was still significant the method of cell reduction and the actual chi square tables are shown in Appendix IV to this study.

The criteria chosen for accepting or rejecting the relationships being tested was if the chi square was significant at a level of .05 or less. Those relationships which met that criteria and which appeared to be statistically sound are listed below in Table VIII.3.

Table VIII.3 - List of Significant Chi Square Relationships

Relationship Tested	for	Raw or Corrected Chi Square	Degrees of Freedom	Significance Level	See Appendix IV, page
GENOP with OPEAC	Total Sample	5.80938	1	.0159	D-1
"	Ugandans	4.56156	1	.0327	D-2
GENOP with OBJKNL	Total Sample	10.24862	4	.0364	D-3
GENOP with PERTRN	Total Sample	7.30647	2	.0259	D-4
"	Non-citizens	9.64646	2	.0080	D-5
REGST with COLLAB	Total Sample	14.20193	3	.0026	D-6
RESUTL with SCICOM	Total Sample	10.67571	2	.0048	D-7
"	Non-citizens	9.16663	2	.0102	D-8
SERUTL with EXPSTA	Total Sample	27.58310	12	.0064	D-9
COMPEN with CRTSIZ	Total Sample	39.21621	4	.0000	D-10
PROX with TRANS	Total Sample	17.72168	4	.0014	D-11
PERKNL with OBJKNL	Total Sample	35.89935	4	.0000	D-12
"	Citizens	14.04719	4	.0071	D-13
"	Non-citizens	23.67579	4	.0001	D-14
"	Kenyans	20.40852	4	.0004	D-15
PERKNL with RESUTL	Total Sample	15.13808	4	.0044	D-16
EXPSTA with INTPRE	Total Sample	9.22548	3	.0264	D-17
"	Non-citizens	13.29960	3	.0040	D-18
SCICOM with COLLAB	Total Sample	26.07964	2	.0000	D-19
"	Citizens	10.36096	2	.0056	D-20
"	Kenyans	22.67340	2	.0000	D-21
SCICOM with INTPRE	Total Sample	9.38475	2	.0092	D-22

The following propositions from Chapter VI are therefore supported by the results from this study:

1. The degree of positiveness of the general opinion of national researchers toward EAAFRO (as measured by their agreement or disagreement with a statement about EAAFRO being "truly regional, East African") is directly related to the amount of Experimental Collaboration benefits they have received from EAAFRO in the past.*

*The External Scientific Aid parameter did not appear to affect this relationship or even to be operative in this case.

2. The degree of positiveness of the general reaction/response opinions that national researchers have toward EAAFRO (as measured by their direct favorable-unfavorable responses) is directly related to their general reaction/response opinions toward the EAC.

5. The degree of positiveness of the general reaction/response opinions that national researchers have toward EAAFRO (as measured by their direct favorable-unfavorable responses) is directly related to the extent of their knowledge of EAAFRO (as measured by the number of EAAFRO officers they were able to name.)

10 (a). The perceived utilization of the EAAFRO output benefit of research results by national researchers is directly related to the extent that EAAFRO's scientific work complements their own.

(b). The perceived utilization of the EAAFRO output benefit of scientific services by national researchers is directly related to the extent of their experience at their national station.

In addition to the explicitly stated propositions which were supported by the statistical results, a number of inter-relationships between indicator measures also received significant support. Some of these significant relationships are not surprising; others are:

-The general reaction/response opinions of national researchers toward EAAFRO (as measured on a five level favorable-unfavorable scale) were found to be significantly related to the perceived success of EAAFRO's information or technology transfer efforts;

-The composite scores of benefits received by national researchers from EAAFRO were found to be significantly related to the critical size of the national institute where the national researchers were located;

-The amount of personal contact transactions a national researcher had with EAAFRO officers was found to be significantly related to his proximity to EAAFRO;

-The indicator measure for Objective Knowledge-the number of EAAFRO officers known by the national researcher-was found to be significantly related to the national researcher's perception of his own knowledge about EAAFRO;

-The national researcher's perception of his own knowledge about EAAFRO was found to be significantly related to whether he had ever utilized the results of EAAFRO research in his own scientific work or not;

-The number of EAAFRO officers a national researcher considers to be his "personal friends" was found to be significantly related to the length of time he had been at his national station;

-Whether or not a national researcher had ever engaged in experimental collaboration with an EAAFRO research officer was found to be significantly related to the extent that EAAFRO's scientific work complemented his own;

-The number of EAAFRO officers a national researcher considers to be his "personal friends" was found to be significantly related to the extent that EAAFRO's scientific work complemented his own.

In addition to the statistically significant relationships listed in Table VIII.3, there were a number of tests which either tended to approach a level of significance of .05 or which were significant at a level of .05 or less but appeared to be somewhat shaky due to low expected values in a number of cells. These relationships are shown below in Table VIII.4.

Table VIII.4 - List of Relationships Receiving Some Limited Support

Relationship Tested	for	Raw or Corrected Chi Square	Degrees of Freedom	Significance Level	See Appendix IV, page
GENOP with OPEAC	Non-citizens	5.06531	2	.0794	D-23
REGST with COLLAB	Citizens	6.62640	3	.0848	D-24
RESUTL with SCICOM	Citizens	5.71739	2	.0573	D-25
"	Ugandans	7.23456	2	.0269	D-26
"	Tanzanians	11.14338	2	.0038	D-27
SERUTL with EXPSTA	Citizens	21.28155	12	.0464	D-28
COMPBN with SCICOM	Total Sample	8.30333	4	.0811	D-29
COMPBN with CRTSIZ	Citizen	13.35637	4	.0097	D-30
"	Non-citizens	25.41028	4	.0000	D-31
"	Kenyans	20.58245	4	.0004	D-32
PROX with INTPRE	Total Sample	12.665566	4	.0130	D-33
OBJKNL with PERKNL	Tanzanians	16.19900	4	.0028	D-34
OBJKNL with EXPSTA	Total Sample	28.08286	12	.0054	D-35
"	Non-citizens	25.41912	12	.0130	D-36
PERKNL with RESUTL	Non-citizens	9.20380	2	.0100	D-37
PERKNL with SERUTL	Total Sample	25.88784	8	.0011	D-38
"	Citizens	18.28315	8	.0192	D-39
PERKNL with EXPSTA	Total Sample	29.52719	8	.0003	D-40
"	Kenyans	18.54207	8	.0175	D-41
EXPSTA with TRANS	Total Sample	25.42739	8	.0013	D-42
"	Non-Citizens	29.78325	16	.0192	D-43
SCICOM with COLLAB	Non-Citizens	17.01570	2	.0002	D-44
INTPRE with TRANS	Total Sample	14.81336	8	.0629	D-45

There are details to add to the above significant propositions and relationships, as well as discussion about some perhaps more surprising outcomes in which indicator measures were shown not to be significantly related. This interpretation of results will follow an outline suggested in Table VIII:2 in which the topics to be discussed are presented in a similar fashion and order.

In looking at the first eight propositions from Chapter VI and discussing the tests which concerned the general reaction/response opinions of national researchers toward EAAFRO based on a five-level favorable-unfavorable scale (GENOP), the most striking thing is the number of tests that did not turn out to be statistically significant-or even close! Contrary to what might have been expected, benefits that the national officer received from EAAFRO do not appear to influence his general opinions toward it. Institution-Building (INSTBL), the Utilization of Research Results (RESUTL), the Utilization of Scientific Services (SERUTL), Experimental Collaboration (COLLAB), Interpersonal Relations (INTPRE), and Publishing (PUBSCH) benefits are not at all significantly related to the general opinions toward EAAFRO (GENOP), nor is the Composite rating score for all six benefits (COMPNB). None of the benefits tests worked out for any of the citizen, non-citizen, or national sub-samples either, so the rejection of proposition 1 is fairly firm.

Proposition 2 hypothesized that the general reaction/response opinions of national researchers toward EAAFRO (GENOP) would be influenced by their general reaction/response opinions toward the East African Community (OPEAC), the regional framework within which EAAFRO exists, and this was supported at a significance level of .0159 even after several rows and columns had been combined in order to raise the expected values in the cells-See Appendix IV, p. D-1. This proposition also was significantly supported for Ugandan researchers, and the statistic tended to approach significance for non-citizen researchers. One of the complications in the OPEAC scores for non-citizen researchers that was mentioned in the previous chapter was that many of them gave different opinions for the EAC "in theory" and the EAC "in practice". This was resolved by using the opinion they gave first rather than the qualification that came after a "but", and it may be the case that these researchers responded in the same way toward EAAFRO but didn't add on the qualification. In any event, proposition 2 is significantly supported.

Proposition 3 hypothesized a relationship between the general reaction/

response opinions of national researchers toward EAAFRO (GENOP) once again and the corresponding opinions of relevant national groups. Since there was no feasible way to determine what the "relevant national groups" for a particular national researcher were, let alone measure their opinions toward EAAFRO, the nationality of the research system the researcher was employed by was used as a surrogate indicator measure. It was expected that if the general opinions toward EAAFRO from very favorable to very unfavorable clustered according to Kenya's, Uganda's, and Tanzania's researchers-in any order-that this factor of overall national opinions toward EAAFRO would be influencing the opinions of national researchers. In the presentation of data in the previous chapter, it was apparent that this was not the case, and so proposition 3 is not supported.

Proximity (PROX) was also not related to the general reaction/response opinions of national researchers toward EAAFRO (GENOP) as hypothesized in proposition 4. Neither the total sample test nor the tests for any of the sub-sample groups even tended to approach significance.

One of the indicator measures of the Knowledge of EAAFRO variable, an objective indicator as measured by the number of EAAFRO officers that the national researcher was able to name (OBJKNL), was significantly related to his general reaction/response opinion toward EAAFRO (GENOP) which supports proposition 5. The national researcher's perception of the extent of his own knowledge about EAAFRO (PERKNL), however, was not significantly related to his general opinion toward EAAFRO (GENOP). Even when several categories were combined in order to raise the expected values in the cells, the level of significance for relating OBJKNL to GENOP was .0364 for the total sample-See Appendix IV, p. D-3. None of the tests performed on any of the sub-sample groups turned out to be even tending to approach significance.

None of the remaining variables hypothesized in propositions 6, 7, or 8 significantly related to the general reaction/response opinions of national researchers toward EAAFRO (GENOP) or even tended to approach significance. It was noted in the previous chapter that the race of the national researcher, as hypothesized in proposition 6, did not appear to affect his favorable-unfavorable opinion toward EAAFRO. The extent of personal contact transactions between national and EAAFRO researchers (TRANS) and the extent to which EAAFRO's

scientific work complemented that of the national researcher's (SCICOM), for propositions 7 and 8, were both tested for a relationship to the general reaction/response opinions of national researchers toward EAAFRO (GENOP), but neither turned out to be significant for either the total sample or any of the sub-sample groups.

In addition to the relationships explicitly hypothesized in propositions 1 - 8, the general reaction/response opinions of national researchers toward EAAFRO (GENOP) were also tested for significant relationships with the perceived relevance of EAAFRO's scientific work (PERREL), the opinions about whether or not EAAFRO's research should be of a more applied nature (RESBAL), the perceived competence with which EAAFRO's scientific work was carried out (PERCOM), the perceived success of EAAFRO's information or technology transfer efforts (PERTRN), the critical size of the national institute where the national researcher was located (CRISIZ), and the length of time the national researcher had been at his station (EXPSTA). The only variable that turned out to be significantly related to the general opinions of national researchers was their perceptions of the success of EAAFRO's information or technology transfer efforts. After several categories had been combined in order to raise expected values in some of the cells, the level of significance for the total sample was still .0259. An interesting aspect of this relationship is that the level of significance for non-citizen researchers after the categories had again been combined is even higher at .0080! Relationships with other sub-sample groups did not turn out to be significant. It does appear that national researchers -- particularly expatriates -- who perceive EAAFRO to be successfully transferring information and results to themselves are likely to be favorably influenced toward EAAFRO.

Agreement with a statement to the effect that EAAFRO was a "truly regional, East African institution" on a five-point scale from Strongly Agree to Strongly Disagree (REGST) was a second indicator measure used for the general opinion toward EAAFRO variable. This indicator (REGST), however, was not significantly related to the indicator which directly asked for favorable-unfavorable opinions (GENOP), so they were probably measuring different aspects of the national researchers' over-all attitudes toward EAAFRO. As was shown in Table VIII.2, this regionality statement indicator of general opinions toward EAAFRO (REGST) was tested for significant relationships with most of the same indicator measures as listed above for the favorable-unfavorable indicator (GENOP), but the only

significant relationship that was found was with the experimental collaboration indicator (COLLAB) at a level of .0026 for the total sample - See Appendix IV, p. D-6. Although several of the tests performed on sub-sample groups were significant or tended to approach significance, the only one in which reasonable confidence might be placed was for citizens at a significance level of .0848.

In attempting to interpret the above results for the GENOP and REGST indicators of the general opinions which national researchers have toward EAAFRO, not too much of a positive nature can be said. It appears that favorable opinions about the larger framework within which EAAFRO is located, greater knowledge about EAAFRO, and higher perceptions of EAAFRO's success in transferring information and results to themselves may influence national researchers to have favorable general opinions toward EAAFRO itself. It also appears that the experience of having collaborated with EAAFRO researchers on joint experimental projects may influence national researchers to agree that EAAFRO truly is a regional, East African institution. What may be more interesting is the interpretations that might be given to all of the relationships that did not turn out to be significant.

The over-all lack of influence which potential EAAFRO benefits appear to have on general opinions toward EAAFRO may not be so surprising if the results from the previous chapter are reviewed. Despite the official pronouncements of the functional relationships between regional and national research which implies more fundamental and more applied research at the respective different levels in the same field and the transfer of results in between, the results clearly show that this is in fact occurring only in a limited number of cases, maize breeding being the best example. Much of the research done at regional and national levels - fundamental or applied - is in different fields, and so there is little national utilization of EAAFRO research results and little experimental collaboration between them. This is perhaps best shown in the results of the Scientific Complementarity with EAAFRO variable (SCICOM) in the preceding chapter, in which relatively few national researchers fell into the High category for the extent to which EAAFRO's scientific work complemented their own. In addition, the utilization of scientific services (SERUTL) seems to be generally dependent upon the length of time the national researcher has been at his station (EXPSTA) (significant at a level of .0064 - See Table VIII.3) and also upon personal contact transactions (TRANS) and proximity (PROX) although these latter relationships are not significant. In any event, with the one exception of the East

African Literature Service, which operates through the post office, the different scientific services which EAAFRO offers also effectively reach only a very limited number of national researchers. Of the remaining potential benefits from EAAFRO, institution-building (INSTBL) was limited to the four national stations where decentralized divisions are located. The extent of interpersonal relations (INTPRE), as measured by the number of EAAFRO officers national researchers considered to be friends, was not as great as might have been expected due perhaps to racial or proximity factors or the newness of many national researchers to research in East Africa. In addition, interpersonal relations (INTPRE) was shown above in Table VIII.3 to be significantly related to scientific complementarity (SCICOM), which already has been pointed out to be limited in the numbers of national researchers who fall into the High category. Finally, for whatever reason or reasons, only a very few national researchers have published in the East African Agricultural and Forestry Journal (PUBSCH).

Therefore, it appears that a situation exists in East Africa in which the benefits from EAAFRO do not generally flow to the national agricultural and forestry research systems. There are exceptions, of course, but instead of working together on agricultural and forestry problems, the regional and national levels of research are working separately. This situation obviously runs counter to the official pronouncements of how EAAFRO and national agricultural and forestry research systems are supposed to be working together, and brings into question the centralization of efforts argument that lies behind EAAFRO and other regional institutions. Indeed, if a regional institution is not going to handle the entire job or function that it is set up to accomplish and national institutions are established to do the same types of jobs or functions, then some analog of the "more fundamental research at regional level and more applied research at national level" probably exists to justify or rationalize the existence of comparable institutions which might be accused of duplicating efforts. One of the carry-overs from this study to other regional-national institutions, therefore, might be the examination of how much these supposedly complementary institution levels are actually complementing each other in terms of the greater centralization, greater specialization, etc. arguments for the existence of regional institutions.

In the absence of widespread benefits from EAAFRO upon which to base their opinions, it is perhaps not surprising that proposition 2 was supported and that

the general opinions of national researchers toward the EAC (OPEAC) seemed to influence their general opinions toward EAAFRO (GENOP). Why the Ugandan and non-citizen sub-samples appear to be more strongly influenced in this way than the others is open to question. Nevertheless, the fact that this relationship is supported suggests that EAAFRO, as part of the East African Community, has the favorable hopes and expectations of the national researchers behind it for it to succeed and to do better. It does not appear that national researchers are satisfied with either EAAFRO or the EAC. To the contrary, many complaints and qualifications about pieces of EAAFRO's performance were continually raised, even as favorable opinions were being given; "politics" sums up their fears that the EAC may be broken up due to conflicts between the governments of the Partner States. But although fears, qualifications, and complaints were raised, they were usually - particularly for African national researchers, it seemed - placed in the context of wanting the EAC, and EAAFRO, to improve and succeed.

Contrary to what was predicted in propositions 3 and 6, the Partner State the national researchers were working in or their race did not appear to have any influence on their general opinions toward EAAFRO. The bases for both of these propositions were found in the integration literature, but they were also heavily supported by conventional wisdom and/or public opinion that appeared to be quite strong in East Africa. One would have thought, for example, from past assertions by Tanzania that Kenya was dominating regional arrangements and profiting the most from them, that researchers from Tanzania would have had the most unfavorable opinions toward EAAFRO, that researchers from Kenya would have had the most favorable, and that researchers from Uganda would have fallen somewhere in between. One might also have thought, from EAAFRO's image and reputation as a "white man's institution," that African citizen national researchers would have had a more unfavorable opinion toward EAAFRO and European non-citizens a more favorable opinion. From the results shown in Chapter VII, neither one of these suppositions appeared to be true. This is not to say that the Partner State the national researcher was working in or his race made no difference at all, however. There were a few national researchers from Tanzania and Uganda who continually made remarks about Kenya benefitting more from EAAFRO than their country and about EAAFRO not understanding or slighting their country throughout their interviews, but these were only a few. The racial factor, while again felt only by a few African national researchers, seemed to be felt more deeply

and more bitterly by Kenyans, and was repeated in their responses to many interview questions. Response patterns based on race - as indicated by citizen and ex-patriate groupings in Chapter VII - also turned out to be different on some issues such as whether EAAFRO was doing enough applied - as opposed to fundamental - research.

Although the proximity variable (PROX) did relate significantly to one other variable, it was not related to the opinions of national researchers toward EAAFRO (GENOP) as hypothesized in proposition 4. As will be discussed later, proximity did not appear to have as much influence on any aspect of regional-national relationships as might have been expected. Likewise, the personal contact transactions (TRANS) and scientific complementarity with EAAFRO (SCICOM) variables were not related to the opinions of national researchers toward EAAFRO (GENOP) as hypothesized in propositions 7 and 8. Other than to note that this was the way they turned out, no comments are able to be offered.

The one other hypothesized relationship (proposition 5) that was statistically supported was that of the national researcher's knowledge about EAAFRO, as objectively measured by the number of EAAFRO officers he was able to name (OBJKNL), and his opinion toward EAAFRO (GENOP). Again, no comment is able to be offered on why this relationship was supported.

Of all the non-hypothesized relationships tested with respect to the opinions of national researchers toward EAAFRO (GENOP), only one - with the perceived success of EAAFRO's information or technology transfer effort (PERTRN) - proved to be significantly supported. It was a bit surprising that the perceived relevance of EAAFRO's scientific work (PERREL), or the popularly related issue of applied vs fundamental research (RESBAL), were not the variables significantly related to the general opinions (GENOP), if any were to be. As was discussed in an earlier chapter, the needs of developing countries are so great that the concepts of relevant and applied research have perhaps become over-emphasized in our awareness and thinking. What seemed to be more important to the national researchers in influencing their opinions toward EAAFRO (GENOP) - since competence (PERCOM) was generally perceived to be fairly high - was EAAFRO's information or technology transfer (PERTRN) efforts. At least this seemed to be the case particularly for non-citizens. The fact that the critical size of the national station where the national researcher was located (CRTSIZ) was not significantly related to his opinion toward EAAFRO (GENOP) may reflect that although researchers at the smaller, less capable national institutions may be

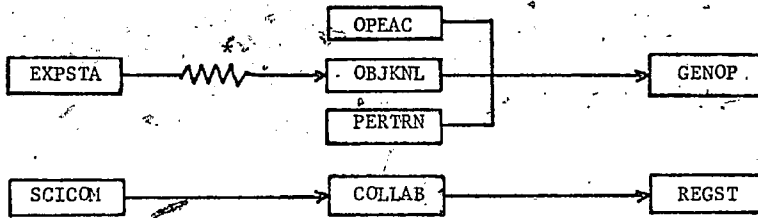
less able to absorb and utilize some of EAAFRO's potential benefits like research results or scientific services than researchers at larger and more capable national institutions, they do need and therefore appreciate whatever benefits they do receive. The final indicator measure that was not related to the opinions which national researchers had toward EAAFRO (GENOP) was the length of time they had been at their national station (EXPSTA). This indicator for experience, however, was related to other indicator measures as will be discussed later.

As mentioned earlier, the other indicator measure for the opinions of national researchers toward EAAFRO that concerned their agreement or disagreement with a statement about EAAFRO being a truly regional institution (REGST) did not significantly relate to their direct favorable-unfavorable responses toward EAAFRO (GENOP). This former indicator did, however, significantly relate to one of the potential benefits from EAAFRO - whether or not the national researcher had collaborated with EAAFRO officers on any joint experimental projects (COLLAB). This relationship seemed to be most important for citizen-national researchers, but it is really difficult to say how important it is in view of the limited positive response to collaboration in that sub-sample. As recounted in the previous chapter, there was also some difficulty in measuring the agreement or disagreement responses since at least some national researchers thought that "truly regional, East African" referred to an international vs local regional comparison rather than a regional vs local national one. Therefore, these results, even though significantly supported, might be open to question. Experimental collaboration (COLLAB), however, was significantly related to the extent that EAAFRO's scientific work complemented that of the national researcher (SCICOM), which does make sense. None of the other indicator measures tested with REGST turned out to be significantly related.

Although the positive results from the above discussions concerning the general opinions of national researchers toward EAAFRO have been limited, they can perhaps best be summarized and presented as shown below in Figure VIII.1.

Since research results and scientific services are probably the two most important direct outputs and benefits of any scientific research institution, several relationships concerning the utilization of EAAFRO's research results and scientific services by national researchers were hypothesized in propositions 9, 10, and 11 in Chapter VI. In addition to the six independent variables explicitly mentioned in those propositions, the proximity of the national researcher to EAAFRO (PROX) was also tested for significance with his utilization

Figure VIII.1 - Variables Relating to the General Opinions of National Researchers Toward EAAFRO



* ~~Wavy~~ means that the relationship tends to approach significance or is significant but statistically shaky.

GENOP = General Opinion

REGST = Regionality Statement

OPEAC = Opinion toward EAC

OBJKNL = Objective Knowledge

PERTRN = Perceived Success of Transfer

COLLAB = Experimental Collaboration

EXPSTA = Experience at Station

SCICOM = Scientific Complementarity

of EAAFRO research results (RESUTL) and scientific services (SERUTL). In the discussions in Chapter VI, three basic processes of all research institutions were described: the process of selecting projects to work on; the process of doing the scientific work; and the process of transferring the results. If done well, these processes would respectively result in relevant projects selected, competent work being done on them, and successful transfer of the results to an intended receiver; if a breakdown occurred at any point in this chain of events, results and services could not be utilized. Perceptions about EAAFRO's performance of these three functions (PERREL, PERCOM, and PERTRN) by national researchers were hypothesized to be related to their utilization of EAAFRO research results and/or scientific services (RESUTL and SERUTL) in proposition 9. None of these relationships were significantly supported by the statistical analyses performed. One other possible breakdown factor was hypothesized in proposition 11 - the capacity of the national institution where the researcher was located (CRTSIZ) to utilize EAAFRO results or services (RESUTL or SERUTL) might be so low as to preclude this from happening. This relationship was not statistically supported either.

In light of previous discussions, this result is not so surprising either if it is recognized that EAAFRO and national agricultural and forestry research systems are, with a few exceptions, generally working in different agricultural areas. Therefore, national researchers may believe that EAAFRO is selecting relevant projects, doing competent scientific work, and successfully transferring the results to some unknown colleagues - and be located at a relatively strong national research station - and still not have personally utilized EAAFRO research results

or scientific services. This interpretation is supported by the fact that the two intervening variables explicitly mentioned in proposition 10 - the length of time the national researcher has been at his station (EXPSTA) and the extent to which EAAFRO's scientific work complements that of the national researcher (SCICOM) - are significantly related to, respectively, the utilization of scientific services (SERUTL) and the utilization of research results (RESUTL) from EAAFRO. These relationships also make a certain amount of logical sense in that scientific complementarity would seem to be a natural requirement for the utilization of research results, but not necessarily for the utilization of more general scientific services; and the greater the length of time a national researcher had been at his national station would seem to logically have given him a greater opportunity to utilize the general scientific services, but would not necessarily, however, have given him any more opportunity to utilize research results if he and EAAFRO were not working in the same field.

As can be seen in Appendix IV, p.D-7, the significance of the relationship between the utilization of research results (RESUTL) and scientific complementarity with EAAFRO (SCICOM) was at a level of .0048. When non-citizen researchers as a group were tested with respect to this relationship, the results were also significant at a level of .0102, and the tests for citizens, Ugandan, and Tanzanian national researchers tended to approach significance. Two of the categories for the experience indicator (EXPSTA) had to be combined as shown in Appendix IV, p. D-9, the relationship with the utilization of scientific services (SERUTL) still turned out significant at a level of .0064. Citizen national researchers was the only sub-sample group for which this relationship turned out to be significant, but low expected values in a number of cells made this significance somewhat shaky. A result that was a bit surprising was that proximity (PROX) was not significantly related to either the utilization of EAAFRO research results (RESUTL) or scientific services (SERUTL).

As kind of a check on some of the above tests, the composite score of the amount of all six benefits received by national researchers from EAAFRO (COMPBN) was also tested for significance with their proximity to EAAFRO (PROX) and with their scientific complementarity with EAAFRO (SCICOM) and the critical size of the national institution where they were located (CRTSIZ). Once again, proximity (PROX) was not significantly related to the composite score for receiving benefits from EAAFRO (COMPBN). As shown in Appendix IV, p.D-29, however, the relationship between scientific complementarity with EAAFRO (SCICOM) and the composite benefits score (COMPBN) still tended to approach significance at a level of .0811, even after

some categories had been combined to raise expected values. Therefore, this extent to which EAAFRO and national researchers are working in complementary fields may be influencing the amount of total benefits a national researcher receives from EAAFRO more so than would be indicated by the utilization of research results alone.

The surprise, however, was that the critical size of the national institute where the national researcher was located (CRTSIZ) did turn out to be significantly related to his composite benefits score (COMPBN) at a level of less than .001 after some combining of categories took place - See Appendix IV, p.D-10. Since this variable was not significantly related to the utilization of research results or scientific services as mentioned above, there must be some way in which this factor is influencing the other benefits that a national researcher might receive from EAAFRO. Although the citizen, non-citizen, and Kenyan researchers subsamples for this relationship all turn out to be supported at levels of significance of less than .01, there are low expected values in enough of the cells to make these results somewhat shaky again-See Appendix IV, pp.D-30 to D-32. Nevertheless, the fact that the critical size of the national institute does apparently play some role in the over-all benefits that a national researcher receives from EAAFRO is an important point to remember with respect to how the different Partner States organize their own agricultural and forestry research systems.

Some additional comments might be made at this point on some of the characteristics of scientific services alluded to earlier as opposed to scientific research. Although some scientific services are more related to some agricultural research fields than others, in general scientific services can provide aid across the board - e.g., the East African Literature Service provides scientific information in all fields of agricultural research. The output from scientific research, on the other hand, even if it is of a more fundamental nature so that the results can be utilized in further applied research, is of direct use only to other researchers in the same field. Therefore, it seems appropriate that EAAFRO might consider the emphasis it places on providing scientific services to national research systems since 1) with the exceptions of the East African Literature Service and the Plant Quarantine Service, it does not appear that much time or effort has been expended on them; 2) at least some of the scientific services already offered on a limited scale are urgently needed and would be greatly appreciated by national researchers; and 3) it appears that the provision of across-the-board

scientific services might be a very appropriate function for a regional institution like EAAFRO to carry out. Unlike scientific research, no Partner State could claim that these service benefits were intended more for one State than another. Problems of providing some scientific services over large distances would still remain, but much more could be done in this area. If one wished to speculate on the future and wished to emphasize this point to the extreme, one might expect that as national agricultural and forestry research systems inevitably become stronger than EAAFRO might find, its logical role in the region becoming more of a provider of expensive but routine scientific services and less of a doer of research. Such a development would totally change the character of EAAFRO, however, since top-quality researchers want to do experimental research, and it is by no means certain that this is desirable.

Returning to the previous discussion on the utilization of research results and scientific services, by skipping ahead of the outline shown in Table VIII.2 to the statistical results for the knowledge of EAAFRO variable, some inter-related connections can be drawn. First of all, two indicators were used to measure this variable: perceived knowledge as determined by the national researcher's own perception of how much he knew about EAAFRO on a five point scale from Almost Everything to Almost Nothing (PERKNL); and objective knowledge as measured by the number of EAAFRO officers the national researcher was able to name (OBJKNL). These two indicators were significantly related to each other at a level of less than $.05$ even after some combining of categories had taken place in order to raise expected values. Moreover, this relationship for citizen, non-citizen, and Kenyan researchers sub-samples also proved to be significant at levels of less than $.01$ - see Appendix IV, pp. D-12 to D15. According to these results, national researchers seemed to accurately perceive how much they objectively knew about EAAFRO.

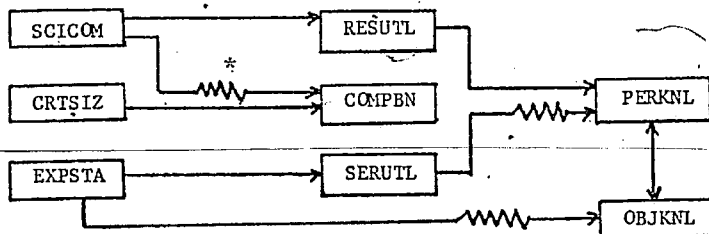
Chi square tests were run on the relationships between the objective knowledge indicator of knowledge of EAAFRO (OBJKNL) and the national researchers' experience at their station (EXPSTA) and their scientific complementarity with EAAFRO (SCICOM). As was referred to earlier, the relationship between objective knowledge (OBJKNL) and experience at the station (EXPSTA) was found to be significant for both the total sample and the sub-sample of non-citizen national researchers at levels of less than $.05$ - see Appendix IV, pp. E-35, D-36 - but low expected values in a number of cells made the results a little shaky. The relationship between objective knowledge (OBJKNL) and scientific complementarity with EAAFRO (SCICOM) was not significantly supported. So although one variable that would logically seem to influence a national researcher's knowledge about EAAFRO does


appear to be related, another one doesn't - i.e., the longer a national researcher has been at his station the more EAAFRO officers he can name, but the fact that a national researcher is or is not working in a field which EAAFRO is also working in does not seem to influence how many EAAFRO officers he can name.

It was thought that in addition to scientific complementarity with EAAFRO (SCICOM) and experience at the national station (EXPSTA) indicators that a national researcher's perceived knowledge about EAAFRO (PERKNL) might also be logically related to the extent that he had utilized EAAFRO research results or scientific services (RESUTL or SERUTL) - i.e., that the more of these direct outputs of EAAFRO a national researcher had used, the more he would think he knew about EAAFRO. When tested, the utilization of research results (RESUTL) did significantly relate to perceived knowledge (PERKNL) at a level of .0044. The non-citizen sub-sample for this relationship was also significant at a level of .01, but there were low expected values in a number of cells - See Appendix IV, p. D-37. The same general pattern occurred with both the utilization of scientific services (SERUTL) and experience at the station (EXPSTA) variables - they both related significantly to perceived knowledge (PERKNL) at levels of less than .01, but low expected values in a number of cells make the results somewhat shaky - see Appendix IV, pp. D-38 and D-40.

These inter-relationships just described might be all summarized and put together in a model as shown in Figure VIII.2 below.

Figure VIII.2 - Variables Relating to the Utilization of EAAFRO Results and Services



*  means that the relationship tends to approach significance or is significant but statistically shaky.

PERKNL = Perceived Knowledge
 OBJKNL = Objective Knowledge
 RESUTL = Research Utilization
 COMPBN = Composite Benefits

SERUTL = Services Utilization
 SCICOM = Scientific Complementarity
 CRTSIZ = Critical Size
 EXPSTA = Experience at Station

Two final propositions were not supported by the statistical results. It was hypothesized in proposition 12 that national researchers would regard the concepts of "relevant" and "applied" research to be one and the same thing, so that their perceptions of both characteristics of EAAFRO's scientific work would be directly inter-related. This was not supported by the results - although citizen researchers in particular are concerned about applied research and solutions to the problems of under-development, it appears that national researchers do distinguish between "relevant" and "applied" research. Proposition 13 addressed two variables which it hypothesized would be related to the perceived success of EAAFRO's information or technology transfer effort (PERTRN) - the proximity of the national researcher toward EAAFRO (PROX) and his scientific complementarity with EAAFRO (SCICOM). Neither turned out to be statistically supported. National researchers who work close to EAAFRO apparently don't perceive the success of this essential effort much differently from those who work far away. Likewise, national-researchers whose scientific work is complemented by EAAFRO's apparently don't perceive the success of EAAFRO's transfer effort much differently from those whose work isn't. The fact that neither of these relationships is supported is somewhat surprising, since they would both appear to have some face validity. Perceived transfer success (PERTRN) was also tested with the amount of personal contact transactions (TRANS) that had occurred between the national researcher and EAAFRO officers, but this was not supported either. Factors that might be influencing this varying response from national researchers on the success of EAAFRO's information or technology transfer efforts to themselves thus remain open to question. This is an important issue because this perceived transfer success (PERTRN) was one of the three variables found to be significantly related to the general opinions of national researchers toward EAAFRO (GENOP).

The remaining discussion will focus on the inter-relationships among independent variables that were and were not supported by the statistical results. Since proximity (PROX) was one variable which seemed to make so much sense in the ways it might be influencing others, a number of additional relationships between it and other variables were tested. In addition to the number of seemingly logical relationships concerning proximity which have already been shown to be unsubstantiated, a number of these relationships are surprising because they are not supported by the results. They include the following:

- proximity (PROX) was not significantly related to experimental collaboration (COLLAB) - i.e., a national researcher far away from EAAFRO was just as likely to have collaborated on an experimental project as one close by;

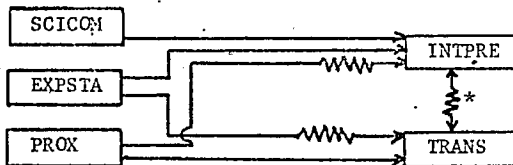
proximity (PROX) was not significantly related to either perceived or objective knowledge about EAAFRO (PERKNL or OBJKNL) - i.e., a national researcher far away from EAAFRO was just as likely to think he knew as much about EAAFRO as one close by, and to objectively know as much as well.

Proximity (PROX) did, however, significantly relate to the amount of personal contact transactions between national researchers and EAAFRO officers (TRANS) at a level of .0014 after several categories were combined to raise expected values - See Appendix IV, p. D-11. It (PROX) also appeared to be significantly related to the EAAFRO interpersonal relations benefit as measured by the number of EAAFRO officer friends a national researcher had (INTPRE), but even after combining categories expected values were low enough to make the significance somewhat shaky - see Appendix IV, p. D-33.

The length of time a national researcher had been at his station (EXPSTA) was also thought to be an important independent variable, and in addition the relationships concerning it which have already been mentioned, it was also tested with the amount of personal contact transactions (TRANS) and the number of EAAFRO officer friends (INTPRE) indicators. The latter relationship was significantly supported at a level of .0264 after some categories were combined to raise expected values, and the same relationship for the non-citizen sub-sample was significantly supported at an even higher level - see Appendix IV, pp. D-17, D-18. The lesser significance of this relationship for African citizen researchers is probably because many of their friendships with EAAFRO officers were formed during university training or sometime before they became research officers. Ex-patriates, on the other hand, probably would have to form most of their friendships starting with their arrival in East Africa at their national station. Experience at the national station (EXPSTA) was also significantly related to the amount of personal contact transactions between national researchers and EAAFRO officers (TRANS) - both for the total sample and non-citizens once again - but expected values were low in enough cells to make the significance shaky. Nevertheless, this relationship would again appear to make a lot of sense, particularly for expatriate national researchers.

Scientific complementarity with EAAFRO (SCICOM) was tested with the experimental collaboration (COLLAB), the inter-personal relations (INTPRE), and the personal contact transactions (TRANS) variables. The significance of the relationship between scientific complementarity (SCICOM) and experimental collaboration (COLLAB) was already noted in the earlier discussion on the regionality statement indicator (REGST) for general opinions toward EAAFRO. For the total sample, this relationship was significant at a level of less than .001. Sub-sample tests on this relationship for citizen and Kenyan researchers also turned out to be significantly supported - See Appendix IV, pp. D-19 to D-21. The extent to which EAAFRO's scientific work complemented that of a national researcher's (SCICOM) was also significantly related to the number of EAAFRO friends he had (INTPRE) at a level of .0092, after some combining of categories took place in order to raise expected values - See Appendix IV, p. D-22. It did not turn out that scientific complementarity (SCICOM) was significantly related to personal contact transactions (TRANS). In other words, the fact that EAAFRO was doing work in the same field as the national researcher seemed to influence the number of EAAFRO officers who were his personal friends, but not the number of times he might see them. When personal contact transactions (TRANS) were tested with interpersonal relations (INTPRE) on the other hand, the result was a significance level of only .1055 - not significant, but tending to approach it. The above discussion can perhaps be summarized and presented in the model shown below in Figure VIII.3.

Figure VIII.3 - Some Inter-relationships Among Several Independent Variables



* means that the relationship tends to approach significance or is significant but statistically shaky.

INTPRE = Interpersonal Relations
 TRANS = Transactions
 SCICOM = Scientific Complementarity

EXPSTA = Experience at Station
 PROX = Proximity

This concludes the interpretations of the results to this study, and the study itself. It is by no means felt that this study has definitively answered all or any of the questions concerning multi-national scientific integration or the relationships between regional and national agricultural and forestry research systems in East Africa, but it is hoped that some good questions were raised and some useful insights gained into this complex phenomena.

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Appendix I

A Short History of Regionalism in East Africa

We, the leaders of the people and governments of East Africa assembled in Nairobi on June 5, 1963, pledge ourselves to the political Federation of East Africa

We share a common past and are convinced of our common destinies. We have a common history, culture, and customs which make our unity both logical and natural. Our futures are inevitably bound together by the identical aspirations and hopes of our peoples and the need for similar efforts in facing the tasks that lie ahead of each of our free nations

For forty years the Imperialists and local settler minorities tried to impose political federation upon us. Our people rightly resisted these attempts. Federation at that time would quickly have led to one thing -- a vast white-dominated dominion.

• The East Africa High Commission and its successor the Common Services Organization have taught us the value of links in the economic field. Indeed, it was the recognition of the value of these connections which led the two fully independent members to agree to continue participation after they had achieved their freedom. In many practical ways we already are cooperating -- in scientific research, in communications and in postal services. An important factor in view of our determination to achieve Federation is the existence of shared currency; a leading aspect of economic working together is the functioning of the East African Common Market. . . .

Economic planning, maximum utilization of manpower and our other resources, the establishment of a central bank and common defense programme, and foreign and diplomatic representation are areas in which we need to work together. Such an approach would provide greater coordination and savings in both scarce capital, facilities for training and manpower. What is more, we would have a total population of more than 25 million people -- a formidable force and a vast market to influence economic development at home, attract a greater investment and enhance our prestige and influence abroad

The achievement of truly popular governments in each country removes fears of minority or settler domination under federation. We believe a political federation of East Africa is desired by our peoples. There is throughout East Africa a great urge for unity and an appreciation of the significance of federation.

We are aware that local and territorial factors have to be taken into account. We firmly believe that ways can be devised of overcoming any fears, and of surmounting such difficulties

We reiterate that our plans for the federation of East Africa are the logical promotion of the spirit of pan-African unity, and wish to make it therefore clear that any of our other neighbours may in future join this federation. (Rothchild, Donald (ed), Politics of Integration - An East African Documentary, East African Publishing House, Nairobi, 1968, pp. 76-78).

1) The author recognizes that East African history extends much further back in time than the beginning of Britain's efforts to foster cooperation between artificially carved out units of land called colonies. This chapter, however, is not intended to cover the whole of East African history, but only that part which directly relates to cooperative efforts between the three countries which have culminated in the forming of the East African Community today.

So spoke President Julius Nyerere of Tanganyika, Prime Minister Milton Obote of Uganda, and Prime Minister Jomo Kenyatta of Kenya in "A Declaration of Federation by the Governments of East Africa" on June 5, 1963. Today, the proposed Federation of East Africa is a dead issue and the East African Community (EAC), successor organization to the East African Common Services Organization (EACSO) and the common market, is struggling to cope with political and economic problems in keeping together the remnants of federation. Still, as Green and Krishna pointed out in 1967,

In East Africa, for example, despite the existence of long standing and justifiable grievances and the considerable provocation to go separate ways, the three independent nations have managed to pull together on a number of highly important matters. There is often a temptation to point to the cracks in the common market edifice, the decision to set up separate central banks, and the growth of nationalist fervour in political and economic matters. What is often ignored is that these forces have hardly made a dent in the structure of cooperation that exists. The tensions and differences -- some real, but others purely imaginary -- tend to receive wide and adverse publicity, while the fact of continued cooperation in vital areas seems hardly to receive any attention. (Green and Krishna, op cit, p. 11)

East Africa covers an area of approximately 1,763,000 square kilometers, which is about one and a half times the size of the European Economic Community (EEC). Tanzania has the largest land area and Uganda the smallest (see Figures IV.1 and IV.2), although large portions of both Tanzania and Kenya are semi-desert. The total population of the region is about 30 million, with Tanzania again having the largest and Uganda the smallest number of people. In terms of population density, however, Uganda has 33 persons per square kilometer, which is almost two and a half times as much as Tanzania with 13 persons per sq. km. and almost twice as much as Kenya with 17 persons per sq. km. Nevertheless, the average population density in East Africa -- 12 persons per sq. km. -- is only a fraction of that of the EEC, which has more than 150 persons per sq. km. (See Table IV.1)

TABLE IV.1^a EAST AFRICAN POPULATION, AREA, AND GDP

	Population 1967 ('000)	Area ('000 sq. km.)	Population Density (persons per sq.km.)	Total GDP 1965-66 ('000,000) U.S. \$	Annual Growth Rate ^b (%)	Per Capita GDP 1965-66 (\$ U.S.)	Annual Growth Rate ^c (%)
Kenya	9,948	583	17	1,013	3.6	112	0.6
Uganda	7,934	240	33	653	4.2	86	1.7
Tanzania	<u>12,231</u>	<u>940</u>	<u>13</u>	<u>760</u>	3.6	<u>66</u>	0.7
Total	30,113	1,763	17	2,426		87	

- a) This table has been compiled from Tables 1, 2, and 3 in OECD, *op cit*, pp. 140-143.
- b) Constant prices - 1959-61 to 1964-66
- c) Constant prices - 1959-61 to 1964-66.

Total Gross Domestic Product (GDP) in East Africa in 1966 was approximately \$2.4 billion, with Kenya having the largest at just over \$1 billion and Tanzania and Uganda with \$760 and \$650 million respectively. Average per capita income in the region for that same year was about \$87, with Kenya having the highest of \$112, Tanzania having the lowest of \$66, and Uganda coming in the middle with \$86.²⁾ At constant prices, Uganda enjoyed a slightly higher annual growth rate of both total and per capita GDP than either Tanzania or Kenya from about 1960 to 1966. (See Table IV.1). In the period just before this,

Figure IV.2 - EAST AFRICA IN AFRICA



2) It must be remembered that each country has a sizable minority Asian community which dominates commerce and small-scale industry, however, and that Kenya, and to a lesser extent Tanzania, have minority European settler groups. Thus, Robson states: "African incomes do not differ greatly amongst the three countries and are probably highest in Uganda." Robson, *op cit*, p. 100)

however -- from 1954-1960 -- Kenya had experienced an annual rate of growth in current prices of approximately 6%, which was much higher than either Uganda at 2.5% or Tanzania at 4.6%. (Robson, op cit, p. 100)

The structure of the economies in East Africa can be seen from Table IV.2 below:

Table IV.2^a Gross Domestic Product Percentage by Major Sector, 1966

	Kenya %	Uganda %	Tanzania %	East Africa %
Agriculture, forestry & fishing	40	61	54	51
Manufacturing	11	5	5	7
Trade	12	11	14	12
Other	<u>37</u>	<u>23</u>	<u>27</u>	<u>30</u>
	100	100	100	100

a) Table IV.2 is taken from Table 4.2 in Robson, op cit, p. 101.

Agricultural and related primary products dominate the economies in East Africa. Most of these products are produced on a small scale -- partly for subsistence and partly for the export market³⁾ -- except for a certain amount of large-scale commercial agriculture which is largely confined to the former European areas in Kenya and to a few plantations or estates which exist in the other two countries. These latter agricultural enterprises account for a high proportion of the value of the marketed agricultural output. East Africa's economy is highly dependent on foreign trade -- in 1966 exports amounted to 24% and imports to 27% of total GDP. Moreover, the four agricultural crops of coffee, tea, cotton, and sisal dominate the export market, accounting for 64% of the total value of East African exports in 1966 even though prices for coffee and sisal were relatively low! Fluctuations in natural climatic conditions or man-made prices on the world market can thus place East Africa's economy in a very vulnerable position. East Africa's best customers are the United Kingdom, West Germany, and the United States, while the Far East provides an important outlet for the cotton crop. With the exception of crude petroleum, East Africa imports mainly manufactured goods such as fabrics, industrial machinery, and motor vehicles. Most of these imports again come from the United Kingdom, West Germany, and the United States. In East Africa as a whole, manufacturing is little developed and accounts for only about 7% of total GDP. Most of this sector, moreover, is concentrated in Kenya where

³⁾OECD estimates that 25% of the GDP in East Africa originates in the subsistence sector. (OECD, op.cit, p. 53).

industrialization and the accompanying financial and commercial services were first begun to serve the whole region. Kenya, in fact, produces about 60% of the region's total industrial output; Uganda has a small but growing industrial nucleus around the city of Jinja; and Tanzania is the least industrialized of the three. The principal manufactured products include foodstuffs (particularly products of sugar, coffee, and wheat), cigarettes, beer, metal products, cement, textiles, footwear, and wood and paper products. (Robson, op. cit, pp. 100-103; Ndegwa, op. cit, p. 24-29; and for a further breakdown of the manufacturing sector, see OECD, op. cit, pp. 146-147)

Many authors have remarked on the "natural" or "logical" conditions which -- at least at first glance -- seem to favor some form of integration among the three countries of East Africa -- i.e., unique opportunities able to be taken advantage of in forging some kind of new community which these authors were almost always in favor of. Donald Rothchild, for example, states the following:

... East Africa, with its long history of administrative co-ordination, possessed objective conditions for unity as favourable as any in the third world. Certainly social, cultural, political and economic differences existed at the time of the 1963 declaration on federation, but they were small compared to those elsewhere. Kenya, Tanganyika and Uganda formed a contiguous land mass, had been ruled by the same metropolitan power, and had emerged from colonial rule at roughly similar times. Their leaders shared common educational backgrounds and a common Pan-Africanist ideology; moreover their experiences together in operating a joint customs union, common currency and tariff arrangement, and such interterritorial services as railways, posts and harbours, and airways created links which made its proponents optimistic about the chance for unity. (Rothchild, Donald, "From Federalism to Neo-Federalism," in Politics of Intergration, Rothchild (ed), East African Publishing House, Nairobi, 1968a, pp. 4-5.)

A closer look at some of these conditions, however, reveals that the "natural" logic of regionalism in East Africa is often over-emphasized. Geography is a case in point. Although the three countries are contiguous, Nye says that

In their natural features there seems no reason to believe that any of the three levels -- the individual countries, East Africa, Greater East Africa -- is more a natural unit than another. The "obvious unity" of East Africa is man-made. (Nye, Joseph S., Pan-Africanism and East African Integration, Harvard University Press, Cambridge, 1965, pp. 61-62.)

Geographic conditions in the region range from the tropical lowlands along the coast to the more temperate highlands further inland which extend up to 8,000 feet in altitude, with a variety of soil and climatic conditions. The only geographic feature the three countries share in common is Lake Victoria. Neither national nor regional borders have any particular physical or ethnic logic. The northern highlands of Tanzania are geographically more naturally linked with Nairobi, and

the Southern highlands with Zambia, than with the capital of Dar es Salaam; the northern frontier districts of Kenya are closely tied to Somalia; the Equatoria province of Sudan and the Acholi province of Uganda naturally go together, as do the Turkana district of Kenya and the Karamojong part of Uganda. Traditionally, cattle, crops, and people have followed these natural geographic contours rather than the arbitrary and capricious boundaries laid down by colonial powers. At the same time, there is an over-all similarity of soil and climate in all three countries which has led to the development of generally similar cash and export crops in each. Thus, instead of agricultural complementarity there is competition, and combined with the "natural" desire of any country to be self-sufficient in food and other agricultural products, there has been only a marginal movement of these products across national borders in East Africa for trade. (Ndegwa, op. cit, pp. 68-70; Franck, Thomas M., "East African Federation," in Why Federations Fail, Thomas M. Franck (ed), New York University Press, New York, 1968, p. 10).

Likewise, with respect to ethnic groups, the Masai exist in both Kenya and Tanzania, the Luo are in both Kenya and Uganda, the Shiftas in northern Kenya are ethnically Somali, and there are many other examples of ethnic divisions. Sometimes such conditions within the region are cited as an argument for regionalism, but Franck contends that

These facts emphasize the superficiality, irrationality, and instability of the existing regional boundaries that divide East Africa -- they do not necessarily argue for regional unity, although the two are too readily confused. (Franck, op. cit, p. 10)

The lack of geographic, economic, or ethnic logic to national borders does not make it any easier to remove them -- but unless they are removed or changed, the countries are almost certain to have border incidents, liberation movements, smuggling, and other forms of trouble. Although there have been very few restrictions placed on the movement of labor within East Africa, migration across national borders has not been significant.⁴⁾ Some Kenyans were working in Uganda, but this only seems to have caused more tensions between the countries. Uganda objected to common citizenship and free population movements within East Africa in 1963, and in late 1970 forcibly expelled many Kenyans who were working there. Since independence, national labor markets have become increasingly separated in practice. More labor migration occurs between East Africa and surrounding countries than within East Africa itself. (Nye, op. cit, p. 64; Robson, op. cit, p. 105)

⁴⁾Nye says, "In terms of migration, East Africa was not a significantly integrated unit." (Nye, op. cit, p. 70)

Complementing geography in the effectiveness of any integration scheme are the transport and communications systems which link the different parts together. Although East Africa's transport infrastructure may not be very developed compared to those in industrialized countries, it has enabled goods and people to be transported among the major population centers relatively cheaply. The basis for freight movement in the region is the railway. The first rail link between Mombasa on the coast and Lake Victoria was completed in 1901 and consisted of 582 miles of track. This has grown to about 4,000 miles of track in the region today, but it wasn't until 1963 that Tanganyika's rail network was fully linked with the others. A road system which is very good in relation to tropical African standards adds to the effectiveness of the total system. Internally, Tanzania has less road mileage in proportion to its areas than either Kenya or Uganda, but roads linking the three countries are either paved or in good, all-weather condition. Kenya, Uganda, and northern Tanzania⁵⁾ are thus well linked together, but Dar es Salaam (Tanzania's capital) and southern Tanzania are relatively isolated and the densely populated area around Lake Victoria also lacks adequate transport links. Air transport, particularly for the elites, has become an increasingly important means of moving people between population centers. Postal and telecommunications systems in the region also provide relatively good communications services, and radio broadcasting in each nation has greatly increased in range and subject matter. (Robson, op. cit., p. 100; Nye, op. cit., pp. 76-77)

Franck contends that common languages -- Swahili and English -- and common colonial rule and administration are two other over-rated factors often cited for their contribution to regional unity. (Franck, op. cit., p. 11) There are approximately 120 major "tribes" or ethnic groups in Tanzania, 48 in Kenya, and 28 in Uganda, and Tanzania -- unlike Uganda with the Buganda and to a lesser extent Kenya with the Kikuyu -- has had no major tribe which has been able to dominate the area in terms of political or language influence. Although 95% of Tanzania's population and 70% of the population in both Uganda and Kenya are Bantu-speaking peoples,⁶⁾ Swahili -- which is a Bantu language considerably influenced by both Arabic and English and the closest thing to a "common language" in East Africa -- is widely used and understood only in Tanzania. Not only was there a lack of competition from the language of a politically dominant tribe in Tanzania, but

⁵⁾The area around Arusha and Moshi in northern Tanzania is agriculturally important and relatively prosperous.

⁶⁾Bantu-speaking peoples refers to a very loose linguistic similarity -- it does not imply that these people all understand each other's language. The remainder of the populations are Nilotic, Hamitic, or Nilo-Hamitic. (Nye, op. cit., p. 65)

the early German colonial administration was instrumental in spreading Swahili throughout the country through the use of Swahili-speaking Africans from the coast in the administration of the interior. Swahili originated and is most widely used along the coast of East Africa, and along with the influence of Islam, makes tribal distinctions less important there. In Uganda, the use of Swahili is relatively limited, confined mainly to trade and market transactions. Far inland from the coast, the Buganda people and their Luganda language have dominated the administration of Uganda -- at least in the colonial past -- and they have opposed the extension of Swahili, seeing in it another threat to their own dominance. At their insistence, Swahili was dropped from the education curriculum in the 1930's, and in the recent past individual tribal languages rather than Swahili have been used over the national radio. In Kenya, Swahili is certainly a major language, with perhaps 50% of the population understanding it, but not a nationally-wide used one. The government of Kenya, however, is actively promoting the use of Swahili over the radio and through other means as an aid to national (and regional) unity. English is still used unofficially (if not officially) in all three countries, but is mainly confined to the more educated part of the population. (Nye, op. cit., pp. 64-68) Tanzania, however, is rapidly replacing English with Swahili in most aspects of national life.

The common traditions, bureaucratic procedures and forms, legal systems, etc. which were part of British colonial administration were indeed very handy for those colonial administrators, but since independence much of this British legacy has been changed. (Franck, op. cit., p. 11) Moreover, in the absence of any outstanding resource in the region around which to plan for growth and change, the content of colonial developmental policies in the region has not been favorable to regional unity. As will be discussed further, white immigration from Britain to Kenya was encouraged while to Uganda it was not. Agriculture was the primary resource in all the region, but in Tanganyika the Germans emphasized huge plantations run by relatively few of their managers, Uganda was characterized by small-scale African peasant farmers who grew enough cotton and coffee to account for around 90% of Uganda's agricultural exchange in the 1960's, while Kenya restricted African commercial agriculture and encouraged the farms and plantations of European immigrant families. In the latter case, the presence of Europeans also laid the basis for the concentration of whatever investment in industry and manufacturing there was in Kenya. One aspect of common colonial administration did contribute something to East African unity -- African education policy. The generally low level of African education in East Africa made the few elite that were educated just that much more important. And, at the higher levels, this education was regional in scope. Makerere College in Kampala (Uganda), which was founded as a trade school in 1921, became an East African institution in 1937 and achieved

university status in 1949. To this university came the brightest students from all over East Africa,⁷⁾ and the shared educational experience which they had played an important role in the subsequent history of regional East Africa. (Ibid, pp. 80-84)

Britain's colonial interest in East Africa began in the early 1880's when she was already in Egypt and concerned about protecting the source of the Nile -- especially so because Germany was also pursuing imperial ambitions from Tanganyika in that direction. The kingdom of Buganda -- in southern Uganda around the shores of Lake Victoria -- was the focus of British activity, not only because the Nile River began there but also because missionary activity was centered there. It was also a relatively wealthy area and efforts to suppress the slave trade centered there. The vast interior of East Africa had been claimed by the Sultan of Zanzibar, but in the "scramble for Africa," Britain and Germany divided up East Africa between them along what is today the northern Tanzanian border at a conference in Brussels in 1890. In the settlement, Zanzibar became part of British East Africa in exchange for an island in the North Sea -- Heligoland -- which went to Germany.⁸⁾ The British territories were administered at first by the Imperial British East Africa Company. In the latter years of the 19th century, the British government began to assume direct administrative responsibility for the "protectorates" of Uganda and East Africa (as Kenya was then known), and the idea of consolidating the two protectorates into one colonial administrative unit began to receive attention. In 1889, Sir Henry Johnston had been sent to Uganda as a Special Commissioner to East Africa with instructions to bear in mind the possibility of merging the two protectorates, and in 1901 he formally recommended this. This recommendation was opposed by Sir Clement Hill, head of the Africa Department in the British Foreign Office, however, on the grounds that the amalgamated unit would be too large to administer effectively -- some personal animosity might also have been involved -- and this first regional move failed. (Nye, op. cit., pp. 86-87; Hughes, op. cit., p. 213; Franck, op. cit., pp. 8-9; Soja, op. cit., p. 16)

Events, however, were about to alter the British map of East Africa with far-reaching consequences. The Buganda Kingdom's importance to the British made transportation from the coast to the interior one of the prime objectives of British policy. At first the "old northern caravan route" was travelled on foot to Buganda, but in 1896 railway construction began from Mombasa on the coast and

⁷⁾For example, in 1963, 20 of 49 cabinet ministers in the three countries had graduated from Makerere, and in the 1960 territorial legislative councils, 11 of 30 African members in Uganda, 8 of 17 in Tanganyika, and 7 of 14 in Kenya were also Makerere graduates. (Nye, op. cit., p. 84)

⁸⁾The Sultan of Zanzibar was able to keep only a small coastal strip under his formal control, which was only legally transferred to Kenya in 1963. (Franck, op. cit., p. 9)

in 1902 it was completed to Kisumu on the densely populated shores of Lake Victoria from where Buganda could easily be reached. At that time, the area east of the present eastern border of Uganda up to the Rift Valley -- the Uashin Gishu and Trans Nyoia areas -- formed the Eastern Province of Uganda, containing Kisumu and the western part of the railway. In order to bring the railroad under one administration, Sir Clement Hill did recommend that the Eastern Province of Uganda be transferred to the protectorate of East Africa (Kenya), and in 1902 this was done.

As the railway was being built, British administration followed it through the interior of Kenya. The old caravan route passed through vast stretches of seemingly empty highlands between the coast and Lake Victoria, in which the absence of a settled population was a most striking feature. British attitudes toward Kenya while the railroad was being built are aptly described by Soja:

During this period, the East African Protectorate was much more of a nuisance to the British than an asset, since it presented a vast stretch of unproductive and often troublesome territory between the coast and Buganda. (Soja, op. cit., p. 16)

In an effort to make the railway pay for itself, the decision was made to promote European settlement and encourage European productive activity in the highlands of the newly formed protectorate of East Africa. This decision had far-reaching consequences for regionalism in East Africa, as it

. . . set the basis for the later reliance on African agriculture in Uganda and on European agriculture in Kenya This difference in the racial basis of economic and social policies was to be the major pitfall in later colonial attempts at unification. (Nye, op. cit., p. 87)

White settlers were recruited from South Africa in 1903, and by 1911, the year that the Convention of Associations -- or "Settler's Parliament" as it was more popularly known -- was formed, the number of white settlers had increased from less than a dozen in 1902 to 3,175.

In 1906, the seemingly empty and very fertile highlands were reserved for white settlement only and became known as the "White Highlands." This process of separating the African inhabited land from the uninhabited -- with the latter available for European settlement -- was known as "land alienation." Alienation of the White Highlands, however, ignored several important factors. African agriculture as practiced by the Kikuyu was a "shifting" type in which one area would be farmed until the soil was played out and the people would then move to another area while the previous one would be allowed to lie fallow and build up its fertility again. Much of the alienated highlands had, in fact, been farmed by the Kikuyu, who, however, had been temporarily forced to vacate much of this land due to a series of disasters -- drought and famine, smallpox, etc. Other parts were used by the Kikuyu and the nomadic Masai, who were constantly on the

move following their grazing cattle, as a buffer zone between them. Thus, ignorance and misconceptions led the Europeans to believe that the climatically temperate and relatively disease-free fertile highlands could be "reserved" for themselves without opposition --

The result of these operations was to establish the center of European society in Kenya directly across the line of Kikuyu cultural and demographic expansion on land which the Kikuyu claimed as traditionally their own. (Soja, op. cit., p. 19)

In Uganda, on the other hand, the Buganda Agreement of 1900 with Britain had established individual African land tenure and given a dominant position in Ugandan politics to the Bugandan Kingdom. An alliance between Buganda, sympathetic missionaries, and British administrators had unofficially been formed, and in 1905 the British Governor made it clear that large-scale European settlement would not be welcome. The foundations were laid for an African peasant agricultural economy -- primarily with cotton -- and land alienation for Europeans was discouraged. The few Europeans who did settle in Uganda remained politically uninfluential and generally cool to the idea of amalgamation with Kenya, which they perceived to have a less promising economic future. (Nye, op. cit., p. 88; Hughes, op. cit., p. 214)

During the early 1900's, some expressions of support for territorial amalgamation or cooperation continued to appear⁹⁾ and cooperation on a number of activities did begin, but it was not until after World War I that the idea received a fresh boost. Under the terms of article 119 of the Peace Treaty of Versailles, Germany renounced all rights to her overseas possessions -- including Tanganyika -- which were to be allocated to certain victorious countries as "mandates." In 1919, Britain was appointed to exercise the mandate for Tanganyika, and

Article 10 of the Mandate Agreement for Tanganyika expressly authorized Britain to incorporate the territory into a customs, fiscal, and administrative union or federation with adjacent territories under Britain's administration, provided measures adopted to this end did not infringe upon the provisions of the Mandate. (Delupis, Ingrid, The East African Community and Common Market, Longman Group Ltd., London, 1969, pp. 19-20.)

And, immediately that same year, the governors of the three territories submitted reports to the British Colonial Secretary, Lord Milner, on the practical aspects of closer coordination among their territories.

⁹⁾ In 1905, the retired commissioner for the East African Protectorate, Sir Charles Elliot, said: "It is generally agreed that it would be advisable to amalgamate the two Protectorates, and if this is to be done it certainly should be done soon" and in 1922, the Colonial Secretary, Winston Churchill, ". . . declared that he looked forward to the day when 'a great East African Federation, almost an empire, would be created.'" (Hughes, op. cit., p. 214)

In 1924, Sir Sydney Henn moved in the British House of Commons,

That, in view of the desirability of unity of policy both in administration and development of the territories of Kenya, Uganda, Tanganyika, Zanzibar, Nyasaland, and North-Eastern Rhodesia, and the necessity for a comprehensive scheme of transport development throughout East Africa, this House urges the Secretary of State for the Colonies to send out to East Africa this year a special commission to report to him on the practicability of coordinating policy and services throughout the territories, and to advise on the programme of future economic development, especially cotton-growing and railway construction. (House of Commons Debates, reprinted in Rothchild (ed), op. cit., p. 19)

Colonial Secretary L. S. Amery appointed such a commission under the chairmanship of W. G. Ormsby-Gore, and in 1925 they reported on their findings:

. . . We should like to state at the outset that we are impressed with the need for greater cooperation and understanding, not only between the five administrations but between unofficial residents in the territories as well. Few things struck us more than the lack of knowledge in each territory of East Africa regarding its neighbours; in fact, we found not merely a lack of knowledge but in many cases complete misunderstanding. But, while there is greater need for mutual understanding, we are of the opinion that the day is still far off when such cooperation could be brought about by the imposition of federal government over the whole of the territories.

We found little, if any, support in East Africa for the idea of immediate federation, and in some quarters we found definite hostility. (Report of the East Africa Commission, reprinted in Rothchild (ed), op. cit., p. 20)

Although other obstacles such as geographical conditions, a lack of communications, and the curtailing of local administrative freedom and initiative were cited as reasons for rejecting federation, it is apparent that a lack of support for the idea amongst all population groups was decisive. White settlers in Kenya feared that closer cooperation would mean increased Colonial Office control over "native policy" and a lessening of their own influence, while Africans seemed to fear the opposite. The Buganda especially feared that federation would mean a change for the worse for themselves and the "special considerations" accorded to them in the Buganda Agreement of 1900 -- not so much in relation to white settlers as to other African tribes -- although they did not object to the amalgamation of certain public services.¹⁰⁾ The Ormsby-Gore report, as it came to be known, also rejected the federation of existing services as being impracticable on administrative grounds without actual political federation. The suggestion was made, however,

. . . that there should be regular periodic conferences of Governors and also of the responsible officials of the various departments

¹⁰⁾ See a letter of the Kabaka of Buganda to Mr. W. Ormsby-Gore of 29 October, 1927, reprinted in Rothchild (ed), op. cit., pp. 21-22.

Such conferences should necessarily deal with matters of common interest to all the territories, such as native administration, communications, taxation, land policy, labour, etc., etc. (Ibid., p. 21)

In 1926, the first Governors' Conference was held and it was decided that a permanent Secretariat should be set up in Nairobi. Gradually, however, the Governors of Nyasaland and Northern Rhodesia attended these meetings less and less frequently, which left the Governors of the three East African territories plus Zanzibar represented on it. (Delupis, op. cit., pp. 21-22)

Meanwhile, the attitudes of the influential¹¹⁾ white settlers in Kenya toward federation of the three East African territories had been changing in a positive direction -- but only on their own terms. Under the leadership of Lord Delamere -- one of the original settlers -- a "closer union movement" or "settlers' federation movement" developed from 1924 to about 1931 which advocated political unification of the three territories. Colonial Secretary L. S. Amery, an admittedly strong supporter of federation, in 1925 appointed Sir Edward Grigg to be Governor of Kenya¹²⁾, a man who has been described as

... a trusted friend of the settlers but also a supporter of federation, [who] helped to bring the Europeans around. (Hughes, op. cit., p. 216)

The price for settler backing, however, was the legitimization of white rule in Kenya. At their "Conference of Unofficials" in 1926, the settlers voted to support the idea of federation, provided that an elected¹³⁾ majority of Europeans was granted in the Kenya Legislative Council.¹⁴⁾ (Nye, op. cit., p. 89; Hughes,

11) Nye says that the unofficial "Settlers' Parliament" referred to earlier was able to exert strong political pressure and generally overshadowed the official Legislative Council of the Government begun in 1907. (Nye, op. cit., p. 87)

12) See Rothchild (ed), op. cit., pp. 22-23 for a reprint of Amery's own recounting of the appointment.

13) "Elected", as opposed to appointed, meant a greater degree of settler self-government as opposed to British government control

14) Lord Delamere put it like this in a speech during the elections of January 1927: "In order to safeguard the future of Tanganyika we believe the time has come actively to take part in helping in welding Tanganyika to the British states north and south of her, and the first step is to attach her to Kenya and Uganda.

But it will not help her or the cause of civilizing influences in Eastern Africa to tie her to Kenya if Kenya's own constitution is still founded on the shifting sands of an official majority subject to the direct orders of the Secretary of State of the day. It is a vital necessity to any scheme of co-ordination based, for the present at least, on the radiation of civilization from Kenya that we should have a free Council here -- a Council where officials, missionaries, settlers and merchants are free to express their opinions. And the only way you can get this is by having on your Legislative Council a European elected majority over all parties We all know we should never dare enter a confederation of any sort until we were assured that Kenya was first of all anchored fast to civilization and unable to shift from her moorings." (Rothchild (ed), op. cit., pp. 23-24)

op. cit., p. 216; and for a quote from a Convention of Associations resolution regarding the 1926 conference decision, see Rothchild (ed), op. cit., p. 24). All whites in East Africa were not willing to go along with settler demands, however. At a Governors' Conference in London in 1927, the Governor of Tanganyika opposed closer union of the territories and the possible extension of Kenya's racial policies. Nevertheless, a British government white paper published that same year emphasized the importance of federation on economic grounds, and Secretary Amery, hoping to "secure Cabinet consent to actual federation" by producing "some authoritative backing independent of the views of the Colonial Office," appointed a commission under Sir Hilton Young as Chairman "to look into the whole question of federation or closer coordination between the several governments in that part of the world."¹⁵⁾

The Hilton Young Commission began its investigations toward the end of 1927 and the report was published in 1929. The principal charge to the Commission was

. . . to make recommendations as to whether, either by federation or some other form of closer union, more effective cooperation between the different governments in eastern and central Africa may be secured, more particularly in regard to the development of transport and communications, customs tariffs and administration, scientific research and defence. (Hughes, op. cit., p. 216)

The Commission reported that the time was "not yet ripe for any drastic and sudden change"¹⁶⁾ in the area, but it did recommend that policies should be coordinated among the territories and that a Governor-General for Eastern Africa be appointed with full executive powers to link the Secretary of State in London with the territorial governments. It was further recommended that the Governor-General should become a "high Commissioner for Transport" of the three territories to deal with regional transport matters, along with an "inter-colonial Advisory Council or Board," and that preliminary regional efforts in communications, customs, defence, research,¹⁷⁾ and other matters should be begun under him or along similar lines. (Hilton Young Report, reprinted in Rothchild (ed), op. cit., pp. 26-30) But a great deal of the report also dealt with the coordination of native policy --

¹⁵⁾These are Amery's own words, as reprinted in Rothchild (ed), op. cit., p. 23.

¹⁶⁾This is the phrase used in the Hilton Young report -- See Rothchild (ed), op. cit., p. 26.

¹⁷⁾"This is a matter of so technical a nature as to require special arrangements. We . . . have recommended a special inquiry by experts in order to settle the objectives for this work. The further steps to be taken must depend on the results of this inquiry, and must be co-ordinated with the general plan now being considered for an imperial research organization. The Governor-General in the preliminary stages would be mainly concerned with ensuring the assistance and cooperation of the three territories in pursuing the necessary inquiries." (Hilton Young Report, reprinted in Rothchild (ed), op. cit., p. 30)

which was "urgently needed" -- and the composition and powers of territorial Legislative Councils. Changes were recommended for the Kenya Legislative Council which increased the number of appointed European members nominated to represent African interests from one to five, and otherwise implied a loss of local, white control over Kenya's "native policy." Such recommendations were described as "anathema to the Kenyan settlers," (Nye, op. cit., p. 90) and opposition to federation again began to develop amongst them. 18)

In an attempt to secure some modified and workable agreement on regional cooperation, Secretary Amery sent his "right-hand man," Sir Samuel Wilson, to East Africa to negotiate personally with the dissenting settlers. Ironically enough, it was not just the settlers who were against federation or increased cooperation toward that end along the lines recommended by the Hilton Young Report, but the Indians and Africans also -- albeit, for quite opposite reasons from those of the settlers. 19) b

18) Colonial Secretary Amery described these developments somewhat poignantly: "Unfortunately the recommendations of the Report, in which the views of the majority of the Commission largely prevailed over those of the Chairman, did not seem to me altogether practical. In the case of East Africa, instead of confining themselves to the economic issues where a single development policy was most needed, they aimed at the much more difficult and doubtful object of unifying native policy, where local conditions differed so widely, not only between the three territories, but within those territories themselves The recommendations, as they stood, were obviously unacceptable in East Africa." (Rothchild (ed), op. cit., p. 23)

19) In a response to the Hilton Young Report at the Eighth Session of the Eastern Africa Indian National Congress on April 13, 1929, the President said: ". . . the proposal for a continuous replacement of officials by Europeans nominated to represent native interests has created considerable uneasiness. . . . The process envisaged by the Commission will sooner or later lead us to a stage when Europeans will be in a majority as compared with Indians and officials taken together; . . . when Indians cease to hold the balance between officials and non-official Europeans there will be no guarantee that their interests will receive due consideration. . . . The question of closer union cannot be considered without reference to past events and the feeling they have engendered among Indians. . . one of alarm at the probable effect of proposals for federation. Tanganyika and Uganda Indians were afraid of the extension of the Kenya spirit to their countries and having to conform to the less liberal native policy of Kenya." (Rothchild (ed), op. cit., pp. 34-34)

In a memorandum to the Hilton Young Commission, the Kikuyu Central Association stated: "The Association views with distinct alarm the proposal of the settlers that they should have an unofficial European majority in the Legislative Council of Kenya. Such a constitution is bound to be very harmful to the natives and to result in heavier taxation, oppressive labour laws and imposition of further restrictions on the personal freedom of the natives. . . . The Association is also of the opinion that until the safeguards enumerated above are first provided for and measures suggested are definitely initiated, any step towards a federation of British East Africa territories would be premature and tend to aggravate the domination of the white settlers and render the native communities in all territories more helpless than ever. The Association is afraid that native grievances and consequent discontent will be perpetuated by any approach to a political federation." (Ibid, p. 25).

In his report, which was published in 1929, Sir Samuel Wilson stated:

... I had not been in East Africa for long before I realized that everyone was frightened of any idea of political federation. (Rothchild (ed), op. cit., p. 34)

In order to placate the settlers, Wilson's report dismissed the Hilton Young suggestion to coordinate native policies under a central authority as fine in principle but impractical and concentrated instead on the details of coordinating services. (Ibid, pp. 34-35; Nye, op. cit., p. 90) This report was more pleasing to the settlers, but political events in Britain caught up with Amery's and Wilson's efforts.

In 1929, national elections were held in Britain and the Labour Party came to power along with a new Colonial Secretary -- Lord Passfield (Sidney Webb) -- who scrapped Wilson's report and issued a "White Paper on Closer Union," which, in Amery's words,

... completely upset European opinion, both in East and Central Africa and, coupled with the subsequent economic depression, postponed all possibility of federation indefinitely. (Rothchild (ed), op. cit. p. 23)

This report called for a regional High Commissioner -- to be advised by a nominated Council -- who would have control over common services and also over African affairs in the three territories. (Hughes, op. cit., p. 218) But the Labour Cabinet, being now and understandably cautious, decided to consider the matter further by hearing more independent opinions, and in 1931 a Joint Select Committee of both Houses of Parliament was convened to hear evidence from over 750 delegations and individuals on the matter -- many of them coming from East Africa and representing all races and interests concerned. African evidence before this Committee in London was striking in its unanimous opposition to political federation and the reason that lay behind it -- a fear of increased white domination.²⁰⁾

20) Kenyan Africans particularly feared that the office of High Commissioner would be dominated by white settler opinion and that their last resort to British government approval of territorial decisions would subsequently be lost. Tanganyikan Africans expressed satisfaction with their colonial Governors and administrations appointed by the British government, both with regards to advancements made by and for them and the upward mobility available to them, and feared that federation would mean a distinct loss of such benefits and freedoms. Uganda -- which was represented by leaders of the Buganda Kingdom -- echoed Tanganyikan Africans and added their own parochial fears of a loss of Buganda privileges accorded to them under the Buganda Agreement of 1900. This summary of the evidence is taken from the minutes of the Joint Select Committee as reprinted in Rothchild (ed), op. cit., pp. 36-42.

The vacillations of successive British governments and the world-wide economic difficulties being experienced at that time had made the white settler in East Africa hostile to federation by this time also. Besides, it is doubtful if the League of Nations would have let its mandate -- Tanganyika -- join such a political union. Later in commenting on the Joint Committee's report, the Permanent Mandates Commission of the League of Nations stated:

With reference to the expression "the time is not yet ripe," the Commission considers that a political or constitutional union of the Mandated territories with the neighbouring territories cannot be carried out as long as the present mandate is in force. (Rothchild (ed), op. cit., p. 42)

In any event, the Joint Select Committee report published in 1931 rejected any radical moves toward political federation or even economic union. However, since at least some African opinion did not object to the further coordination of common services -- as long as this was not used as a pretext for political federation -- the report did say that the Governors of the three territories should meet more frequently and explore further the means for ensuring such cooperation. Subsequently, up to the beginning of World War II, the Governors did meet regularly once a year, and Hughes says that through these conferences and meetings of officials a useful means of achieving practical coordination was provided. (Hughes, op. cit., p. 219)

Thus, up to World War II, political federation of the three territories had not been achieved, but interterritorial cooperation in a number of common service areas did get started -- e.g., transportation, posts and telecommunications, meteorology, locust control, higher education, common currency, common market, etc. As previously mentioned, the Eastern Province of Uganda was transferred to the East African Protectorate (Kenya) in 1902 and from then onwards, the railway -- later extended to Kampala -- was operated by a centralized regional administration. During World War I, a military railway was constructed from Voi in south-eastern Kenya to Kahe in northern Tanganyika and the Ormsby-Gore Commission recommended that this Voi-Kahe stretch be operated by the Kenya-Uganda railway. At the first Governors' Conference in 1926, the Governor of Kenya became the "High Commissioner for Transport for the Kenya-Uganda Railway" and a "Special Railway Secretariat" was set up to administer the lines. One year later, the administration of the port of Mombasa -- previously under the Kenya government -- was transferred to the railways administration and its name was changed to the "Kenya-Uganda Railways and Harbours Administration." All of the subsequent reports -- Hilton Young, Sir Samuel Wilson, and the Joint Select Committee -- recommended more regional cooperation in the field of transportation, as did a 1933 report entitled "The Coordination of Transport in Kenya, Uganda, and Tanganyika Territories." (Hughes,

op. cit., p. 219) A postal union between Kenya and Uganda was first established in 1911, and in 1925 the postal and telecommunications administrations of the two colonies were amalgamated. In 1933, Tanganyika joined the postal union, a Postmaster-General was appointed for the region, and a common telegraph system was put into service. (Delupis, op. cit., pp. 19-20)

In economic and trade areas, an East African Currency Board was set up in 1905 to issue bank notes for Kenya and Uganda, but a common currency for all three territories was not issued until 1919. Tanganyika officially joined the Currency Board in 1921. From this point on, East African currency was part of the sterling exchange system under which external reserves were held in sterling securities and local currency was issued and redeemed in exchange for sterling at a fixed rate. (Robson, op. cit., p. 115)

. . . There has always been a kind of unity among the three East African territories in their trading and commercial relationships with each other and with the outside world . . . (Kennedy, T.A., "The East African Customs Union: Some Features of Its History and Operations," in Politics of Integration, Rothchild (ed), East Africa Publishing House, Nairobi, 1968, p. 169)

writes T.A. Kennedy. The Congo Basin Treaties, which were negotiated at the Berlin Conference of 1885 and the Brussels Conference of 1890, established two important principles which provided the basis for uniform trading policies in all territories of the Congo Basin -- maximum limits for tariffs and non-discrimination. Subsequently, there were close and frequent economic contacts between German-ruled Tanganyika and British East Africa. During the late 1800's, the greater part of Uganda's external trade was carried out through Tanganyika, and after the Kenya-Uganda railway was built, northern Tanganyika became closely tied to it and the port of Mombasa. Lake Victoria trade was administered jointly by German and British authorities, and for some time customs duties and most internal taxes were maintained at the same -- or similar -- rates. In the early 1900's, each territory had its own customs authority and chain of customs posts, but when the railway was finished and imports intended for Uganda started coming through Mombasa instead of Tanganyika, a dispute between Uganda and the East African Protectorate arose out of the duties on Uganda-bound goods which the latter territory was keeping. An agreement between the two British territories was reached in 1909 in which Kenya agreed to turn over a certain proportion of the customs revenue collected at Mombasa to Uganda. As the customs duties which Uganda collected at her own border became less and less, it was decided that the two customs authorities should be amalgamated. This was done in 1917, and provision was also made for free trade between the territories in both local and imported products -- i.e., a customs union was established. Tanganyika joined the union in stages. In 1922, a common external tariff was adopted for all three territories; in 1923, tariffs on locally produced goods were eliminated; and in

1927 the duty-free transfer of imported goods from one territory to another -- with the customs duty credited to the territory of final consumption -- was established; and finally in 1949, Tanganyika's customs administration was amalgamated with that of Kenya and Uganda. This common market -- as it came to be known -- was not based on a formal treaty or agreement between the three territories, but operated on their de facto acceptance of the way things were. Towards the end of the 1930's there was a commission of inquiry into the financial position of Kenya. As a result, an income tax was introduced in Kenya in 1937, and in 1939 it was extended to Uganda and Tanganyika with the same rates and structure. In 1940, a Joint East Africa Income Tax Board was established to handle the collection of the tax. (Robson, op.cit., p. 104; Delupis, op.cit., pp. 20-23; Kennedy, op.cit., pp. 169-173)²¹⁾

World War II had a very great impact on the course of East African history. As Nye states:

What central structure was achieved in East Africa must be credited in large part to World War II. (Nye, op.cit., p. 93)

The war made regional planning and action an accepted feature of East African life, especially when Italy entered the war in 1940 and occupied neighbouring Ethiopia. The war provided the impetus for establishing institutions on a wide geographic basis for regulating, directing, and coordinating the British East African war effort. In 1940, the Governors' Conference established a "joint Economic Council" -- with its own secretariat -- to maintain liaison between the heads of common service administrations and the civil governments, and to enable the three territories to act as one economic and commercial unit. A wide range of temporary ad hoc councils, boards, and committees grew up around the Economic Council Secretariat, perhaps the two most important of which were the Production and Supply Council and the War Supplies Board which tried to fulfil resource and manpower demands made by the Allied forces. (Rothchild, Donald, "Achievement of Administrative Union," in Politics of Integration, Rothchild, (ed), East African Publishing House, Nairobi, 1968b, p. 47; also Delupis, op.cit., p. 23; and Hughes, op.cit., p. 220)

Because the authority in such arrangements was diffuse and decentralized, consultation and agreement were necessary before action could be taken, and delays and confusion resulted. Most dissatisfaction centered on the Governors' Conference itself, which was accused of being both secretive and impotent.

Therefore it is not surprising that by the war's end, both the need for a more efficient common machinery and the futility of the present arrangement became evident to many East Africans of all races and led to a

²¹⁾ See also Hazlewood, Arthur, "Economic Integration in East Africa," in African Integration and Disintegration, Hazlewood (ed), Oxford University Press, London 1967, p. 73; Nye, op. cit., p. 132.

widespread desire to place such non-political activities on a firmer constitutional footing. (Rothchild, 1968b, op.cit., p. 47)

The British Government was also interested in seeing that more effective cooperative agreements between the three territories were developed. In 1945, the Labour Government published a White Paper on "Interterritorial Organization in East Africa" which proposed arrangements designed to secure greater coordination and efficiency in the operation of common services and to satisfy the desire for more popular participation and control, but not to promote closer political union.

In brief, Colonial Paper No. 191 (as the White Paper became known) proposed that a High Commission and Central Legislative Assembly be established for the region to run the common services on a constitutional basis. The High Commission was to be composed of the three territorial Governors -- with the Governor of Kenya as Standing Chairman -- who would control and operate the services. The actual day-to-day administration, however, would be done by five officials -- the Chief Secretary to the High Commission, the Financial Secretary, the Director of Transport, the Postmaster General, and the Commissioner of Customs -- who, along with an Economic Advisor and a Legal Secretary would be the ex-officio members of a regional Central Legislative Assembly. The Assembly itself would serve for a term of four years and would have the power to enact legislation for the region, but only with relation to a restricted list of subjects. Moreover, both the High Commission and -- ultimately -- the British Government had to approve the legislation before it could become official. The most striking -- and controversial -- aspect of the arrangements was the proposed membership of the Assembly. In addition to 12 official members (seven ex-officio members mentioned above, one nominee from each Governor, and two nominees by the High Commission) and a Speaker, there were to be 24 unofficial members -- six Europeans, six Indians, six Africans (or trustees of African interests -- two from each territory), two Arabs, and four others. The European and Indian members would be elected by territorial Legislative Councils and the remainder would be nominated by the High Commission. (Ibid, pp. 48-49)

The principle of group equality for European, Asian, and African unofficial members raised a storm of protest among the white settler communities in Kenya and northern Tanganyika --

The paramount cause of European protest was a fear that acceptance of racial parity in this instance would "put ideas of racial equality into the Africans' heads" on future occasions. (Ibid., p. 50)

With the exception of white communities in Uganda and southern Tanganyika, white opinion opposed any move toward regional cooperation under these circumstances.

At first, Indian and African groups were not satisfied with Colonial Paper 191

either. After an initial negative reaction, however -- and after strong assurances that no political unification was planned -- African and Indian opinion became mostly favorable.²²⁾ Only in Tanganyika was there any significant African opposition.

During the summer of 1946, the Under-Secretary of State for the Colonies, Mr. Arthur Creech Jones, toured East Africa and held discussions with all racial groups on Colonial Paper 191. In 1947, Mr. Creech Jones became Secretary of State for the colonies, and in February of that year Colonial Paper No. 210 was issued which announced the revised proposals of the government for interterritorial organization. There was now to be a general review of the Central Legislative Assembly after four years to determine if it should continue to exist and the form it should take if so, additions to regional services or subjects the Assembly was allowed to deal with were forbidden without a clear expression of approval from each of the territorial Legislative Councils, and the membership of the Central Legislative Assembly was changed. There would now be a Speaker, seven ex-officio members from the High Commission staff, one Arab, and five members from each of the territories -- one appointed by the Governor, one elected by the territorial legislature, and one from each of the three racial groups to be appointed by the territorial government or elected. Assuming that a European governor would appoint a European and that a European-dominated territorial legislature would elect a European, white dominance was assured.

Under the conditions of Colonial Paper 210, attitudes toward regional cooperation quickly changed --

In their new form the proposals were accepted by the Europeans, but rejected by Africans and most Indian opinion in all three countries. (Hughes, op.cit., p. 222)

The Africans and Asians -- along with their few white allies in Southern Tanganyika and Uganda -- felt bewildered and betrayed by the sudden turnabout. They attempted to oppose the new arrangements,²³⁾ but the other side had official majorities in each of the territorial Legislative Councils and events inexorably pushed forward. In the early part of 1947, debates were carried on simultaneously in each territory's Legislative Council and motions to accept the proposals for Interterritorial

22) "Also, the fury of settler disapproval in Kenya must have enlisted further African support, for whatever the settlers rejected categorically must have taken on added lustre for the more outspoken black nationalists" (Rothchild, 1968b, op.cit., p. 49)

23) "However, African leaders were by no means unaware of the need for operating on an East African basis. Mr. Mathau, for one, emphasized he was not opposed to the principle of interterritorial reorganization. That which he and his associates did oppose was what they considered to be a retreat from the equality explicit in Colonial No. 191." (Rothchild, 1968b, op.cit., p. 54)

Reorganization in East Africa as set forth in Colonial Paper No. 210 were passed, with the few African and Asian members voting no or abstaining. On July 28, 1947, Mr. Creech Jones announced to the House of Commons that he had decided to put Colonial Paper 210 into effect, and under these rather inauspicious circumstances, the East African High Commission came into operation on January 1, 1948 and the East African Central Legislative Assembly first met on April 6, 1948.²⁴⁾ (Rothchild, 1968b, op.cit., pp. 52-54; Hughes, op.cit., p. 222)

As finally constituted, the East African High Commission (EAHC) did consist of the three territorial Governors with the Governor of Kenya as Chairman and empowered to act in certain cases on behalf of the Commission when it was not in session. Administratively, the EAHC Secretariat was composed of four principal executive officers -- Administrative Secretary, Financial Secretary, Postmaster General, and Commissioner for Transport -- plus a Legal Secretary. Unlike the Governors' Conference, the EAHC had its own regional Secretariat and not simply territorial -- mostly Kenyan -- representatives and Civil Servants working for it. The Central Legislative Assembly was constituted as previously discussed, and was restricted to legislating only on the following regional topics: appropriations providing for the EAHC, Assembly, or common services expenditures; civil aviation; customs and excise administration -- but not the power to set tariff rates; income tax administration -- but not the power to set rates; regional scientific research; Lake Victoria fisheries; Makerere College; meteorological services; post, telegraph, and telecommunications; railways and harbours; inland water transport; loan ordinances for the self-contained²⁵⁾ services; statistics and the census; Royal Technical College of East Africa; merchant shipping; General Clauses Acts; pensions and other matters affecting staff; and any matter concerned with peace, order, and good government of the three territories. (Delupis, op.cit., p. 29; Hughes, op.cit. p. 222) Although the range of topics was thus very wide, the Assembly itself was subordinate to the High Commission. As Delupis describes it,

²⁴⁾ After World War II, the United Nations replaced the League of Nations and the Mandates of the latter organization were converted into "Trusteeship territories" of the former. Article 5 of the Trusteeship Agreement for Tanganyika provided for a "customs, fiscal or administrative union or federation with adjacent territories under His Britannic Majesty's sovereignty or control" as long as such measures were not inconsistent with other terms of the Agreement. (Delupis, op.cit., p. 26) However, the United Nations General Assembly was quite clear about their opposition to political federation. In Resolution 224 (III) of the Third Session (November 18, 1948) they state: "The General Assembly ... Endorses the observation of the Trusteeship Council that an administrative union 'must remain strictly administrative in its nature and scope, and that its operation must not have the effect of creating any conditions which will obstruct the separate development of the Trust Territory, in the fields of political, economic, social and educational advancement, as a distinct entity.'" (Rothchild (ed), op.cit., p. 60)

²⁵⁾ To be explained shortly.

The role of the Legislative Assembly was limited to the mere consideration of East African legislation (on certain topics) before it became "law" by the assent of the High Commission, i.e., by the Governors of the three territories. But this assent was given beforehand; all Bills had to be approved by the High Commission before their introduction in the Assembly. (Delupis, op.cit., p. 29)

Still, the Assembly did enact a number of important laws in its first years of existence, and these laws -- with the consent of the High Commission -- then had the force of law in all three territories.

Despite the advantage which the High Commission had over the Governors' Conference, there were still limitations placed on it which made it fall far short of any real degree of regional unity. The basic political and administrative powers remained with the territorial governments. With the exception of the self-contained services which paid at least most of their own way, the activities and services of the High Commission depended on financial funding from the territories. Moreover, the High Commission's executive and legislative authority rested upon the unanimous agreement of the territorial governors and governments. One territory could block any proposal. And if a territory were to violate any regional agreement, there were no regional courts or police force to enforce the High Commission's laws or decrees. With all these limitations, however, Hughes says that

After the disagreements surrounding its inception, the High Commission quickly settled down to doing an efficient job of work with little public interest. (Hughes, op.cit., p. 223)

Many of the services and activities of the EAHG can be divided into seven functional groupings: Administration; Finance; Communications; Social Services; Research and Scientific Services; Economic Services; and Defense. As mentioned earlier, a Secretariat was established for the EAHG to administer its functional responsibilities. A Public Service Commission was also set up in administration in 1957 to advise on recruitment of staff and other staff matters. Under Finance, the East African Income Tax Department was responsible for administration and collection of income taxes in the region. Previously, territorial income tax systems had been almost identical so that few adjustments were needed. The EAHG now had the power to legislate on the management and administration of collections, and did so -- the Assembly passed the East African Income Tax Management Act of 1952 which regulated the manner in which the tax was collected throughout the region -- but not on the rates or personal allowances of the tax, responsibilities which remained with the separate territories. Tax returns were filed on all income earned in the region, and the revenues were subsequently allocated to the territories on the basis of what they would have received if there had been separate Income Tax Departments. Also performing a financial function was the

East African Customs and Excise Department -- established on January 1, 1949 -- which collected customs and excise duties in the region. In practice, there were common customs and excise rates, but the power to set those rates again remained with the territories. Later in 1949, the Assembly passed the Customs and Excise Revenue Allocation Act which provided for the allocation of this revenue to the three territories. (Ibid, pp. 32-34)

Communications functions were carried out by Railways and Harbours, Post and Telecommunications, and Civil Aviation Departments.²⁶⁾ From 1949 onwards, the regional Assembly annually enacted an Appropriation (East African Railways and Harbours) Act and an Appropriation (East African Post and Telegraph) Act towards the expenditures of these departments. Both of these departments, however, were "self-contained" commercial units,

. . . which operated on commercial lines, were self-accounting enterprises, financing their expenditure from the sale of their services, and from loans for capital development, (Hazlewood, 1967, op.cit., p. 72)

as opposed to the other "non-self contained" services.²⁷⁾ Railways and harbour systems had been gradually amalgamated into one administrative unit, and the process was completed with the introduction of a common tariff for both systems and the new East African Railways and Harbours Administration Act of 1950. Post and telecommunications services already had been under a regional Postmaster General with headquarters in each territory. Following the conversion into a self-contained department, a Post and Telegraph Advisory Board was established to communicate with the regional Assembly. The Directorate for Civil Aviation came into existence in 1949 under the regional Commissioner for Transport. The Postmaster General was responsible for supplying air radio technical services, and a Director of Civil Aviation was established for service operations. (Ibid, pp. 35-36)

Under Social Services came the East African Refugee Administration, the East Africa Literature Bureau, and the East Africa Inter-Territorial Language Committee. The Refugee Administration was in charge of some Polish refugees in the aftermath of World War II. By 1949, most of these refugees resettled in other countries or were repatriated and its mission was fulfilled. The East African Literature Bureau -- and its auxiliary, the Inter-Territorial Language Committee -- was established in 1948 to fight illiteracy, publish written materials, and to provide libraries. There had been some regional cooperation in Research

26) In 1960, the EAHC transferred the Meteorological services from "Scientific Services" to "Communications."

27) For all the non-self supporting services, the regional Assembly enacted an Appropriation (Non-Self Contained Services) Act annually from 1949 onwards to provide for their expenditures. (Delupis, op.cit., p. 30)

and Scientific Services before World War II in the fields of meteorology and agriculture, but after the War the number of regional research services under the High Commission increased greatly. By 1950, there were about 20 research organizations working on a regional basis. The Order in Council which established the High Commission only mentioned a few of these organizations by name, but there was a general authorization which provided that research units could be set up on a regional basis as they became necessary. (Ibid, pp. 36-38)

There were several Economic Services which the High Commission provided. The East African Production and Supply Council -- later renamed the Department for Economic Coordination -- studied the supply of certain commodities and made price control recommendations, and was also a forum for the coordination of import control policies. Under its direction, such groups as the East African Cereals Pool, the Timber Advisory Board, and the Advisory Bureau for Quality Standards functioned. The East African Industrial Council was concerned with industrial licensing in the three territories. Under the Industrial Licensing Ordinances -- and amendments -- of the three territories, the Council was authorized to receive applications and grant exclusive licenses to manufacture specific products in the region for a period not exceeding five years, in order to protect infant industries. The East Africa Office in London maintained liaison between British and East African governments on trade matters such as long term contracts and bulk purchases. The East Africa Tourist Association was another joint undertaking under the High Commission established in 1948 to encourage and promote tourism (Ibid, pp. 38-39).

The final functional service of the High Commission was in the field of Defense. Under the High Commission's Order in Council, it had the power to establish regional defense services. A Kenya Royal Navy Volunteer Reserve had existed in the past, but in 1949 the regional Legislative Assembly passed the East Africa Naval Force Act, and in 1950 the regional Naval Force replaced the Kenyan Reserve. (Ibid, p. 39)

There were other early activities of the High Commission which might also be mentioned. In 1949, the regional Assembly passed the Makerere College Act which provided a new Constitution for the College, and in 1963 the College was transformed into a University College of East Africa. The importance of Makerere as a common training institution for a whole generation of East African elite has already been mentioned. In the 1950's, these elite were also united by their common struggle for independence. Franck speaks of one plus factor in region-building efforts, a "gradually developed habit of cooperation and unity" which came from the common struggle for independence by friends, many of whom studied

together at Makerere or in Britain. (Franck, op.cit., p. 12) Although Africans were still suspicious of the High Commission as a forerunner to federation,²⁸⁾ some of their attitudes were changing. There were complaints over the white-supremist atmosphere in Nairobi -- the High Commission's headquarters -- and over the pace of Africanization in the Commission's activities, but although vocal and public complaints about the Commission were heard from African leaders, they did recognize its economic value:

. . . most African leaders were well enough aware of the economic advantages of the organization not to give backing to a few trade union leaders who went so far as to demand the dismantling of the High Commission. (Hughes, op.cit., p. 223)

During the 1950's, colonial Africa moved toward independence under African control and the attitude of East Africans toward regional cooperation or federation became increasingly important. Inherent in the word "nationalism," however, were the ingredients that would eventually oppose regionalism, although they need not have necessarily been the determinant factors. Either a strong East African colonial regional government or African nationalist organization would have had some positive effect on pre-independence federation attempts, but the relatively weak cooperative structure of the High Commission was reflected in the attempts of territorial nationalist parties to get together. Nye describes the situation well:

When nationalist institutions were established in East Africa, they were built at the territorial (not the East African) level, because British colonialism had constructed the effective power structure (which the African elite wished to capture) at the territorial level. Once they had captured it, the African leaders had to use the territorial power structure to "build a nation," to create the community that they had claimed. This put strains on the weak East African structure of cooperation." (Nye, op.cit., p. 85)

There was some important regional political activity among the Africans, however. In 1945, two Kenyans -- James Gichuru and Francis Khamisi -- travelled to Uganda and Tanganyika to explore the possibilities of joint political cooperation, but the response to their efforts was negative. In Uganda, the dominant leaders of Buganda -- true to their past attitudes -- disliked the idea of joining with other Africans, and in Tanganyika no effective leaders or organizations were found to cooperate with. In October of 1950, under the shadow of the impending

²⁸⁾See the "Report of the United Nations Visiting Mission to Tanganyika, 1954" and the Proceedings of the East Africa Central Legislative Assembly, both reprinted in Rothchild (ed), op. cit., pp. 61-67 for examples of this suspicion.

Central African Federation which most Africans violently opposed,²⁹⁾ a second attempt was made to get African political movements together on an East African basis, but it too failed. Nye claims that the failure was, due to a "disparity between political organizations" between Kenya and the other two territories.³⁰⁾ (Ibid, p. 97)

A continental-wide Pan African movement had meanwhile begun to grow up, but it was dominated by the relatively more sophisticated West Africans and so in September of 1958 East Africans once again met in Mwanza (Tanganyika) on the shores of Lake Victoria. This time the Pan African Freedom Movement for East and Central Africa (PAFMECA) was established in connection with the all-African People's Conference and included Africans from Nyasaland and Northern Rhodesia as well as from East Africa. The coming reality of African independence made many of the African elite see the concept of an East African Federation in a new -- and more favorable -- light, but PAFMECA was still a relatively weak organization compared to its territorial components. Uganda would not agree to establishing a definite organizational plan and most of its activities were concerned with coordinating the struggle for freedom -- "The question of East African Federation, they decided, did not arise at that time." (Hughes, op.cit., p. 230)

Still, a regional political organization of Africans did exist, and it was used by individuals within PAFMECA to generate a federalist movement. Somewhat wistfully, Franck states:

Its coming into being as an association of the like-minded East and Central African political parties gave the region an institutional basis of shared purpose, struggle and camaraderie which no other part of Africa could match. . . in early 1960 the inner circle of PAFMECA (Kaunda, Nyerere, Kamona, Obote, Mboya, Kenyatta, Gichuru) had a youthful restless spirit, a lean and hungry intellect, an integrity, an indifference to tradition -- both African and Western -- an idealistic, intelligent inventiveness, a fondness for innovation, for the probe and thrust, which is not a creed or ideology so much as style. Had they been able to translate that élan into a political union, there would have been nothing comparable on the African continent. But they could not for élan was not enough. (Franck, op.cit., pp. 13 & 16)

29) The Central African Federation of Southern Rhodesia (now Rhodesia), Northern Rhodesia (now Zambia), and Nyasaland (now Malawi) was perceived to be an attempt by the dominant white settlers of Southern Rhodesia to extend their power over the other two British territories. This fear is generally thought to have been realized, and the vehement opposition by Africans in both Northern Rhodesia and Nyasaland to the British-enforced federation led to its break-up only ten years after it was established.

30) "Real power and real nationalist organization were in the three territories, and the difference in territorial settings resulted in creation of organizations that were not easily merged into one." (Nye, op.cit., p. 98)

Eventually, PAFMECA saw its members assume power in independent Kenya, Uganda, Tanzania, and Zambia. In 1963 it dissolved itself and its remaining functions were taken over by the Organization for African Unity (OAU).

According to Franck, PAFMECA had two limitations which inhibited its ability to influence an East African Federation. Firstly, it never became a mass movement -- it was composed of a small handful of African elite; and secondly, it did not resolve political rivalries between Africans that surfaced with the increasingly imminent prospect of independence. In each territory, there were conservative, tradition-oriented African movements which wanted independence merely to restore power to pre-colonial chiefs, sultans, or kings. Quite naturally, these movements were often not in sympathy with the inner circle of PAFMECA, which was composed of more radical nationalist parties and individuals -- TANU and Nyerere in Tanganyika; KANU and Kenyatta, Odinga, and Mboya in Kenya; UPC and Obote in Uganda; and the ASP and Karume in Zanzibar.³¹⁾ These four more radical parties worked together and supported each other, and if they had all come to power at the propitious moment, East Africa's history might have been very different. (Ibid, pp. 14-15)

For in 1960, a resolution was passed at a PAFMECA meeting in Mbale (Uganda) which stated "that the time was now ripe to agree upon and plan a federation of East African states." (Hughes, op.cit., p. 232) Time was getting short, however, because Tanganyika's independence was fast approaching. In a paper remarkable for its clarity, commitment, and foresight, presented to the June 1960 Conference of Independent African States, Julius Nyerere of Tanganyika stated his hopes and fears for the future of East Africa:

In the struggle against colonialism the fundamental unity of the people of Africa is evident and is deeply felt. It is, however, a unity forged in adversity in a battle against an outside government. If the triumph in this battle is to be followed by an equal triumph against the forces of neo-imperialism and also against poverty, ignorance, and disease, then this unity must be strengthened and maintained.

The feeling of unity which now exists could, however, be whittled away if each country gets its independence separately and becomes open to the temptations of nationhood and the intrigues of those who find their strength in the weakness of small nations.

There is one way to ensure in East Africa that the present unity of opposition should become a unity of construction. The unity and freedom movements should be combined, and the East African territories achieve independence as one unit at the earliest possible moment. This means a federation of the territories now administered separately.

³¹⁾ Tanganyika Africa National Union (TANU); Kenya Africa National Union (KANU); Uganda Peoples Congress (UPC); Afro-Shirazi Party (ASP).

But a federation of Kenya, Tanganyika, Uganda, and Zanzibar cannot and must not be imposed upon the people of these territories. It must be a decision of the people expressed through their elected representatives. . . . This means that discussions on the question of the establishment of a Federation of East Africa can only come after all the countries concerned have governments which are responsive to the wishes of the people, elected by the people and which have full internal power. This position can be reached early in 1961

At the moment Tanganyika is more advanced on the road to independence than any of the other territories; the British Government could not refuse a demand from us for independence in 1961. I believe, however, that it is in the interests of Tanganyika as well as of the other territories that we should unite into a federation. I also believe that the attainment of complete independence by Tanganyika alone would complicate the establishment of a new political unit

There are people who believe, no doubt sincerely, that in order that the decision to bring about the federation may be, and may appear to be, a free expression of the people of East Africa themselves, we must wait until the separate countries are completely independent I believe, however, that the expression of the wishes of the people of East Africa does not have to wait until these countries are completely independent

It has been argued, largely by some of our friends in Uganda, that we must put our separate houses in order first, before we contemplate federation. I do accept this argument But when does one satisfy oneself that our house has been put in order? I say after responsible government. Some of my friends say after independence. I find it difficult to accept this

There are obvious disadvantages if we wait until all the countries of East Africa have reached complete independence If each nation achieves independence separately any move by one of them in the direction of federation is likely to be misunderstood and will certainly be subjected to a campaign alleging imperialistic designs and a search for personal power. For this reason, the most honest and least selfish of the leaders will be strongly tempted to avoid the issue. Further, the leaders of each state will become so preoccupied with the immediate problems of their own government that the long term advantages which can come from the establishment of a federation will get crowded out of consideration.

We have to accept, too, that if each of the East African territories is independent we shall each have to open embassies. . . . accept diplomatic offices in each of our capitals, and shall even have to exchange diplomatic representation Further, once the four nations each have their own representative at the United Nations, have their own national flag and foreign representatives, we shall have established centres of vested interests against unity. This is not because we shall appoint evil people to such posts but simply because we shall be increasing the number of human beings who have a personal interest in disunity -- and because they are human beings most of them will be more conscious of the advantages of the present situation and the difficulties of change than of the long term benefits which would come.

Furthermore, federation after complete independence means the surrender of sovereignty and all the prestige and symbols of such sovereignty. Surely, if it is difficult now to convince some of our friends that federation is desirable, when it does not involve surrendering any sovereignty,

it is going to be a million times more difficult to convince them later.

But I believe in the unity of our countries. I do not want to leave the impression that no price need be paid for such unity. . . . I, for one, would be prepared to postpone the celebration of Tanganyika's independence in 1962 rather than take the risk of perpetuating the balkanization of East Africa. (Reprinted in Rothchild (ed), op.cit., pp. 68-75)

Despite the magnanimity of Nyerere's offer, agreement between the three territories was not reached. KANU leaders from Kenya were generally in favor of immediate federation, but the Buganda kingdom of Uganda strongly opposed the idea for a number of reasons related to their fear of a loss of their own political power. (Hughes, op.cit., p. 231; see also Rothchild (ed), op.cit., pp. 75-76 for some anti-federation documents from Uganda)

The general intention within the "inner circle" of the PAFMECA had been to wait until elections took place in early 1961 in both Kenya and Uganda before making any moves toward federation. After much negotiating with Britain, these elections were to result in African majorities in both territorial Legislative Councils and the right to organize African territorial governments. It was expected that the pre-federation parties of the inner circle would win these elections, providing a mandate to go ahead with a summit conference to work out the necessary details and steps toward federating. In Kenya, KANU won an overwhelming electoral victory, receiving 67.4% of all votes cast compared to 16.4% which its closest opposition, KADU (Kenya African Democratic Union), received. In one of those ironic tragedies of history, however, the European governor -- in a carry-over from Mau-Mau days -- would not release Jomo Kenyatta from detention and KANU would not agree to govern without him. In attempting to end the impasse, the Governor formed a short-lived government with the minority KADU party in April of 1961 and federation hopes decreased.³²⁾ In Uganda, the opposition Democratic Party won over Milton Obote's UFC in a freak election upset, and in Zanzibar the elections resulted in a deadlocked stalemate --

The absence of straightforward outcomes in the three territories meant that there could be no firm basis for the proposed discussions, and inevitably produced in each of them an increased preoccupation with internal political problems. (Hughes, op.cit., p. 233)

Therefore, in March of 1961 it was agreed by Britain that Tanganyika should become independent on December 28th of that year. Consequently, in June of 1961, a conference was held in London to discuss the future of the High Commission and the common services in light of this pending change in constitutional status. It

³²⁾For a good account of the Kenya elections, see Bennett, George and Rosberg, Carl G., The Kenyatta Elections: Kenya 1960-1961, Oxford University Press, London, 1961. For a good discussion of the Uganda upset, see Rothchild (ed), pp. 156-158.

was agreed by the delegates from all three territories that the common services provided by the High Commission would continue to be provided on a regional basis and that an East African Common Services Organization (EACSO) should be established to administer them in December of 1961.

The "winds of change" and independence came so unexpectedly quickly in East Africa that African leaders didn't really have time in the turbulent years of the early 1960's to develop an ideology or plan for federalism. In the busy months preceding Tanganyika's independence, all territorial governments were busy passing legislation and little was said or done to promote federation. Although proponents of East African Federation had not given up hope, Tanganyika did become independent by herself in December of 1961 and the East African High Commission became the Common Services Organization.

This new organization did not radically differ from its predecessor in form or content,³³⁾ but important changes were made in its policy making machinery which now had to relate to the new African elite. The High Commission was replaced by the East African Authority, which consisted of the chief executives of the three governments. Decisions of this supreme body still had to be unanimous, but the chairmanship of the Authority rotated among the three countries instead of staying in Kenya's hands. The functions and powers of the new Central Legislative Assembly stayed much the same as before, but its membership was expanded and popularized -- outside of the Speaker and 18 members from the EACSO's administrative Secretariat, nine members were to be elected from each country. The common services were to be run by four -- and later five -- Ministerial Committees composed of one Minister from each country. These "Triumvirates," as the Ministerial Committees soon became known, were as follows: The Communications Committee; the Finance Committee; the Commercial and Industrial Coordination Committee; the Social and Research Services Committee; and the Labour Committee. (Delupis, op.cit., pp. 42-45)

In most respects, the common services which EACSO provided were much the same as those provided by the High Commission, although organized a bit differently. The Refugee Administration, of course, had fulfilled its mission and gone out of existence; the Publicity Committee and the Inter-Territorial Language Committee were conveniently omitted from the enumerated schedule of common services; defense was to be a national responsibility from 1962 onward; and in 1966 the

33) In "The Structure of the East African Common Services Organization" (reprinted in Rothchild (ed), op.cit., pp.261-262), Jane Banfield says that the EACSO differed from the High Commission in three respects: It owed its existence to an agreement entered into by the three governments primarily concerned, and not to an Order in Council from the British Government; a local executive Authority was provided for under the EACSO rather than a High Commission with primary responsibilities to Britain; and finally, the EACSO constitution could be altered or amended by East African agreement without Britain's approval.

East Africa Office in London was closed. A new Public Services Commission was established in 1962 to make appointments and discipline the staff of the non-self-contained services financed through the General Fund; similar -- but separate -- Commissions did the same for Railways and Harbours and for Post and Telecommunications. Organizationally, EACSO headquarters consisted of a Secretary-General's Office; a Treasury Office,³⁴⁾ and a Legal Secretary's Chambers (which included the Public Service Commissions). Outside of headquarters there were EACSO departments in Civil Aviation, Meteorology, Customs and Excise, Income Tax, the East Africa Literature Bureau, and for eleven scientific research organizations. One organizational innovation which the EACSO constitution provided for was a Court of Appeals for Eastern Africa which could hear appeals from the highest courts in the three East African countries and other nearby British-ruled territories. Both headquarters offices and divisions and the external departments were under one of the Ministerial Committees (Triumverates) mentioned above. (Ibid, pp. 46-48)

The Triumverate Committees, although called an "important innovation" by Delupis (p. 44), did cause some problems in that the East African Ministers were also ministers in their own national governments and tended to give their primary loyalty to the nation rather than the region. In describing these committees, Hazlewood says the following:

The committee system is not entirely satisfactory, for the members are not able to divorce themselves from their territorial interests when serving as members of the EACSO committees. They act more as delegates of their territories than as ministers of a central administration. (Hazlewood, 1967, op.cit., pp. 72-73)

Unanimous agreement was necessary on these committees for any proposed measure to be approved, and so the system worked effectively only for readily agreed upon measures -- controversial matters with conflicts of territorial or national interest tended to be avoided, and thus remained unresolved. With regional headquarters in Nairobi, moreover, East African Ministers from Uganda and Tanganyika were physically removed from the focus of administrative power much of the time and gave the EACSO a "Kenya orientation." Particularly at the middle and lower bureaucratic levels, Kenyans dominated the regional civil service and had much easier access to their own East African Minister than did those from Tanganyika or Uganda. (Ibid, p. 73; Robson, op.cit., p. 106) Even with these limitations,

³⁴⁾The Treasury Office had several divisions: the Office of the Financial Secretary; the Financial and General Division (which controlled the General Fund); the Economic Coordination Division (which provided services for the Industrial Council and Industrial Research Board); the Statistics Division; and the Accounts Division. (Delupis, op.cit., pp. 46-47)

however, EACSO did represent a step forward for regionalism from the High Commission --

EACSO did not constitute a federation. It was not conceived to be even a truly supra-national economic community But in practice, East Africa had, by the end of 1961, inched a long way toward an integrated system of communications, marketing, finance, research, higher education, adjudication and currency control. (Franck, *op.cit.*, p. 19)

During 1962 and 1963, hopes for an East African Federation remained high, as illustrated by the lengthy quote at the beginning of this Chapter.³⁵⁾ On 9 October, 1962, Uganda became independent under Prime Minister Milton Obote, and, after receiving self-government on 1 June 1963, Kenya became fully independent on 12 December 1963 under Prime Minister Jomo Kenyatta. All of the signers of the June 5th declaration had achieved power. The delay in waiting for independence, however -- as Nyerere had foreseen -- was critical:

But a much more serious consequence of the delay in Kenya's and Uganda's independence was its effect on the ethos of unity. Ambitious political leaders soon discovered that, while it is one thing to fight together for power, it is quite another to share power once it is won. (Ibid, p. 16)

Working Party meetings to prepare a framework for a draft constitution for the proposed East African Federation began in Dar es Salaam almost immediately following the June 5th declaration. At first, all important political elements -- even the Buganda³⁶⁾ -- supported the call for federation and an aura of optimism surrounded the first meetings. The first hints of trouble in Uganda began almost immediately, however,³⁷⁾ and by August it was clear that a deadlock had been reached between Uganda and the other two countries. On 20 August 1963, the leader of the Uganda delegation to the Working Party predicted that federation would not be achieved that year. The newspaper account of the incident read as follows:

Although he made no direct reply to claims by Kenya and Tanganyika Ministers that it was Uganda who was holding up the proceedings, Mr.

35) "It must, however, be admitted that in December, 1963, federation seemed a sure thing and an ideal to which not only the technicians, the economists, the civil servants, but also the political leaders had dedicated themselves." (Franck, *op.cit.*, p. 4)

36) See the "Buganda Response to the June 5 Communique" reprinted in Rothchild (ed), *op. cit.*, p. 88.

37) See Rothchild (ed), *op. cit.*, pp. 91 & 92 for a newspaper account of the Kabaka (king) of Buganda missing an important meeting between East Africa's leaders and Ugandan hereditary rulers on 1 July 1963. On pp. 92-98, see the Ugandan National Assembly Debates for 12 July 1963 in which the hesitancy of some Ugandans to federation was openly expressed.

Nekyon, who leads the Uganda Working Party at the federation talks, said Uganda wants to know "exactly where she is going" before she commits herself to anything.

"I am not prepared just to throw my nation into darkness," he said, "so I must know exactly where we are going and to whom we are surrendering our powers. And, as a small state, Uganda needs certain guarantees for her future within a larger unit." (Rothchild (ed), *op.cit.*, p. 98)

Prime Minister Obote boycotted a special meeting of the three East African leaders ³⁸⁾ which had been called by the other two for mid-September in an attempt to revive the idea of federation, and bickering between Uganda and the other two countries ensued. ³⁹⁾ In January, 1964, the three Heads of (now all independent) State met and reaffirmed their desire that "the policy and objectives of the East African Federation should be pursued," (Ibid, p. 116), but by April of that year hopes of federation were gone. In that month, President Nyerere's threat to break up the common market resulted in the Kampala Agreement, which will be covered in more detail later. The Working Party on East African Federation still met, but in a sad post-script to the changing situation, a summary issued on May 30, 1964, from Kampala, listed the areas of disagreement between the countries as follows:

1. With regard to the distribution of powers within the federation:
 1. Foreign Affairs
 2. Citizenship
 3. External borrowing
 4. Agriculture
 5. Marketing boards
 6. Livestock and Animal Husbandry
 7. Higher education, i.e., post-secondary education
 8. Mines, collieries, minerals, etc.
 9. Trade unions.
 10. Senate
2. The federal capital.
3. The powers of the Senate. (Ibid, p. 131)

What went wrong? As always, in complex and ambiguous events involving human beings, there are many different -- and sometimes contradictory -- reasons and villains offered by different authors. One basic thread, however, seems to dominate much of the analyses -- the lack of a real consensus on what "federation" meant. In describing the events of 1963-64 mentioned above, Franck states that

³⁸⁾ See Rothchild (ed), *op.cit.*, p. 98 for a reason given by the leader of the Ugandan Working Party, Mr. Adoko Nekyon, for Mr. Obote's absence.

³⁹⁾ See Rothchild (ed), *op.cit.*, pp. 101-103 for reprinted accounts of a dispute between Obote and the Minister of State in the Kenyan Prime Minister's Office, Mr. Joseph Murumbi; also pp. 126-131 for accounts of the dispute following a joint KANU-TANU Parliamentary Groups resolution for immediate federation, with the proviso that if Uganda did not want to join, Kenya and Tanganyika should go ahead by themselves.

It soon became apparent, however, that beneath the inscrutable concept of federalism lay many different and mutually contradictory ideas which, having never been previously explored, could not now, suddenly be reconciled. (Franck, op.cit. p. 20)

In "From Federalism to New-Federalism," Donald Rothchild adds to this viewpoint:

Recognition of the existence in East Africa of strikingly different conceptions of what federation comprises is crucial to an understanding of the breakdown of negotiations on unity in that region during 1963 and 1964 . . . a fundamental divergence existed in conceptions about the nature of federation; these divergencies contributed substantially to the final collapse of the Working Party deliberations, for they proved too basic to make compromise feasible. (Rothchild, 1968a, p. 2)

Related to this lack of realization of differing concepts of "federation," according to Franck, was the fact that federation was primarily an elitist goal which remained somewhat vague because there was no ideological basis developed for it to be used in building a mass movement. The Working Party meetings were held in the deepest secrecy -- even national members of parliament didn't know how things were going⁴⁰⁾ -- the public was not involved and public opinion was never a factor in the bargaining which took place in secret. Franck states his contention as follows:

The cause of East African unity suffered from bad timing, but also from the singular failure to develop an ideology of unity . . . they produced no ideologists to develop and enunciate a systematic blueprint for East African unity, a grand design to fire the imagination and quicken the pulse

Vaguely aspirational goals are temptingly convenient as a form of stimulator and unifier for an evolving society. But once a society has progressed to the point where its goals become real and immediate, if the vague goals have not undergone sharp ideological definition (or have been exchanged for new long-range goals) they tend to have the opposite effect, dividing, confusing and thus impeding the society in its progress. (Franck, op.cit., pp. 16-17 and 21)

The interchangeability of East African unity and East African federation in the first sentence of the previous quote illustrates how easily the gulf between different concepts of federation was overlooked. In East Africa, there were four independent ideas of federalism which were interacting with each other and which produced the end result: political unification; mercantilist federalism or multi-national coordination; sub-national or centrifugal federalism; and Pan-African federalism. The greatest distinction was between the first two, and had a philosophical as well as a practical basis. "Federation" can either be viewed

⁴⁰⁾ See Rothchild (ed), op.cit., pp. 99-101 and 104-105 for vivid examples from the Ugandan National Assembly Debates.

as an ideology or a methodology -- as an end in itself or merely a means of achieving some other, worthwhile, objective. An ideology of federalism implies the pursuit of unity as far as possible or conceivable for its own sake; a methodology of federalism implies the pursuit of unity only to the limited extent of achieving the stated objective. These two typologies are idealized and found in the real world only to greater or lesser degrees, but they may still be incompatible.

The origins of federalism in East Africa were not ideological, but rather methodological. The British wanted federation in order to simplify administration; the white settlers wanted federation in order to facilitate internal self-government under their rule -- as had happened in Rhodesia -- and promote development. In the early 1900's, most African nationalists -- as we have seen -- opposed federation which was designed to suit white ends. Only when indigenous self-government was assured did African leaders begin to support the idea, and then they wanted to give federation a meaning beyond that which had existed in the white, colonial era -- a meaning which transcended petty economic concerns and emphasized African brotherhood and the unity of the anti-colonial struggle. Mercantilist federalism designed to facilitate economic and business objectives was thought to be the philosophy of only the white man, but Franck says that a small -- but powerful -- non-white middle class of farmers, businessmen, and professionals had developed in East Africa who felt the same way. This was true particularly in Uganda⁴¹) where development occurred largely under African control, and also in Zanzibar with its large number of Arab and Indian businessmen --

They were all for federalism, no doubt, but within this infinitely vague, elastic frame they meant to preserve almost complete political autonomy for the governments and economies they controlled. (Ibid, p. 30)

The common services were one manifestation of this methodological mercantilist philosophy of federalism which the white man imposed on East Africa because they were economically advantageous. The bulk of these services would remain

⁴¹) Franck mentions a speech given by the leader of the Ugandan Working Party, Mr. Nekyon, in August, 1963, to Ugandan students at the University of Dar es Salaam in which it was said that "... federalism was a method of securing certain mutual 'businessman's' advantages to the participating countries who were its shareholders, and that its powers should be limited strictly to those essential to the securing of the desired advantages." (Franck, op.cit., p. 24) See also the Ugandan National Assembly Debates of November 4, 1963, in which Sir Edward Mutesa, President of Uganda and Kabaka (King) of Buganda, said the following: "These aims and ideals include the unity of Unity of East Africa not as a block but as partners in the great effort to advance economic co-operation leading to a better social life in East Africa." (Rothchild (ed), op.cit., p. 104)

necessary -- on a national or regional basis -- even if there were no other economic or political linkages between the three countries. Built up gradually over a period of 50 years, the efficient and appreciated common services were institutional elements of functional unity which, however, were regarded by the African as alien and did not provide an emotional impetus to further integration. In fact, their very success in seeming to bring most of the benefits of federalism without much -- if any -- loss of national sovereignty made the argument for unification less persuasive and less urgent. Moreover, especially in the case of the self-contained services, the administration of the services as almost autonomous units within the colonial governments⁴²⁾ tended to divorce them from the idea of East African regional or national governments which were to follow. The centralization of the self-contained services headquarters in Kenya also added to the growing dissatisfaction of Tanganyika and Uganda by shifting economic activity from them to Kenya. (Green and Krishna, op. cit., pp. 32 & 106; Franck, op. cit., p. 17)

The principal disagreement was between Uganda, who, Rothchild says, thought federation to mean "a loose plan of inter-territorial coordination" (Rothchild, 1968a, op. cit., p. 2), and Kenya and Tanganyika:

What Tanganyika wanted, what the Kenyans were willing and able to agree, and what most people in those countries understood, was not federal government, but unification; while the federal rubric might permit decentralization of various kinds, the fundamental notion was that of "Closer Union," made possible and fruitful by the prospects of a joint political directorate, over a range of crucial matters, of a group of leaders who were in basic sympathy with each other. (Leys, Colin, "Recent Relations Between the States of East Africa," in Rothchild (ed), Politics of Integration, East African Publishing House, Nairobi, 1968, p. 159)

Uganda did not want to surrender its national sovereignty, particularly in matters such as foreign affairs and citizenship, and, although she did not repudiate the Nairobi Declaration which Prime Minister Obote had signed, she sought to strengthen the EACSO rather than create a new Federation. This approach, however, would not even be discussed by Tanganyika. (Delupis, op. cit., p. 50)

Another concept of federalism -- sub-national or centrifugal, as it may be called -- also entered into the picture with regard to Prime Minister Obote and the Kingdom of Buganda. It sometimes tends to be forgotten that federation can work two opposite ways -- it can be used to unite separate political entities or

⁴²⁾Green and Krishna provide an example of the Railways and Harbours Administration: "For example, EAR and H was for all practical purposes delegated power to set rates in a way subsidizing whatever products and areas it viewed as prime candidates for expansion at the cost of higher rates for other products and areas." (Green and Krishna, op. cit., p. 106) See also Robson, op. cit. p. 105.

to decentralize or separate the parts of one political entity in reaction to centripital or centrifugal forces. From the beginning of Britain's colonial rule in the Uganda Protectorate, her "special relationship" with the Kingdom of Buganda had resulted in a de facto federal relationship in which the Buganda enjoyed a special position within Uganda and expanded their political influence. When Milton Obote and the Uganda People's Congress were negotiating for political independence with Britain, the Buganda were also negotiating for a larger measure of constitutional autonomy within independent Uganda. In exchange for the Buganda's political support, Obote agreed to a federal constitution for Uganda and an uneasy alliance between the two inherently opposed factions was joined. In the post-independence negotiations for an East African Federation, however, the Buganda Kingdom demanded that it should enter such a federation as a separate unit, and not as part of Uganda. The following newspaper quote is from the Uganda Argus of August 22, 1963:

Buganda must join the East African Federation as one of the constituent states and not as a part of Uganda, the Kabaka's Minister of Education, Mr. A. K. Mayanja, said yesterday. . . .

Mr. Mayanja said that only by joining as one of the constituent states would Buganda be able to guarantee her existence as an entity and play her part in the affairs of the wider community

As Buganda was already a federal state within Uganda, and as it was not possible to have a federation within a federation, Mr. Mayanja said the Kingdom could not join an East African Federation in any other form.

The kingdom would support a federation which guarantees its continued existence and development of her culture and way of life which was centred on the Kabakship. (Rothchild (ed), op.cit., p. 99)

This viewpoint of federalism was strongly opposed by Prime Minister Obote who was trying to unify a nation, and rather than accept East African Federation on those terms he would not have it at all. This same tendency of sub-national centrifugal federalism was echoed by other tribes -- such as the Masai in Kenya and Tanzania -- but was an important factor only in Uganda.

The final concept of federalism which interacted with the others in East Africa was that of Pan-African federalism. The desire to achieve African unity on a continental wide basis was most intensely identified with Kwame Nkrumah of Ghana. Nkrumah was fervently opposed to regional federalism, regarding it as an obstacle to the unity needed to promote economic development and a regression to tribalism. This feeling was in part due to his bitter battle against the Ashanti Kingdom and its demands for sub-regional autonomy within Ghana at the time of independence, but it was also due to his suspicions of British-American neo-colonialist intentions

and their support for an East African Federation.⁴³⁾ In Africa Must Unite, he says the following:

In effect, regional federations are a form of balkanization on a grand scale. These may give rise to the dangerous interplay not only of power politics among African states and the regions, but can also create conditions which will enable the imperialists and neo-colonists to fish in such troubled waters. (Nkrumah, Kwame, Africa Must Unite, Heinemann, London, 1963, pp. 214-215)

He was also quoted in the Accra Evening News of April 19, 1964:

"... Just at a time when a strong government is necessary," he argued pragmatically in support of his general ideological position, "federalism introduces an element of paralysis into the machinery of state, and slows down the process of governmental action" (Rothchild, 1968a, op.cit., p. 6)⁴⁴⁾

The Pan Africanists argued that the creation of regional federations would somehow impede the future progress toward continental-wide unity.

Overt opposition to an East African Federation by Nkrumah began in June of 1963, after the Nairobi Declaration. Although his opposition has been seen by many observers to be a product of petty jealousies and a fear of the potential power in an East African Federation, Thompson says that (although an element of pettiness undoubtedly was involved) the sincerity of Nkrumah's fears was genuine. He had never looked favorably on the idea of regional unions and had been very concerned that groupings such as the quasi-regional Afro-Malagasy Union of former French colonies should not violate the spirit of the CAU. Nkrumah first expressed his misgivings to Nyerere in personal correspondence, but when he failed to convince Nyerere he sought to drive a wedge between Uganda and Tanzania.⁴⁵⁾ In addition to persuasive diplomatic efforts, Nkrumah gave monetary support to Ugandan organizations opposed to federation. Still, Thompson says that

It is difficult to believe that Ghana's policy was in any way a critical factor in the breakdown of negotiations on the East African Federation in 1963 and 1964. (Thompson, op.cit. p. 114)

The problems which prevented federation were internal to East Africa. What is true, however, is that Uganda did use the Pan-Africanist argument as yet another reason why federation should be delayed. Although there is a widespread tendency

⁴³⁾"But Nkrumah had an underlying suspicion of Britain's intentions By 1963 Nkrumah's general suspicions of 'neo-colonialism' had increased, and it is not surprising that he suspected an ulterior motive in Britain's support for an East African Federation; he feared that the East African leaders were ingenuously falling into a British trap." (Thompson, W. Scott, "Kwame Nkrumah and East African Federation," in Rothchild (ed), op.cit., pp. 113-114; See also Franck, op.cit., p. 5

⁴⁴⁾See also Rothchild (ed), op. cit., p. 112 for further statements by and about Nkrumah

⁴⁵⁾See Rothchild (ed), op. cit., pp. 112-113 for some evidence of Nkrumah's "meddling" and Nyerere's reaction to it.

to blame Uganda/Buganda and Prime Minister Obote for the failure to federate, Colin Leys questions this viewpoint in an article reproduced in Politics of Integration. According to Leys,

... the decisive factor has been the relative fragility of the political systems of the three countries in relation to their internal problems. . . . June 1963 represented a completely different phase in the political dynamics of each of the three countries, so that the political significance of the federation proposal was for this reason alone very different for each of the three leaderships concerned. (Leys, op. cit., p. 155)

The situation in Uganda, which had been independent for one year, has been referred to earlier. By itself, the Ugandan Peoples' Congress (UPC) was a minority party, and in order to receive independence from Britain, Obote and the UPC had to agree to federal status for Buganda within Uganda and enter into an alliance with the Kabaka Yekka (KY), the Bugandan political party. This alliance, however, was far from stable, and in June of 1963 Obote was engaged in the very delicate operation of playing off the Kabaka Yekka against the opposition Democratic Party until the UPC could achieve a majority and expand and consolidate its power in the country. The success of this operation was far from complete,⁴⁶⁾ however, and joining an East African Federation in 1963 against the wishes of the Buganda (unless on their terms of Bugandan independence within the federation) would have rocked the very shaky boat. (Ibid., pp. 156-158)

The firm commitment which Obote made in signing the Nairobi Declaration can be explained -- in part -- by the internal politics of Kenya at this time. KANU needed independence in 1963 in order to avoid the risk of re-opening the latent divisions within itself which had almost broken it apart in 1962. The British were believed to have a 1964 date in mind, however, and the support of Uganda and Tanganyika was needed. It was no accident that the Nairobi Declaration called for federation by the end of 1963, and whether or not this tactic made any difference, Britain did grant Kenya independence that December. (Ibid, pp. 158-159)

Having been independent for almost two years, Tanganyika was the only country which had the capacity to call for federation in 1963. After a period of relative impotence just after independence, Nyerere had built TANU into a

⁴⁶⁾ Following defections from both the opposition Democratic Party and the Kabaka Yekka, the UPC was able to oust its former ally in 1964 and rule on its own. In early 1966, Obote seized power and suspended the 1962 Constitution. The new constitution, which was adopted on April 15, 1966, ended Buganda's federal status and treated Uganda as a unitary state. The Buganda resisted, and after much trouble military power was used to crush their attempt at secession and the Kabaka was exiled. In one of those ironic turnabouts of history, however, Obote was the victim of a military coup in late 1970 and the since-dead Kabaka came to a hero's funeral.

capable government which could control the shape of national economic growth.⁴⁷⁾ At the time of the Nairobi Declaration in June of 1963, the Tanganyikan government was in the process of making some basic decisions about targets for their first national five-year plan -- a process which was making clear to Tanganyikan leaders just what they hoped to accomplish and how difficult that task was going to be. Leys makes the following points about Tanganyika's situation: 1) There was no opposition to federation within TANU and Tanganyika was therefore politically free to promote it; 2) Leaders in both Kenya and Uganda -- men like Mboya and Obote -- were perceived to be primarily African Socialists and pan-Africanists so that a federal government would be likely to be ideologically similar to TANU; 3) It was thought that federation would improve Tanganyika's position in the common market; and 4) that some of Kenya's resources would then be available to aid in solving Tanganyika's own problems. (Ibid, pp. 155-156)

But whereas Tanganyika had the capacity to promote federation in 1963, Obote and the UPC did not have the capacity to join in, and so the attempts failed. It was hoped that a new initiative by Kenya after her independence might revive the issue, but events intervened once again. On 12 January 1964, the majority of Africans on the island of Zanzibar revolted and toppled the minority Arab government in a bloody coup d'etat. This event, according to Ali Mazrui, started off a chain reaction of army mutinies in all three East African countries, which was "the most decisive blow against federal hopes." (Mazrui, Ali, "Impact of the 1964 Army Mutinies -- Federalism and Revolution," in Politics of Integration, Rothchild, (ed), p. 17) All three countries asked for British troops to help quell the uprising and East African unity could have been furthered by a common approach to the crisis. But Tanganyika was also the headquarters for and leading force behind the liberation movements fighting in countries still under European rule. The neo-colonialist stigma of asking for British troops was an acute embarrassment to Nyerere, and he followed an independent course in trying to clear Tanganyika's reputation -- not East Africa's as a region. Subsequent acts of Tanganyikan policy were not only unilateral and anti-British, but they often -- as in the case of inviting the Chinese and East German Communists to train Tanzanian troops -- introduced foreign policy and ideological differences to the region. Tanganyika and Zanzibar had become Tanzania, but in Mazrui's opinion,

The narrower unification of Tanganyika and Zanzibar has harmed the ambition of a broader unification of East Africa as a whole. Nothing could

⁴⁷⁾The consolidation of TANU power in government culminated in a legalized one-party state. For a discussion of the negative effect which this had on East African federation, see "Federalism and the One Party System" by Ali Mazrui, in Politics of Integration, Rothchild (ed), pp. 116-117.

have dramatized more effectively the problems which would attend a prospective East African Federation than the problems already met in relations between Zanzibar and Tanganyika in their own more modest union . . . there are occasions when a blind plunge into union is what is needed to make the union take place at all. The union between Tanganyika and Zanzibar did itself constitute such a sudden plunge. But once that took place, East Africa as a whole could no longer federate blindly -- for the smaller union had opened the eyes of the region as a whole to the difficulties involved in such a venture. (Ibid, p. 119)

As Leys points out also, the Zanzibar revolution, army mutinies, and unification of Tanganyika and Zanzibar radically narrowed Nyerere's freedom of action with regard to federation. With several strong Zanzibari personalities now in the Tanzanian government and the just-completed, five-year plan ready for implementation, Nyerere was forced to act. In March of 1964, he threatened to break up the common market unless certain Tanzanian disadvantages were rectified. In the relatively short time of three weeks, both Kenya and Uganda did agree to a "radical adjustment" of the common market which satisfied Tanzania in the Kampala Agreement of April 1964. Leys notes ironically that such a quick agreement was possible because -- just as Nyerere was beginning to be constrained by internal political forces -- both Obote and Kenyatta were beginning to enjoy a greater degree of freedom of action in their own countries as their political parties gradually consolidated their control. Thus the important factor, according to Leys, is that in 1963 when Tanganyika was ready for federation and Kenya would go along, Obote in Uganda could not afford to do so because of internal political reasons; in 1964, the situation gradually reversed itself and once again federation was thwarted. (Leys, op.cit., pp. 160-161)

The Kampala Agreement was a compromise settlement of economic difficulties within East Africa, and although Leys -- and others -- claims that internal national politics and not economic disagreements have been the primary forces behind regional problems,⁴⁸⁾ the economic reasons must also be discussed in a historical context. The early history of the customs union and common market in East Africa has been described earlier in this chapter. The seeds for future economic disagreement over the functioning of the common market between the independent East African countries were sown as far back as 1924. Previously, customs tariffs had been designed and motivated solely to raise revenue for the colonial governments, and any disagreements which had existed concerned the collection and rightful destination of the revenue. In 1922, however, a committee

48) . . . although the tensions involved in operating the common market and common services did register themselves politically, the reaction to Tanganyika's ultimatum in respect to the worst of them was integrative, not divisive; if the consolidation of the Kampala Agreement now seems in jeopardy, it is again internal forces operating on a leadership of extreme political fragility (in relation to the problems which confront it) which is primarily responsible for this." (Leys, op.cit., p. 161)

of the Kenya government recommended a new tariff designed explicitly to protect Kenya's agriculture and stimulate its industry. When introduced in 1924, this tariff -- which is described by Kennedy as "something of a turning point" (Kennedy, op. cit., p. 171) -- did prove to be successful in establishing Kenya's early industrial base. With the settlement of Europeans in Kenya in the early 1900's, the balance of political power had gradually shifted from Uganda to Kenya --

To a considerable extent Kenya's political pre-eminence had already been confirmed and it was from the middle of the 1920's that the foundations of her commercial leadership within East Africa were laid.

In countries which are economically immature any competitive advantages are very quick to make themselves felt, so that a relatively small amount of development can create economies for an area which may not only stimulate further development there, but may permanently retard development elsewhere. This is particularly liable to occur in an economy of "islands" and especially in one which relies on the importation of foreign capital and enterprise which tends to lead to the establishment of well-developed enclaves within the economy which have little or no relationships with the surrounding region.

The practical point, however, is that the development of a number of Kenya's "islands" in the formative years took place under a system of protective tariffs which were designed primarily to meet the needs of Kenya alone, and that as a result early advantages and economies were created which enabled Kenya to acquire the commercial leadership which she still holds. (Ibid, p. 171)⁴⁹

Uganda -- and to a lesser extent Tanganyika -- reacted very strongly in opposing this tariff change, but effective control over customs matters had already been achieved by Kenya and there was little that could be done. Uganda threatened to pull out of the customs union, but Tanganyika took a somewhat ambiguous attitude toward the change and with the onset of the world-wide economic depression of the 1930's, opposition gradually died away.

Prior to World War II, trade between the three East African territories was relatively insignificant. An overwhelming proportion of the interterritorial exports of Kenya and Tanganyika that did exist was in agricultural foodstuffs; in Uganda's case, cigarettes accounted for a very large share of her interterritorial exports. Between 1946 and 1966, a twelvefold increase in interterritorial exports for East Africa as a whole occurred. The overall growth was steady, but Kenya's regional exports increased by 19 times as compared to seven times for Uganda and 9 times for Tanganyika. (See Table IV.3 on next page)

⁴⁹Also, "However, the 1924 tariff was successful in encouraging a number of industries in Kenya which gave her an early and decisive commercial and industrial leadership in East Africa." (Ghai, Dharam, "Territorial Distribution of Benefits and Costs of the East African Common Market," reprinted in Politics of Integration, op. cit., p. 203).

Table IV.3 (Robson, op.cit., p. 120)

East Africa Inter-Country Trade

	KENYA		UGANDA		TANGANYIKA		Balance of Inter-Country Trade			£000 Total inter-country exports
	to Tanga-nyika	to Uganda	to Kenya	to Tanga-nyika	to Kenya	to Uganda	Kenya	Uganda	Tanga-nyika	
1945	577	494	878	327	555	113	-362	598	-236	2,944
1946	854	649	1,163	422	394	102	-54	834	-780	3,584
1947	832	723	1,387	411	437	110	-269	965	-696	3,900
1948	1,067	774	585	645	664	169	-408	1,287	-879	4,904
1949	2,033	1,084	1,271	645	779	140	1,067	692	-1,759	5,952
1950	2,355	1,211	1,553	847	727	170	1,286	1,019	-2,305	6,863
1951	1,959	1,740	1,541	901	895	246	1,263	456	-1,719	7,282
1952	2,261	1,963	2,418	1,182	678	256	1,128	1,381	-2,509	8,738
1953	2,419	2,686	2,621	1,948	819	401	1,665	1,482	-3,147	10,894
1954	2,630	2,889	3,175	1,972	810	233	1,534	2,025	-3,559	11,709
1955	2,365	3,360	3,112	1,642	1,202	475	1,411	919	-2,330	12,156
1956	3,678	3,706	1,725	975	1,490	567	4,169	-1,575	-2,596	12,141
1957	4,451	4,826	2,554	1,440	1,507	505	5,216	-1,336	-3,879	15,283
1958	5,644	5,101	3,361	1,465	1,516	1,076	5,868	-1,351	-4,517	18,163
1959	6,513	5,784	3,640	1,587	1,848	726	6,809	-1,282	-5,526	20,089
1960	7,608	6,163	5,120	1,574	1,875	450	6,776	81	-6,857	22,790
1961	8,901	7,047	5,152	1,704	1,844	390	8,952	-581	-8,371	25,038
1962	10,017	7,303	5,386	1,669	1,954	437	9,980	-685	-8,295	26,766
1963	10,365	9,425	6,248	1,993	2,915	508	10,627	-1,692	-8,935	31,454
1964	13,299	12,581	7,344	2,442	4,110	1,021	14,426	-3,816	-10,610	40,797
1965	14,087	15,339	7,135	2,592	4,569	1,346	17,722	-6,958	-10,764	45,068
1966	13,282	15,619	7,317	3,120	3,806	842	17,778	-6,024	-11,754	43,986

SOURCE: East African Statistical Department, Economic and Statistical Review.

NOTE: The figures exclude excise duty on excisable commodities and customs duty charged on imported raw materials used in local manufactures. Since 1959 these adjustments have been made by the East African Customs and Excise Department. The 1958 figures were adjusted by the East African Statistical Department. Figures for 1945-57 are estimates made by D. A. Lury in 'The Trade Statistics of the countries of East Africa 1945-65', Economic and Statistical Review, March 1965.

In 1965, the year of the highest absolute value of regional trade, Kenya had regional exports worth £29.5m as compared to \$10m for Uganda and only £6m for Tanzania. Kenya's regional exports are thus almost twice as much as those of Uganda and Tanzania put together.⁵⁰ (Robson, op.cit., p. 119; See also Ghai, op.cit., p. 201 and OECD, op.cit., pp. 54 & 150)

The importance of regional trade for East Africa as a whole and for each country separately can be estimated from Table IV.4 below. Inter-country exports increased roughly 12 times in value compared to an increase of nine times for domestic exports. From 1946 to 1966, these inter-country exports grew from 13% to 18% of the region's total exports. The ratio of the member countries' inter-country exports to their

⁵⁰As Ndegwa says, "Briefly, the principal trading partner is Kenya." (Ndegwa, op.cit., p. 50).

gross domestic products provides only an indication of the role which regional trade has played in their economies, but from 1956 to 1966 this ratio for Kenya rose from 5% to 12%, in Uganda from 3% to 6%, while in Tanganyika it has stayed constant around 2%. Robson claims that even in the case of Uganda that the importance of her regional trade was less in 1966 than in the late 1940's, so that

Thus, while in the region as a whole, inter-country trade has assumed a substantially more important role over the period, only in Kenya has its relative importance increased. For the other two countries, while the absolute increase is substantial, this has merely kept pace with the growth of domestic product. (Robson, op.cit., p. 123)

Table IV.4 (Robson, op.cit., p. 121)

Significance of Inter-Country Trade in the Regional Economy

	£million											
	KENYA			UGANDA			TANGANYIKA			EAST AFRICA		
	1946	1956	1966	1946	1956	1966	1946	1956	1966	1946	1956	1966
Inter-country exports (a)	1.5	7.4	28.9	1.6	2.7	10.4	0.5	2.0	4.6	3.6	12.1	44.0
Domestic exports (b)	6.2	29.0	53.1	8.9	40.4	65.9	8.5	44.9	79.1	23.6	114.3	203.1
Total exports (c)	7.7	36.4	87.0	10.5	43.1	76.1	9.0	46.9	84.7	27.2	126.4	247.1
(a) as % of (c)	19	20	33	15	6	14	2	4	6	13	10	18
Gross monetary domestic product (d)	n.a.	145.2	243.5	n.a.	102.8	172.8	n.a.	89.3	197.9	n.a.	337.3	614.2
(a) as % of (d)	n.a.	5	12	n.a.	3	6	n.a.	2	2	n.a.	4	7

SOURCE: Statistical Abstracts for Kenya, Uganda and Tanganyika, and Economic and Statistical Review, (EACSO).

Table IV.5 below gives a breakdown of the commodity structure of regional trade. Just after World War II, most regional trade had consisted of agricultural foodstuffs. Processed food, drink, and tobacco industries were the earliest to develop in East Africa, but there has been a slight decrease in the monetary amount of these products in regional trade in more recent years as national self sufficiency in these fields has increased. The striking feature shown in the pattern of regional trade is the marked increase in the importance of "other," non-food, drink or tobacco manufactured goods! "Other manufactures" rose from 42% of total regional trade in 1959 to 71% in 1966 as a wide variety of import substituting industries grew up in response to tariff protection and a rise in regional incomes.⁵¹ (Ibid, p. 123) A further breakdown of the composition of regional trade by major products in 1966 is shown in Table IV.6 below.

Several important features relating to the individual member countries can be recognized from the preceding tables. The first is that Kenya has become

⁵¹ See also Ndegwa, op.cit., p. 48 on this same point.

Table IV.5 (Robson, op.cit., p. 122)
Composition and Shares of Inter-Country Trade

	1959			1963			1966			£000
	Exports	Imports	%	Exports	Imports	%	Exports	Imports	%	
Unprocessed food and raw materials										
KENYA	1,419	2,168		1,846	2,338		3,150	2,620		
UGANDA	1,133	1,232		1,443	787		1,790	2,425		
TANGANYIKA	1,477	629		1,430	1,594		1,436	1,331		
TOTAL	4,029	4,029	20	4,719	4,719	15	6,376	6,376	14	
Processed food										
KENYA	2,863	942		3,272	2,567		3,418	1,490		
UGANDA	933	1,467		2,189	1,857		1,357	1,541		
TANGANYIKA	381	1,768		519	1,556		321	2,065		
TOTAL	4,177	4,177	21	5,980	5,980	19	5,096	5,096	12	
Drink & Tobacco manufactures										
KENYA	2,347	352		2,893	695		1,125	252		
UGANDA	1,102	1,059		969	1,129		238	458		
TANGANYIKA	15	2,048		12	2,050		46	699		
TOTAL	3,464	3,464	17	3,874	3,874	12	1,409	1,409	3	
Other Manufactures										
KENYA	5,668	2,021		11,779	3,563		21,208	6,761		
UGANDA	2,059	2,752		3,640	6,160		7,052	12,037		
TANGANYIKA	701	3,655		1,462	7,155		2,845	12,307		
TOTAL	8,428	8,428	42	16,881	16,881	54	31,105	31,105	71	
All Items										
KENYA	12,297	5,488		19,790	9,163		28,901	11,123		
UGANDA	5,227	6,510		8,241	9,933		10,437	16,461		
TANGANYIKA	2,574	8,100		3,423	12,358		4,648	16,402		
GRAND TOTAL	20,098	20,098	100	31,454	31,454	100	43,986	43,986	100	

SOURCE: Annual Trade Report of Tanganyika, Uganda and Kenya, 1959, 1963 and 1966, Commissioner of Customs and Excise, Mombasa.

the principal exporter of manufactured goods in the region, or, as Ndegwa says,

... it means that Kenya has become the industrial partner in the East African Common Market. (Ndegwa, op.cit., p. 65)

In 1966, Kenya accounted for 68% of total regional manufactured exports as compared to 23% for Uganda and only 9% for Tanzania, with a monetary value of £21m as compared to £7m and almost £3m respectively. Kenya's predominance in this trade category obviously reflects the fact that a very large part of the industrialization which has taken place in East Africa has been located there. (Robson, op.cit., pp. 123 & 125; see also Ndegwa, op.cit., p. 58)

A second feature, easily discernable from Table IV.3, is the growing imbalance in regional trade among the three member countries. This balance

Table IV.6 (Robson, op.cit., p. 124
East Africa: Inter-Country Trade 1966

S.I.T.C. Section	KENYA		UGANDA		TANGANYIKA	
	to Uganda	to Tanganyika	to Kenya	to Tanganyika	to Kenya	to Uganda
0. Food & live animals	3,405	2,567	1,567	375	842	182
1. Beverages & tobacco	532	850	615	198	397	14
2. Crude materials, inedible	283	160	194	58	427	29
3. Mineral fuels, lubricants, etc.	2,445	2,187	442	7	5	-
4. Animal & vegetable oils and fats	79	54	679	51	353	122
5. Chemicals	1,857	1,930	774	78	91	5
6. Manufactured goods, etc.	3,919	3,861	2,846	2,194	1,248	412
7. Machinery & transport equipment	222	181	13	11	63	42
8. Miscellaneous, manufactured articles (inc. clothing,) etc.	2,820	1,487	182	146	370	35
9. Commodities & transactions n.e.s.	57	54	5	2	10	1
TOTAL	15,619	13,282	7,317	3,120	3,806	842

NOTE: Principal items (in excess of £350,000) included above were:
Kenya to Uganda, Fresh milk and cream, butter, wheat (unmilled), cigarettes, petroleum products, soap, paper bags and boxes, synthetic fabrics, clothing, footwear
Kenya to Tanganyika, Margarine, beer petroleum products, cosmetics and dentifrices, soap, paper products, cement, footwear
Uganda to Kenya, Margarine, unmanufactured tobacco, vegetable oils, cotton fabric, electricity
Uganda to Tanganyika, Cotton fabric
Tanganyika to Kenya, Unmanufactured tobacco
Tanganyika to Uganda, None

SOURCE: Annual Trade Report of Tanganyika, Uganda and Kenya for the year 1966. Commissioner of Customs and Excise, Mombasa.

of trade pattern has evolved through several well-marked phases. From 1945 to 1948, both Kenya and Tanganyika had small deficits and Uganda had the larger surplus. From 1949 to 1955, Kenya jumped to a surplus which grew steadily, mostly at the expense of Tanganyika whose deficit jumped and grew correspondingly. Uganda's surplus fluctuated from year to year, but also grew slightly on the average. In 1956, Uganda suddenly incurred a substantial deficit and Kenya's surplus correspondingly increased -- a shift which was due to the transfer of cigarette production from Uganda to Kenya. From 1956 to 1966, Kenya's surplus has increased four times to £18m, while Tanzania's deficit has steadily

grown to £12m and Uganda's to £6m. This trend is closely linked with the growing importance of manufactured goods in regional trade and the concentration of manufacturing in Kenya. The substantial increase in Tanzania's and Uganda's deficits is largely due to their growing net importation of manufactured goods from Kenya. (Robson, op.cit., p. 125)

This regional balance of trade has worked to Kenya's advantage in external trade with the rest of the world. Kenya has consistently run large trade deficits with the rest of the world, while both Uganda and Tanzania have obtained smaller -- but substantial -- surpluses. (See, for example, Table IV.7 below for the year 1966) Kenya's over-all deficit has normally been offset by its regional surplus in both visible and invisible trade⁵²) -- by the net earnings from the financial,

Table IV.7 (Robson, op.cit., p. 103)

East African Foreign Trade 1966

	Net Imports	Domestic Exports
Kenya	112,396*	58,073
Uganda	42,947	65,936
Tanganyika	64,251	79,106
TOTAL	219,594	203,115

* Kenya's imports in 1966 are inflated by over £10m due to expenditures on regional activities with headquarters in Kenya. Kenya's deficit, however, is still substantial.

transport, and other services provided for the region but which had their headquarters located in Kenya. Any remaining deficit has been offset by a net capital inflow which has enabled Kenya to actually increase its foreign exchange reserves. (Robson, op.cit., pp. 103-104; Ndegwa, op.cit., p. 83) As Ndegwa says,

The large surplus of Kenya in both invisible and merchandise transactions with the rest of East Africa helps to explain how this country has been able to run persistently large deficits in her merchandise transactions with countries outside East Africa. In other words both Uganda and Tanganyika have been indirectly earning foreign exchange for Kenya. (Ndegwa, op.cit., p. 84)

The third feature of regional trade is the geographical pattern among the three member countries. Kenya's regional exports are divided almost evenly between Tanzania and Uganda, but almost all of the regional exports of the latter two countries go to Kenya. Tanzania and Uganda do not trade very much with each

⁵²) "Visible" trade is the trade in physical goods which is included in a country's statistical report. "Invisible" trade can include physical goods (e.g., smuggling), but most often involves a service transaction (e.g., insurance) between countries which does not show up in their statistical reports, but which can, nevertheless, affect their financial positions.

other because of the relative lack of transport links between them, but a more fundamental reason for this is that it is Kenya which has most of the industries which were designed to serve all of East Africa. Indeed, part of the reason why Tanzania's regional exports are so low is that the Europeans in Tanganyika invested mainly in coffee and sisal for export abroad, while those in Kenya -- and to a much lesser degree in Uganda -- attempted to exploit both the East African and the foreign market. (Robson, op.cit., pp. 125-126; Ndegwa, op.cit., p. 54)

Regional trade patterns in East Africa are important because, as Ndegwa says,

. . . . the extent to which each country benefits from the operation of the East African common market is more or less directly linked to the quantity and nature of her intercountry exports and imports. In general, if a country joins a common market and does not increase her exports to the other partners, but only changes the source of her imports from third countries to the partners, she is not gaining anything; indeed, she will lose if the new sources of her imports are more expensive than the previous ones Moreover, for underdeveloped countries aspiring to industrialize, the commodity composition of intraunion exports is also relevant. (Ndegwa, op.cit., pp. 52-53)

The major reason for the past and present problems of regionalism in East Africa has been the widely-held belief that the gains from regional cooperation have been unequally distributed -- that most of the benefits have gone to Kenya and that Uganda and Tanzania have benefitted little and, indeed, may even have lost from it. Robson says,

Although the advantages of the common market from these and other sources have been widely accepted, it is generally believed that the gains have been unevenly distributed among the participants. This is thought to be a consequence of the fact that industry attracted to East Africa by the size of the common market has tended to locate in Kenya But even if it cannot, in the nature of the case, be demonstrated that any country would gain from leaving the common market in the long run, there seems little reason to doubt that its major benefits accrue to Kenya. Not one of the several independent economic evaluations of the operation of the common market has suggested the contrary. (Robson, op. cit., pp. 128 & 148)

Other sources repeat the contention that Kenya has benefitted the most from regional cooperation as industries for East Africa have tended to concentrate in the Nairobi area.⁵³⁾ As industrialization is often considered to be the

⁵³⁾In an "Editor's Note on the Tensions Within the Common Market," (Politics of Integration, Rothchild (ed), 1968c, op.cit.) Rothchild says: ". . . the more prominent reservations East Africans held about interterritorial coordination in the economic sphere. First Tanganyikans (now Tanzanians) and Ugandans resented Kenya's more rapid rate of industrialization . . . the Tanganyikans and Ugandans contended the existence of a common market arrangement had accentuated existing disparities." (Rothchild, 1968c, op.cit., p. 120) Also, ". . . in the present conflict among the three countries, it is generally agreed that the common market is effective in promoting development and industrialization; the

equivalent -- or at least a very important aspect -- of development, Tanzania and Uganda resented the fact that they were being left behind as primarily agricultural producers and blamed the common market for their predicament.

With respect to natural resources such as minerals or agricultural land, Kenya is probably not as well off as either Tanzania or Uganda; yet her industrial development and economic growth rate -- particularly in the 1950's -- have outdistanced those of her neighbors.⁵⁴⁾ The industrial manufacturing sector in Kenya is not that large -- accounting for only 11% of her gross domestic product in 1966 -- but it is growing and accounted for about 60% of the manufacturing activity in the region in 1966. (Ibid, p. 100-102) Most of Kenya's industrial activities are in the field of consumers' goods rather than capital goods due to the fact, perhaps, that import substitution is easiest for consumers' goods. Most of her industries are also small-scale, but the few large ones which do exist account for a large share of the industrial production and employment. (Ndegwa, op.cit., pp. 67-68) The responsibility of the regional common market for this disparity of development is debatable, but even Tanzania and Uganda recognize that other factors have influenced this trend.⁵⁵⁾ Most -- if not all -- of these factors can be traced back to the historical decision to promote European settlement in Kenya. When the British happened to base the camp for the railroad builders at present-day Nairobi before the immense task of extending it down the escarpment of the Great Rift Valley, they laid down the beginnings of a modern industrial infrastructure which has developed into the center of industrial activity for East Africa. Entrepreneurial ability, higher incomes and a relatively broad base of purchasing power, skilled labor, good transportation facilities, efficient management, etc. are all advantages which Nairobi has had over the rest of East

53) conflict arises from unequal distribution of the benefits accruing from it We have also seen that the benefits accruing from the common market have not been equally shared -- Kenya has gained substantially, Uganda has certainly gained although not by as much as Kenya, while Tanganyika has probably lost and certainly has gained the least. These unequal benefits derive from unequal growth rates in the manufacturing sectors of the three countries, with the result that tensions and strains have developed in the operation of the common market;" (Ndegwa, op.cit., p. 136) "Industry -- and especially interterritorial exports -- are heavily concentrated in Kenya although Uganda has a substantial stake (especially if sugar is an industrial product) and Tanzania a growing one. While all three states gain to the extent production costs are lowered, Tanzania and Uganda lost to the possibly quite considerable extent regionalization reduces the size of their industrial sectors compared to what they would have been under national protectionist policies." (Green and Krishna, op.cit., p. 33)

54) From 1954-1961, Kenya's average annual growth rate was 6.7% as compared to 5.2% for Tanganyika and 2.7% for Uganda. (Ndegwa, op.cit., p. 108; or see Robson's figures quoted at the beginning of the chapter)

55) Ndegwa cites the deteriorating terms of trade in primary product exports which Uganda and Tanganyika experienced from 1954 to 1962 as one other reason for their lower growth rates. (Ndegwa, op.cit., p. 110)

Africa and which induced industry to settle there. With the center of political influence also in European Nairobi, British colonial policy for East Africa favoring Kenya as the economic center of the region also helped. And, in a laissez-fair situation, industry would continue to locate in such a place where infrastructure facilities made it most economical to do so until over-crowding and rising costs would make it economical to locate elsewhere. Indeed, in discussing this point, Green and Krishna stress not only the over-concentration of economic activity, but also

. . . the lack of an overall formal constitution or treaty framework and the resultant dis-co-ordination or absence of planning and control over joint economic sectors, particularly the common market, (Green & Krishna, op.cit., pp. 112-113)

which might have been able to more nearly balance industrial development in the region. They state:

The unplanned -- in the case of the common market unregulated -- nature of East African regionalism has combined with extreme centralization of regionally oriented activity to create a series of stresses and conflicts between national economic plans and certain aspects of the economic community. (Ibid, p. 35)

There were other regional problems related to the basic one of unbalanced economic development among the member countries.⁵⁶⁾ Rothchild mentions four in addition to the resentment over Kenya's industrial progress: fiscal limitations; losses of revenue from import duties; the high-prices of certain goods produced in Kenya; and reservations about the free flow of economic factors within the region. The basis of regionalism in East Africa has been the customs union with its common external tariff. Both customs and excise taxes were administered by a regional Customs Department on behalf of the three member countries, and although there have been a few exceptions in recent years, both customs and excise duties were virtually uniform throughout East Africa. Income taxes were likewise administered by a regional Income Tax Department. Income earned anywhere within East Africa was treated as a single sum and the tax revenue -- with the exception of regional employees -- was allocated to the member country in which it was earned, both for individuals and corporations. Again, the rates for personal and corporate income taxes have been virtually uniform throughout the region. Indeed, any significant variance in tax rates among the three member countries would have caused disruptions, as businesses moved to take advantage of lower rates, or as tax-cutting "wars" lowered them to new uniform levels.

56) Although there were other problems, none of them were probably serious enough to really threaten regional cooperation had development been balanced. Green and Krishna state: "Certainly a number of other differences have arisen, among the most publicized those centering on central banking and currency, airline landing rights, and EACSO trade disputes legislation. None of these, however, would have

For both types of taxes, the structures were established by the regional Central Legislative Assembly, but rates and allowances were enacted by the separate national governments. In practice, these rates were only changed after negotiations among the three Finance Ministers -- when agreement was reached on new uniform rates. In this way, about three quarters of the tax revenue for national governments was obtained from sources which were characterized by regional uniformity and the harmonization of national policies. The main sources which national governments controlled on their own were graduated personal taxes -- a kind of low-rate income tax levied by local authorities -- export taxes, and special consumption taxes.

The high degree of regional uniformity which was practiced in the fiscal field had many economic and administrative advantages and directly contributed to the smooth running of the customs union. At the same time, however, it caused a high degree of budgetary inflexibility at the national level --

But the need for parallel tax structures limited the territorial governments as they attempted to grapple with national requirements in the face of fluctuating commodity prices on world markets. Because these governments lacked the ability to adjust tax rates to changing conditions at home, they looked reproachfully upon the common market arrangement itself as a contributing cause of their problems. (Rothchild 1968c, op. cit., p. 121)

Before independence, these fiscal limitations were a major restraint on the territorial governments; since the early 1960's, the trend has been for national governments to diverge somewhat on expenditure, and taxing policies, but as long as the divergence stays within reasonable limits the operation of the common market should not be adversely affected. (Robson, op.cit., pp. 107-112)

As regional trade within the common market has grown -- with Kenya as the chief regional exporter -- Uganda and Tanzania have complained about their losses of revenue from import duties as Kenya's duty-free products have replaced those from outside the region. Ndegwa has estimated that in 1962, Tanganyika lost \$1.8m and Uganda \$0.2m in customs revenue due to this reason, and their imports from Kenya have grown since 1962. (Ndegwa, op.cit., p. 103) Kenya has also lost revenue from the same process, but a much smaller amount which is many times made up for from the increased personal and corporate income taxes generated by her production facilities.

A related problem of revenue losses concerned the allocation of customs and excise duties and "transfer trade." The basic rule for the allocation of those duties was that the revenue accrued to the member country of final desti-

56) threatened the basic functions of the community had not the three central problems outlined remained unsolved." (Green and Krishna, op.cit., p. 113 -- the "three central problems" basically add up to unbalanced development.)

nation.⁵⁷⁾ Thus, when foreign goods were imported into one country in the region and subsequently transferred to another, a reallocation of customs and excise duties from the country of "origin" to the country of "destination" was made. In East Africa, most of this transfer trade is from Kenya to Uganda and Tanzania. Kenya's modern port at Mombasa serves all of land-locked Uganda and northern Tanzania -- transport from Tanzania's port at Dar es Salaam to northern Tanzania being less well-developed than that from Mombasa. Moreover, Kenya, as indicated earlier, is the headquarters for most of the large and well-established import firms and companies which serve all of the East African market. About half of the transferred goods from Mombasa were re-exported without being broken up or changed in any way -- "referenced goods" -- and the original duties collected at Mombasa could simply be reallocated. For the other half of "broken-bulk goods," this could not be done and the reallocated duties were calculated on the basis of ratios which took into account the value added in Kenya due to distribution or processing before re-exportation. (Robson, op.cit., pp. 110-111; Ndegwa, op. cit. pp. 32-33) The problem in the transfer trade was satisfying Tanzania and Uganda that they were receiving their fair share of reallocated customs and excise duties. This was quite important to them because as developing countries, with relatively little taxable income, they depended quite heavily on these duties as a source of government revenue. In 1963, Ndegwa mentions that Tanzania obtained £11m in revenue from customs and excise duties, £3.7m of which was transferred from Kenya; in land-locked Uganda, the corresponding figures were £9.3m and £5.6m respectively.⁵⁸⁾ (Ndegwa, op.cit., p. 37) In speaking of total political integration in the region, he says

. . . until that is achieved, allocation of customs revenue will continue to be a source of political conflict. (Ibid, p. 38)

Another complaint of Uganda and Tanzania involved the unreasonably high price of certain goods produced in Kenya and sold throughout the region. Even with transportation costs, they claimed that dairy products -- for example -- could be imported at a lower price from Europe than from Kenya if only the tariff

⁵⁷⁾ In the few cases where customs or excise rates differed for the member countries, the customs rate of the country of destination applied while the excise rate of the country of origin applied, even though the revenue still accrued to the country of destination. (Robson, op.cit., p. 110)

⁵⁸⁾ Due to "invisible" transfer trade which does not go through any customs, these figures are only partially correct. (Ndegwa, op.cit., p. 37) If the country of destination has a higher customs, excise, or other tax, part of this "invisible" transfer trade will be due to smuggling. Robson says that these instances have not been numerous, but that smuggling of paraffin and sugar has occurred in East Africa. (Robson, op.cit. p. 111)

were to be reduced. The operations of Kenya's statutory marketing boards, which controlled the internal marketing of agricultural products, also were the object of bitter complaints as there were known instances where Kenya's products were priced higher in East Africa than they were in Europe! (Rothchild, 1968c, op. cit., p. 121)

Finally, there were general reservations about the free flow of capital and labor within the common market area. A common market is usually predicated upon the desirability of market forces operating to produce the most economical location of industries, prices of goods, etc. But many East Africans had reservations about the workability of capitalism and have interfered with the market in many ways. The marketing boards mentioned above were one such device; other devices include public development corporations, customs duty relief, special trade agreements, etc. (Ibid, p. 120) As Robson puts it:

In point of fact, both the advantages of the common market and the distribution of its benefits have been limited and influenced not only by the natural forces of polarization, but also by policies and practices of the three governments which have to some extent prevented economic forces from determining the location, level, and the costs and prices of economic activity. (Robson, op.cit. p. 129)

The conflict in working for East Africa's welfare, but also for the welfare of the member country where one was from, has been a serious problem for regional civil servants in the absence of any official and detailed balanced plan for investment in the region.

Although the quantitative "independent economic evaluations of the operation of the common market" cited earlier in a quote from Robson have all concluded that Kenya benefits the most from it, the effects on Uganda and -- especially -- Tanzania have been less conclusively analyzed. In an article entitled "Customs Union Versus Economic Separatism in Developing Countries" (Yorkshire Bulletin of Economic and Social Research, May and November, 1961), A. J. Brown analyzes the East African situation and, according to Robson, concludes that, given the common market, Tanzania and Uganda are compensated for their purchases from Kenya at higher than world prices by Kenya's imports from them. The acid test, however, is whether a country would be better off in than out of a regional common market, and Brown's analysis cannot shed light on this point because he has not dealt with the possibility of industries which do not need the enlarged regional market coming to East Africa and locating in Kenya whereas in the absence of the common market they might have settled in Uganda or Tanzania. It is exactly on this issue that Green and Krishna make the following statement:

While the exact degree is highly controversial, it would appear that most industrial products traded within East Africa have markets in each

territory which would have allowed initiation of production under national protection (as opposed to the existing regional). To a lesser degree the same holds for agriculture. (Green and Krishna, op. cit., p. 33)

Dharam Ghai employed an analysis in which gains and losses from the common market were closely related to the balance of regional trade among the three member countries. Gains were indicated by weighting each member country's categories of regional imports similarly weighted. Ghai concluded that

From our analysis of the territorial distribution of benefits and costs of the EACM, it appears that Kenya has been the greatest net beneficiary, that Uganda has on balance gained rather than lost, and that Tanganyika has suffered a substantial net loss. (Ghai, op.cit., p. 207)

Arthur Hazlewood, in "The East African Common Market: Importance and Effects," (Bulletin of the Oxford University Institute of Economics and Statistics, Vol. 28, No. 1, February 1966, and reprinted in Politics of Integration, Rothchild (ed), op.cit.) criticizes Ghai's conclusions on several grounds and offers an analysis of his own on the gains and losses from the common market. Hazlewood's main criticism is the assumption that the nominal protection given by the common external tariff is identical with the effective protection enjoyed by regional exports of the member countries, i.e., that all existing trade between the three member countries is dependent on the external trade.⁵⁹⁾ Hazlewood agrees that there is a large regional trade imbalance favoring Kenya; the cause, however, is not the common market or external tariff but geography and historical accident, post colonial settlement and development policies. He says:

When account is taken of these considerations, the common market can be seen to be much less important than is commonly believed. It follows that it has been a less important cause of the interterritorial inequalities than is commonly supposed.⁶⁰⁾ (Hazlewood, 1966, op.cit., p. 210 in Politics of Integration)

Some of the "considerations" he raises are the fact that some products traded interterritorially have no duty on them if imported from abroad, some -- e.g., liquid milk -- have no effective competition from abroad, some -- e.g., beer and

59) "The main objection to Mr. Ghai's conclusions arises from the fact that his study is concerned exclusively with the nominal protection accorded to interterritorial trade. His procedure is valid only if it can be assumed that the protection accorded by the external tariff is entirely necessary to give the market to the East African product." (Hazlewood, 1966, op.cit., p. 213 of Politics of Integration.)

60) Green and Krishna agree with this conclusion: "In fact, the present economic significance of the common market and services is almost certainly generally overstated. Both qualitative and quantitative estimates suggest it is at most 1.5 - 2 per cent of gross product -- admittedly on the order of £10 million a year. Its net development stimulating effect, both at present and during most of its history also appears distinctly marginal." (Green and Krishna, op.cit., p. 32)

cigarettes -- are competitive in price and quality with foreign imports, and some find export markets outside East Africa. Regional trade in these products would appear to have little or nothing to do with the external tariff. Robson says that Hazlewood has suggested that in 1962, 50% of Kenya's regional exports, 60% of Uganda's, and 58% of Tanzania's were, in fact, independent of the external tariff. (Robson, op.cit., p. 137) Hazlewood concludes his analysis by stating that the differences in costs and benefits from regional trade in the common market between Kenya and Tanzania are negligible and cautions against breaking it up. (Hazlewood, 1966, op.cit., p. 216 in Politics of Integration)

Robson is not entirely satisfied with either Ghai's or Hazlewood's analyses because they compare the situation of the member countries inside the common market with what their individual situation would be in the case of free trade with the rest of the world. However, the realistic alternative to the common market would not be free trade, but three separately protected national markets, and the question to ask is how these two situations would compare. Robson cites a study by W. T. Newlyn⁶¹) which does attempt to analyze this type of alternative choice question for East Africa. His study only considers the question for Tanzania and Uganda, and his procedure is to determine those industries which could be established -- with national tariff protection -- in Tanzania and Uganda and produce substitutes for Kenyan imports and the effects that this would have on their national products. These effects would be a measure of the gain or loss involved. Those "shiftable" industries which would be viable in Tanzania and Uganda, given protection, would be assumed to shift; the remaining industries which were dependent on the common market would be assumed to disappear. Robson says:

Thus Newlyn concludes: "On the basis of the criteria used and in respect of the 1961 figures, there would be a clear gain to Tanganyika and an insignificant loss to Uganda from leaving the common market." (Robson, op.cit., p. 139)

There are several objections which might be raised about Newlyn's analysis -- the most crucial probably centering on the identification of shiftable and non-shiftable industries -- and Newlyn himself recognizes that the static short term gains from leaving the common market may well be overshadowed by the potential long-term gains from staying in. After discussing all of these analyses, Robson himself concludes that:

No satisfactory estimates of the benefits and costs of the East African Common Market have yet been made, mainly because although in a static framework the factors on which these values depend are clear enough, the cost and demand data necessary for adequate quantification are not available. (Ibid, p. 147)

⁶¹) W. T. Newlyn, "Gains and Losses in the East African Common Market," Yorkshire Bulletin, November, 1965.

Whether or not the benefits and losses from the common market have been "proven" by quantitative analyses is less important anyway than the perceptions which the individual East African countries have held on this issue. In this situation, evidence can best be produced from the affected countries themselves. In Tanganyika's first five-year plan for 1964-69, the following paragraph is found:

The East African Common Market, within which for more than 40 years the economic destinies of Kenya, Uganda and Tanganyika have been associated, has without any doubt contributed to the industrial development of the area taken as a whole. Unfortunately for historical and geographical reasons, this development has been inequitably distributed between the three states and Tanganyika, in spite of certain fiscal, compensatory and corrective measures, has not drawn from this association a benefit proportional to the capacity of its market compared with that of the whole East African Market. (United Republic of Tanganyika and Zanzibar, Tanganyika Five-Year Plan for Economic and Social Development, 1st July, 1964 - 30th June, 1969, Vol. 1: General Analysis, Government Printer, Dar es Salaam, 1964, p. 16)

In a speech by President Nyerere to the EACSO Central Legislative Assembly, the following reasoned analysis was given:

Let me illustrate my point by explaining Tanzania's problems in certain matters relating to the common market. The pattern of European settlement in East Africa together with other fortuitous circumstances, meant that Nairobi developed as an industrial and commercial centre for the whole area. Firms were established there and expanded their operations to sell goods throughout the three territories. Tanzania obtained virtually no industries of her own. . . . The result has been . . . that the deficit on Tanzania's trade with Kenya had increased to £9.2 million.

In other words, the colonial economic pattern meant that Tanganyika was a free market for Kenya, and the surplus she earned on overseas trade with other countries was not promoting her own development. . . . Because of the common tariff arrangements, and the free inter-East African trade, Tanzania cannot buy in the cheapest market abroad, and equally, she cannot protect her own infant industries against competition from long established and large-scale firms in Kenya, and -- to a lesser extent -- Uganda.

This situation did not result from evil machinations by the people or government of our northern neighbours. It was a historically determined fact. But, as far as Tanzania was concerned, it meant that her own development was hamstrung. Without the establishment of an industrial base, Tanzania will never achieve a stable economy or reach the take-off point of economic growth. If the present pattern continues -- and it is obviously not self-correcting -- Tanzania would never be able to guarantee the financing of the basic social and public services which her people rightly demand. (Reprinted in Rothchild (ed), op.cit., pp. 231-232)

Uganda's feelings on this issue are not as thoroughly documented, but in the National Assembly Debates of July 9, 1963, Prime Minister Obote stated the following:

- In the past, we in Uganda have often felt that we got a good deal less than our fair share of the development of manufacturing industry within the common market. Nevertheless, we believed that the common market was for the good of all and that with a little give and take it would be possible.

to share out the benefits to the satisfaction of each country. (Ibid, p. 223)

And Kenya was not unaware of these perceptions. In a speech to the East African Staff College on November 2, 1966, the Kenyan Minister for Economic Planning and Development, Tom Mboya, said with regard to the Common Market:

The principal difficulty is simple to state, but it is requiring the best efforts of ministers and officials to resolve. How can these gains be equitably distributed among our three countries? . . . By the late 1950's it had become apparent that the majority of the gains from the common market were accruing to Kenya with Uganda and Tanganyika receiving a smaller share. Indeed, some people have argued that Tanganyika was suffering a net loss in economic activity as a result of the common market itself. . . . (Ibid, p. 245)

There had been some attempts to deal with this issue ever since World War II. One of the regional bodies originating during World War II was the East African Industrial Council. An industrial licensing system -- to be managed by this Council -- was first initiated in 1948 by identical territorial legislation and re-established by new identical legislation in 1952-53. The object of the system was to (1) induce firms on a list of "scheduled" industries to locate in East Africa by giving them a monopoly in the region for a stated period and to (2) grant such monopoly licenses both with "regard to the resources of the applicant and to the general interests of East Africa." (Raisman Commission Report, reprinted in Rothchild (ed), op.cit., p. 186) It was the intention that the Industrial Council should direct industries to locations in accordance with a general development plan for East Africa, but the idea of drawing up such a plan was abandoned by 1949. Without such a plan, the Council did not influence the location of new industries and they logically settled in Kenya, for reasons outlined earlier. As the industrial imbalance under this system became apparent, Tanganyika objected to the addition of new industries to the scheduled list and the scope of the licensing system therefore remained quite small. Without an agreed upon general development plan, the system did not achieve its objectives and served very little useful purpose in relation to industrial development in East Africa. (Ibid, pp. 185-186; see also Ndegwa, op.cit., pp. 111-112)

The first attempt to comprehensively deal with the strains and grievances in the common market was in 1960 when the East African Economic and Fiscal Commission of Enquiry, headed by Sir Jeremy Raisman, was appointed to study the operations of the common market and common services and the fairness of these operations for the partner territories. The commission reported a year later⁶²⁾ and concluded that

⁶²⁾ East Africa, Report of the Economic and Fiscal Commission, Sir Jeremy Raisman, Chairman, HMSO, London, 1961.

the common market had

... enabled East Africa to become a substantially unified market (and had) been an important factor in the establishment of manufacturing industry in East Africa By virtue of these effects, it (had) played an important part in enabling East Africa as a whole to maintain in recent years a rate of growth in its total volume of output which is comparable with that shown by most of the advanced countries . . . in spite of adverse world market conditions Rates of growth in the separate territories have shown great disparity, Kenya's growth being much more rapid than that of either of the other two territories. . . . The largest part of the new capital and skill has gone to Kenya. Nevertheless, it is very doubtful whether Uganda or Tanganyika could, by setting up barriers within the common market, have gained more than they would have lost by the certain impoverishment of East Africa as a whole . . . (and moreover) the contributions which the common market arrangements can make to economic growth are likely to be greater in the future than in the past. ⁶³⁾ (Raisman Commission Report, reprinted in Rothchild (ed), op.cit., p. 187)

According to the Commission, the primary advantages of the common market were the larger potential market -- which permitted greater economies of scale and generated external economies such as a skilled labor pool -- and specialization as the basis of comparative advantages. Although it admitted that Kenya was the largest gainer from the common market, it thought that Kenya's purchases from the other two countries and other "spread effects" compensated them for their other losses and that no country had suffered an actual, net loss. The internal strains, however, were recognized:

Inequality in the distribution of the common market's benefits is, however, the fundamental source of the present strains. (Ibid, p. 189)

Therefore, the Commission, believing that the common market was very important to the economic future of East Africa and recognizing that the internal strains were so great, made recommendations to improve the common market and correct the imbalance of benefits.

To this end, the Commission proposed a number of measures to improve economic coordination among the member countries, ⁶⁴⁾ but its main recommendation was to establish a "Distributable Pool" of revenue which would partially offset the inequalities arising from the common market. Actually, there was a dual

⁶³⁾ Robson says that broadly similar conclusions were reached by the World Bank (IBRD, The Economic Development of Tanganyika (1961), The Economic Development of Uganda (1961), and The Economic Development of Kenya (1963), all published by John Hopkins University Press) and by a study for the Rand Corporation (Massell, B.F., East African Economic Union: An Evaluation and Some Implications for Policy, RAND, Santa Monica, 1963).

⁶⁴⁾ These proposals were as follows: 1) the negotiation of a code of agreed principles of interterritorial trade and marketing policy; 2) that regional economic coordination should be sought by regular meetings of the relevant territorial Ministers; 3) that these meetings should be assisted by an independent Economic Advisor and Secretariat; and 4) that industrial licensing should be discontinued. (Raisman Commission Report, reprinted in Rothchild (ed), op.cit., p. 188)

purpose involved. Up to 1961, the East Africa High Commission had lacked any independent sources of revenue. While the self-contained services were self-financing, the other, non-self-contained services were financed by grants from the British Government and other outside sources and by annual appropriations from the territories. The Raisman Commission thought that an independent source of revenue for these latter services would be advisable in providing the High Commission with a greater certainty of funds and the opportunity to more efficiently administer these services for East Africa as a whole.⁶⁵) Half of the Distributable Pool would be allocated to a General Fund of the High Commission for running these services, but its main purpose was still to redistribute regional resources so as to offset part of the inequalities of benefits derived from the common market. (OECD, op.cit., p. 55; Robson, op.cit., pp. 106 & 112)

The Distributable Pool was to be formed by taking 6% of the customs and excise revenue and 40% of the revenue from the income tax on companies' profits from manufacturing and finance in the region -- revenue which was assumed to be related to the benefits from the common market. After deducting collection costs, half of the Pool was to be allocated to financing the common services mentioned above, and the other half was to be distributed evenly among the three member countries. The three member governments accepted this proposal and the Pool went into operation on July 1, 1961. Kenya paid the most into the Pool (See Table IV.8 below), but received a direct reimbursement only equal to that given to Uganda and Tanzania.⁶⁶)

Table IV.8 (Robson, op.cit., p. 113)

East Africa Distributable Pool				
	£000			
Receipts from	1961-2	1962-3	1963-4	1964-5(est)
KENYA	1,731	2,092	2,551	3,000
UGANDA	759	831	1,159	1,420
TANGANYIKA	791	1,028	1,164	1,300
TOTAL RECEIPTS	3,281	3,951	4,874	5,720
Payments to				
1/2 to GENERAL FUND	1,640	1,975	2,438	2,860
1/6 to KENYA	547	658	812	953
1/6 to UGANDA	547	658	812	953
1/6 to TANGANYIKA	547	658	812	953
TOTAL PAYMENTS	3,281	3,949	4,874	5,719
Net Receipts				
KENYA	-1,184	-1,434	-1,739	-2,047
UGANDA	-212	-173	-347	-467
TANGANYIKA	-244	-370	-352	-467

SOURCE: East African Common Services Organization.

65) SEE NEXT PAGE

66) SEE NEXT PAGE

NOTE: The receipts of the Fund are net of its share of the costs of collection. Since half of the Pool went to finance the non-self-contained General Fund common services, however, a measure of the total redistributive effect would have to take this into account also. Unfortunately, there seems to be no completely satisfactory way to measure this indirect redistribution. On the basis of "two assumptions which might reasonably be made," Robson (p. 114) does calculate the total redistribution (See Table IV.9 below), but Hazlewood, after examining the expenditure figures for 1964-65 concludes that

. . . there is no effective redistribution between the territories through the operations of the General Fund or non-self-contained services. (67) (Hazlewood, op.cit., p. 83, 1967)

However much the revenue redistribution was -- OECD called it "quite substantial" (op.cit., p. 55); Robson called it "fairly small" (op.cit., p. 130) -- this solution did not prove satisfactory for very long. As Ndegwa put it in 1965,

. . . for what Uganda and Tanganyika want is not just extra revenue but a share in the industrialization process taking place in East Africa. (Ndegwa, op.cit., p. 106)

Table IV.9 (Robson, op.cit., p. 114)

Territorial Redistribution through Distributable Pool

		£000			
		1961-2	1962-3	1963-4	1964-5
Assumption (i)	Kenya	-318	-388	-463	-547
	Uganda	+168	+243	+233	+243
	Tanganyika	+152	+144	+230	+303
Assumption (ii)	Kenya	-637	-776	-927	-1,094
	Uganda	+335	+485	+465	+486
	Tanganyika	+303	+288	+460	+606

Moreover, the Distributable Pool itself proved to be a new source of controversy among the member states. Uganda and Tanzania considered the redistributive effect

65) Indeed, the Distributable Pool did improve the system of financing the non-self-contained common services. This independent and consistent source of funds enabled the regional services to plan ahead -- something which was more difficult to do when their financing depended on an annual vote in each member country. (Ndegwa, op.cit., p. 107)

66) "The direct redistributive effect is clear. Each territory was to receive the same amount, but they would contribute to the Pool in proportion to the revenue collected from them." (Hazlewood, 1967, op.cit., p. 86)

67) The self-contained services -- especially the railroad and airline -- were a different matter. Hazlewood commented that ". . . the cross-subsidization in the self-contained services must be a powerful counterweight to the unequal distribution of the gains from the common market." (Hazlewood, 1967, op.cit., p.85) These services, of course, were outside the scope of the Distributable Pool.

to be inadequate, while Kenya -- being the major contributor -- felt it to be too excessive and an unjustified burden on her own limited taxing capacity. (OECD, op.cit., p. 55; Green and Krishna, op.cit., p. 34)

Therefore, as the possibility of full political federation became less and less in the early 1960's and as events took place as we have seen, Tanzania took the initiative to bring about basic changes in regional economic relations. On March 17, 1964, Tanzania's Minister for Development Planning startled a conference on the coordination of regional economic planning at Entebbe (Uganda) by threatening to withdraw from the common market. The response was immediate. On April 3, Tom Mboya travelled to Dar es Salaam and talked with President Nyerere. One week later, the Heads of Government and large delegations from the member countries met in Nairobi. The outcome of this conference was a tension-easing declaration by Tanzania that she had no intention of withdrawing from the common market and an agreement to set up an emergency committee to examine trade relations and industrial development within East Africa. Throughout the remainder of April, the Ministerial Emergency Committee -- which included the Ministers for Finance and the Ministers for Commerce and Industry of all three countries -- met in Kampala to consider various positive measures aimed at redressing internal trade imbalances. By the end of the month, the committee announced that it had reached full agreement on how to solve regional economic difficulties. Although more discussions and meetings were held by the Heads of State and slight modifications occurred, the final version as approved by the Heads of State at Mbale (Uganda) in January 1965 was substantially the same and it became generally known as the Kampala Agreement of April 1964. (Rothchild, 1968c, op.cit., pp. 122-123)

The central feature of the agreement is that is sought to reduce the inequalities of the common market operation through the elimination of the internal trade imbalance by 1) industrial location and relocation agreements and 2) trade restrictions. Five methods or approaches were proposed:

- (a) Immediate action with certain interterritorially connected firms to increase production in a deficit country and thereby reduce imports from a surplus country.
- (b) Agreement as to the immediate allocation of certain major industries.
- (c) The application of a system of quotas and suspended quotas whereby exports from surplus countries would be progressively reduced and local production increased in the deficit countries according to the building up of the productive capacity of the deficit country.
- (d) Increased sales from a country in deficit to a country in surplus.
- (e) Early agreement within the East African Common Market on a system of inducements and allocations of industry in order to secure the equitable distribution of industrial development as between the three countries. (Kampala Agreement documents, reprinted in Rothchild(ed), op.cit., p. 224)

In (a), firms operating in more than one East African country were to be requested to increase their relative output in Tanzania and/or Uganda. In (b), several new regional industries which were to be established in East Africa were allocated among the member countries. Eight industries were named in the original April agreement, of which five were to go to Tanzania, two to Uganda, and one to Kenya. After slight modifications, the final agreement allocated the manufacture and assembly of radios, the manufacture of motor vehicles, tyres and tubes, and the manufacture of aluminium foil, circles, and plain sheets to Tanzania; the manufacture of bicycles and fertilizers to Uganda; and the manufacture of light bulbs to Kenya. The allocation agreement was to be implemented by scheduling these industries under the Industrial Licensing Acts -- referred to earlier -- and then having the East African Industrial Council issue licenses only in accordance with the locations agreed upon.

The other principal agreement was that a system of quotas was to be introduced under (c) on exports from Kenya -- such as beer, cigarettes, and shoes -- in order to facilitate the building up of the productive capacities of Tanzania and Uganda. In (d), Kenya agreed to attempt to increase its purchases from Tanzania and Uganda, and in (e), a system of incentives designed to attract industry to Tanzania and Uganda was provided for and a committee of industrial experts was to be appointed to study the long-range problem of allocating industries among the three countries. (Robson, op.cit., pp. 149-150; Rothchild, 1968c, op.cit., pp. 123-124; OECD, op.cit., p. 56; Ndegwa, op.cit., p. 55)

Reservations about the main parts of the Kampala Agreement were expressed almost immediately, however, in discussing the allocation of industries, Rothchild said:

However, it was yet to be determined that an industrial location policy could work. Could foreign industrialists be induced to invest in a location not of their choosing and would the East African Governments forgo a project simply because the investor resisted the location allotted to him? East Africa's long experience with industrial licensing indicated that such conflicts of interest would not be surmounted easily. (Rothchild, 1968c, op.cit., p. 124)

Green and Krishna noted that the relocation of existing industry would, indeed, narrow the trade gap between Kenya and the other two countries, but would do so by reducing trade and the net benefits to the region as a whole from specialization. They commented,

To "preserve" the common market in this way -- as was provided in the Kampala Agreement -- except as an interim device is to destroy it by attrition. (Green and Krishna, op.cit., p. 33)

Hazlewood also noted that the tendency of the quotas was to increase national self-sufficiency in the products affected and to reduce regional trade. He pointed out

that a trade imbalance within the region did not have to be solved by the elimination of trade -- trade, after all, could be balanced at zero if quotas were carried to the extreme. He therefore questioned the quota agreement and said:

Whatever the intention, the arrangements initiated under the Kampala Agreement had some restrictive and cost-raising effects. (Hazlewood, 1967, op.cit., p. 99)

Robson mentions that the quota arrangements do not seem to have been intended to reduce regional trade or promote national self-sufficiency. The Kampala Agreement states that

. . . this quota system was not intended to be a permanent feature of the East African Common Market (Kampala Agreement documents, reprinted in Rothchild (ed), op.cit., p. 227)

Moreover, a Committee consisting of the Ministers for Commerce and Industry of all three countries was to be created to administer the quota system. Quotas could only be imposed with the approval of this Ministerial Committee, and only

. . . by any East African country which was in aggregate imbalance in its visible trade with another East African country on any particular product line in which its trade with that country was in deficit, provided that firm could operate on an economically viable basis or expand its operations within the national market. (Ibid, p. 228).

Therefore, it does seem to have been the intention that quotas would be applied only to a limited range of products which Tanzania and/or Uganda had the market and manufacturing capacity to produce themselves and thus develop their own industrial base. Products which were dependent on the size of the regional market were to remain free of quota restrictions. (Robson, op.cit., pp. 150-151)

Although the first of the five recommendations was implemented and the production of cigarettes, shoes, cement, and beer was decentralized from Kenya and increased in Tanzania and Uganda, the Kampala Agreement was a failure. By the middle of 1965, it was clear that it wasn't operating and the whole future of the East African region was in doubt. Under the final terms of the Kampala Agreement approved in January 1965, only six items -- beer, paint, inexpensive shirts, wheat flour, galvanized iron, and exercise books -- were subject to quota restrictions, and quotas were put into effect immediately by Tanzania and -- in most cases -- Uganda. However, as Tanzania's trade deficit rose to £9.2m in fiscal 1965, she became increasingly impatient with the breakdown of the Kampala Agreement and took more drastic measures. In spite of the agreement to act on quotas only in concert with the other member states, on August 11, 1965, President Nyerere announced that Tanzania was unilaterally imposing restrictions affecting £2m worth of imports from Kenya. These restrictions and quotas were further extended unilaterally in subsequent months and 18 items were added to the quota list in December 1966 -- actions which were "well outside what was contemplated in the

Kampala Agreement." (Ibid, p. 151)

The breakdown of the Kampala Agreement paralleled a general culmination of divisive events in East Africa. Kenya -- which gained very little from the Kampala Agreement -- was somewhat hesitant about the terms of the agreement, but went along -- Robson says -- on the understanding that the common currency would continue as well as the common market and common services. (Ibid, p. 151) On February 12th, 1965, however -- just after the Mbale meeting which approved the final version of the Kampala Agreement -- Tanzania indicated at a joint meeting of the three Finance Ministers and an International Monetary Fund Mission (to advise East Africa on how best to proceed in establishing an effective central banking system) that she was going to establish her own central bank and issue her own currency. After this announcement, Kenya no longer felt committed to the Agreement and did not officially ratify it. The main effect of Kenya's subsequent actions was felt in the industrial allocation agreement. Although the manufacture of Raleigh bicycles in Uganda was announced and Phillips Industries reached an agreement to build radios in Tanzania, the remainder of the allocation system broke down. (Rothchild, 1968c, op.cit., pp. 124-125) As Robson says:

During 1965, when confronted with offers from investors to establish in Kenya industries which were allocated to other countries under the Agreement, her response apparently was to fail to take steps to schedule allocated industries as had been envisaged under the Agreement. This inaction had the effect of rendering these provisions inoperative and postponing the commencement of these industries in Tanzania.

The failure of the industry sharing agreements gave rise to much bitterness in Tanzania and seems to have been the factor above all responsible for her resort to large-scale import restrictions against Kenya.⁶⁸⁾ (Robson, op.cit., p. 152)

Caught in a vicious circle, Kenya reacted equally bitterly to Tanzania's unilateral trade restrictions on its products⁶⁹⁾ and questioned the financial contribution it was making to the Distributable Pool for fiscal compensation and the worth of remaining in the common market. As Rothchild put it,

In brief, the Kampala Agreement was fully satisfactory to no country.⁷⁰⁾ (Rothchild, 1968c, op.cit., p. 125)

In actual fact, the quotas and restrictions which Tanzania -- and to a lesser

68) For a good example of the bitterness in both Tanzania and Uganda, see the EACSO Central Legislative Assembly Debates reprinted in Rothchild (ed), op.cit., pp. 242-244.

69) For good examples of this, see a newspaper editorial and EACSO Central Legislative Assembly Debates reprinted in Rothchild (ed), op.cit., pp. 238-242.

70) In a speech previously referred to, Tom Mboya said that the industrial allocation agreement failed "because first feasibility studies were not conducted before the allocation of industries, second the industries were not broadly enough defined to attract investment, and third the attempt to allocate industry did not in and of itself provide an inducement for private industry to comply with the proposed

extent, Uganda -- imposed under the Kampala Agreement did not reduce their trade deficits with Kenya. Indeed, had Tanzania's restrictions been fully implemented, the result would have been to replace imports from Kenya by imports from the rest of the world since she simply did not have the additional productive capacity. Some diversions of this nature did occur, but on the whole the restrictions were flexibly applied and only a few major Kenyan goods were seriously affected in 1966. The total value of Kenyan exports to Tanzania did decline by 6% -- £800,000 -- in 1966, but there was also an offsetting decline in Tanzania's exports to Kenya of about £750,000 and so the trade deficit was only reduced by an insignificant £50,000. Uganda's own exports to Kenya declined by an even greater amount, so that Kenya's regional trade surplus actually increased! With these offsetting effects, the principal effect of Tanzanian restrictions was to reduce trade in both directions -- and is likely to have raised costs and lowered efficiency. (Robson, op.cit., pp. 152-153; OECD, op.cit., p. 56). Perhaps more importantly, as Green and Krishna state:

In practice, the Kampala Agreement quotas . . . have not prevented widening trade imbalances, but they have both struck at the basic nature of the common market and led -- for complex reasons -- to a serious erosion in business community as well as official confidence in the existence of mutual good faith and dominant joint economic interests. (Green & Krishna, op.cit., pp. 67-68)

The issue of separate national currencies and central banks in East Africa remains to be discussed briefly. From 1919, when the East African Currency Board was established in order to separate local currency from the standard of the Indian rupee -- in circulation in East Africa at the time -- and to establish a fixed conversion rate with the British Pound Sterling, to 1966, when separate national central banks were established, a common currency was in use in East Africa. In 1936, Zanzibar joined the Currency Area and the East African Shilling was introduced as legal tender to take the place of the currency previously used. Although the Board was in initial financial difficulties, its position began to steadily improve in 1932 and by 1950 its assets slightly exceeded its net currency liability, and in 1952 it made its first profit distribution to the member territories. (Delupis, op.cit., p. 52; Blumenthal Report; reprinted in Rothchild (ed), op.cit., pp. 284-286)

In 1952, the eventual desirability of a Central Bank for East Africa was first discussed in an analysis by W. T. Newlyn.⁷¹⁾ Prior to independence, steps

⁷⁰⁾pattern. The operation of the quota procedure encountered a number of implementation difficulties of which you are all aware." (Rothchild (ed), op.cit., p.245)

⁷¹⁾Later published in 1954, Money and Banking in British Colonial Africa by Newlyn and Rowan.

to establish a regional central bank were hindered by the Africans' fear that such an institution would be dominated by white settlers, and also by the fear in Tanganyika and Uganda that such a unitary banking system -- almost certainly to be based in Nairobi -- would work once again to Kenya's advantage. Even after independence was gained, the primary issue was still the degree of centralization which should be built into a central banking system, particularly when the possibilities of full political federation were decreasing --

The problem in determining the structure of an East African Central Bank was that of deciding how centralized a structure should be established, and to devise a system which would work in the absence of a common government in East Africa. (Hazlewood, 1967, op.cit., p. 104)

A compromise solution was proposed by W. T. Newlyn which envisaged the creation of an East African Reserve Board and three central banks with common reserves but separate currencies, but it failed to gain support. In 1962, Tanganyika commissioned Mr. Erwin Blumenthal, a German Banker, to report on the monetary arrangements then existing and the desirability of a regional or national central banking system for Tanganyika. The "Blumenthal Report,"⁷²⁾ published in 1963, recommended a strongly centralized system in which effective power rested with a regional Central Bank and advised against an independent Tanganyikan Central Bank and currency.⁷³⁾ In 1964, the three member states decided to ask the assistance of the International Monetary Fund in resolving the issue and a team of experts led by Mr. J.V. Mladek arrived early in 1965. It was at a meeting with this IMF mission on February 12th that Tanzania indicated its intention to establish its own central bank and currency. The formal announcement of this intention did not occur, however, until June 10th, 1965, when the Finance Ministers of all three member states simultaneously mentioned in their budget speeches that separate central banks would be established and separate national currencies would be issued in each country. In 1966, national currency notes and coins were issued and gradually began to replace the former East African money, which was valid up to April 1, 1969. The East African Currency Board -- which was to be dismantled -- existed until 1969 as it gradually wound up its affairs. (Robson, op.cit., pp. 116-117; Delupis, op.cit., pp. 53-54; Hazlewood, 1967, op.cit., p. 105)

Both Kenya and Uganda criticized Tanzania for the break-up of the common

⁷²⁾Erwin Blumenthal, Tanganyika - East Africa: The Present Monetary System and its Future, Government Printer, Dar es Salaam, 1963; parts of it are reprinted in Rothchild (ed), op.cit., pp. 284-290.

⁷³⁾His recommendation was actually for a two-tier system with a regional Central Bank and separate State banks. However, the powers to be given to the Central Bank made the system highly centralized. See Robson, op.cit., pp. 116-117.

currency,⁷⁴⁾ but Tanzania contended that she had only intended to stay within a monetary union which was encompassed in a full political federation, and that a monetary union was, indeed, feasible only within such a political union. In his August 10, 1965, address to the EAGSSO Central Legislative Assembly, President Nyerere said:

. . . our decision in 1961 to remain within the common currency area was based on a false premise -- the expectation that control would be able to be exercised on a federal basis when the other two territories became in their turn, independent. (reprinted in Rothchild (ed), op.cit. p. 234)

In response to accusations that Tanzania had deliberately attempted to wreck the East African common currency system, the Tanzanian Minister of Finance, Mr. Paul Bwani, said:

From the beginning of our discussions on the central banking question, it has been clearly evident that the creation of an effective central banking system and the continuance of a common currency was dependent upon the establishment of a political union. (Ibid, p. 295)

Tanzania's position on this issue was, in fact, backed up by the East African Currency Board itself: In its Report for the Year ended 30th June, 1965, it states the following:

Some of the proposals put forward in recent years for maintaining the currency union under a central banking system reflect an emotional attitude rather than a reasoned appraisal of what can be made to work. It has still to be proved that a central bank properly functioning as such and serving two or more independent states could exist for long without an effective political union. It would certainly not do so unless there were at least a wide-ranging harmony in financial attitudes which could be translated into a coherent policy in the monetary field. (Ibid, p. 296)

This "wide-ranging harmony in financial attitudes" among the three member states, however, did not exist.⁷⁵⁾ Each country wanted to reserve the benefits which resulted from a common regional currency but did not want to share sovereignty over policy matters which affected -- and limited -- national economic policies and ambitions. The disadvantage in the past operations of the Currency Board and the potential operations of a centralized regional banking system was its alleged inflexibility, its unresponsiveness to the urgent development needs of the member states -- or, as Nye put it, "the price they paid for it was a rigid monetary policy." (Nye, op.cit., p. 131) Prior to 1955, the requirement of having 100%

⁷⁴⁾ See Rothchild (ed), op.cit., pp. 292-295 for examples.

⁷⁵⁾ Uganda's Minister for Finance, in his announcement of the establishment of a Ugandan Central Bank said: "It became clear in the course of the joint discussions that there were fundamental differences in our respective concepts of a workable central banking system for East Africa." (Rothchild, ed., op. cit., p. 292.)

external reserve holdings -- which made deficit financing impossible -- did restrict development according to Hazlewood.⁷⁶⁾ After 1955, however, this requirement was relaxed and the Currency Board did begin to take on more of the functions of a central bank.⁷⁷⁾ In 1960, the Board was transferred from London to Nairobi and representatives from the member countries were appointed to it. It is from this date that the Board itself marks a functional change:

The Board's policy since 1960, when it became a representative currency institution, has been to create and expand central banking facilities and techniques within the framework of the existing monetary system as a step towards a full-scale central bank for East Africa. (Rothchild, (ed), op. cit., p. 296)

Some of the steps taken were as follows: a fiduciary issue⁷⁸⁾ which had risen to £23m by 1963; lending for crop financing which rose to £10m in 1962; the commencement of banking activities to other banks; and the extension of a network of currency sub-centers in the region to improve the money supply. (Hazlewood, 1967, op.cit., p. 102; Blumenthal Report, Rothchild (ed), op.cit., p. 286)

But these efforts were not enough for Tanzania. Ideologically, Tanzania had accepted the socialistic premise that a rigorously planned economy was the best -- perhaps even the only -- way to develop. Therefore, in order to develop, it was necessary to be able to control the instruments of economic planning. Sharing this control with the more laissez-faire oriented Kenya was unworkable. President Nyerere addressed the EACSO Central Legislative Assembly as follows in August 1965:

One thing which all of us agree about is that our poverty can only be overcome by economic planning. We must therefore be in a position where there is either one federal development plan, or where each of the separate states have the power, as well as the responsibility, to make and implement a national development plan.

It was this need which caused Tanzania to take the lead in calling for the establishment of separate national currencies. We found that it is impossible to control our economy and achieve the maximum development while our currency and credit was outside our control. (Rothchild (ed), op.cit., p. 234)

Hazlewood essentially agrees with this argument:

With the formation of a federal government, Tanzania would have hopes of a vigorous development policy for East Africa as a whole, with the equalizing allocations of finance and investment which are possible in a federation. The Tanzanian Finance Minister was essentially right to argue that, with the failure of federation talks, Tanzania had to look to her

⁷⁶⁾Robson claims that the Currency Board system operated more flexibly than the literal interpretation of this requirement would indicate. (Robson, op.cit., p.115)

⁷⁷⁾The currency board was only -- by definition -- supposed to issue and redeem currency on demand against Sterling.

⁷⁸⁾An issue of money without gold or Sterling reserves to back it up.

own development policies. And it was natural enough to find that those policies were inhibited by the interterritorial arrangements. The interterritorial arrangements in East Africa were more or less satisfactory in "the era of colonialism;" they are quite unsatisfactory for "the era of development." (Hazlewood, 1967, op.cit., p. 111)

In any case, the break-up of the common monetary system did not affect the common market that much. According to the agreement reached among the three partner states, the three separate currencies remained freely convertible with each other and at a par value with the East African money they replaced. As long as these arrangements are maintained, the adverse affects on trade and foreign investment in the region should not be significant.⁷⁹⁾ If the three countries were also to combine their reserves to adjust to different seasonal demands for credit in the partner states, Robson says that a high degree of de facto monetary integration would still exist. (Robson, op.cit., pp. 117-118; see also Green and Krishna, op.cit., p. 35) There is, one qualification to this optimistic assessment which is pointed out by many authors, however. The freedom of action which Tanzania gained to expand credit would still be restricted by the monetary policies of the other two states. Should an expansionist monetary policy lead to price increases or to a deterioration of reserves in one country relative to the others, there would likely be a flight of capital and losses of foreign exchange, given free trade and no exchange controls. There is the danger, then, that the more expansionist country would go its own way and introduce monetary restrictions which would endanger the whole regional scheme.⁸⁰⁾ (Robson, op.cit. p. 118; Green and Krishna, op.cit., p. 35; Hazlewood, 1967, op.cit., p. 108)

Prior to the mid-1965 monetary crises, a number of other ominous signs for the future of East African regionalism had appeared. On February 15, 1963, Uganda announced its intention to withdraw from the East African Tourist Travel Association on the grounds that she had not received a fair return on her investment in it and to establish a national department to deal with tourism. On November 30, 1965, the regional organization officially died and all three governments established their own tourist agencies. Green and Krishna commented that:

⁷⁹⁾At present, there are currency restrictions against taking national currency outside of the country in all three partner states. The effects of this development are not able to be discussed by the author at this time.

⁸⁰⁾Moreover, as Hazlewood points out, expansionist monetary policies are no quick or easy way to development. Thier success largely depends on an underutilized capacity for production -- a condition which is not generally present in Tanzania. (Hazlewood, 1967, op.cit., p. 112)

. . . the tourist promotion break-up seems likely to be a serious handicap to the value of the East African economic community in promoting development. Although the existing board was limited in function, its expansion both in promotion and facilities and tour coordination could have been of substantial value to each territory and to East Africa as a whole as opposed to smaller duplicatory, competitive national operations. (Green and Krishna, op.cit., pp. 34-35) 81)

The University of East Africa has undergone a similar evolutionary process. The structure of the university, as envisaged in 1963, incorporated the regional benefits from specialization with colleges at Makerere, Nairobi, and Dar es Salaam specializing in medicine, engineering, and law respectively, with the realization that basic arts and sciences faculties should be developed at all three colleges. Since both Nairobi and Dar es Salaam colleges were almost brand new and far behind Makerere, it was also the intention -- at least in Kenya and Tanzania -- that the university should concentrate most of its resources in the Nairobi and Dar es Salaam colleges to achieve a rough parity among all three in basic arts and sciences faculties. The Ugandans, however, did not see why Makerere should mark time and wait for Nairobi and Dar es Salaam to catch up. As a member of the Ugandan National Assembly said in 1965:

But what we want is that we are in a position to develop Makerere to even a higher status and we are not going to wait until Dar es Salaam or Nairobi, which just started three or four years back, comes to the status of Makerere (Reprinted in Rothchild (ed), op.cit., p. 283)

Uganda's hostile attitude was reinforced, moreover, by the fact that both Dar es Salaam and Nairobi colleges had established their own medical schools (and Nairobi a law school as well), which they justified by claiming that Makerere would not have sufficient capacity to accommodate the larger number of students graduating from secondary school in the post-independence era. It appears that the Minister for Education of Uganda made the initial proposal to establish each of the three colleges as independent universities in March of 1965. The matter went from there to the Heads of State, and in August 1970 the three colleges did become independent universities. (See Documents reprinted in Rothchild (ed), op. cit. pp. 278-283; also Delupis, op.cit., pp. 112-114)

There were disturbing political incidents as well. In May of 1965, a shipment of arms was seized by the Kenya police as it was allegedly on its way from Tanzania to Uganda. Kenya made the accusation that the arms were actually intended for the disaffected Luo people in the Lake Victoria area to use in a tribal, Communist-supported coup against the Kenyatta administration. In this strained atmosphere, the EACSO Central Legislative Assembly postponed their scheduled

81) See Rothchild (ed), op.cit., pp. 267-278 for further discussion of this development. (Also, see Delupis, op.cit., p. 123 for further details of the Association.

meeting and this was another incident which reinforced Kenya's decision to delay the ratification of the Kampala Agreement. Although the crisis eased and the arms shipment was released to Uganda, a kind of cold war existed in the region with Tanzania -- and to a lesser extent, Uganda -- regarding Kenya as having sold out to capitalism in the United States and Britain, while it appeared to Kenya that Tanzania had become a hotbed of Chinese Communism. In April of 1966, President Kenyatta once again accused two Tanzanian Ministers of plotting with the left-wing opposition in Kenya -- centering around former Vice-President Oginga Odinga -- to overthrow him. (Franck, op.cit., pp. 6-7) The Arusha Declaration -- a Tanzanian declaration of socialism and self-reliance -- and the nationalization of Tanzanian banks in 1967 furthered the ideological differences. Once again it was President Nyerere who astutely commented on the differences that were dividing the region and their effect:

The trouble is, of course, that each difficulty of this kind uses up our stock of emotional unity. Kenya clearly feels extremely bitter about Tanzania's pressure to restrict the freedom of entry into the Tanzanian market. Tanzania, on her side, feels that if East Africa does not federate, there must be some effort to accept the inevitable consequences of such a failure. Similarly, Tanzania feels let down by what she regards as a weakening of the airline which the three countries own in equal proportions, while Kenya feels that we have failed to appreciate her needs in relation to this Pan-American proposal.⁸²⁾

Unfortunately, once this sort of resentment begins to be felt, there are plenty of people only too anxious to emphasize the differences and difficulties between us, and exaggerate them until they become suspicions and hostility. . . . Who has not heard the suggestion that Tanzania is under Chinese influence,⁸³⁾ or that Kenya is under American? (Uganda so far appears to have escaped these allegations, doubtless on the principle of dealing with one thing at a time!) There are suggestions made to Kenya that Tanzania is preparing to replace imports from her by imports from China; there are suggestions being made to Tanzania that Kenya is deliberately worsening Tanzania's non-aligned image overseas so as to gain an economic advantage. In isolation these suggestions would be dismissed out of hand; but when our real problems give rise to friction and misunderstanding, would it not be natural that eventually we should each begin to wonder whether they have some basis? (Rothchild, ed., op.cit., p. 233).

⁸²⁾ See Rothchild (ed), op.cit., pp. 283-284 for a further explanation of this dispute from the Tanzanian point of view.

⁸³⁾ After white-ruled Southern Rhodesia illegally declared its independence in late 1965, a railroad between the port of Dar es Salaam and land-locked Zambia became one of Tanzania's top priorities. After the World Bank, the United States and others had turned down the project on the grounds that it was uneconomical, the Chinese agreed to build the railroad, thus increasing their political and economic influence in Tanzania and Zambia. Construction of the railway is under way at present, but both Presidents Nyerere and Kaunda (Zambia) vigorously deny that they have been "taken over" by the Chinese.

At the same time that the divisive forces mentioned above were operating in East Africa, however, a new initiative to promote regional cooperation was beginning. In June of 1965 -- just after the announcements of intention to establish separate national central banks and currencies -- Kenya called for a general review of the Common Services agreement and discussions on all aspects of regional cooperation. Since everyone was dissatisfied with the status quo, the three Heads of State met in Mombasa in August that same year and decided to appoint a joint Commission under an independent chairman to undertake this comprehensive review. In September, Professor Kjeld Philip, former Danish Minister of Trade and Finance, was appointed chairman of an East African Commission with the following terms of reference:

To examine existing arrangements in East Africa for cooperation between Kenya, Tanzania and Uganda on matters of mutual interest, and having due regard to the views of the respective Governments, to make agreed recommendations on the following matters:

- (a) How the East African Common Market can be maintained and strengthened and the principles on which, and the manner in which, the Common Market can in future be controlled and regulated.
- (b) The arrangements necessary for effective operation of the Common Market consequential upon the establishment of separate currencies.
- (c) The extent to which services at present maintained in common between the three countries can be continued, and the form which such services should take.
- (d) The extent to which (if at all) new services can be provided in common between the three countries, and the form which such services should take.
- (e) The manner in which the common services should be financed.
- (f) The extent to which the management of different services can be located in different parts of East Africa.
- (g) The legal, administrative and constitutional arrangements most likely to promote effective cooperation between the East African countries in the light of the recommendations made under paragraphs (a), (b), (c), (d), (e), (f). (Robson, op.cit., pp. 153-154.)

The Philip Commission -- as it became known -- consisted of the chairman and three ministers from each of the partner states, and was assisted by a large team of advisors. It began its work in January of 1966 and reported to the three governments in May that same year. This report served as the basis for discussions among the three Heads of State which resulted in the Treaty for East African Cooperation which was signed by them in Kampala on June 6, 1967 and went into effect on December 1, 1967.

The Treaty establishes an East African Economic Community with an East

African Common Market as an integral part of it, thus giving the common market an official legal basis for the first time. The aims of the Community are mentioned right away in Article 2 of the Treaty:

It shall be the aim of the Community to strengthen and regulate the industrial, commercial, and other relations of the Partner States to the end that there shall be accelerated, harmonious and balanced development and sustained expansion of economic activities the benefits whereof shall be equitably shared. (The Treaty for East African Cooperation, reprinted in Rothchild (ed), op.cit., p. 304)

Specific aims, such as the establishment and maintenance of a common customs and excise tariff, are subsequently listed.

Organizationally, the supreme executive authority in the Community remains the three Heads of State, who now constitute the East African Authority. The Authority is to be assisted by three East African Ministers (with Deputy Ministers to assist them), one appointed from each Partner State. These Ministers will be of cabinet rank in their own governments but will be allowed to have no other national portfolio or responsibility, thus (hopefully) avoiding conflicts between national and East African interests and loyalties. Ministerial functions are performed by individual ministers rather than committees because of the past experience with ministerial committees which were unable to provide swift and efficient policy decisions to the common services. Accordingly, although the Treaty makes no mention of this, three Secretariats have been established -- one for each of the East African Ministers -- in the following fields: Common Market and Economic Affairs; Communications and Research; and Finance and Administration. The Ministers are thus supposed to work in cooperation and consultation with the Authority and the concerned national ministers in administering the affairs of the Community. (Delupis, op.cit., pp. 56 & 60-61; OECD, op.cit., p. 57)⁸⁴⁾

Also assisting the Authority are five Councils which are each composed of the three East African Ministers plus a varying number of national ministers. According to the Treaty, the Common Market Council's principal function is to ensure the proper development of the common market and to settle problems arising from the implementation of the Treaty sections dealing with it. It can make recommendations on a wide range of subjects dealing with the Community such as its economic relations with outside bodies, but it has no binding force for its views except if it is dealing with an alleged breach of the Treaty when it may issue a "binding directive" to a Partner State or States. The Communications Council receives and considers information from the Boards of the Community Corporations

⁸⁴⁾Also see Robson, op.cit., pp. 154-155; and Hazlewood, 1967, op.cit., pp. 394-395. Although these other sources make contributions to the following discussion, Delupis is the primary reference.

(the former self-contained services plus East African Airways) and also must approve any development plans or loan programs associated with them. This Council also considers and approves, in principle, any legislative proposals submitted by the Boards. The Finance Council functions mainly by consultation on major financial affairs of the Community, but may also consider and approve (or disapprove) major financial decisions relating to Community services. The Economic Consultative and Planning Council is a purely advisory body. It assists national planning in the Partner States and advises the Authority on long-term planning of the common services. The Research and Social Council is also advisory only, and it assists in coordinating the research and social policies of each of the Partner States and the Community.⁸⁵⁾ (Delupis, op.cit., pp. 61-63)

The East African Legislative Assembly was reconstituted to consist of the three East African Ministers and Deputy Ministers, nine members appointed⁸⁶⁾ from each of the Partner States, and a Chairman of the Assembly, Counsel to the Community, and the Secretary-General -- the principal administrative officer -- of the Community. As before, the Assembly passes Community legislative bills which must, however, be assented to by all three Heads of State before they become Acts of law. If the unanimous assent of the Authority is not received within nine months of the date of Assembly passage, the bill lapses.⁸⁷⁾ The Assembly also studies, debates, and approves policy statements, public accounts, expenditure and revenue estimates, and other matters of East African interest for Community bodies. The listed subjects on which the Assembly can legislate are not much different from those previously listed for the EACSO or High Commission. A great deal of legislative latitude is actually given to the Assembly as in item seven it is authorized to confer upon itself new measures not mentioned in the Treaty, and item 27 includes "any matter, not mentioned elsewhere" which is related to the Community. (Ibid., pp. 59-60 & 67-72)

The Authority also may exercise a legislative function. By simple "orders" or "decisions" the three Heads of State can amend the Treaty Annexes which deal with such things as the common services which the Community is to perform. The

85) The actual role which these Councils play in the operation of the Community is somewhat murky. Most of the administrative and policy-making functions seem to be carried out in the three Secretariats referred to above, and how these Councils relate to the Secretariats and the East African Ministers is unclear. The Councils are, however, definitely subject to the control of the Authority.

86) "It would be normal for any legislature to have some members directly elected by the people. But at the time when the new Treaty for East African Cooperation was drafted, it was felt that such a change in relation to (some) Assembly members would, in fact, convert the organization into a quasi-federal structure." (Delupis, op.cit., p. 60)

87) "In some cases, the Assembly cannot even proceed on a Bill without the previous express permission of the Authority." (Delupis, op.cit., p. 68)

Authority may also appoint "Commissioners" to "edit" Community laws which includes omitting, revising, or amending them. As far as revising the Treaty itself, this may be done at any time with the agreement of all the Partner States. No mention is made of procedures to be used or if ratification is necessary. The Treaty allows for considerable delegation of powers -- both in executive and legislative functions -- from the Authority to practically any officer within the Community. Legislative "Acts" of the Community automatically are granted legal status in the Partner States as soon as they are published. "Rules" and "Orders" from the Authority have the same immediate effect. Local national laws enacted by the national legislatures could thus be amended or repealed by the three Heads of State, and when the Community came into being they immediately made fundamental changes in the existing laws of the three countries, repealing several laws altogether. National parliaments do have the theoretical power to safeguard the validity of their laws, even if they are in conflict with Community Acts, by including "express provisions" to that effect in them, but in practice this is an almost impossible power to use and Community laws have been supreme. (Ibid, pp. 72-78)

Two new items on the Assembly list which must be mentioned are the Common Market Tribunal and Industrial Licensing in East Africa. Along with the Court of Appeal for East Africa, whose existence was continued with the power to hear appeals from the courts in the Partner States, and the East African Industrial Court, which deals with Community staff matters and labor disputes, the Common Market Tribunal was to be a Community judicial institution. The function of this Tribunal was to

. . . ensure the observance of law and of the terms of this Treaty in the interpretation and application of so much of this Treaty as appertains to the Common Market. (Treaty for East African Cooperation, Rothchild (ed), op.cit., p. 317)

The Tribunal was to be made up of five appointed members, one chosen by each of the Partner States, the Chairman chosen by the Authority, and the last member chosen in turn by the Chairman. The Tribunal was intended to take over complaints which could not be settled by the Common Market Council, but could also deliver Advisory Opinions to the Council on questions of law which arose out of the Treaty provisions affecting the Common Market. One question left unanswered in the Treaty was what law and precedents the Tribunal was to apply. Only the Partner States were to implement its decisions and judgments with no mention of any sanctions to ensure such implementation. In any event, a discussion of the structure and procedures of this Tribunal is academic -- the Common Market Tribunal has not yet come into existence⁸⁸⁾ because it has allegedly been impossible to appoint a qualified

⁸⁸⁾ This was the information from the most current reference available. However, there is now a Common Market Tribunal listed under the Nairobi headquarters of the Community.

Chairman. So far, the Common Market Council has had to deal with all complaints of Treaty violations regarding the Common Market. This Council may issue a "binding decision," make a recommendation, abandon or otherwise dispose of, or record its own disagreement on any complaint. Partner States which feel aggrieved by the outcome of the Council's actions may bring the matter to the Tribunal if and when it is established. Although the proceedings of the Common Market Council are secret, Delupis deduces that complaints regarding the operation of the transfer tax have been brought before it and that action has been taken. (Delupis, op. cit., pp. 64-65 & 92-94)

The industrial licensing system under the East African Industrial Council was continued by the Treaty at least until 1973. The Industrial Council may issue licenses, however, only for the manufacture of cotton yarn, cotton and woolen blankets, steel drums, all kinds of glassware, metal window frames, and enamel holloware. In making its licensing decisions, the Council must consider the capital, technical skill, and raw material involved; the industry location with respect to fuel, labor, transport, etc.; the potential production and demand for the product inside and outside East Africa; the interests of labor and consumers; and, finally, general industrial promotion and development and the avoidance of harmful competition. (Ibid, pp. 90-92)

The Treaty common market arrangements include a common customs tariff for all foreign goods imported into East Africa. Exceptions to this rule are allowed only if all three Finance Ministers agree to them. Likewise, a common excise tariff was to be established. For revenue purposes, exceptions could again be made after consultations among the Finance Ministers. Freedom of transit between the three countries was guaranteed. For goods entering one partner state but destined for another, the duties collected would be paid to the consuming state. Apart from the transfer tax there were to be no internal tariffs, and no quantitative restrictions, on East African products. Exceptions to the latter rule, however, were to be allowed for goods covered by special obligations, certain agricultural goods, and goods affecting such things as national security or the protection of animal and plant health, or in cases where a balance of payments difficulty was encountered. (OECD, op.cit., p. 57; Delupis, op.cit., pp. 80-83)

The Treaty's "Measures to Promote Balanced Industrial Development" include common fiscal incentives towards industrial development in the region, the transfer tax system, and the East African Development Bank -- the heart of the Treaty, however, is the transfer tax system.⁸⁹⁾ A transfer tax may be imposed by any

⁸⁹⁾"The transfer tax is a euphemistic term for the imposition of limited inter-country tariffs." (Robson, op.cit., p. 157)

country which has a trade deficit in its total trade in manufactured goods with either or both of the other two, on manufactured goods produced in those countries. The value of the goods taxed, however, cannot exceed the amount of the trade deficit with the producing country, and once a country comes into an 80% balance of its total trade in manufactured goods, it loses the right to impose new transfer taxes (although existing ones continue in force). Moreover, the tax can only be imposed on goods which the importing country is itself manufacturing, or can reasonably be expected to begin doing so within three months, and the home industry being thus protected must have a productive capacity of at least 15% of the total domestic consumption in that country or of a value of 100,000 per year -- whichever is less. The maximum rate of the transfer tax is 50% of the customs duties which would be imposed on those goods coming from outside East Africa. Transfer taxes cannot last longer than eight years, and all are to be revoked 15 years after the Treaty has come into force when industrial imbalances are expected to have been redressed. A reappraisal of the transfer tax machinery is to take place after the first five years of its operation.

If there is a significant deviation of trade in the taxed goods to countries outside East Africa, the tax imposing country must take immediate measures to counteract the deviation. Furthermore, if this tax-imposing country's own protected industry is able to export 30% of its annual production to the other two countries, the transfer tax must be abolished. The Customs and Excise Department -- based in Mombasa -- is in charge of the collection of the transfer tax under the Treaty. Precisely how the system should be administered was not specified in the Treaty, but the tax is probably collected from the importer on the basis of a transfer form which is necessary for the shipment of goods from one Partner State to another. (Delupis, op.cit., pp. 83-84; Robson, op.cit., p. 157)

In an analysis of the effects of the transfer tax, Robson says that on the basis of the 1966 patterns of trade that Tanzania could have imposed transfer taxes on £9.8m of Kenyan imports and £2.1m of Ugandan imports; that Uganda could have imposed transfer taxes on £7.4m of Kenyan imports and none against Tanzania; and that Kenya, of course, could not impose transfer taxes at all. The actual amount of trade taxed, however, would have been much smaller because of the production capacity requirement. Robson believes that this mechanism will lead to some expansion in Tanzania and Uganda of some of the protected industries, but is likely to be most useful in encouraging new product lines there. This system does reduce some of the potential benefits from a common market and disadvantages such as increased production costs and decreased total intra-regional trade will occur, but these are relatively minor compared to the effects of quota restrictions. Clearly, he says, the transfer tax is intended only for those industries where additional plants can operate profitably in the national markets of the deficit

countries, and where the protection offered is only temporary, -- they cannot be imposed on industries which depend on the regional market. Therefore, he concludes,

In short, although the treaty permits a moderate interference with the common market in relation to small-scale industries . . . the framework of the treaty does appear to provide a good basis for the continued exploitation of many of the gains from integration. (Robson, op.cit., p. 159)

But what of the positive gains to Tanzania and Uganda from the transfer-tax? Here, Robson is more pessimistic:

As noted already, the transfer tax should have a favourable effect on industrial development in Tanzania and Uganda. It is difficult to assess the extent of its impact; nevertheless, . . . its effect is not likely to be large. The imposition of the tax may also make it possible to increase tax revenues in the less developed partner states It may even be that the imposition of the transfer tax will cause price reductions in some Kenya products imported by the other countries. . . . But any gains derived in these ways are solely gains in relation to the working of the existing common market. . . . Looking at the common market aspect of the new community alone, Tanzania and Uganda can only be said to benefit in a relevant sense if they attract more capital and industry than if they were outside the common market. This is partly bound up with the possibility of their attracting a share of large-scale industry made possible by the existence of the common market.

It may be argued that the immunity of industry from the imposition of the transfer tax in deficit countries will in fact provide an incentive for some new large-scale industry to locate in these areas. This conclusion must be regarded as very doubtful. To be sure, where such an industry is set up in Tanzania, it is virtually assured that no transfer tax will be imposed on its product in Kenya or Uganda. But as soon as market growth makes a second plant profitable, a competing plant will most probably be put into operation in Kenya, and on a scale to serve the Kenya market. Should the industry be located in Kenya in the first place (where a large part of the East African market for manufactures is), it will still be assured of freedom from the transfer tax, at least until such time as a second plant becomes viable in a deficit country as a consequence of the protection afforded by the transfer tax. If these are the alternatives, it is difficult to argue that the transfer tax will significantly affect the location choice for new large-scale industries in East Africa. (Ibid, pp. 160-161)

The other innovation in the Treaty which might conceivably affect industrial location in the region is the East African Development Bank. Its principal objectives are

- (a) to provide financial and technical assistance to promote the industrial development of the Partner States;
- (b) to give priority, in accordance with the operating principles contained in this Charter, to industrial development in the relatively less industrially developed Partner States, thereby endeavouring to reduce the substantial industrial imbalances between them;
- (c) to further the aims of the East African Community by financing, wherever possible, projects designed to make the economies of the Partner States increasingly complementary in the industrial field. (Treaty for East

African Co-operation, Annex VI, Rothchild (ed), op.cit., p. 330

In order to accomplish the second objective, it is to select investment projects⁹⁰⁾ over a five-year period so that 38.75% of its allocated resources go to Tanzania and the same to Uganda, and only 22.5% to Kenya. The "original members" of the Bank are the three Partner States, and their subscription to its authorized stock can never fall below 51% of the total capital stock. The authorized capital for the Bank is \$20m, but the initial subscription was to \$10m, of which the Partner States would provide \$2m each, thus hoping that \$4m would be contributed by other financial institutions from both within and outside the region. In addition to this equity capital, the Bank is authorized to raise loans and to administer external aid funds which are designed to promote the objectives of the Bank. (Robson, op.cit., pp. 161-162; Delupis, op.cit., pp. 87-88)

All powers of the Bank are given to a Board of Directors, each Partner State appointing one "appointed" Director and one Alternate. Other contributors to the Bank's equity capital are entitled to nominate "elected" Directors to the Board. The voting power of any contributor to the Bank -- exercised by an "appointed" or "elected" Director -- is equal to the number of shares of capital stock which it holds. A Director General administers the day-to-day affairs of the Bank under the direction of the Board. Amending the Bank's Charter needs the approval of at least 85% of the total voting power of the Board of Directors, plus the approval of the Authority, but as the Charter is not very detailed so far as organization or operations are concerned, the Bank enjoys a great deal of independence in providing for organs and services not originally mentioned. Accordingly, for administration purposes, the Bank has established a Secretary's Department, Treasury's Department, and an Operations Department. The latter department is divided into an Investment Division which appraises the industrial project applications submitted to the Bank and an Economics Division which is concerned with broader economic questions relating to industrial development in the region. There are a number of limitations placed on the Bank's operations, however. It must confine its initial operations to financing or assisting industrial projects (see footnote 90); its total amount of outstanding loans and guarantees cannot exceed its total of unimpaired reserves and surplus in its ordinary capital resources; in order to guard its investments, loan recipients must repay their loans in the same currency in which the credit was given, and the total amount payable to the Bank in a specific currency cannot exceed the amount payable by the Bank in that same currency; and, finally, the Bank's financing cannot cover the entire financial

90) "Industry is defined to include manufacturing, assembling and processing (including food) but not building, transport or tourism." Robson, op.cit., p. 161

requirements of the project and in no case can the Bank's contribution exceed 49% of its own equity capital. (Delupis, op.cit., pp. 89-90)

The impact that the Bank will have on balanced industrial growth in the region depends on two main factors according to Robson: the extent to which a lack of finance acts as a major constraint to industrial development in East Africa, and the extent to which the establishment of the Bank results in the provision of additional finance and not just the diversion of funds which would otherwise be available to the Partner States separately. In the former case, the extent to which finance is a constraint on industrial development is probably least important in Kenya and most important in Tanzania. External private investment in viable large-scale industries has been readily available and is likely to continue to be, so that the Bank may be redundant if it confines itself only to economically viable projects. On the other hand, external private capital may not flow very freely into socialist Tanzania, even if the project is viable, and the Bank could have an important role here. Initially, however, the gains to either Tanzania or Uganda are limited to the difference between their contribution to the Bank and their financing from it. This could be as low as the difference between 38.75% and 33¹/₃% of the Bank's equity, or £325,000. Of course, this amount would be increased if the Bank is successful in attracting additional capital. Of the hoped-for maximum of £4m, Tanzania and Uganda would be entitled to £1.55m each, and Kenya to £0.9m -- but this £4m would probably include some capital which would have been invested in East Africa anyway. (Robson, op.cit., pp. 162-163)

The self-contained common services of the EACSO undergo important constitutional changes under the Treaty, becoming public statutory corporations like the East African Airways Corporation. Previously under the EACSO, these services were administered on the basis of a direct relationship between management and a Ministerial Committee. This direct Ministerial control proved unsatisfactory because either the Ministerial Committee became overloaded with work or Management was given too much autonomy in making policy decisions. East African Ministers who also had cabinet responsibilities in their own national governments were also unable to develop a truly East African attitude toward the services. Under the Treaty, the self-contained services were established as public corporations and explicitly charged to operate on a commercial basis, paying for their own expenses from their own revenues. Appointed Boards of Directors are responsible for the supervision of the services' management and they function by formulating policies which management follows and by ensuring that their business operations are conducted efficiently.

In making this change to statutory corporations, the Partner States knowingly gave up some of the powers and responsibilities they formerly had with regard to these services. It is felt, however, that adequate control and accountability

is maintained in a number of ways. The Communications Council referred to earlier is one of the most important of these. The membership of this Council -- the three East African Ministers and the three national Ministers responsible for communications -- represents both regional and national interests and ensures a balanced viewpoint. The Council ascertains that corporation policies do not conflict with overall regional interests, that the Boards are carrying out their functions efficiently and accounting for their responsibilities, and that recurrent expenditures do not exceed recurrent revenue. It was expected that close liaison between the Council and the Chairmen and Chief Executive Officers of the Boards would be maintained. Moreover, Annual Reports and Accounts are required from the Corporations to the East African Legislative Assembly as well as a Report on their operations by the Auditor General. The Corporations no longer have to have their revenue and expenditure estimates approved by the Legislative Assembly, however -- a process that had proved to be cumbersome. (Delupis, op.cit., pp. 95-96)

The Railways and Harbours Administration of the EACSO was split up under the treaty into two Corporations, thus making a total of four at present. The Railway Corporation provides all railway and most inland marine transport services in the region, while the Harbours Corporation controls all seaports in East Africa and is the principal transport instrument for long distance import and export traffic.⁹¹⁾ The Railways and Harbours Act, passed in 1950, is still in force for the two Corporations. Under that Act, policies such as that cheap transport should be provided to assist agricultural, mining, and industrial development or that Railways and Harbours should be on a non-profit earning basis with any surplus earned being applied to reduce costs to the public have been continued in the Corporations. The Board of Directors for the East African Railways Corporation consists of eight members -- a Chairman, Director General, and three members appointed by the Authority, and one member appointed by each of the Partner States. The Director General is the executive officer of the Corporation, and he may -- on his own -- establish, operate, or alter Corporation services which do not involve a "major reorganization." Furthermore, he can approve capital expenditures which do not exceed £20,000. Capital expenditures above £20,000 and up to £250,000 must be approved by the Board of Directors, which also must annually report on the operations of the Corporation to the Communications Council. The Board also can make minor alterations to the rates and fares of its services and can submit legislative proposals to the Council for transmission to the Legislative Assembly. The Communications Council approves investments beyond £250,000 and major alterations in

⁹¹⁾ The East African National Shipping Line, established in 1966, is a Community merchant shipping service in which Zambia is also included. See Delupis, op. cit., pp. 117-119.

rates and fares. As in all of these cases, of course, the Authority has the ultimate power. The Board of Directors of the East African Harbours Corporation is appointed the same as for Railways, and its operating rules are also similar to those described above. (Ibid, pp. 100-105)

The East African Posts and Telecommunications Corporation has a monopoly for the provision of postal, telephone, and telegraph services, and is also responsible for the control of radio communications in East Africa. Exceptions are granted, however, under special licenses, for certain bodies such as Police Forces to operate their own specialized telecommunications services. Its Board of Directors is appointed exactly as in the case of Railways and Harbours. The Director General is entitled to authorize capital expenditures up to £5,000 and the full Board from £5,000 to £100,000. Above £100,000, the Communications Council has to approve the expenditure. The Council also gives directions of a general nature to the Board and approves any alterations in service rates and the salaries of employees. The Corporation also owns 66% of the shares of the East African External Telecommunications Co. Ltd. -- the remaining portion being held by Cable and Wireless Ltd. -- which provides external telecommunications services with the rest of the world. The Corporation exercises control as to general policy, tariffs, and international relations over the External Company, and Cable and Wireless Ltd. provides such expert staff as proves necessary.⁹²⁾ (Ibid, pp. 97-100)

The East African Airways Corporation was established in 1946 and became the national airline for the three East African territories. By 1963 it had grown from a domestic carrier to an international airline. In 1965, a Commission under Chairman Mr. Stephen Wheatcroft was appointed by the EACSO to review the constitutional position of the Airways with regard to making it a self-contained service of EACSO. The Commission reported in May of 1965 and recommended that the Airlines should become a self-contained corporation, a recommendation that was also followed for the other self-contained services. EACSO took no further action on the recommendation, but the East African Community Treaty made the Airways a Community institution together with the other Corporations. The Chairman, Director General, and two members of its Board of Directors are appointed by the Authority, and two members are appointed by each of the Partner States. Although this Corporation is also subject to the Authority and the Communications Council, it has a great deal of autonomy in its day-to-day operations. It can make individual capital expenditures on such things as aircraft, aerodromes, supplies, etc. up to £250,000; it can manufacture such items; it can acquire and manage related hotels and restaurants;

⁹²⁾The External Company was established for five years beginning January 1, 1964. The author is not sure if it is still in existence.

and it can enter into agreements concerning air transport services with other countries. For expenditures beyond £250,000, however, approval of the Communications Council is needed. The Corporation must also submit annual reports, five-year development plans regarding estimated traffic-growth, development of air routes, the use and operation of aircraft, and estimates of revenue and expenditures, and a detailed annual program for its operations in the coming year to the Council. The Council also must approve any alterations in air rates. The Authority gives directions of a general nature to the Communications Council and the Board of Directors, and may intervene if there is a dispute between the two bodies. (Ibid, pp. 105-108)

Decentralization is a general policy under the Treaty which has greatly affected the Community Corporations. The East African Railways and Harbours Administration had had its headquarters in Nairobi under the EACSO. When the two services were split, the Railways Corporation retained these regional headquarters in Nairobi, but also established railway headquarters -- with revenue and accounting services -- in the three national capitals. Furthermore, the headquarters for the inland marine services -- which are offered on Lake Victoria and Lake Tanganyika -- have been centrally established at Mwanza (Tanzania) on the southern shore of Lake Victoria. Uganda has been assigned to receive diesel locomotive facilities and carriage and wagon depots. Railway headquarters were retained in Nairobi mainly because a considerable investment had been made in a telecommunications network there which provided for the efficient control and operation of the system. Nairobi is also the center of most of the railway traffic and revenues. The headquarters of the Harbours Corporation, however, have been moved to Dar es Salaam (Tanzania). Mombasa is the largest port in East Africa, and the Chief Port Manager had resided there in the past, but Dar es Salaam was more centrally located with respect to the ports at Tanga (Tanzania) and Mtwara (Tanzania) and was also a capital city. The regional headquarters of the Post and Telecommunications Corporation were also transferred from Nairobi, this time to Kampala. There are national headquarters in all three Partner States, however. It was not administratively practical to move the headquarters of the Airways Corporation from Nairobi, but the Treaty did decentralize some of its operations -- engine overhaul workshops and the maintenance base for some types of aircraft were transferred to Entebbe (Uganda). In order to balance things out, the headquarters of the new East African Development Bank were located in Kampala, and the headquarters of the Community itself were transferred from Nairobi to Arusha (Tanzania). Thus, each country was allocated two headquarters under the Treaty. (Ibid, pp. 99, 102-103, & 105)

These measures were taken to implement the new policy of decentralization which is intended to grant, in particular, Tanzania and Uganda a

greater share in the administration of East African affairs. (Ibid, p.97)

There may be some loss in administrative economies from this policy, Robson says, but the principal gains from regional operations are likely to be preserved. He adds that these changes will result in some redistribution of income in favor of Tanzania and Uganda, but gives no estimate of how much. (Robson, op.cit., pp. 156 & 159)

The Community is to directly administer the following services which are non-self-contained and do not finance themselves: The Secretariat of the Community, including Common Market and legal services; the East African Directorate of Civil Aviation; the East African Meteorological Department; the East African Customs and Excise Department; the East African Income Tax Department; the East African Industrial Council; the East African Literature Bureau; the Auditor-General's Department; the East African Community Service Commission; the East African Legislative Assembly; 12 East African scientific research institutes and organizations; and services for miscellaneous operations such as statistical services, grant or loan administration, and for any body established to facilitate further cooperation between the Member States. Some of these services will be briefly discussed.

The tax-collecting operations of the Income Tax and Customs and Excise Departments had not been entirely satisfactory under the EACSO. A lack of contact between national Ministries of Finance and these regional departments had resulted in misunderstandings and some duplication of work. Furthermore, although income and customs and excise taxes have been traditionally handled in two separate bodies, it is also necessary for a coherent overall tax system that they be well-coordinated. Therefore, the Treaty established an East African Tax Board to

... review the whole tax field, to ensure a smooth cooperation between the services, to advocate synchronization of the tax systems of the three different Governments, and to explore new tax possibilities which do not come under either Department, for example turnover taxes. (Delupis, op.cit., p. 85).

This Board is composed of the two regional Commissioner Generals for Income Tax and Customs and Excise and the three national Commissioners from each Department,⁹³⁾ the three national Ministers of Finance, and a senior Officer from the Community Secretariat. (Ibid, pp. 85-87)

The East African Community Service Commission replaced the EACSO Public Service Commission. Its duties are to make staff appointments and exercise staff disciplinary control for all General Fund services -- the Corporations and Development

⁹³⁾A "Commissioner General" is in charge of the whole department; "Commissioners" are appointed for each Partner State with responsibilities for the operations of the department within that state. See Delupis, op.cit., pp. 86-87.

Bank will handle their own staffing activities. (Ibid, p. 66) The Directorate of Civil Aviation is centralized in Nairobi, which has been designated as the Area Control Centre of the East African Flight Information Region by the International Civil Aviation Organization to serve all three countries through a highly developed communications network with stations in each country. Under the Treaty, however, a Director of Civil Aviation has been appointed in each Partner State to deal with technical civil aviation matters affecting their countries. These Directors are also members of the Civil Aviation Board which licenses air transporters and advises national Ministers on policy matters. (Ibid, pp. 110-111) Meteorology is one of the oldest regional services in East Africa. The department's Telecommunications Centre and Analysis and Forecasting Centre have remained centralized in Nairobi because it would not be economically possible to have such centres in each of the Partner States. Meteorological offices exist in all Partner States, however, and provide data to the Climatological and Central Research Sections of the Department. (Ibid, pp. 111-112)

These directly administered, non-corporate Community services are still financed -- as are all Community expenditures except those from "special funds" -- by a General Fund under the Treaty. Each Partner State contributes to this Fund in proportion to its income tax revenue on companies engaged in finance and industry and to its customs and excise revenue. The contributions, however, are limited to cover approved expenditures and so no unexpended surplus can be built up. The Distributable Pool also continued for awhile, financed in the same way, to be distributed among the Partner States in equal shares. It operated on a reduced scale, however, and went out of operation in June of 1969. (Robson, op.cit., pp. 159-160; Delupis, op.cit., pp. 54-55)

What then can be said of the East African Community and the prospects for regionalism in the future? Robson gives the following assessment:

The Treaty on East African Co-operation is an impressive measure. If it is fully implemented and proves to be durable, it will provide a basis for the continued exploitation of the economic gains from integration, though it does admittedly entail some modest initial departure from a full common market in manufactures. By preserving the main structure of economic co-operation in East Africa, and in some ways extending it, the agreement provides a springboard from which an even closer unit may be fashioned, involving perhaps a full common market and possibly political integration

But all these possibilities depend on an assurance of stability in relation to the market's operations and a determination to make it work on the part of its members. Ultimately this must depend on the extent to which each member is satisfied It is true that Tanzania and Uganda will continue to derive benefits from the redistributive effects of the common services -- as well as benefits from their operating economies, and will enjoy new benefits from their decentralization.

It is also clear that Tanzania and Uganda will get some differential benefit from the operations of the Development Bank, but this seems small compared with the annual fiscal transfers hitherto received by those countries. In relation to the operation of the common market itself, However, Tanzania and Uganda seem to get little out of the new arrangements that they might now have enjoyed independently. Not only does fiscal compensation disappear, but the kind of industrialization which will be fostered by the transfer tax does not need the common market to make it viable. . . .

The problem of ensuring that the lagging countries get a share of the additional industry made possible by the existence of the common market, which takes the form mainly of industries requiring the whole of the market for profitable operation, has not been tackled It seems that the basic problem which has confronted the common market ever since industrialization got under way has not been resolved. . . .

Finally, although this discussion has focused on economic considerations, it cannot be too strongly stressed that East African Cooperation is a matter of politics as well. But, idealism and defence considerations apart, politics is very much concerned with who gets what. (Robson, op.cit., pp. 163-165)

In contrast to this detailed prognosis, Franck presents a more pessimistic and much more metaphorical viewpoint of East African regional prospects which will end this chapter:

But East Africa . . . resembling more those peculiar ex-lovers who, having broken up, still continue to meet and engage in love -- hateful domestic bickerings that end sometimes in sex but never again in marriage. (Franck, op.cit., p. 8)

Appendix II

The Determination of EAAFRO Research Priorities

An Analysis of EAAFRO Priority Activities

In order to be able to judge the balance of the value of EAAFRO's activities among the three countries which make up the East African Community, it is first necessary to describe discrete EAAFRO activities and to weight them in terms of the priorities which EAAFRO places on them. The activity descriptions which are included in this section were obtained both from extensive interviews with EAAFRO research officers as described previously and from written descriptions in the EAAFRO Newsletters and Annual Reports.

The activity portfolio outlined in this section was taken at a specific point in time -- late 1971 and early 1972 -- and so the analysis may suffer from this time constraint -- i.e., it may be charged that the results obtained are valid only for this one point in time and that similar analyses performed for previous portfolios would have led to different conclusions. This, indeed, may be a consideration to keep in mind. Nevertheless, there are several reasons why this time-constrained analysis should not detract too much from the results. First of all, almost all of the major activities of EAAFRO go back in time; only a very few are of recent origin. At the same time, a reading of previous annual reports and Newsletters reveals only one area where EAAFRO activities might have been curtailed just prior to late 1971, and that is in the Animal Production Division, for reasons outlined earlier. Secondly, with the growth of nationalistic pressures upon EAAFRO, they should have been ever more aware and concerned about a balanced portfolio and keeping all three countries satisfied. And, indeed, this author found awareness and concern for this factor to be very high among the EAAFRO administration and research officers. If there is any error in this analysis due to a time constraint, it is likely to favor EAAFRO rather than hurt it.

EAAFRO's activities will be listed and described in terms of experimental research projects and scientific services, as these terms have been distinguished and defined. Although it was found to be impossible to develop national scientific service priorities from the national development plans for comparative purposes, the descriptions are included to give the reader a complete picture of EAAFRO's activities and of what these services -- which will come up in other results -- include.

In terms of ranking EAAFRO's activities, it must be remembered that although this author did the ranking himself, he did so on the basis of criteria which indicated EAAFRO's priorities, and not his own. The principal criteria utilized was the amount of professional manpower time and effort devoted to each activity, coupled with a consideration for the amount of similar past effort that had gone into each activity. One qualification, however, must be noted,

Several EAAFRO activities are largely supported by external aid, and there is a legitimate question if these activities reflect EAAFRO's priorities or those of the donor country or international agency. Since it is impossible to resolve this issue satisfactorily, we shall assume that these aid activities were the result of -- at the very least -- EAAFRO acquiescence after negotiations, and that they do reflect EAAFRO priorities.

An important part of the activity descriptions will focus on the applicability of the results and how local specific the activities are with respect to the sites where they are carried out. One of the most important features of agricultural research -- as relatively opposed to, for example, industrial research -- is that different soil, rainfall, altitude, etc. characteristics can make a good piece of research unutilizable just 5, 50, or 500 miles away! Information on external field sites was obtained directly from EAAFRO research officers during the interviews, and is -- in itself -- an indication of EAAFRO's activity balance among the three Partner States, particularly in those instances where the activity is relatively local specific -- i.e., the results of the activity are applicable only at the specific location where the activity was carried out or at ecologically similar locations. The judgment of this latter attribute will have to be somewhat subjective, and will depend both on information from the EAAFRO interviews and from the author's later interviews with other relevant people and the accumulated knowledge he gained while in East Africa. Applicability, however, depends upon people as well as ecological factors. If the people will not use the results of some research simply because they do not like the color of the food grain, for example, then that research is not applicable.

In terms of being able to relate EAAFRO to national priorities, certain key words or phrases will be underlined at the end of the description. There could be several ways to identify and thus try to relate projects, but the simplest and most valid way in this case seemed to be by the principal crop or crops involved, or -- if that was impossible -- by an ecological or resource descriptor. EAAFRO's activities are then as follows, beginning with research experiments:

Class I -- Highest Priority -- One to three full-time¹⁾ research officers plus extensive supporting staff involved; projects had been going on four years or more.

<u>Project</u>	<u>Division of EAAFRO</u>
I. 1 Sugar Cane Breeding	Sugar Cane Breeding
I. 2 Softwood Tree Breeding	Forestry
I. 3 Sorghum Breeding	Sorghum and Millet

1) "Full-time" means that the officer has only one major project he is working on -- he may have some other, minor activities as well.

ProjectDivision of EAAFR0

I. 4 Maize Breeding

Maize Genetics

I. 5 Virus Disease Survey²⁾

Plant Pathology and Nematology

I. 1. Sugar Cane Breeding The Sugar Cane Breeding Division of EAAFR0 is essentially composed of this one project -- the breeding of new, high-yielding and disease-resistant varieties of sugar cane for East Africa. There are two parts of this project: the crossing of imported with indigenous sugar cane varieties, and the testing and selection of the resultant seedlings for disease resistance.

Indigenous East African varieties of sugar cane have evolved in such a way as to enable them to thrive under East African ecological conditions and resist the diseases which are present, but they are also deficient in sucrose content. Therefore, this breeding project is trying to broaden their genetic base by crossing them with imported varieties of sugar cane that are commercially viable. The seedlings then go through a selection and multiplication process lasting up to eight years, during which time they are selected for attributes such as high yields, high sucrose content, cane millability, fibre content, absence of leaf hairs, etc. The later phases of this selection process for varieties intended for the Lake Victoria area take place at, and in cooperation with, national research stations in the three Partner States (Kibos in Kenya, Kawanda in Uganda, and Kilombelo Valley in Tanzania). EAAFR0 advises and assists in this operation,

One of the specifically important aspects of the lengthy selection process is to ensure that the new sugar cane varieties are resistant to the relevant major diseases present in East Africa. This disease-resistance testing and selection occurs toward the end of the selection process, and is also being carried out on imported varieties of sugar cane which were directly used in the fields without becoming part of the breeding program. In the future, resistance to insect pests may also become part of this testing and selection phase.

An inevitable aspect of the breeding program is experimental work on breeding methods and problems which have occurred during the sugar cane breeding process. An example of such work was the investigation of the relationships between the premature yellowing and death of young sugar cane seedlings and the presence of undecomposed vegetable matter in the compost used. This work is considered a supplemental part of the main program. In the past, some work has also been done on problem solving unrelated to the breeding program. An example of such work was the investigation of the relationships between the water table level and the existence of yellow wilt disease in Tanzania in 1969 and 1970. This problem wasn't really cleared up however, and no more investigations -- or any other unrelated work --

²⁾ There are no priority implications within a class of projects with respect to the order in which they are listed.

were taking place when the interviews took place.

There are three research officers, plus supporting staff, working on this project, all in different places. The head of this division is stationed at the Kenya Coast Agricultural Research Station in Mtwapa, where the breeding program was started in 1966. This is only a temporary site for this project, however, and another officer is working on the establishment of the permanent sugar cane breeding center in Kibaha, Tanzania. The third officer is in charge of the testing and selection process for disease resistance, and he is stationed at the Kawanda National Agricultural Research Station in Uganda where he has his own facilities and supporting staff.

Due to the effects of altitude on flowering time, the breeding program is more usefully situated near sea level -- a condition that is satisfied both at Mtwapa and at Kibaha.³⁾ And as far as this author was able to discover, there are no important, direct locale specific aspects in siting the project at either place. Not all varieties developed will be suitable for all ecological areas, but all varieties will be tested in national sugar-growing areas until suitable ones are developed. According to an EAAFRRO source, however, the national selection-testing process -- which depends on national cooperation -- is not working out as well in Tanzania because of their lack of capabilities and interest. In 1970, over 58,000 seedlings were requested and sent to Kibos (Kenya) for field testing and selection; about 40,000 went to Kawanda (Uganda); but only about 3,000 went to Kilombelo (Tanzania).

Most sugar cane diseases seem to be present in all of East Africa and so the disease-resistance unit seems to function well on a regional basis stationed in Uganda. The testing and selection for disease resistance is carried out both right at Kawanda and at Ugandan sugar estates at Lugazi. The only direct cooperation with national researchers is with the Kibos station (Kenya) in the selection for resistance to sugar cane smut -- a disease that occurs principally in Kenya.

According to EAAFRRO sources, all three Partner States have a good potential for greater sugar production. Kenya's sugar-growing area is around the shores of Lake Victoria, and some on the coast. Although Kenya produced over 120,000 metric tons of sugar in 1971, it is still short of domestic consumption. Uganda also grows sugar around Lake Victoria -- near Jinja and further west -- and produced over 140,000 metric tons in 1971, slightly more than it consumed. Tanzania grows sugar mainly around Arusha-Moshi and in the Kilombelo Valley and about breaks even on production.

³⁾It had originally been intended that the entire sugar cane project would be located in Uganda, and when the decision was made on scientific grounds that the breeding should be located near sea level -- i.e., Kenya or Tanzania -- Uganda was reportedly not very happy. One scientific reason mentioned for choosing Kibaha over Mtwapa as the permanent site was its position further south of the equator. A location even further south along Tanzania's coast would apparently have been even better, but conditions were too remote and so Kibaha was chosen.

It produced almost 90,000 metric tons in 1971.

The history of how this project was selected is, of course, dependent on the interpretations of the officers interviewed who are now carrying it out. Two of them indicated that most of the initial push for the project came from within EAAFR0, while the third indicated that there was substantial pull from all three national governments. Discussions took place in the early 1960's about it. The first meeting of the Specialist Committee on Sugar Cane was held in 1963 and some decisions were made at that time. Although some experts recommended that new varieties only be imported at first, it was decided at some point that East Africa needed its own breeding program to take advantage of local varieties which were best suited to East Africa's own ecological conditions. The research officer head of the division was hired by the Community in 1966 and attended the second meeting of the specialist Committee which was held that year. The decision was made at that time to locate the division at Kibaha, but because of a lack of facilities there it began work at Mtwapa, where facilities were available, until Kibaha could be made ready. Sugar Cane

I.2 Softwood Tree Breeding The main function of the softwood tree breeding project is to provide improved genetic plant material for the national forestry departments in East Africa and to enable them to establish clonal seed orchards of their own. The three main tree species involved were Mexican Cypress, Mexican Pine, and Monterey Pine (respectively, Cyprussus lusitanica, Pinus patula, and Pinus radiata). In the evolution of this project, four phases have emerged:

- 1) Species and provenance trials, in which the species best suited for specific sites and the most suitable geographic sources of seed of the selected species were identified/selected;
- 2) The selection/identification of individually superior trees to be used as exclusive sources of seed for the species identified/selected above and/or the importation of desired parent trees;
- 3) The development of techniques for vegetative propagation and the multiplying of the seed of parent trees, and progeny trials to confirm that the seed from these parent trees was superior; and to establish seed orchards of exclusively superior stock; and
- 4) Long-term progeny testing for growth characteristics, with periodic assessments every two to three years.

One important characteristic which trees are being selected for in the project is disease resistance. The most visible instance of this in the past has been the vulnerability of Pinus radiata to needle blight in East Africa. This disease was first recorded in 1958 in Tanzania, and later spread throughout East Africa causing severe defoliation and even death in areas of high rainfall. Investigations into fungicidal and shade treatment control measures were carried

out, but while they were successful, these protective measures were also too expensive relative to the income to be derived. Therefore, the development of a Pinus radiata resistant to blight was determined to be the only feasible answer in East Africa.

Two full-time and one minor, part-time EAAFRO officers were involved in the tree breeding project, plus a quite extensive supporting and field labor staff. Moreover, in earlier years of the project, more officers had been involved as it was getting underway. Direct cooperation with national Forest Departments seems to have occurred in the selection/identification of the individual parent trees, because local knowledge was necessary, in the establishment of national clonal seed orchards in the Partner States, and in the long-term progeny testing in those national orchards. EAAFRO sources did not comment directly on the quality of this cooperation, but while this author was on the scene an incident happened which indicated that cooperation with Tanzania had greatly deteriorated if not broken down -- an EAAFRO officer was not allowed to visit the national seed orchard at Sawa Hill in Tanzania for the purpose of taking measurements for the progeny trials. In reference to this incident, one EAAFRO source spoke about a personal and political chip-on-the-shoulder approach to relations with EAAFRO of recently promoted national research officers as causing trouble. Another, more directly affected EAAFRO source, took a more philosophical attitude, however, and indicated that more deep-seated reasons were behind the troubles with Tanzania. Cooperation with both Kenya and Uganda seemed to be good.

The need for such a tree breeding project had apparently been discussed in East Africa as far back as the 1950's. According to one respondent, the Forestry Division of EAAFRO had worked on silvicultural projects, mainly nursery and planting techniques, but by the early 1960's the Partner States all had their own capabilities in this field and -- according to this version -- EAAFRO then asked the national forestry departments at a meeting of a Forestry Research Coordinating Committee what they wanted EAAFRO to be doing in the future. Discussions on this question also occurred at the Forestry Research Specialist Committee meeting, and in 1961, the Director of EAAFRO was asked to begin a tree breeding program. Aid was obtained from the U. K. on how such a program should be set up, and the first plantings were begun in 1964.

A somewhat different picture of the origins of the project were obtained from other sources, however, who raised a question if the project was in fact designed more for and by the officer who heads it than by the expressed and/or real needs of the Partner States. According to this viewpoint, EAAFRO officers have tended to think they are superior and have tended to give advice to national researchers rather than listen to them and really involve them in project selection.

The main focus of this unhappiness seems to center around the indigenous hardwoods vs. plantation softwoods issue. Tanzania and Uganda have wanted breeding work done on hardwoods, both exotic and indigenous, but all the work to date has been done on plantation softwoods, which Kenya has in far greater quantities than either Tanzania or Uganda. Even according to the holder of the former view on how the project developed, softwood plantations are not nearly as important in either Uganda or Tanzania as they are in Kenya. The Kenya Forest Department is plantation oriented -- their everyday business is growing plantations and almost no attention is paid to indigenous forests. In the case of Tanzania, they have indicated they want to move more in the direction of plantations, but as yet the concern for their indigenous forests has been dominant. Uganda has the least plantation forests in East Africa, and their main concern has also been for their indigenous forests.

There is some support for this latter viewpoint in that the EAAFRO officer who heads this project joined EAAFRO in 1963 specifically to run it after having served from 1948 to 1963 in the Kenya Forest Department. Furthermore, it was reported by an EAAFRO source that the project had, in effect, started before 1963 in the Kenya Department. Referring to the four phases mentioned earlier, this source stated that Phase 1 -- the species and provenance trials -- was always actually going on in the minds of individuals as they developed criteria for selecting the best tree species and geographic sources of parent trees for specific sites in East Africa -- and, indeed, is still occurring today as criteria are revised or further developed. But the second phase, the identification of individual, superior parent trees also reportedly began before 1963 and ended in 1968 when all potential parents had been identified. For the third phase -- the development of tree propagation techniques and progeny trials -- work on a small scale was begun in 1957 in Kenya. Large-scale operation in this field was begun in 1965 and will be going on continually. The first orchard plantings at EAAFRO were made in 1964 and assessed in 1967. They will continue to be assessed at two-to-three year periods.

The goal of establishing clonal seed orchards in all three Partner States to complement the EAAFRO breeding program gives the project a decentralized character, and there was no indication that the EAAFRO breeding project in its own nursery was locale specific to any significant degree. The goal was to have 120 acres of clonal seed orchard in East Africa by 1972 -- those already established by the late 1960's totalled 101 acres, 43 in Kenya, 35 in Tanzania, and 23 in Uganda. Softwoods

I.3 Sorghum Breeding The purpose of this project is to produce better sorghum varieties through the crossing of desirable lines, selecting out the most promising segregates, and then testing and selecting advanced generations of these segregates for increased yields, protein and lysine content, lodging resistance, palatability, suitability to higher altitudes, and bird and insect pest resistance. As part of

this project, different breeding techniques are used and the new varieties developed are tested all over East Africa under local conditions as part of the Variety Trials Testing program.

The justification for work on sorghum is that there are extensive areas in East Africa where conditions -- mainly rainfall -- are not suited to the growth of the three major cereals: maize, wheat, and rice. Sorghum can be grown about anywhere in East Africa, but its principal advantage is that it does better than most crops in low rainfall, low fertility areas. Although scientifically the project has already produced one successful variety which achieved world wide recognition, sorghum has not become a major food crop in East Africa. Named "Serenna," this new sorghum variety not only achieved a substantial yield increase, but achieved the same increase at high and low yield levels with the greatest percentage increase thus occurring at low levels of production. This meant that the greatest benefits of Serenna would go to areas where yields were limited by low rainfall or the low standards of farming practices -- a very important bonus. It was also less susceptible to bird damage. Unfortunately, the kernels had a coarse brown grain instead of the white flinty grain preferred by those people in East Africa who did use it for food, and particularly with the growth in the popularity of maize, sorghum has not become a major food crop. It is used the most in parts of Uganda to make traditional beer; it is also used in parts of Tanzania, but not to that great an extent; and it is hardly used at all in Kenya. Further development has concentrated on high yielding varieties that the people will desire, but so far there has been only limited success.

After the breeding process had developed new sorghum varieties, a major aspect of the subsequent screening and selection process is the effort to develop resistance to the shoot fly and stem borer, two of the most important pest problems of cereals in East Africa. Both pests cause "dead hearts" in the central shoot of the sorghum plant stem which prevents the grain from developing to its fullest extent or causes the stem to break. Two selective breeding strategies are being followed: 1) to develop "recovery resistance," a form of tolerance that will enable tillers to grow after the dead heart occurs and produce grain; and 2) to develop primary resistance in which the insect larvae cannot cause the dead heart by boring into the stem.

The location of this project -- and the entire Sorghum/Millet Division of EAAFRRO -- is at the Serere Agricultural Research Station in Uganda. As is true of other cereal breeding programs, this type of research is fairly locale specific with respect to altitude and rainfall patterns. Although it is probably true that any improved variety would do better than indigenous varieties in any ecological pattern, it is also true that for all ecological patterns, other than the one in which the research breeding project took place, that a better variety would have

been produced for any of those patterns if the breeding project had taken place there. As was mentioned above, the new improved varieties are field tested all over East Africa in the Variety Trials program and have done better than local varieties, but not as well as could have been possible.

A "product champion" seems to have been the impetus behind the origins of the sorghum breeding project. He was, unfortunately, no longer with EAAFRRO, and the officers working on this project at the time of the interviewing were new and unsure of its origins. Nevertheless, it seems to have begun around 1958 when Hugh Doggett left government agricultural research in Tanganyika because they would not allow him to do his desired work on sorghum. The really big step came in the early 1960's, however, when USAID and the Rockefeller Foundation took an interest in supporting a Major Cereals Program that included millet and maize as well as sorghum. The U. S. Department of Agriculture made a feasibility study in the early 1960's, and when the results were positive, USAID decided to support it. Because the problems seemed regional in scope, USAID decided to work through EAAFRRO, which accepted it but until 1972 did not put up any significant funds for it⁴⁾ or really control it in any way. The selection and screening process for insect pest resistance began about 1968.

With the exception of Hugh Doggett, most of the research officers involved in this project have been American scientists sent over and paid by USAID. Two officers have been working full-time on sorghum breeding, plus supporting staff at Serere. In addition, two officers working as Field Trials Officers in Tanzania and Uganda for the Variety Trials program are concerned with sorghum, although their primary trials are for maize. No direct national cooperation was mentioned. Sorghum

I. 4 Maize Breeding Unlike EAAFRRO's other breeding projects, the objective of the maize breeding project -- which is the essence of the entire Maize Genetics Division of EAAFRRO -- is not so much to produce improved varieties of maize (although that will be an inevitable result) as to compare different maize breeding methods in order to determine the more efficient ones for utilization by the breeding program of any cereal crop that may be cross pollenated, such as national maize breeding programs. The results should be equally applicable to sorghum or millet. The project is comprised of seven ear-row selection schemes, three mass selection experiments, two full-sib selection schemes, one S₁ selection study, one reciprocal

⁴⁾ Prior to July 1, 1972, USAID paid all expenses for the Major Cereals Program, including all equipment costs, staff costs, etc., etc. After July 1, 1972, EAAFRRO took over the costs of vehicle operations, and as of January 1, 1973, EAAFRRO was responsible for all expenses other than the salaries of American researchers who continued to be paid by USAID/USDA.

recurrent selection experiment, and three half-sib selection studies. Variance within a given selection method was by material, stand levels, size of population, male selection, and vigor of the testers.

The Maize Genetics Division is located at the Kenya National Agricultural Research Station in Kitale, and its work is intimately related to Kenya's maize breeding program which is also located there. And, although the development of breeding methods is not related to any specific location, the improved maize varieties that are the official by-product of these breeding methods are most productive in the high altitude, high rainfall areas which exist principally in Kenya. Other sources have also indicated that the development of actual new, improved maize varieties is a very real -- if unofficial -- objective of officers working on the EAAFRRO project, since such productivity results are more likely to bring scientific acclaim to the developers. The principal indicator being used to measure such productivity advances is yields under experimental conditions, however, and others are more concerned about aspects such as lodging resistance.

As in the case of sorghum, improved maize varieties developed at Kitale by both the EAAFRRO and Kenya programs are being tested throughout East Africa under local conditions in the Variety Trials Program, but once again it is true that improved varieties developed under other ecological conditions than present at Kitale would do even better in similar areas. Tanzania in particular has stressed the need for three maize breeding programs -- one for high-altitude conditions, as at Kitale; one for medium-altitude conditions; and one for low-altitude, coastal conditions. At the national level, Kenya's program has also experimented with varieties for the dry, short-growing season conditions that exist around Nachakos and many other areas in that country with some success.

Despite the close locational and functional relationships with Kenya's national breeding program, an EAAFRRO source reported that there was little research cooperation with them. The national program utilized some of the plant material developed in EAAFRRO's work and there was the usual office interaction due to being housed in the same building, but that was all. Liaison with Kenya's program was obviously self-evident, however, for giving advice and assistance. Some interaction was also reported with national maize breeding programs in Uganda and Tanzania, but again this was more advisory in nature rather than cooperative.

This project has also been part of the USAID Major Cereals Program and has the same general history as was discussed for sorghum. There was one full-time officer working on the project at Kitale, but the two Field Trials Officers stationed in Tanzania and Uganda to work on the Variety Trials Programs there also

were principally concerned with maize. All three were fully supported by USAID. The Maize Genetics Division at Kitale also had quite an extensive supporting and field staff. Maize.

I. 5 Virus Disease Survey The ultimate objective of this project is to develop virus disease-resistant cereals and legume crops for East Africa through breeding programs. First, however, the identification of the critical disease viruses and an assessment of their economic impact must occur. Since very little work on plant viruses in East Africa had been done, surveys were being conducted to determine what viruses were present and hot house and field tests were being carried out to estimate the yield losses caused by them. Once the critical viruses are identified, basic studies on them will take place, local and imported varieties will be tested for resistance, and a breeding program will be started.

The work to date has been described graphically as follows in Newsletter No. 58:

We have isolated five separate viruses which either alone or in combination cause diseases in groundnut and other legume crops, notably soya bean and cowpea. We have detected the presence of a further two viruses. . . these seven viruses constitute the major components of all the various groundnut virus diseases that occur in East Africa We are about to initiate the next stage of this research, which is the critical assessment of resistance of lines of groundnut varieties to our isolates from various widely distributed areas. In this way we hope to identify, for the first time, the genetical background to resistance. Until we achieve this, breeding is unlikely to advance.

We have isolated and initiated a study of two maize viruses which appear to be widely distributed in East Africa. They cause similar streak/mottle symptoms in maize, and also infest sorghum and sugar cane. . . . These viruses do not cause any noticeably serious disease in maize, but there is evidence that infection at the seedling stage results in at least a 10% loss in yield.

The principal focus of the project is on legume food crops, because of their protein content. Although surveys like this may be specific to the areas surveyed, different ecological zones in all three countries are being surveyed and so far the viruses found have existed all over East Africa. In higher altitude areas, however, losses due to virus infections are usually less because the insect vectors that transmit most viruses are less abundant. Losses in legumes such as beans and cowpeas have ranged around 20%, and just because a virus is mentioned with respect to one crop does not mean that it is not also infecting others. This project is still developing and is really forming the basic background work that will be the basis for future studies on a broad front of virus disease problems.

Two EAAFRRO officers are working full-time on this project; a third has been

working principally on a specific virus disease of tobacco, but also spends some time on the general survey. Supporting and field staff in the entire Plant Pathology and Nematology Division is very limited. As indicated earlier, surveys have been conducted in wide-spread areas of all three countries -- the ocean coastal areas of Kenya and Tanzania, the Lake Victoria region, the Kenya highlands, etc. Most of the studies of the collected material are necessarily carried out at EAAFRO headquarters, as are the hot-house experiments on disease damage assessment. Field experiments on yield losses seem to have been confined to Kenya, but these assessments are admittedly very speculative and should be rough guides to losses in the other countries also. There has been little -- if any -- cooperation from the national level in carrying out this project.

The origins of this project are again somewhat confused -- "It just happened," according to one source. In all of East Africa, there seems to have been very, very few researchers interested in or qualified to work on viruses and virus diseases. In this atmosphere, a Dr. Storey, who was a virologist, gained a reputation for his work on maize streak and its virus -- insect vector relationship, back in the days when EAAFRO was still located at Amani in Tanzania. A tradition therefore developed that EAAFRO was the place to go to find out about virus diseases in East Africa, and that tradition persisted into the 1960's even though personal interests changed and no actual research was being done on the subject. There are differing versions of what happened in the mid-1960's -- one says that the Chief Research Officers of the three Partner States asked EAAFRO to do work on the virus diseases of major food crops and another says that the impetus came from within EAAFRO, that the Plant Pathology division thought this was a project that urgently needed doing and so prepared a proposal to that effect which was presented to the Director of EAAFRO and then to the Chief Research Officers of the Partner States. Whichever version is more correct, the Specialist committee system was not involved in the initial project selection process. National agreement was reached, however, and the project began around 1968. Lexumes

Class II -- One or two research officers working full or part-time plus a varying amount of supporting staff; length of time project has been going on varies but is considerable. Any of these projects might possibly have been in Class I except that their content did not seem to be as important to EAAFRO.

<u>Project</u>	<u>Division of EAAFRO</u>
II. 1 Millet Breeding	Sorghum and Millet
II. 2 Water Catchment Area and Land Use	Physics and Chemistry
II. 3 Timber Fungus Decay	Forestry
II. 4 Plant Taxonomic Revisions	Herbarium

II. 1 Millet Breeding Like sorghum, millet is a cereal crop better suited to the low-rainfall conditions that prevail in large parts of East Africa than maize, wheat, or rice are. Using a world collection of different genetic types of millets, new varieties of finger and bullrush millet are being developed in this project and tested for quantitative yield and qualitative improvements. Characteristics such as maturity time (early-, medium- or late-maturing), lodging resistance, and disease resistance are important factors affecting yields which are experimentally varied. Finger millet is rather low in protein and amino acid content, however, and so a major effort is underway to improve this quality. The biggest problem with bullrush millet is that it has no protective covering -- as does the ear of maize, for example -- and that birds find it an attractive food. Efforts to improve bird resistance are therefore a major part of the bullrush millet breeding project. All new varieties go through a selection and screening process after their initial breeding, and are eventually tested under local conditions all over East Africa in the Variety Trials Program. In addition to supplementary work on millet breeding methods, new imported varieties are continually being screened, selected, and tested for applicability to East Africa.

Three varieties of finger millet had been developed to date to the point where they were ready for release to farmers. Also, like sorghum, however, finger millet is used only in Uganda to any extent at all -- Tanzania does grow some, but Kenya hardly any at all. Moreover, EAAFRO sources didn't see much potential for finger millet in Kenya and were unsure about Tanzania. Bullrush millet is not presently utilized for food anywhere in East Africa, and even though an EAAFRO source said it should be used more because of its great drought tolerance, it seemed to be making no impact at all on the people -- the people don't like it -- and to provoke a negative reaction from national sources.

One full-time EAAFRO officer is working on this project plus extensive supporting and field staff and the two Field Trials Officers in Tanzania and Uganda also test millet varieties in the Variety Trials Programs in those countries. This project is also located at the Serere Agricultural Research Station in Uganda, with the sorghum breeding project, and the varieties developed here are subject to the same locale specific qualifications as were discussed for sorghum. Millet breeding was added to the Major Cereals Program of USAID around 1965, and its funding is part of that Program. Finger millet seems to have been selected for a breeding project because it already was in use in parts of Uganda and had potential as a food grain in other, drier areas of East Africa. In the case of bullrush millet, however, the officer in charge of millet breeding had done extensive work on it in the United States and its incorporation into the breeding program seems to have been done on his own initiative. Millet

II. 2 Water Catchment Area and Land Use There are few year-around rivers in East Africa, and they originate from relatively small areas of high rainfall. Water is a valuable and scarce resource in many areas of East Africa; and its origins and flow must be preserved. It turns out, however, that much of the water catchment areas presently covered by natural forests are also areas with the highest potential for agricultural development, and there is considerable population pressure to open these lands for such development. The objective of this long-term catchment area research project is to find out whether any reduction in water yields or changes in flow patterns will result from land use changes designed to increase the agricultural potential of an area.

Four field sites were originally selected for this project: the Kericho and Kimakia catchments in Kenya; the Atumatak catchments in the Karamoja districts of Uganda; and a number of catchments near Mbeya in Tanzania. The Kimakia study involved the effects of intensive grazing on bamboo forest and pine plantations; the Kericho study involved the change from forest to tea plantation; a controlled grazing scheme has been studied in Atumatak; and the hydrological effects of peasant subsistence cultivation on indigenous forests have been studied in Mbeya -- all in cooperation with national research programs. Only the cooperative efforts in Kenya, however, are judged to be successful by EAAFRRO sources. Data from Uganda is unreliable and the project has broken down due to security problems -- Karamoja is the territory of some less governable, nomadic tribes and theft has been a continual fact of life. The Tanzanian project apparently ran into insurmountable scientific problems with the data and it has more or less been abandoned. Even though there are only two working field sites left, however -- and both in Kenya -- it is hoped that the results can be used for determining the hydrological effects of planned land use change in similar areas of East Africa. How similar catchment areas and the planned land use changes can be matched, however, is a more difficult question.

There was only one EAAFRRO officer working on this project at the time of the interviews, plus some support staff, but another was expected to be coming shortly from England and there had been a series of one or two officers working on it in the past. This long-term project was started back around 1957-58 and was expected to last 20 years or more. Its origins, however, are unclear. There has been some involvement starting in the 1960's with the International Hydrological Decade of the UN, but this came after the beginning.

One factor fairly unique to this project is the amount of national involvement. In the case of Kenya, a committee composed of representatives from EAAFRRO, the University of Nairobi, and the national Forestry Department, Water Development Board, etc. is in charge of the catchment area projects. EAAFRRO has a central role in providing the research scientists for the projects, but puts up relatively

little money. Its success has depended upon the cooperation of people on the committee and the financial support of the Kenya Forest Department and Water Development Board. The Ministry of Agriculture in Uganda and the national forestry, irrigation, and water departments in Tanzania have also cooperated with their catchment area projects, but since the results have just not worked out, these projects have been abandoned. Water Resources/Land Use

II. 3 Timber Fungus Decay Fungal attacks on timber in East Africa either stains or rots the wood of camphor, mahogany, cypress, and pine trees. An investigation of these attacks is being carried out which involves the assessment of the economic impact of the attacks in terms of wood volume lost, the identification of the fungi causing the decay, and their points of entry into the affected trees. The objective of the project is to develop recommendations for forest management practices which will minimize these decay losses.

Camphor and Mahogany are hardwoods indigenous to East Africa, and the origins of this project in Tanzania and Uganda occurred with respect to those species. The indigenous forests on the southern slopes of Mt. Kilimanjaro in Tanzania are one of the main sources of camphor -- an important furniture and general utility timber -- in East Africa. Where the original trees had already been cut down, second-growth sucker regeneration forests were growing and being maintained by the Tanzanian Forest Department, but the presence of heart rot decay in the young camphor stands had made the economic justification for this maintenance questionable. Similarly, the Budongo Forest near Masindi in Uganda contains the richest concentration of mahogany species in East Africa, and a large proportion of the revenues earned by their Forest Department came from these trees. In recent years, however, the incidence of heart rot decay had reached "serious proportions."

The initiative for this project began with independent direct requests from the Forest Departments of Tanzania and Uganda⁵⁾ sometime prior to 1968 when the project officially began. According to EAAFRRO sources, the Forestry Division at EAAFRRO then began working on a proposal to carry out a general fungus decay project, which was presented to the Director of EAAFRRO and EAC Headquarters. The proposal apparently was discussed informally at the 1967 meeting of the Forestry Research Specialist Committee, but not until two months after the project began -- at its 1968 meeting -- did the proposal formally enter the Specialist Committee system.

Once the project was underway, further initiatives came from both Tanzania and Uganda once again to study the fungal decay in cypress plantation forests. Among the exotic softwoods grown in the East Africa highlands, cypress ranks first in area planted, volume harvested, and export sales -- besides being of increasing importance to local construction industries. As has been discussed earlier, Kenya

⁵⁾In Tanzania's case, the request seems to have come directly from the district forest headquarters at Kilimanjaro, and in Uganda's case it came from the district office through the national Forest Department to EAAFRRO.

has by far the greatest resources of plantation softwoods in East Africa, and this is also true for cypress plantations. Field sites for the investigation of butt rot have taken place only where the decay is known to occur -- around the north Kilimanjaro area in Tanzania and at four major softwood growing areas in Uganda.

Thus, by an EAAFR0's-source's own estimates, only about 10% of the field activity for this project was being done in Kenya -- Tanzania and Uganda about equally shared the remaining 90%. (Way after the project was underway, Kenya did request an investigation of the losses to pine forests from elephant damage in which heart rot fungi had infected the wound, and this was carried out.) Nevertheless, the work on cypress fungi would seem to be of greater potential importance to Kenya than to Tanzania or Uganda if the butt rot fungi presents a future threat to Kenya's cypress plantations. In the absence of any indication to the contrary, the work on camphor and mahogany seems to be of primary interest to, respectively, Tanzania and Uganda only.

One EAAFR0 officer was working on this project full-time, plus a graduate technical assistant and some other supporting staff. This project has also entailed quite extensive cooperation with national forestry departments in the form of setting up sample plots, providing field assistance, transport, and accommodation for the EAAFR0 researchers, sawing logs, etc. etc. EAAFR0 sources reported that although cooperation with the Tanzania Forest Department was good at the district level, that cooperation at the national level was much less satisfactory. These sources blamed this situation on the overall negative attitude of Tanzania toward EAAFR0, on the organizational and administrative chaos that existed at the national forestry level, and on the great distance and lack of efficient communications between EAAFR0 and Dar es Salaam, the capital of Tanzania. Cooperation with both Uganda and Kenya Forest Departments has been much better. It was intended that this project would be finished by mid-1972. Hardwoods and Softwoods

II. 4 Plant Taxonomic Revisions Taxonomic revisions of plant classifications are part of the basic inventory research being carried out by the East African Herbarium, which is a division of EAAFR0. As more and more information is gained about plant categories from expanded collections, taxonomic revisions of older classification systems are carried out to clear up confusions and to simplify the systems to make them more useful. Taxonomic revisions were then being carried out on liliaceal, smilacaceal, and leguminosae:papilionoideal plants in East Africa. Also involved in this project was some cyto-taxonomic work in which plants under study were being grown and slides made of the roots, pollen mother cells, etc. These would be used to study the plant chromosomes for future classification objectives.

Two EAAFR0 officers at the Herbarium were devoting a major part of their efforts to this work. No direct national cooperation was involved, and the work

is of such a basic nature that it should be equally applicable in all Partner States. This type of work has been going on since the Herbarium was established and would not go through any project selection system in any event. Basic Research

Class III - One full-time and/or varying numbers of part-time officers, plus varying support staff; mostly of relatively recent origin -- could become more important in the future.

<u>Project</u>	<u>Division</u>
III. 1 Groundwater Resources	Physics and Chemistry
III. 2 Soils - Fertilizers Calibration	"
III. 3 Plant Tissue Culture Techniques	Plant Quarantine Service
III. 4 Tobacco Virus Disease	Plant Pathology and Nematology
III. 5 Rice White-Tip Nematode	"
III. 6 Compensatory Growth Gain	Animal Production
III. 7 Nutrient Requirements of Indigenous Zebu Cattle	"
III. 8 Forestry Insect Defoliators	Forestry
III. 9 Armillaria Root Rot Disease	"
III.10 Agronomic Management of Sorghum/Millet	Sorghum and Millet

III. 1 Groundwater Resources An investigation of the existing groundwater resources in all of East Africa is a necessary first step in determining potential areas for further water development projects. A study of existing data on recharge rates from rainfall, surface flow, and evaporation is to be carried out to assess the replenishment of underground water and plan extraction rates in different areas. According to an EAAFRRO source, the results of this project should have applicability wherever there is a water shortage and people are (or are to be) located -- in particular, Kenya and Tanzania. In Uganda, there wasn't a general problem of water shortage; too much water, in fact, was the problem there, which could, however, also be aided through an investigation of groundwater resources.

This project had just begun about a month before the interviewing took place at EAAFRRO with the arrival of a researcher from the United States, so it was only in the formative planning stage. Scattered bits of research on this topic had been done at the national level in the past, and this officer's first task was to collect this existing information and try to put it together on a regional basis. Afterwards, he plans to subdivide the over-all groundwater topic into scientific sub-problems according to natural criteria rather than national political boundaries. From this list of scientific sub-problems, one will be selected which all three Partner States agree on and EAAFRRO's resources will then be concentrated on this pilot demonstration project. If the project were to develop into a full-scale

investigation of groundwater resources, he estimated that 10-15 researchers might be needed.

According to an EAAFRO source, the three Partner States had wanted this project for the last 4-5 years, because water resources are such a crucial problem in East Africa. Since the Physics and Chemistry Division of EAAFRO had carried out other hydrological work in the past, this was thought to be a natural continuation of their past work. A lack of qualified manpower prevented EAAFRO work on groundwater resources, however, until USAID was asked to supply a researcher in 1969. This is a case, however, of where USAID is funding a man rather than a program as is the case with the Major Cereals Project. So one, full-time officer has just started working on this project, with limited support staff. There has been no direct national cooperation on this project, but there could be some in the future. Groundwater Resources

III.2 Soils - Fertilizers Calibration This is an investigation of the relationships between different types of soils, different kinds and application rates of fertilizers, and crop yields. The ultimate objective of it is to provide the agricultural extension worker with a kind of handbook which he can use to advise farmers with regard to fertilizer application on the basis of a simple soil test. Potentially, the results should be applicable to all crops and agricultural land, but in practice the testing to date has focused primarily on maize and -- to a lesser extent -- sorghum and millet.

According to an EAAFRO source, this project grew out of soil analysis services which EAAFRO performed for the Kenya maize breeding program in 1966. In 1967, the EAAFRO officer in charge of this service proposed a regional plan design for this project to the Specialist Committee on Soil Fertility and Plant Nutrition. Although the origin of the impetus behind the proposal was not known, the Specialist Committee did approve the project and it did go through the official committee system successfully. The project depended on extensive national cooperation and financial support, however -- EAAFRO would plan and coordinate the experiment and do the analysis work, but national researchers would be responsible for carrying out all the field tests -- and subsequently the national governments claimed they couldn't afford to do all that the original proposal had planned. On a voluntary basis, the national governments kept participating in the project to the extent that they were already carrying out soil fertility experiments, but this was at a much lower scale of effort and not according to any design. Also, due to personnel turnover, EAAFRO seemed to lose interest in the project for awhile, until the present officer in charge of soil chemistry arrived about a year prior to the interviewing. He is now devoting a major effort of his time to this project, along with a number of laboratory technicians (who do the soil

analyses) and supporting staff. In addition, one EAAFRRO officer in the EAAFRRO Sorghum and Millet Division at Serere is also working part-time on this topic with respect to those crops.

There is some national cooperation on this project reported, however. Two officers from the Kenya national research staff -- a maize agronomist and a senior soil chemist -- are cooperating on complex soil analyses work with respect to maize and, to a much lesser extent, wheat and pastures production. This cooperation has gone so far that joint papers may be produced on some of the results. At least one officer in Uganda has been trying to cooperate on this project by sending in his own soil analysis data, but so far the EAAFRRO officer had not been able to do much more in the way of cooperation than pay a visit. He commented on the good possibilities for more cooperation in Uganda in the future, however, especially through the EAAFRRO Field Trials Officer in that country since most of Uganda's national work on soil fertility was also being done with respect to maize. There was not much -- if any -- cooperation on this project from Tanzania, this EAAFRRO source also reported. This situation was blamed on conditions in Tanzania's national research program -- high staff turnover and movement, and a lack of funds to participate. Once again it was hoped that cooperation could be started through the EAAFRRO Field Trials Officer stationed in Tanzania. Maize

III. 3 Plant Tissue Culture Techniques This research project is intimately related to the Plant Quarantine Service of EAAFRRO which is described later on in this chapter. In the past, the Quarantine Station had developed the reputation of being a bottleneck in the process of importing new varieties or new crops into East Africa, and the national governments -- principally Tanzania and Uganda -- were quite critical of this slow-down to their national development activities. In their latest national development plans, in fact, both Tanzania and Uganda allocated funds for the establishment of their own plant quarantine stations! Faced with the necessity of preserving phytosanitary standards required to keep pest-and-disease-carrying material from entering East Africa on the one hand, and of coping with the expanded demands for more imported plant material to the satisfaction of the Partner States on the other, the physical expansion of the Quarantine Station was undertaken. This was not enough, however, and EAAFRRO Newsletter No. 69 (June, 1971) describes this project as follows:

While the station has been effective in preventing the introduction of pest or disease-carrying material, it has become clear during the past year that techniques for rapid propagation of clean material are essential in order to minimize the temptation of extensive illegal importations by large-scale growers.

In order to make better use of existing facilities for the purpose not only of accelerating the rate at which accessions are processed, but

to make available more plant material to the Partner States when an accession is released, a research program in plant quarantine pathology has been initiated. The research is centered on making practical application of recent advances in tissue culture techniques to the specific needs of plant quarantine pathology. The areas of current interest are the use of heat-therapy and meristem-tip culture to produce virus-free plants, and the use of tissue culture in the rapid propagation of plants.

This research is potentially applicable to any plant material that must come through quarantine, but one EAAFRRO source indicated that the research was being performed on strawberries, pineapples, sugar cane, and chrysanthemums, and another source indicated that soya beans, rice, tobacco, bananas, and potatoes were also being given priority in the project. Most of these crops are covered in the discussion of national agricultural priorities as derived from national development plans, but two that are not mentioned at all -- strawberries and chrysanthemums -- are of special interest to private investment in Kenya. All of this work is carried out at the Quarantine Station, so there is no national cooperation.

This project began when the officer in charge of it arrived at EAAFRRO in 1970. He devotes all of his research time to it, but also has significant amounts of time taken up with providing services and doing administration as head of the Plant Quarantine Station. In addition, he has a full-time graduate scientific assistant and some part-time laboratory assistants working with him on it. According to an EAAFRRO source, this officer selected this project before he arrived and more or less went ahead with it on his own, with the approval of the EAAFRRO administration. It was not discussed or selected by the Specialist Committee system. Horticultural Crops - Propagation

III. 4 Tobacco Virus Disease One of the specific aspects of EAAFRRO's over-all work on virus diseases in East Africa is the investigation of a particular virus disease affecting tobacco in Tanzania. The requests for this work and infected plant material specimens began arriving at EAAFRRO from Tanzania in 1968, but the problem was shelved until 1971 when a newly-arrived officer in the Plant Pathology Division was told to work on it. No reason for this delay was given by EAAFRRO sources, except that being the only virus research unit in East Africa, it was constantly being bombarded with problem-solving requests. In 1971, the head of this division reportedly indicated that the problem should be worked on because it was important enough to spend the time, and work began.

Infected tobacco material had been being maintained in EAAFRRO greenhouses since 1968, so the work started with an investigation of it. The next step will be to examine the viruses in the field to determine how important which ones are. The objective of the project is to identify the viruses and then to try and locate sources of resistant tobacco varieties to import and either directly use or incorporate in a tobacco breeding program.

This project is entirely dependent on cooperation with Tanzania. So far, Tanzanian authorities had provided EAAFRO with infected materials and tobacco seed to work on; and they were arranging an imminent field trip to Tabora (Tanzania) by the EAAFRO officer working on this project. An EAAFRO source noted that tobacco was an important crop in Tanzania, but not of much significance to either Kenya or Uganda. Most of the tobacco viruses also came from Tanzania, although a couple were found in Kenya. In addition, since the request for this project came from Tanzania, the remark was made that it was therefore "politically convenient" to work on it. All of the EAAFRO work is being done by one full-time officer and one part-time assistant. Tobacco

III. 5 Rice White-Tip Nematode The white-tip nematode seed development can cause up to 50% losses in rice yields, and is prevalent in West Africa and Zaire. Prior to the beginning of this project in late 1979, the Inter-African Phyto-Sanitary Commission of the OAU -- the quarantine body for the African continent -- had requested a survey for this parasite in East Africa, which was thought to be free of it. Instead, the nematode has been found to be "widely distributed and abundant" in Tanzania, in dangerous amounts at several places in Kenya, and hardly at all in Uganda. Rice samples were still being received, however, and infested areas were still being determined. Losses due to this worm in East Africa were unknown, but field tests to assess them were being planned.

Dormant nematodes are found underneath the seed coats of rice and only become active when the seed germinates. In addition, there is no way at present of diagnosing the presence of the nematode on the basis of plant symptoms. Thus, the pest is very difficult to wipe out once it has infected an area. The best approach to the problem over the long-term would be to develop resistant rice varieties, and EAAFRO will be screening indigenous varieties for wither resistance or tolerance. In the meantime, work is underway on a method of seed treatment control of the nematode which has been utilized in Madagascar with some success. It is currently being tested under East African conditions. This project developed as a response to a crises rather than going through any official selection process.

National cooperation on this nematode problem has been quite forthcoming from both Tanzania and Kenya, but there have been some communications problems with Uganda according to an EAAFRO source. Both Kenya and Tanzania have cooperated in sending seed samples from the field to EAAFRO for analysis and a determination of the extent of the infestation, and had expressed great interest in setting up field test plots in their national rice schemes with EAAFRO's cooperation. A remark was made that since there are no nematologists in Tanzania, they are extremely active in asking for help in this field. Kenya has a brand-new indigenous graduate in nematology who is also very eager to receive help. In Uganda, however, apparently

there had been a nematologist there for many years who was very jealous and possessive about his field and would not cooperate with EAAFR0. This person had just left Uganda, however, and this EAAFR0 source expected that cooperative activities would begin soon.

Much of the rice production in the Partner States is concentrated on irrigation schemes which are just beginning to be developed. The potential for rice production in all of them is just beginning to be realized according to this EAAFR0 source, and they will all be wanting to increase production at least to the point of self-sufficiency. There is one EAAFR0 officer working on this project full time, plus a graduate officer-trainee is helping part-time and some supporting staff. Rice

III. 6 Compensatory Growth Gain This project is designed to investigate the effect of a restricted growth rate in the subsequent live-weight gain, economy of gain, carcass composition, and carcass quality of both indigenous and imported cattle in East Africa. It involves the potential for ~~meat~~ production in arid and semi-arid areas where the ability of an animal to regain weight after periods of growth stoppage during droughts is an important characteristic. In the experiments, growth of different cattle is artificially restricted for varying periods of time to induce weight losses, and different subsequent feeding patterns are then tested. The results should indicate how well the animals compensate or bounce back and catch up after restricted periods, and how efficient the feed to beef conversion ratio is during these compensatory periods. The desirability of supplementary feeding will also be investigated. The crucial question for these semi-arid rangeland areas, however, is whether a temporary loss of weight during droughts will affect the ultimate productivity of the animal adversely or not, and how much weight loss is necessary before there is such an effect.

Estimates of two-thirds to three-fourths of East Africa being semi-arid or arid have been made, depending on the amount of rainfall criteria. What is clear, however, is that up to 85% of Kenya's land may be classified in this category, that a large amount of Tanzania is also marginal (although not as much proportionally because Tanzania is a larger country to begin with), and that only a small amount and proportion of Uganda's land is thus classified. Much of this rangeland already supports a large proportion of East Africa's livestock, as well as almost all the wild animals, but it is clear that it can be much more productive than at present since it is suited to extensive (as opposed to intensive) grazing. The Animal Production Division of EAAFR0 was organized to do research on problems limiting animal production in these areas.

There is no cooperation with the national level on this project, and it is carried out by one officer who devotes a major portion of his time to it, plus extensive supporting and field staff. An EAAFR0 source explained that this project

was a "logical extension" of work done at EAAFRRO over the previous 15 years -- to answer questions growing out of previous work. It was proposed by an EAAFRRO officer and approved by the Director before it was sent to the Animal Husbandry Research Coordinating Committee in 1968 -- the last time this committee met. There apparently were no particular pressures for or against it and so it was sent on to other committees and approved in a process which this source described as a "rubber stamp." The project began in 1969 and was expected to last six years, although it might be extended further. Rangeland

III. 7 Nutrient Requirements of Indigenous Zebu Cattle This project is related to the one just above, arising out of much of the same concerns. Previous studies had indicated that during the dry season in the semi-arid rangelands of East Africa, cattle might lose up to 50% of the weight they had gained during the wet season. This was attributable primarily to undernutrition rather than pathological or genetic factors. Quite a bit was known about the growth of imported cattle in the high-rainfall areas of East Africa, but there was a general lack of scientific information on the nutritional requirements of indigenous Zebu (Boran) cattle grazing on tropical grasslands during different seasons of the year. There were some preliminary observations which indicated that the nutrient requirements of these indigenous cattle might be lower than those for imported breeds, and in order to aid in the assessment of the potential value of indigenous livestock beef production in rangeland areas this project was designed to study the voluntary intake, digestibility, and metabolism of feed nutrients by the Zebu cattle. In a first phase, nine levels of energy and nitrogen intake were compared, and a second phase is planned in which just two treatments (high and low) of various nutrients will be compared with respect to metabolism and growth, as related to the genetic background of the cattle.

Zebu cattle exist in the semi-arid, rangeland areas of East Africa, and an EAAFRRO source estimated that there were approximately 20 million head of these cattle in total -- approximately 7 million in Kenya, 4.5 million in Uganda, and 8.5 million in Tanzania. One EAAFRRO officer is working on this project, plus some full-time and part-time supporting staff, and there is no cooperation with the national level on it. This source reported that EAAFRRO had been requested by the three Partner States, through the Natural Resources Research Council of the EAC, to work on the problems of beef production in semi-arid areas. Several problems existed in this field, one of which was the general lack of knowledge about indigenous cattle. When organizing this project, the EAAFRRO director was contacted about what problems should have priority, and a proposal was drawn up on this basis and presented to the appropriate Specialist Committee for approval. The first phase of the project began in 1969 and ended in 1971 -- it, in fact, was the research project for the

officer's Ph.D. degree at a United States university, and so the project selection process was also affected by those considerations. The second phase of this project began in 1971 then, and was expected to finish in 1974. Rangeland

III. 8 Forestry Insect Defoliators This is a general investigation into the five or six major insect pests -- "lepidopterous defoliators" -- which attack the exotic plantation softwoods introduced to East Africa. It involves both field and laboratory studies on such things as the life cycle of the pests in the field, the effect of weather on their growth and development, their feeding capacity as related to damage caused in the field, and the identification of their natural parasite or disease enemies. To a lesser extent, routine insecticide trials are also carried out.

Cooperation with national forest entomologists on this project in all three Partner States was reported by an EAAFRO source, but ironically, the cooperation with Kenya was judged to be less than with Uganda or Tanzania because it wasn't needed as much -- i.e., Kenya's Forest Department was more advanced and located so close to EAAFRO that they already knew most of the necessary information that EAAFRO could provide. The cooperation with Kenya was also described as very informal, which may be a more correct distinguishing characteristic. This source explained that although EAAFRO might draw up a project like this, that the individual national forest departments had to agree to it. Uganda provided manpower and field sites for this project, doing surveys on numbers of insects and population trends; Tanzania also provided manpower and information on natural parasites and diseases of the pests, and participated in an experiment on artificial defoliation of Pinus spatula at its Sao Hill plantations.

This EAAFRO source wasn't in Kenya at the time this project began in 1967, so he is not sure of its origins. Presumably it went through the Specialist Committee system with the approval of all three countries. There is one officer devoting a major portion of his time to this project, plus a full-time senior laboratory assistant and some support staff. Softwoods

III. 9 Armilaria Root Rot Disease This particular disease attacks all tree species, but the concern of this project is for its affection exotic softwood pine and cypress species. The objective of this project is to investigate the disease in order to develop techniques which will reduce losses. It is thought that the disease attacks one tree and then spreads to another through the infected soil. Accordingly, the conditions under which the disease thrives and causes losses are being studied in order to attempt to break this cycle. Improved resistance to this disease is also being sought through genetic breeding in that part of the Forestry Division's work.

Four field sites in each of the Partner States for this project were reported by an EAAFRO source, but no details on cooperation with the national level were provided. There is one EAAFRO officer devoting a major portion of his time to this project, plus some support staff. It began in 1970, but since the EAAFRO source was not in East Africa at the time, he could not provide any information on its origins. Softwoods

III. 10 Agronomic Management of Sorghum/Millet This project involves a number of farm management and/or agronomy input variables being tested in order to develop recommended farming practices to achieve maximum sorghum and millet yields. Different varieties of these crops are being planted at the beginning of the rainy season and at two week intervals thereafter in order to investigate the effects of the planting date on plant growth and to determine when moisture stress occurs. At the same time, different nitrogen-phosphorous fertilizer combinations and rates of application are also being tested for the effect on yields. Other variables being tested include seed treatment (treated or untreated) for disease control, the spacing of plant rows and plants within a row, and weeding practices (including herbicide trials). Trace element deficiencies in the soil with respect to the fertilizer applications is also being investigated. All of these variables should be under the indigenous farmer's control to implement once the recommendations are determined. No cooperation with the national level was reported.

This project is, of course, located at Serere (Uganda) in the Sorghum and Millet Division of EAAFRO, and is part of the Major Cereals Program of USAID which was discussed earlier. This particular agronomic aspect of the work on sorghum and millet apparently didn't begin until early 1971, however, when a USAID researcher was transferred from India after a project there was closed down and carried on with his work at Serere. When he left shortly thereafter, he was replaced by USAID and so there is one EAAFRO officer devoting a major portion of his time to this project, plus some support staff. Sorghum/Millet

Class IV - One part-time officer, plus some support staff; varying lengths of time since project began. These projects are minor ones, but they are still EAAFRO projects as opposed to those in Class V, which seem to be more oriented toward the officers' personal interests.

<u>Project</u>	<u>Division</u>
IV. 1 Silage for Semi-Arid Areas	Physics and Chemistry
IV. 2 Cultivation and the Physical Properties of Soils	"
IV. 3 Crop Water Requirements	"
IV. 4 Pulpwood Storage Trials	Forestry
IV. 5 Charcoal By-Products/Wood Preservative	"

<u>Project</u>	<u>Division</u>
IV. 6 Biological Control of the Woolly Aphid	Forestry
IV. 7 Nematode Survey	Plant Pathology and Nematology
IV. 8 Bean Nematode	"
IV. 9 Root Production of Vegetative Cuttings	Plant Quarantine Service
IV.10 Chemical Control of Sugar Cane Diseases	Sugar Cane Breeding
IV.11 Plant Collection Surveys	Herbarium

IV. 1 Silage for Semi-Arid Areas This is one of the series of projects designed to improve the productivity of indigenous livestock on the semi-arid rangelands of East Africa. One of the primary factors limiting animal production in these areas has been insufficient feed during the dry season -- even when sufficient water can be provided through boreholes, there has not been enough food available to support livestock. This project was to investigate the feasibility of utilizing all the available rainfall in these areas to grow early maturing varieties of maize and sorghum/sudangrass hybrids and then use the silage as a supplementary livestock feed during the long, dry season. Besides testing the feasibility of this fodder, different agronomic practices with regard to the use of fertilizers, plant spacing, and weeding practices were also being tested.

Although the large amounts of arid and semi-arid land in East Africa have been discussed in relation to earlier projects, an EAAFRRO source on this project distinguished between low rainfall potential rangelands and hopelessly dry arid deserts. It is the former category of land, in a rainfall belt of 20-30 inches per year, that is not suitable for either intensive crop or livestock production but is able to support large livestock grazing ranches with perhaps one animal per ten acres and is able to grow specially developed early-maturing cereals. This still "vast" area comprises approximately 20% of East Africa's land, mostly in Kenya and Tanzania.

One EAAFRRO officer is now working part-time on this project, plus some technical staff from the Animal Production Division's Athi River Ranch, which is located in this rangeland ecological zone and used as the field site for this project. There is no cooperation with the national level on this project. It began in 1970 after being selected by the Animal Production Division and approved through the official committee system. They then approached the present officer in the Physics and Chemistry Division to work on it with them, and when the Animal Production Division largely disbanded following the Wasawo report, he was the only one left working on it. Rangeland

IV. 2 Cultivation and the Physical Properties of Soils This project was designed

to enable an evaluation to be made of changes in the physical nature of soils caused by various cultivation techniques, particularly with respect to semi-arid rangeland areas. Different types of land preparation surface cultivation techniques, and their timing with respect to planting, are being investigated for their effect on the physical properties of soils. The effects of different weed control cultivation techniques and herbicide treatment are also being established. The project was being carried out on large-scale national wheat experiments around Njoro (Kenya) and Lyamungu (Tanzania), but according to an EAAFRO source the results should be relevant to all areas of mechanized agricultural cultivation -- not just wheat.

Kenya's national wheat breeding research station at Njoro initiated this project by approaching EAAFRO to work on the soils aspect of their own trials, and this project is actually more theirs than it is EAAFRO's. As one aspect of their work, they utilize various cultivation techniques and investigate the effect on wheat yields -- EAAFRO's cooperation is limited to examining what happens to the physical structure of the soil as a result of the different techniques. Once a year, immediately after the harvest, the EAAFRO officer working on this project collects soil samples at Njoro and Eldoret in Kenya, and at Lyamunga in Tanzania, and takes them back to EAAFRO headquarters for analysis. The project was apparently agreed upon bilaterally between Njoro and EAAFRO in 1969 without going through the specialist committee system, and then later extended to Lyamunga by the Canadian research aid team which is working on wheat breeding in both countries. Most of the cooperation to date seemed to have been with the Kenya project, however, and this EAAFRO source commented that all communication with Tanzania had broken down over the previous six months. One EAAFRO officer was working part-time on this project, plus some support staff. Rangeland

IV. 3 Crop Water Requirements This project concerns the water use efficiency of a crop, which can be defined as the quantity of water used by the crop per unit weight of dry matter produced. Using a lysimeter, studies related to these factors have been carried out on the water requirements of maize, beans, sugar cane, and tea at different stages of growth. Similar work on sorghum and millet at Serere was being planned. The applicability of the results of this project were reported by an EAAFRO source to be related to these crops; especially in the low-rainfall and/or rangeland areas of East Africa or to areas where irrigation projects were being planned.

Cooperation in the field on this project is being carried out at two sites in Kenya and at one site in Tanzania. The Tea Research Institute at Kericho (Kenya) is supervising the experiments on tea located there, and the National Irrigation

Board of Kenya has provided space for experiments for all crops and assisted with their maintenance. In Tanzania, the cooperation has been with a private firm -- the Tanganyika Planting Company -- on sugar cane. EAAFRRO designed the experiment, which is carried out in Tanzania, and the data is sent to EAAFRRO headquarters for analysis. According to an EAAFRRO source, there has been a continuing problem of cooperation with national governmental research programs because they do not have the financial or scientific manpower capability to support cooperation. Kenya, on the other hand, has more money and more research scientists, which are necessary for cooperative efforts because EAAFRRO doesn't have the resources to do everything, and Kenya is thus able to utilize EAAFRRO's cooperation more.

This project began in 1965, reportedly as a continuation -- "the next logical step" -- of previous EAAFRRO work done on evaporation and plants. EAAFRRO thus originated and provided the impetus for the project, which was approved by the Natural Resources Research Council of the EAC. This project is in the final stages of data analysis -- the active work is, temporarily at least, finished. One EAAFRRO officer is working alone on the project, part-time. In the past, however, more officers had been involved in it. Maize, Tea, Sugar Cane, and Beans

IV. 4 Pulpwood Storage Trials For pulping purposes, wood must be clean or it has to be bleached. Different fungi can cause rotting in felled trees, which results in a lower quality paper product; and they can also stain them. This project is to investigate what happens to felled pulpwood logs stored under a variety of conditions and for different lengths of time with respect to fungal decay and staining. These results will potentially be applicable wherever there is a pulp and paper industry in East Africa, but the only country that is beyond the speculation stage for this type of industry is Kenya. Their pulp and paper mill at Broederick Falls is expected to begin production around 1974.

And this project is, in fact, being carried out in close cooperation with the Kenya Forest Department. They designed a set of trials for this experiment and sent a draft of their plans to EAAFRRO for criticisms in 1971. An EAAFRRO officer reported that Kenya's plans were not statistically sound, and so the EAAFRRO statistician and an EAAFRRO Forestry officer rewrote the design and returned it. Kenya then requested that EAAFRRO cooperate on this project, and EAAFRRO replied with a qualified yes until the up-coming Specialist Committee on Forestry Research could discuss and approve it -- which it did. The cooperative project then began in late 1971.

There will not really be that much for EAAFRRO to do in cooperating on this project. Once the trials were designed, Kenya will be cutting down the trees, storing them under a variety of conditions, labeling them, etc. At periodic intervals, they will pull out sample logs and bring them to EAAFRRO headquarters

for analysis and interpretation. One EAAFRO officer is spending a minor portion of his time on this project, plus a part-time graduate scientific assistant. Pulp and Paper Industry

IV. 5 Charcoal By-Products/Wood Preservative This cooperative project involves assisting the Utilization Section of the Uganda Forest Department in testing the potential of charcoal by-products as wood preservatives -- for example, protect telephone poles against fungal decay. Traditional, indigenous charcoal making goes on all over East Africa, so all Partner States might be interested in these results. An EAAFRO source reported, however, that these by-products are obtained only through the large-scale utilization of charcoal in steel processing operations, and that the only steel production of any significance in East Africa takes place around Jinja in Uganda.

In 1970, the Uganda Forest Department reportedly requested EAAFRO to cooperate on this project, and EAAFRO agreed. It was then discussed and approved at the next Specialist Committee on Forestry Research meeting in late 1970 and began in mid-1971. Uganda prepares test block specimens according to the experimental design specifications, treats them with chemical by-products, and sends them to EAAFRO headquarters for analysis. One EAAFRO officer is devoting a minor portion of his time to this project, plus a part-time graduate assistant. Charcoal/Steel Industry

IV. 6 Biological Control of the Woolly Aphid The woolly aphid is an insect that had recently been discovered in East Africa. It attacks pine trees. As EAAFRO Newsletter No. 41 (February, 1969) stated:

As far as is known this is the first occurrence of a woolly aphid in Africa south of the Sahara and its appearance here is a possible threat not only to East Africa plantations but also to other major plantation areas further south in the continent. . . . This Pineus pest is a potential threat to Pine plantations throughout East Africa . . . reports from New Zealand and Australia suggest that attack may result in the death of up to 10 per cent of natural regeneration and marked loss of vigour in planted trees.

This pest was a native of northern hemisphere temperate areas, and only recently had been accidentally introduced into Australia, New Zealand, and South America. When heavy infestations were suddenly found in the pine forests right around Muguza and Kikuyu (where EAAFRO and the Kenya Forest Department are both located) in January of 1969, an EAAFRO source described the situation as a crisis. He estimated that this pest could reduce timber yields from pine plantations in East Africa by a half. The usual procedure in crises situations was for all specialists in the field concerned to get together and decide what to do, without going through the time-consuming official Specialist Committee (or any other) system. In

this case, an EAAFRO officer got together with the Forest Entomologist from the Kenya Forest Department, and the first thing they undertook, with help from the national forest departments, was a survey to determine how wide-spread the pest was. No trace was found of the pest in Uganda or other parts of Kenya, but infestations were discovered at Sao Hill and West Kilimanjaro in Tanzania. Moreover, it began to appear that the pest had entered East Africa through EAAFRO's own plant imports for the breeding project and had been unwittingly distributed by EAAFRO to Tanzania. These two specialists also agreed right away on the necessity for legislation to enforce the destruction of infested trees, and that Kenya would begin research work on insecticidal control of the pest while EAAFRO would work on biological control through natural predators or parasites imported from Europe. Work began immediately on insecticidal control, but early results were mixed. In cooperation with the Commonwealth Institute of Biological Control, which has a unit located at Kawanda Agricultural Research Station in Uganda, the biological control project began in January of 1971. Two specific natural predators of the woolly aphid were collected in Europe and sent to EAAFRO headquarters where they were released on infested trees. The investigation is still continuing.

In this crisis atmosphere, cooperation with the national level seems to have been quickly forthcoming. When informed of the nature of the pest, national forestry departments cooperated on the detection and destruction of their infested trees. Moreover, when so requested, all the national forestry departments immediately agreed to fully support the EAAFRO project financially. In addition to the complementary project on insecticidal control of the woolly aphid, the Kenya Forest Department is also cooperating on releasing the natural predators and monitoring their progress for the biological control project. One EAAFRO officer is devoting a minor portion of his time to this project, plus some part-time support staff.

Softwoods

IV. 7 Nematode Survey Nematodes are microscopic worm parasites that usually attack the plant roots and impair the development of plants. Before any work on general control measures of nematodes in East Africa can begin, the major nematode problems must be determined. This project involves nematode surveys and assessments of their yield loss effects on beans, bananas, and citrus in East Africa.

This general nematode project is what the EAAFRO officer in charge of it originally came to East Africa to do. With the discovery of the rice white tip nematode described earlier, however, this project has only assumed a minor role. According to an EAAFRO source, research on nematodes in East Africa in the past had been slight and sporadic. There seems to have been no specific project on nematodes selected, but when USAID offered to supply a few trained research scientists to EAAFRO, nematology was one of the priority fields determined by

the Chief Research Officers of the three Partner States. The work on the particular crops of beans, citrus, and bananas had its origins in different ways. A general problem on beans originated from the Thika area of Kenya, where individual growers are supplying the crop to Kenya Canneries. It was determined that their problem was caused by nematodes, and a separate control project (IV.8) was subsequently begun by an EAAFRRO graduate officer trainee under the guidance of this EAAFRRO officer. The work on citrus nematodes seems to have been started because the EAAFRRO officer in charge was familiar with citrus problems in other parts of the world and he was curious about what the situation was in East Africa. A specific request from Tanzania to investigate nematodes in bananas on the western shores of Lake Victoria provided the impetus for that survey.

The potential applicability of all this work would extend to all citrus, banana and bean growing areas of East Africa, since the nematode parasites have been found in all three Partner States. In the case of beans, however, the greatest interest and investment in the growth and canning of horticultural crops for export has occurred in the Thika area of Kenya, where large-scale processing facilities have been established and both large-scale and small-scale supplier farms encouraged. In the case of citrus, the survey to date had indicated that there was a nematode problem, but the assessment of its economic importance would determine whether further work would be done. Citrus fruits grow all over East Africa and the applicability would be wide-spread and general. Although the request to work on bananas came from Tanzania, the applications of the results are much greater in Uganda where bananas are more of a basic food crop. In both Kenya and Tanzania, they are usually eaten as a supplementary fruit.

Outside of the Thika area, field surveys had been conducted in the central areas of both Kenya and Tanzania, and the trip to western Tanzania was just about to begin. Cooperation from the national levels had been limited to providing housing facilities on extended surveys and showing examples of infected plants. One EAAFRRO officer was devoting a minor part of his time to this project. A graduate officer trainee was devoting a major portion of his efforts to the bean problem for his M.Sc. degree work, but that is discussed below. Bean, Citrus and Banana

IV. 8 Bean Nematode As was discussed above, after the bean problem at Thika (Kenya) was discovered to be caused by nematodes, a project was begun to investigate economical ways of controlling the parasite. Since the nematodes exist in the soil and attack the plant roots, different soil treatments were being tested with respect to subsequent increases in yields as compared with costs for the small-scale, peasant farmer. This project is being done at field sites near Thika in cooperation with individual farmers, but there is no direct cooperation with national researchers.

The applicability and history of the project were discussed above. An EAAFRQ officer is devoting a minor portion of his time to advise the EAAFRQ graduate officer trainee who is doing most of the work, Beans.

IV. 9 Root Production of Vegetative Cuttings In order to pass plant material through the Plant Quarantine Service, once the plant material arrives it must be kept, grown, and propagated for distribution if it is pest and disease free -- i.e., it must not be allowed to die out. This project is concerned with the efficiency of establishing plant material at the Quarantine Station which arrives in the form of "cuttings." Cuttings of plants have no roots, and so they must be grown in a special environment in order for them to develop roots. Special factors which might affect this root growth and are being investigated in this project include the following: the effects of damage in transit; the effects of damage from fumigation upon arrival; the effects of differences in climate and/or seasonal changes between the country of origin and East Africa (light, temperature, day length, etc.); the effects of growth hormones; the effects of different rooting media.

Of all the plant material coming into the station, the most important products that come in the form of cuttings (instead of seeds) are grade vines, pineapples, bananas, and potato tubers. There is no national cooperation on this project; technically it hasn't even started yet. The EAAFRQ officer working on this project had just arrived from university training a year earlier. According to an EAAFRQ source, the general concern for improving the efficiency of the Quarantine Station's operations was stressed by the head of the Station, and this young graduate officer then got the idea for this project. He apparently did background work and wrote a detailed proposal on the project -- among other duties -- during his first year, which was submitted to the Director of EAAFRQ and which is where the matter stood at the time of the interviewing. Horticultural Cuttings - Quarantine

IV. 10 Chemical Control of Sugar Cane Diseases Although resistant varieties of sugar cane are the ultimate answer to the disease problem in East Africa, chemical control measures are being tested for use in the short-term. Testing of chemicals already in use and of promising new ones provided by private companies is going on as part of the disease unit for sugar cane breeding located at Kawanda (Uganda). According to an EAAFRQ source, fungal and -- to a lesser extent -- bacterial diseases are the principal ones controlled in this way; virus diseases are left to the resistance built up in the breeding program. The testing is carried out on privately owned sugar cane estates around Jinja -- there are no field sites in either Tanzania or Kenya, and no national level cooperation from any of the Partner States. According to the same source, the results will be applicable throughout East Africa, however, since before embarking on a chemical testing program the diseases are checked to ascertain that they exist and function the same throughout

East Africa.

This series of chemical tests began in 1970, but apparently there were earlier chemical control experiments which evolved internally at EAAFRO. During a previous investigation of sugar cane yield losses due to brown spot disease, it was necessary to begin a chemical spraying program in order to find out what maximum yields were. From these origins, it was reported that the present project developed. It apparently did not go through the Specialist Committee system, but has been informally discussed and approved at the meetings. One EAAFRO officer devotes a minor portion of his time to this project, plus extensive, part-time support staff. Sugar Cane

IV. 11. Plant Collection Surveys Many plant specimens added to the Herbarium's collection are sent in by outside private and public sources in East Africa, but some collecting field trips are made by EAAFRO officers. Some of these trips are made to generally discover and classify all the plant vegetation that exists in a certain area, such as the collection visit to Tanzania's Ruaha national park, or for some specialized purpose, such as the trips in search of cancerous causing plants in the Narok area of Kenya. These surveys occur at irregular intervals depending on the availability of Herbarium staff. Inasmuch as these collection trips add to the basic knowledge of plant life in East Africa, their usefulness is generally spread all over the region. These trips are considered part of the Herbarium's normal -- if infrequent -- activities and are not intended to go through the official Specialist Committee system in order to be selected. One semi-retired EAAFRO was spending some of his active time on these trips, and two other officers reported that they also went out collecting on occasion. Collecting today, however, seems to be a very minor part of the Herbarium's activities. Basic Research

Class V - A project in the lowest priority classification has one part-time officer devoting a very minor portion of his time to it, plus some support staff at times. These projects seem to be more personal in nature than do those in Class IV.

<u>Project</u>	<u>Division</u>
V. 1 Trace Element Analysis Methodologies	Physics and Chemistry
V. 2 Seed Bed Roughness and Germination	"
V. 3 Pin Hole Borer Population Patterns	Forestry
V. 4 Cypress Canker Disease Criteria	"
V. 5 Liveweight Body Composition Prediction Techniques	Animal Production

V. 1 Trace Element Analysis Methodologies In order to investigate trace element deficiencies in East African soils which are adversely affecting different crops, consistent and reproducible methods of analysis are being developed in this project. Eventually, data on trace elements will be combined with other analytical data on soil fertility in East Africa to produce a complete picture of crop requirements, but as yet this project might almost be considered an analytical service with little experimental work on it.

The impetus for this project originated, according to an EAAFRO source, in a service request from Tanzania. Tanzania had decided to grow wheat on former pyrethrum farms around Ilonga, but they were getting poor yields and couldn't understand why. The government chemist thought trace element deficiencies might be the cause, so he sent soil samples to EAAFRO for analysis. Results were very nebulous, however, and not much notice was taken until the Canadian wheat research team based at Lyamungu (Tanzania) performed some pot tests which established the deficiency. At that point in 1971, Tanzania took the initiative in organizing two conferences on land use and fertilizers, which an EAAFRO representative attended, and now with some more manpower available, EAAFRO may do more in this field. As part of the general soils and fertilizers project discussed above (Project No. III.2), the Chief Research Officers of the three Partner States had also approved, in principle, a study of the micro-nutrient (trace element) status of East African soils. So there is some official approval of it. The only national-level cooperation to date has been with Tanzania.

As a project concerning methodologies of analysis, the results should be potentially applicable to any trace element experiment. The work to date, however, has been on the wheat crop, and the results will be most immediately applicable to the wheat growing areas of Tanzania. Coffee is also affected by trace element deficiencies, and according to this EAAFRO source citrus fruits and sorghum and millet may also be areas of future application. One EAAFRO officer began devoting a minor portion of his time to this project in 1971. Wheat

V. 2 Seed Bed Roughness and Germination This project involves pot tests with seed beds of varying maximum particle size -- i.e., "roughness" -- and the seed germination process of different crops. The effects of this roughness, as related to cultivation techniques, on seed germination are being observed for wheat, maize, and cotton plants. The only EAAFRO officer working on this project thought of it himself from observations he had made on local cultivation practices and started it in 1971. He devotes only a very minor portion of his time to it, but if the preliminary results are promising, he may want to expand it into a larger role with proper field tests. If so, he would then write a "proper proposal" and submit it to the

appropriate decision-makers. Potentially, it was reported that the results should be applicable wherever mechanical cultivation techniques are being used, as more crop seeds would be brought into the design. There was no cooperation with the national level. Mechanical Cultivation

V. 3 Pin Hole Borer Population Patterns Forest Enrichment Programs are designed to aid the growth of valuable tree species in indigenous natural forests by poisoning the waste trees and leaving them to die. Unfortunately, these dead trees are left to rot and become hosts for the Pin Hole Borer, a beetle which exists in dead or damaged trees and attacks live, healthy ones. This beetle is not so dangerous in itself, but it carries fungi along with it when it bores into trees and this causes rot decay. Therefore, the focus of this project is on population fluctuations of the beetle and the effects of different forest management techniques on them.

Forest Enrichment Programs are applicable to any indigenous, natural forest, but only Uganda has utilized them to any extent. Kenya is concentrating almost solely on plantation forests, and, although Tanzania has valuable indigenous forests and has placed a great deal of emphasis on them, she had not adopted these forest enrichment programs. This project, according to an EAAFRRO source, came into being at the request of Uganda's Forest Department when they discovered the problem. They invited an EAAFRRO officer to observe the build-up of the beetle population in the poisoned trees, and he designed the experiment and arranged the necessary cooperation -- Uganda is responsible for the field sites and collects all the data, while EAAFRRO assists in the analysis and interpretation. This project was subsequently included in the proposed EAAFRRO forestry program discussed at the next meeting of the Specialist Committee on Forestry Research, and was approved. It began in 1964 and the field work was completed in 1971; only the data analysis remained to be done. There was only the one EAAFRRO officer devoting a very minor portion of his time to this project. Natural Forests

V. 4 Cypress Canker Disease Criteria Past problems with unusually high attacks of a strain of cypress canker disease in trials where the trees have been selected for their natural resistance to this disease -- and others -- have led to doubts about the selection criteria being used. Accordingly, a direct test of the validity of these criteria is underway along with a general investigation of tree characteristics that seem to correlate with susceptibility to the disease.

One EAAFRRO officer was devoting a very minor portion of his time to this project, which began in 1970. No indication was given of the origins of the project or of any national-level cooperation. The results would presumably be applicable to

plantation softwood breeding programs in East Africa. Softwoods

V. 5 Liveweight Body Composition Prediction Techniques In experiments on the feed to meat conversion ratios of cattle and the effects of climate and/or environment on those ratios, the body composition of the experimental animals is one of the uncontrollable variables that interferes with their validity. The only way to control for this variable at present is to slaughter the animal and do a carcass analysis -- a costly and time-consuming process. In this project, a technique for predicting the body composition of a live animal was being investigated.

The potential applicability of the results -- if successful -- would directly be felt in livestock experiments, and only indirectly would there be any practical or economic implications for any of the Partner States. There is some cooperation on this project with the Faculty of Agriculture at the University of Nairobi (Kenya) but none with national level researchers. Only one EAAFRRO officer is devoting a very minor portion of his time to this project, which began in 1970, and the basis for doing it was reported to be this officer's own personal interests and experimental needs -- it has not gone through the Specialist Committee system. Rangeland

There may be more experimental research projects in the Class IV or V categories that were not reported because of their minor importance, but this descriptive list should include all of the major ones. We shall now take a look at the scientific services⁶⁾ which EAAFRRO performs:

Class I - Highest Priority - In terms of manpower and/or extent of activity.

- I. 1 Plant Quarantine Service
- I. 2 Library
- I. 3 East African Literature Service
- I. 4 Herbarium Identification of Plant Specimens

I. 1 Plant Quarantine Service This service provides the detection apparatus for the comprehensive set of quarantine regulations agreed upon by all the Partner States, which are designed to prevent the introduction of hazardous insect pests and plant diseases to East Africa. Particularly with the current demand for improved varieties of crops -- and new crops -- there is a continual danger that varieties or germ plasma imported for breeding programs will bring new pests and pathogens along with them. Moreover, East Africa is still free from some of the most destructive pests and pathogens, and it would be a great shame to lose this

⁶⁾ Practically all EAAFRRO officers perform general advisory services in their specialities on an ad hoc basis when requested. These problem-solving services are not included in the following list unless they have been formalized or become a major activity.

advantage.

East Africa has had plant quarantine facilities since 1931, when a station was opened at Amani (Tanzania), where EAAFRO was then located. The present quarantine station was opened at Muguga in 1954, the same year the Inter-African Phyto-Sanitary Commission -- now an organ of the CAU -- was formed. As members of the CAU, Kenya, Uganda, and Tanzania are obligated to conform to the plant import regulations recommended by this Commission. The station at Muguga provided adequate service until about 1963 when pressure on its use increased considerably and capacity was doubled. There has been an ever-increasing demand on its limited services since then, and officially only the material accorded the highest priority by the three Chief Research Officers at their annual meeting can be handled.

According to the regulations, there are three categories of plant imports: Those permitted to enter without any restrictions; those prohibited from entering under any circumstances; and those permitted to enter only under quarantine. In the latter category, the EAAFRO officer-in-charge of the Quarantine Service is the only person who can issue quarantine permits. According to an EAAFRO source, any request for such a permit goes to the Chief Research Officer of the Partner State concerned, and he decides on their priorities with respect to the amount of space available at the Station. Roughly one-third of the Station's capacity is allocated to each Partner State, and so except for a small amount of material imported for EAC programs, the Partner States decide what is allowed into quarantine. Once into the station, however, the Quarantine Service personnel decide how long specimens are to stay and if and when they are allowed to pass through. All Chief Research Officers are notified, however, of all plant material in quarantine and after clearance it is made available to all Partner States if they so request.⁷⁾

There is, therefore, fairly close cooperation between the Plant Quarantine Service and the Chief Research Officers in all Partner States. There is further cooperation with the Plant Inspector of Kenya. Restricted plant material that does not have a permit should be intercepted at the airport (most plant material is imported by air) by the national Plant Inspectors, and they may send it to the Quarantine Station or order it destroyed. In Kenya, it is possible because of the close distance to send intercepted material to the Quarantine Station, but this is not a practical possibility for material landing in far-away Tanzania or Uganda. In addition, the Kenya Plant Inspector provides facilities for the fumigation of imported seeds, since EAAFRO doesn't have any. Thus, according to this EAAFRO source, although all three Partner States are officially allocated about one-third

⁷⁾ There has been an exception to this rule, however -- plant material that was the secret property of a private firm was, in at least one case, not made available to anyone else.

each of the Quarantine Service's space for their own priorities, because of its closeness, Kenya is able to utilize the service quickly and take advantage of unused space for local problems much more so than either Tanzania or Uganda.

I. 2 Library The library at EAAFRQ is run jointly with the East African Veterinary Research Organization. The two institutions are both located at Muguga, about three miles apart, but the library is part of EAAFRQ's building complex and for all practical purposes can be considered part of EAAFRQ. It is generally recognized to be by far the most comprehensive agricultural library in all of greater East Africa.⁸⁾ Its materials are available for anyone who wishes to use them on the premises and to qualified individuals on loan. (Due to difficulties encountered in retrieving some publications, they are usually not loaned out to outside individuals anymore except by request from station librarians or officers-in-charge.) The personal use of the library is thus greatly determined by its availability or distance from the individual concerned. An inter-library loan service had been in operation in the past, but its use seems to have declined as the East African Literature Service -- discussed below -- was developing.

The services involved in the library work are mostly those which are done in any library: classification and cataloging work, a book-binding service, the obtaining of references on request, the distribution of Annual Reports, etc. Where measures of national utilization are possible, Kenya reportedly is able to make more uses of these services than either Tanzania or Uganda because of distance.

I. 3 The East African Literature Service East Africa covers a very large area of more than 650,000 square miles in which it has been estimated there are only five well-stocked and adequately equipped libraries -- and three of them, including EAAFRQ's, are situated in the Nairobi area of Kenya. The lack of available scientific literature in the more remote areas of East Africa -- particularly parts of Tanzania and Uganda -- had been recognized for some time, but the suggestion for a mechanism to help provide such literature was reportedly made in 1965 at a conference of the Director of EAAFRQ and the Chief Research Officers in the Ministries of Agriculture in the three Partner States. The Rockefeller Foundation in the United States was approached by the EAC to support a pilot project in East Africa designed to provide current scientific literatures to research-related workers, particularly in smaller, more remote stations, and they agreed to provide funds for the first three years beginning July 1966.⁹⁾ After early preparatory

8) A term used to include Ethiopia, Zambia, Malawi, Somalia, etc.

9) It is only fair to point out that the Director of EAAFRQ was, himself, supported by the Rockefeller Foundation.

work, the service began in early 1967.

Basically, the service works as follows: copies of the list of available periodicals in the EAAFRRO library are sent to all recipient institutions and circulated there among their members so that all relevant periodicals for an institution are listed. The Table of Contents pages from the relevant periodicals are then photocopied and sent to the institutions, where members check off those articles they would like to receive in full. Photocopies of the requested articles are then sent to the institutions -- not the individuals -- and there should become part of that institution's information resource. This work is supposed to take top priority in the system, and a full cycle of the process -- after the initial selection of periodicals -- is supposed to take only eight weeks.

An evaluation of this Service carried out in March of 1969¹⁰⁾ stated that the number of participating institutions had grown from 63 in the beginning to 132 by the end of 1968 -- some outside of East Africa in Zambia, Malawi, Ethiopia, etc. A self-reporting sample of 93 of these institutions indicated that 166 scientists in Kenya, 163 in Tanzania, and 336 in Uganda were being served -- but some definitional discrepancies may have affected these results. (A complete list of the participating institutions obtained in late 1971 shows that out of 181 in total, 69 are located in Kenya, 30 in Uganda, 55 in Tanzania, and 27 outside of East Africa -- no indication of the numbers of research-related people served at these 181 institutions was available.) EAAFRRO's production of numbers of photocopied articles per month had similarly risen from just over 4,000 at the beginning to some 17,000 toward the end of 1968. These articles came from more than 700 periodicals.

The evaluation itself was based on questionnaires sent to all participating institutions and on personal interviews at 30 of the institutions in East Africa selected to provide a good cross section. The numbers and response rates and methodological details of the evaluation are somewhat confusing, but the results are stated clearly:

It is perfectly clear from the answers to the questionnaire and the personal interviews that scientists in Kenya, Tanzania and Uganda were not able to obtain adequate scientific literature to support their research before the advent of the E.A.L.S. This fact was stated by 86 per cent of the respondents to the questionnaire and 90 per cent of those personally interviewed. . . . The information contained in the material received from the E.A.L.S. has definitely stimulated the research workers and affected the work done at their stations. . . . The material supplied by the E.A.L.S. has helped to shorten the time required to complete a project for 67 per cent of the users. . . . (Committee on Evaluation, pp. 13-14).

¹⁰⁾Committee on Evaluation - N.L. Sempira, Chairman, "Report on the East African Literature Service," East African Community, 1969.

The Committee therefore not only reported that the Service was performing a much-needed and useful service, but also recommended that the EAC gradually take over the full cost of it beginning in 1969/70 and this has been implemented.

I. 4. Herbarium Identification of Plant Specimens Upon request from any member of the public, plant specimens sent to the East African Herbarium will be identified and information supplied about them. In order to carry out this service, the largest collection of indigenous East African plants in existence is maintained in the Herbarium, and is constantly being added to any up-dated. Many of these requests come from schools or universities, or from botanical researchers in them. A number of requests also come in from national veterinarians and government chemists about poisonous plants. There are a number of poisonous plants which cattle can die from; particularly expensive imported cattle which are not familiar with them and will eat them whereas indigenous cattle won't. Information requested usually concerns plant descriptions so they can be weeded out or possible antidotes/treatments for the suspected poison utilized. Another important category of requests concerns the potential medicinal value of indigenous East African plants. Pharmaceutical firms are just beginning to investigate traditional plants that have become known for such things as treating wounds or gonorrhoea or inducing abortions. And a large number of requests come from amateur gardeners or horticulturalists who want to know more about plants they have found and/or are growing.

The Herbarium collection was started in 1907 at Amani (Tanzania) and moved to Nairobi when EAFFRO moved to Muzuga just after World War II. I has always been dependent upon cooperation with outsiders who send new specimens in to add to the collection and who go on collecting field trips in out-of-the-way areas. The national universities in all three Partner States cooperate in this way, but according to Herbarium sources, the University of Dar es Salaam stands out in this respect, as does the Forest Department in Tanzania. Cooperation is very closely related to utilization of this service -- when requesting the identity of plants, some of them are likely to be new additions to the collection. Thus Makerere University in Uganda is by far the oldest university in East Africa and has its own herbarium and doesn't need this service as much as other universities. The national parks in Tanzania seem to have also been a heavier user of the service than those in Kenya or Uganda. Kenya's Veterinary Department has had the most requests about poisonous plants, however, and the major pharmaceutical firms are also in Kenya. Very close relations with Kew Gardens in England are maintained for problems that the East African Herbarium cannot solve.

As a basic scientific service, plant identification is equally applicable in all three Partner States. One Herbarium source stated that most requests ori-

ginated in Kenya, but another Herbarium source provided some quantitative figures for 1970: 4,829 specimens to be identified came from Kenya, 944 came from Uganda, and 6,270 came from Tanzania. A great many requests also come from other countries in Africa -- Ethiopia, Zambia, etc. -- and from visitors.

Class II - II. 1 Armyworm Forecasting

II. 2 East African Agricultural and Forestry Journal

II. 3 Statistical Advisory Service

II. 4 Machinery Coordination Service

II. 5 Regional-National Liaison for Cereals Programs

II. 6 Advice and Assistance to National Cereals Programs

II. 1 Armyworm Forecasting The armyworm is an insect pest which, in the past, has done great damage to parts of Tanzania and Kenya -- Uganda has been much less affected by the locust-like attacks. A 10-year armyworm research project at EAAPRO, supported by the U.K. government through the Anti-Locust Research Centre in London and which ended in 1971, had done a lot of work on migratory patterns and seasonal changes in the distribution of the pest which formed the basis for the armyworm forecasting service. A system of light traps placed throughout East Africa provides weekly data on the number of specimens captured, and larvae samples are examined to estimate the date of moth emergence. Combined with information from the Meteorological Department on wind patterns and shifts, accurate and reliable predictions have been made weekly during the November - June outbreak season of those districts in East Africa where armyworm larvae infestations are likely to occur.

This service is essential because the main problem in combatting armyworms up to this time had been the failure to apply control measures in the short time while the larvae are still young. Farmers who have been warned can be prepared and on the look-out for the larvae in their crops, and will have a good chance of finding and destroying them before any serious damage is done. The larvae can be effectively controlled only in their very young stages -- which can be a matter of days -- so being ready for them is crucial.

In addition, the armyworm research program did work on the life history, biology, and chemical control of the pests, and the results of this work have been published in leaflet form to assist field extension officers and farmers in recognizing and controlling the pest.

The service is dependent, obviously, on data from the light traps, which are established at national research stations and other places throughout East Africa. These light traps must normally be maintained by the people on the site, and the data collected and sent in -- otherwise the forecasts will not be accurate. The weekly forecasts are publicized all through East Africa through newspapers

and radio broadcasts to alert everyone in the districts where outbreaks are predicted.

II. 2 The East African Agricultural and Forestry Journal - The East African Agricultural and Forestry Journal, published quarterly by EAAFRRO, is the only significant periodical on agricultural and forestry research published in and especially for East Africa. As such, it not only provides the principal official medium for the communication of research results but also the principal publication source in which East African researchers, regional, national, university, private, etc. -- in the field can hope to get their results published and thus gain scientific recognition. This latter function is especially important for indigenous researchers who do not have the contacts with foreign journals that expatriate researchers often do.

The services involved in publishing this journal are the normal ones for such a task: the editing and/or acceptance/rejection of submitted papers; the preparation of pictures, graphs, etc. to the printing stage; business matters concerning subscriptions and requests for previous issues; etc. In addition to the regular issues, special issues on specific topics such as wheat or wildlife management have also been published.

II. 3 Statistical Advisory Service - There has been a Statistics Division in EAAFRRO, and the main work in this division is to advise research workers in East Africa on the design and analysis of experiments. This service is supplied both to EAAFRRO researchers and to researchers from other regional, national, or private institutions in East Africa. One of the main aspects of this service has been the analysis of large bodies of data using electronic computers, which has resulted in a large library of computer programs being built up which covers a wide range of experimental work. Examples of such work listed in EAAFRRO Newsletter No. 47 (August 1969) include the joint EAAFRRO/EAVRO data on livestock food intake, the data on yields and leaf analysis from the EAAFRRO crop water requirements trials concerning tea, data from coffee berry disease trials carried out by the Coffee Research Station at Ruiru (Kenya), data from aerial surveys of wildlife taken by the UNDP/FAO Range Management project in Kenya, and inventory plot data collected by the Kenya Forest Department.

Much of this service work is done for internal EAAFRRO projects, mainly in the Forestry and Plant Pathology and Nematology Divisions and formerly in the Animal Production Division. EAAFRRO's Annual Report for 1970 stated that 128 service requests came from within EAAFRRO that year. Requests for service from outside of EAAFRRO reportedly had been steadily increasing ever since the service was started in 1965. In 1970 once again, 118 requests for service came from Kenya research organizations, 11 requests came from Tanzania, and 39 requests came from

other EAC institutions -- apparently none came from Uganda. (EAAFRO, 1971, p. 157)¹¹)

II. 4 Machinery Coordinating Service According to an EAAFRO source, this service grew out of the East African Machinery Testing Unit which existed from 1956 to 1962 as a regional institution outside of the High Commission framework. It was located in Nakuru (Kenya) and was part of a National Institute of Agricultural Engineering from the U. K. After independence in the early 1960's, Tanzania and Uganda would not agree to a continuation of this arrangement because they believed that the regional unit had been doing work mainly for Kenya, and this source admitted that the charge was true. It was decided that each country would establish its own national agricultural engineering institution, and a personal position was created within EAAFRO for an officer to coordinate the three national institutions. Subsequently, the scope of the position was broadened to include the coordination, direction, supervision, etc. of any agricultural engineering activity in East Africa, but the position did not become an official part of EAAFRO and the EAC until 1970.

The extent and range of activities reportedly included in this service is enormous: advice and assistance in developing agricultural engineering curricula, and also lecturing and examining for courses in agricultural engineering; coordination of and supervision of all machinery research and testing; supervision of plowing contests; miscellaneous advice on spraying equipment, building equipment, factory processing equipment, etc., as well as for agricultural machinery, to any governmental or private institution or individual in East Africa; etc. The only institutions reportedly doing research in this area are the universities in the three Partner States -- particularly in the Agricultural Engineering department at Makerere (Uganda). The Tanzanian Agricultural Machinery Testing Unit is engaged in a lot of work on ox-drawn equipment and hand tools, and the Kenya machinery testing unit at Nakuru is about the only place left where machinery can still be tested. In addition to the technical advisory services offered, liaison activities in just keeping people in touch with each other forms an important part of EAAFRO's effort in this area.

Besides the institutions directly concerned with agricultural machinery, this service is also offered to individuals and organizations which are concerned with machinery as only part of their operations -- to Uganda's Seed Multiplication Scheme, to the Ministry of Settlement and Agricultural Development Corporation farms in Kenya, to the Agricultural Finance Corporation of Kenya on equipment loans, to the processors of sisal and cashewnuts in Tanzania, etc. And whenever specific problems arise which might call for mechanical solutions -- such as the floating papyrus islands in Lake Victoria -- this EAAFRO service is also requested.

Finally, both buyers and suppliers of agricultural machinery often utilize the

service in order to decide what equipment is most appropriate for East African conditions.

II. 5 Regional-National Liaison for Cereals Programs The actual operation and supervision of variety trials centers in East Africa were considered to be part of, primarily, the Maize Breeding Project and, to a lesser extent, the Sorghum and Millet Breeding Projects discussed earlier under EAAFRRO's experimental research program. In addition to this experimental testing work, however, there are two closely related service activities associated with the Variety Trials Program for cereals -- particularly in Tanzania and Uganda where EAAFRRO Field Trials Officers are stationed. These positions were -- in fact -- created just to aid in seeing that the new varieties of cereals developed in EAAFRRO's breeding programs were adequately tested under local conditions throughout East Africa. The officer assigned to Tanzania arrived in mid-1970 and had to build up a program of testing from almost nothing. At the time of the interview, there were reportedly 32 different field sites for testing scattered throughout the country under the direct control of national research stations. The officer assigned to Uganda arrived in mid-1971 and had just begun his work. Approximately 27 field sites were already in operation in the north and east parts of Uganda for the testing of new cotton varieties developed by the Cotton Research Corporation, but a further 20 sites in the south and west needed a lot of work done on them. The Varieties Testing Program in Kenya was apparently thought to be adequately managed by their national maize breeding program.

Maize is really the principal crop being tested, and the Field Trials Officers were thus created partly to provide liaison services between Uganda and Tanzania and the EAAFRRO-Kenya maize breeding work going on at Kitale. This liaison activity has involved both the physical carrying of plant material and the mental carrying of ideas, instructions, results, requests, etc. over national borders. With EAC passport visas, this service had been of particular use in recent times when tensions between the Partner States had made such travel difficult for national-level researchers. In addition, regional cooperation in the analysis of data and interpretation of results can be maintained through these Field Trials Officers, as well as the capacity for planning for the future, arranging for regional-national meetings, etc.

II. 6 Advice and Assistance to National Cereals Programs This service is closely related to the above discussion. Tanzania and Uganda are both attempting to develop their own national maize programs, and the Field Trials Officers in those two countries are advising and assisting in this effort in association with their work on the variety trials centers. In Uganda, such assistance included the coordination of cereals demonstration plots at different locations -- supplying seeds, fertilizers,

and instructions as well as organizing and managing them. In Tanzania, similar demonstration plot activities were mentioned as well as the training of national level people to run Variety Trials Centers, aid in planning Tanzania's cereals research program, work on the dissemination of cereals information to extension workers and farmers, etc.

Class III - III.1 Soil and Plant Analyses

III.2 Feed and Animal Material Analyses

III.1 Soil and Plant Analyses The Physics and Chemistry Division provides a general analytic service for soil and plant samples sent in from any institution in East Africa. A clear understanding of the physical and chemical characteristics of soils is necessary to assess the agricultural potential of a given area and to recommend fertilizer applications. The physical composition of sand, silt, and clay in soils, for example, not only affects soil fertility but also cultivation operations. Chemical tests to determine soil fertility in terms of the amounts of nitrogen, phosphorous, and potassium -- the three principal minerals -- are also necessary. Routine analyses also determine moisture contents, pore space, hydraulic conductivity, etc. of soils and the chemical content of plant samples. Some analysis work on water samples is also carried out.

According to an EAAFR0 source, both Kenya and Uganda have the capacity in their own national laboratories to perform these analyses for themselves. Tanzania, however, does not have such a capacity and so uses the service very much. EAAFR0's 1970 Annual Report (p. 19) showed the following breakdown of the requests for this analytical service:

Source of samples	Type and number of samples		
	Plant	Soil	Others
Government of Kenya, Agriculture	33	212	—
Government of Tanzania, Agriculture	181	—	—
E.A.A.F.R.O. Research Divisions	42	1,179	3
Other sources including Kenya Coffee Research Foundation, Tea Research Institute of East Africa, University of Nairobi	507	6	400
Total	763	1,397	403

EAAFR0's own requests dominated the soil analyses category and there were no requests at all from Uganda.

III. 2 Feed and Animal Material Analyses The Animal Production Division of EAAFR0 also has a chemistry section which provides analytical services on feed or animal material samples. Most of the requests -- around 75% -- come from within the

Animal Production Division itself, but the remainder come from the Partner States. Over 12,000 samples of grasses, legumes, carcass meat and fat, blood, feces, and urine were analyzed during 1970 to determine such chemical properties as crude protein content, crude fibre content, calcium and phosphorous content, plasma protein fractions, etc. An EAAFRRO source estimated that this service was quite important to Kenya and Tanzania -- that consistent requests came from these countries -- but not to Uganda.

- Class IV - IV. 1 Forest Decay Fungi Reference Collection
- IV. 2 Forest Insect Reference Collection
- IV. 3 Virus Reference Collection
- IV. 4 Nematode Reference Collection

Class IV is composed of a number of reference collection services that are in the process of development at EAAFRRO. The service in each case is the identification of samples sent to EAAFRRO, and the supply of general information about the sample species and potential or known control measures. All of these collections are just underway and very incomplete, and the necessary maintenance and taxonomic work involved in adding to them was covered in the discussions of surveys in the research section or is included in this category. As reference collections, their application is in the basic background information that is necessary to the performance of any experiments on any of these creatures, and the service is made available to any institution or individual who requests it.

In the case of the Forest Decay Fungi collection (IV.1), the Kenya Forest Pathologist is developing a reference collection of all forest fungi and close collaboration between the two collections on this service was expected to occur. The collection hadn't really gotten underway at the time of interviewing, so there were no indications as to the range of its use. The Forest Insect Collection is further along and has been developed in cooperation with the national forest entomologists in Kenya and Uganda who send in new specimens. Tanzania had not had a forest entomologist for some time, and there was an indication that this was also the reason that Tanzania didn't use the service as much as Kenya and Uganda did. As indicated earlier, EAAFRRO has about the only research capability on viruses in East Africa, and the reference collection work (IV.3) is done without national cooperation. There was some indication that Kenya used this reference service a bit, but that neither Tanzania or Uganda even knew it existed. The nematode reference collection (IV.4) was just beginning and there was no indication of direct national level cooperation or utilization as yet.

- Class V - V.1 Carcass Analysis Techniques Training
 V.2 Provision of Experimental Animal Material
 V.3 Provision of Phyto-Sanitary Facilities

V.1 Carcass Analysis Techniques Training An EAAFR0 officer in the Animal Production Division has developed several short-cut techniques for carcass analysis which are very suitable for use in less well-equipped research stations. These techniques can be used in various livestock experiments. Detailed advice and training has been given to individuals in all three Partner States on the use of these techniques. Teams have been sent to Uganda and Tanzania to provide information, and two individuals from each country have been trained in these techniques for two-week periods at EAAFR0. (It was estimated that each country only needed two trained people.)

V.2 Provision of Experimental Animal Material In this service, EAAFR0 has provided animal material to researchers at the University of Nairobi and specialized animals to national researchers in all three Partner States for their own experiments. The former service involves the stomach material of dead cattle which is used in the Anatomy Department of the University, and this was still going on. The provision of live animals with special characteristics for specialized experiments had reportedly not been done for some time.

V.3 Provision of Phyto-Sanitary Facilities Sanitary isolation facilities are provided at the Plant Quarantine Station for a Kenya experiment which is attempting to grow potato bacteria in vitro. The objective is to compare indigenous bacterial strains to foreign ones, and it was necessary to do the experiment with the proper sanitary safeguards. There is no EAAFR0 cooperation involved in the research, however, and permission was gained from all the Partner States before the facilities were provided.

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Table 1 on the following page summarizes the discussions of EAAFR0's research projects according to certain key variables. In Table 1, six variables are ranked for each research project: the amount of activity or number of Field Sites in each of the Partner States; the amount of Involvement or Cooperation from each Partner State on the project; the Applicability of the results of the research

project to each of the Partner States; the Origins of the research project; the amount of involvement that the official Specialist Committee system had in the selection process of the project; and the total accumulation of these variables into their regional or national orientation. "Applicability" includes not only the ecological "locale specific" property of the project to the site where it took place, but people factors as well -- i.e., if people do not desire a particular crop or research despite its ecological suitability to their area, then the applicability of that EAAFRFC activity decreases. On the other hand, "Applicability" does not include a consideration of subjective national priorities, although the two variables may be related.

The Origins of the research projects are divided into five sources: Internally, from within EAAFRFC; from a foreign source such as USAID; and/or from each of the Partner States. There may, of course, be more than one source of the impetus behind the selection of projects. The final column on the Specialist Committee system refers to the official project selection process which is supposed to be operating for all EAAFRFC projects. This System is more thoroughly discussed in the next section of this study, and the results will also be commented on at that time. The Orientation Column tries to sum up all the previous variables and gives each project one of the following classifications: R = Regional Oriented; k, u, or t = more oriented toward, respectively, Kenya, Uganda, or Tanzania, but still some regional basis for the project; K, U, or T = strongly oriented toward, respectively, Kenya, Uganda, or Tanzania; and X = little or no regional or national orientation.

Numerical symbols are used in a few instances in the Activity/Field Site column when specific numbers were available. It was more often the case, however, that general answers were given to questions concerning national-level relations or particular projects, and these lent themselves more readily to the following symbols used in Both Tables 1 and 2: H = High; M = Medium; L = Low; O = Zero, Nothing. These symbols should be interpreted relatively within a particular project, and not between projects -- i.e., the variable under consideration may be ranked High for one Partner State compared to Medium or Low for the others on the same project, but a ranking of High for one Partner State in one project should not be compared to any ranking for any Partner State in any other project! The Zero symbol, however, does indicate that there was no amount of the specific variable, as compared with some -- however little that "some" might be. Check marks are used in a few instances where it was apparent that there was some amount of the specific variable, but no basis for ranking between the Partner States. Check marks were also used in the Origins columns to indicate the presence of a significant impetus to the original selection of the project. Question marks were used when it wasn't clear whether or not the variable applied to any of the Partner States, and N.A. followed

by dash marks indicates that the variable is Not Applicable for that particular project. H, M, and L have a special meaning in the Specialist Committee column -- H indicates that the Specialist Committee System seemed to operate as it is officially described; M indicates that the System was consulted on project selection after the fact and gave their approval; L indicates that some other apparatus was used to formally signify national-level approval; and O indicates there was or seemed to be little or no role at all played by the Specialist Committee system -- or other regional apparatus -- in the project selection process.

Table 3 on EAAFRQ's scientific services follows much the same pattern. A column on the amount of national-level Utilization was added to this table to compare it with the theoretical Applicability of the services. There was enough information to make such a column feasible for the services, while there was not for the research projects. The symbols used have the same meanings discussed above.

In examining the highest priority, Class I research projects shown in Table 1, certain trends begin to appear. Kenya appears to have more Activity/Field Sites than either Uganda or Tanzania do, and the projects in Class I appear to be more applicable to Kenya (with the exception of sorghum breeding) than to either Uganda or Tanzania. There is no national-level Involvement (cooperation at all on two of the five projects in Class I, and in the remaining three the amount of this variable is very great in the case of Kenya and Uganda as compared to that of Tanzania. Four out of these five projects had at least part of their origins from internal EAAFRQ sources. Only two of them -- Sugar Cane Breeding and the Legume-Virus Survey -- seemed to have had part of their origins from all three Partner States. Two projects had part of their origins from foreign sources, and in both of these cases there does not seem to have been any initiative from the Partner States. Sorghum Breeding, in fact, scores very low on Applicability and Involvement/Cooperation, and only slightly better on Activity/Field Sites due to the Variety Trials Program. Although maize is the most important food crop in Kenya and Tanzania, and one of the most important food crops in Uganda, the applicability of the results of the Maize Breeding program is more relevant to Kenya than to the others because of the locale specific nature of the resultant varieties and the capability of their national program to utilize the resultant breeding methods. This latter factor -- Kenya's relatively greater capabilities in this area -- has been partly caused by the location of the EAAFRQ Maize Genetics Division on the same site as their national maize breeding program, and this condition also is partly responsible for the relatively greater amount of Activity/Field Sites and Involvement/Cooperation that is assigned to Kenya. Kenya seems to have had a special national interest involved in the origins of the Softwoods-Tree Breeding project, and this is also reflective of the greater Applicability

and Activity/Field Sites that she enjoys. The official Specialist Committee system for project selection seems to have operated in only one case -- Sugar Cane Breeding -- where it did, however, operate as it was officially described. In three cases this system did not operate at all, and one case was uncertain.

Overall in Class I, the Sugar-Cane Breeding and Legumes-Virus Survey projects seem to be reasonably regionally oriented; the Softwoods-Tree Breeding and Maize Breeding projects are oriented more toward Kenya than to the other two Partner States, but still does have some regional basis; and there seems to be no basis at all for the sorghum breeding project in Kenya, little in Tanzania, and only slightly more in Uganda. The project selection process in Class I seems to be more oriented toward internal EAAFR0 and foreign origins, although there are two very regional cases in which all three Partner States seem to have originally participated.

In Class II research projects, the Basic Research in the Herbarium on taxonomic revisions is in a case by itself -- the activity is done entirely with the Herbarium with no national involvement or cooperation; as basic research on plant classifications it is fundamentally applicable to all Partner States; and it is an on-going project in any Herbarium that keeps its plant collection up-to-date, without specific origins or going through any selection process. For the other three projects in Class II, as a group there do not seem to be any remarkable national differences with respect to Activity/Field Sites, Involvement/Cooperation, or Applicability. Millet Breeding again displays a relatively low rating in these three variables and its origins are from internal EAAFR0 and Foreign sources. The origins of the water catchment area project (Water Resources/Land Use) are somewhat obscure, and although Activity/Field Sites and Involvement/Cooperation are more oriented toward Kenya than the other Partner States, this was due to situations beyond EAAFR0's control -- the original design did call for field sites in and cooperation with both Uganda and Tanzania. Although the applicability of the results of this project will be somewhat locale specific to Kenya, the issue of water resources/land use does seem to be crucial in all Partner States and the techniques developed in this project should be applicable in all of them. The work on Decay in Hardwoods and Softwoods specifically originated with Tanzania and Uganda, and although the principal activity and cooperation has been with those two countries, the results on softwood decay should also be very applicable to Kenya.

Overall in Class II, the work on Hard and Softwoods-Decay, and Basic Research-Herbarium seems to be reasonably regionally oriented; the work on Water Resources/Land Use seems to be oriented more towards Kenya but still has some regional basis; and the Millet Breeding project has only the slightest basis in Uganda and is not regional or national oriented. The Specialist Committee system seemed to have

clearly operated only in the case of one project in Class II, and that only involved after-the-fact approval.

About half of the projects in Class III do not involve any Activity/Field Sites of Involvement/Cooperation on the part of any of the Partner States. In one case -- Groundwater Resources -- consideration of these variables is not applicable yet because the project is in such an early stage, and in another case -- Softwoods-Root Rot -- whether there was any national level Involvement/Cooperation or not was not clear. The two projects on Rangeland research took place on EAAFR0's own Athi River Ranch without any national involvement; the project on the Propagation of Horticultural and other crops takes place entirely within the Quarantine Station, and the Sorghum/Millet Agronomy Project displays the general low level of national interest that has already characterized these crops. The Maize-Soil Fertility project has had much greater activity in and involvement with Kenya than Tanzania, with Uganda coming somewhere in the middle, but EAAFR0 also displayed a lack of interest in this project for a time due to a manpower shortage. Tanzania was the slow cooperator and had the only field site for the Tobacco-Virus project, and a personal problem appeared to have been responsible for Uganda's low scores for the Rice-Nematode project. There was national-level activity/field sites for both the Softwoods-Insect and Softwoods-Root Rot projects in all three Partner States, but no indication of relative amounts among them. The Involvement/Cooperation variable measure for Softwoods-Insect is a bit shaky. It was reported that there was more formal cooperation on this project with Uganda and Tanzania than Kenya, because the latter's Forest Department was so close and capable that they didn't need to cooperate whereas the others did. One suspects, however, that informal cooperation with the Kenya Forest Department was quite high.

In the Applicability columns for Class III projects, Groundwater Resources has a higher score for Kenya and Tanzania because of their larger amounts of semi-arid land, although such resources are also important even in the high-rainfall areas of Uganda. This project has part of its origins within EAAFR0 and part from all three Partner States through the mechanism of the national Chief Research Officers -- not the Specialist Committee system. The Maize-Soil Fertility project appeared to have been selected as an EAAFR0 project through the Specialist Committee system as officially described, but in this case -- interestingly enough -- the weakness of the Specialist Committee system was operative and the project failed on a regional basis. Specialist Committees have no real power -- they can allocate no funds. They can only advise the EAC and the national governments on what they should do, and in this case the national governments decided they couldn't afford to carry out their part of the project. The applicability of the results should be slightly higher in Kenya because most of the cooperative testing is going on

there, but in any case they probably won't be that important for awhile. All three countries should be equally receptive to the results of the Horticultural Propagation project in the Quarantine Station, except for the fact that because of Kenya's closeness to the Station the results will be slightly more applicable there. The Tobacco-Virus project was specifically requested by Tanzania and seems to have a greater applicability there because that is the principal location of the disease. The Rice-Nematode project is an interesting one because its origin is a case of a response to a crisis. Except for the personality problem referred to earlier, activity and cooperation would probably have been high, from all three Partner States, and the applicability is lower in the case of Uganda only because of the lack of confirmation of the extent of the nematode in that country. The two Rangeland projects are not very applicable in Uganda, as compared with Tanzania and Kenya, because of the relatively less amount of ecological rangeland there. In both cases, the overall orientation of the Animal Production Division toward rangeland research apparently was discussed by the Specialist Committee System, but these specific projects were only approved after the fact. It is interesting to note that, according to reliable sources, it was Uganda which influenced the Wasawo Commission to recommend that the functions of this Animal Production Division become a national responsibility. After the subsequent deterioration of the Division in the absence of any clear-cut decision on the matter, there were only two main projects that remained. The applicability of the two projects on softwoods in Class II are once again greater for Kenya, although the origins are not clear, and the Sorghum/Millet Agronomy project exhibits the same characteristics discussed above for these crops.

Overall, it would seem that only the Groundwater Resources and Rice-Nematode projects in Class III are reasonably regionally oriented; four of them -- Maize-Soil Fertility, Horticultural Propagation-Quarantine, Softwoods-Insect, and Softwoods-Root Rot -- are more oriented toward Kenya but still have some regional basis; two of them concerning Rangeland are oriented toward Kenya and Tanzania, but not Uganda; the Tobacco-Virus project is heavily oriented towards Tanzania; and the Sorghum/Millet Agronomy project is not regional or national oriented. The official Specialist Committee system appeared to have operated effectively only once, and then couldn't implement its selection. It approved two projects after-the-fact, but otherwise it was not apparent that it operated at all.

In Class IV, many of the projects listed involve crops or activities that have already been discussed with regard to Table 1, or they are oriented towards problem-requests from specific Partner States. With regard to the Rangeland-Silage project, the previous general discussions on rangeland apply. In the case of the Rangeland-Cultivation project, however, there is quite extensive Involvement/Cooperation with the Kenya wheat breeding station at two field sites, and some

cooperation with Tanzania at one field site. This project was, in fact, directly initiated by the Kenya station and it did not appear to involve the official Specialist Committee system at all. The applicability of the results of the Water Requirements for Selected Crops project is somewhat related to the need to conserve water and the amount of semi-arid land in a country, and therefore Kenya and Tanzania score higher than Uganda on this project. All of the Activity/Field Sites and Involvement/Cooperation also occur in or with Kenya and -- to a lesser extent-- Tanzania. The project seemed to originate within EAAFR0, but it was reportedly approved by the Natural Resources Research Council of the EAC. The Pulp and Paper Industry project was specifically initiated by Kenya; it is principally applicable in Kenya which is the only Partner State to have advanced plans for such an industry, and the only field site and cooperation occur in and with Kenya. Just about the exact same thing is true with respect to Uganda in the charcoal/Steel Industry project. The softwood-Woolly Aphid project is another case of a response to a crisis. The initiative for this project came from both EAAFR0 and the Kenya Forest Department when the insect pest was discovered on forests around Kugusa, but cooperation and data from field sites in all Partner States was immediately forthcoming. The applicability of this softwood project, however, is higher for Kenya. In the case of the Nematode Survey on Bean, Citrus, and Banana, the lack of any Activity Field Sites or Involvement/Cooperation in Uganda is probably due to the personality problem that was referred to earlier. It was reported that all three Partner States, as well as EAAFR0, were involved in the origins of the survey -- although not the specific crops listed -- and the results should also be highly applicable in Uganda. The particular Bean-Nematode project, however, was directly initiated by Kenya, and, although it could have some applicability in Uganda and Tanzania, all the field sites and cooperation are in and with Kenya. The Horticultural Cuttings-Quarantine Project measures shown are due to the same influences that were previously discussed for the other Quarantine project in Class II. Although there is Activity/Field Sites only in Uganda, and no national level Involvement/Cooperation at all, the applicability of the Sugar Cane-Chemical Control project still remains high in all Partner States. Its origins come from within EAAFR0. And, finally, the Basic Research-Herbarium project in Class IV does do some plant collecting in all of the Partner States, but the little cooperation that exists appears to be with Kenya and Tanzania. The results, however, are fundamentally applicable to all of East Africa.

Overall in Class II it would seem that the Nematode Survey of Beans, Citrus, and Bananas project and the Sugar Cane-Chemical Control and Basic Research-Herbarium projects are reasonably regionally oriented; that three projects on Rangeland-Cultivation, Softwood-Woolly Aphid, and Horticultural Cuttings-Quarantine are more oriented towards Kenya but still have some regional basis; that two projects

on Rangeland-Silage and Water Requirements are oriented toward Kenya and Tanzania and not Uganda; and that two projects -- Pulp and Paper Industry and Bean-Nematode -- are strongly oriented toward Kenya and one -- Charcoal-Steel Industry -- toward Uganda. The official Specialist Committee system appeared to operate as it is described in two cases, and was consulted for approval after-the-fact in two other cases. In another case this system was not applicable, and in the remaining projects it did not appear to have operated at all.

The remaining five projects are in the lowest category of EAAFR0 priorities, and it will only be pointed out that one of them -- Mechanical Cultivation-Seed Bed -- is reasonably regionally oriented; that two are oriented toward Kenya and one toward Tanzania, but still have some regional basis; and that one is strongly oriented toward Uganda. Most of these projects were in very initial stages and hadn't gone through the Specialist Committee system yet.

In looking at the results of this analysis as shown in the Orientation column of Table 1, it is apparent that there is a slight bias in Kenya's favor in the top two priority classes of EAAFR0 research projects. With the exception of the Sorghum and Millet Breeding Projects, which have little or no regional or national basis, all of the remaining seven projects have some regional basis and four seem to be principally regionally oriented. When the remaining lower priority classes are examined, however, it does seem that there is a definite bias toward Kenya in EAAFR0's projects over both Uganda and Tanzania, but that Tanzania is definitely higher than Uganda. In other words, the balance (or imbalance) of EAAFR0's research projects, particularly in the mid- and lower-priority classes, is mostly in favor of Kenya, then Tanzania in the middle, and least in favor of Uganda.

Another interpretation of the results in Table 1 is provided by examining all of the projects when they are grouped according to EAAFR0 Division rather than priority classification, as is shown in Table 2. The Sugar Cane Breeding Division is, of course, dominated by that one principal project. Except in the case of Involvement/Cooperation with Tanzania, the division is pretty well balanced across the board, and it seems to have the best Specialist Committee operations. The Forestry Division is dominated by softwood projects, and this tends to bias it toward Kenya-oriented projects. Only one of their projects is reasonably regionally oriented, and three others are largely oriented toward specific Partner States -- two toward Uganda and one toward Kenya. Nevertheless, this Division also seems to have a relatively active Specialist Committee with only one project in which the Specialist Committee was not utilized at all, and that was a very special response to crisis case. The other variables seem to be fairly well-balanced among the Partner States, given the bias toward softwoods mentioned above. The Sorghum and Millet can be characterized by a heavy foreign influence in the ori-

EAFRO Division	Research Projects	Activity Field Sites			Involvement/Cooperation			Applicability		Origins		Specialist Committee	Orientation
		K	U	T	K	U	T	K	U	T	Foreign		
Sugar Cane Breeding	I.1 Sugar Cane Breeding	1	1	1	H	H	L	H	H	H		H	R
	IV.10 Sugar Cane - Chemical Control	0	L	0	0	0	0	H	H	H		M	R
Forestry	I.2 Softwoods - Breeding	H	L	M	H	H	L	H	L	M		7	R
	II.3 Hard & Softwoods - Decay	L	H	H	L	H	H	H	H	H		M	R
	III.8 Softwoods - Insect	+	+	+	L	L	M	H	L	M		7	k
	III.9 Softwoods - Root Rot	+	+	+	7	7	?	H	L	M		7	k
	IV.4 Pulp and Paper Industry	L	0	0	H	0	0	H	L	L		H	k
	IV.5 Charcoal/Steel Industry	0	1	0	0	H	0	L	H	L		0	U
	IV.6 Softwood - Woolly Aphid	+	+	+	H	H	H	L	H	L		0	k
	V.3 Natural Forests - Pin Hole Borer	0	H	0	0	H	0	L	H	L		M	U
V.4 Softwoods - Cypress Canker	0	0	0	0	0	0	H	L	M		7	U	
Sorghum & Millet	I.3 Sorghum Breeding	L	M	L	0	0	0	0	N	L		0	X
	III.1 Millet Breeding	L	M	L	0	0	0	0	M	L		0	X
	III.10 Sorghum/Millet Agronomy	0	0	0	0	0	0	0	M	L		0	X
Maize Genetics	I.4 Maize Breeding	H	L	L	M	L	L	H	M	M		0	k
	I.5 Legumes - Virus Survey	+	+	+	0	0	0	H	H	H		0	R
Plant Pathology and Nematology	III.4 Tobacco - Virus	0	0	1	0	0	H	L	M	H		0	T
	III.5 Rice - Nematode	H	L	H	H	L	H	L	M	H		0	R
	IV.7 Bean, Citrus, & Banana - Nematodes	+	0	+	H	0	H	H	M	M		7	R
	IV.8 Bean Nematode	M	0	0	H	0	0	H	L	L		0	k
	II.2 Water Resources/Land Use	2	0	0	H	L	L	H	M	M		7	R
	III.1 Groundwater Resources	N.A.	-	-	N.A.	-	-	H	M	H		L	R
	III.2 Maize - Soil Fertility	H	N	L	H	N	L	L	L	H		0	k
	IV.1 Rangeland - Silage	0	0	0	0	0	0	H	L	H		0	k
Physics & Chemistry	IV.2 Rangeland - Cultivation	2	0	1	H	0	L	H	L	H		0	k
	IV.3 Water Requirements - Selected Crops	2	0	1	H	0	M	H	M	H		L	k
	V.1 Wheat - Trace Elements	0	0	L	0	0	H	M	L	H		0	k
	V.2 Mechanical Cultivation - Seed Bed	0	0	0	0	0	0	H	H	H		0	k
Plant Quarantine Service	III.3 Horticultural Propagation	0	0	0	0	0	0	H	M	M		0	R
	IV.9 Horticultural Cuttings	0	0	0	0	0	0	H	M	M		0	k
Animal Production	III.6 Rangeland - Compensatory Growth	0	0	0	0	0	0	H	L	H		M	k
	III.7 Rangeland - Nutrient Requirements	0	0	0	0	0	0	H	L	H		M	k
	V.5 Rangeland - Body Composition	M	0	0	M	0	0	H	L	H		0	k
Herbarium	II.4 Basic Research - Herbarium	N.A.	-	+	0	0	0	H	H	H		N.A.	R
	IV.11 Basic Research - Herbarium	+	+	+	L	0	L	H	H	H		N.A.	R

gins of its project selection, and little -- if any -- interest from any of the Partner States. What little activity there is at the national level is included in the Variety Trials Program -- which is mainly concerned with maize -- and the applicability that does exist is confined to parts of Uganda and Tanzania. The Maize Genetics Division is composed entirely of the maize breeding project, and, although it also seems to have had a dominant foreign influence in its selection, it is reasonably regionally oriented. Its location just next to the Kenya national Maize breeding program does give that country some advantage, however. The Plant Pathology and Nematology Division is principally doing some basic survey work and responding to specific problems as they arise. In the latter category, one of the problems was a crisis that existed pretty well on a regional basis, but the other two problems were largely oriented toward specific Partner States -- one toward Kenya and one toward Tanzania. Activity/Field Sites in and Involvement/Cooperation with Uganda seems to have been relatively low, but Applicability and Origins seems to be reasonably well-balanced among the Partner States. It is doubtful that this Division utilized the Specialist Committee system at all. Uganda is definitely underrepresented in the Physics and Chemistry Division. Only two of its projects are reasonably regionally oriented, and the remainder are all oriented more towards Kenya and -- to a lesser extent -- Tanzania. Many of the projects in this Division seem to have had their origins from within EAAFRRO, although a few have been through the Specialist Committee system. Both projects in the Plant Quarantine Services are done entirely at the Quarantine Station. They were both selected internally according to the perceived needs of the Service without going through the Specialist Committee system. 11) The slight bias toward Kenya of these projects seems to be caused solely by the location of the Service within Kenya. The Animal Production Division is oriented toward rangeland research, which means it is oriented towards Kenya and Tanzania. Activity/Field Sites and Involvement/Cooperation with all Partner States is very low, however. Finally, the basic research performed by the Herbarium is regional in nature due to its fundamental applicability to all of East Africa.

A summary of the reported reasons behind the distribution of these variables of EAAFRRO's research projects would have to begin with the effects of location. Having the headquarters of EAAFRRO located in Kenya does seem to have contributed in many instances to the slight Kenya bias in projects which still have some regional basis. Those projects which are principally oriented toward one specific Partner State do not seem to depend on distance or location, but are a direct result of a specific problem in and request from that Partner State. Another

11) Although the Standing Technical Committee on Plant Imports and Exports does not seem to have been active in research project selection, it reportedly is active -- and relatively effective -- in developing recommendations and setting policy for the Plant Quarantine Service.

factor that seems to have contributed to this bias is the capacity and willingness of the Kenya national agricultural and forestry research system to cooperate. In the case of Tanzania, there would appear to be both a national feeling of uncooperativeness with EAAFRRO in some cases but not in others and a general constraint of a relative lack of capacity in their national agricultural and forestry research system to cooperate on EAAFRRO projects which should be applicable in their country. Tanzania is also the largest Partner State and transport facilities are relatively poor, so location and distance work against such relationships also. The case of Uganda is more complicated. Both a general willingness and capacity to cooperate with EAAFRRO appeared to be evident, but EAAFRRO seems to be the least oriented towards Uganda of any of the Partner States. Partly this is probably because Tanzania and Kenya are more ecologically similar to each other than either are to Uganda, so that "regional" projects affecting at least two of the Partner States more often than not are oriented toward Kenya and Tanzania and not toward Uganda. Uganda's border is also further away than ~~Tanzania's~~, and, although it is a much smaller country, transportation facilities are also relatively poor here. Although there are too few cases to generalize from, both location/distance effects and the willingness of national research systems to cooperate seem to be at least partially overcome in response to crises -- even though the crisis may be more critical in one Partner State than another. One note of caution -- this paragraph is analyzing raw data provided by EAAFRRO sources only! The national viewpoint will be provided in the next section.

A similar Table -- Table 3 -- is shown for EAAFRRO's scientific services. The columns on Involvement/Cooperation and Applicability refer to the same variables previously discussed in Tables 1 and 2. It was found to be easier to estimate measures of Utilization -- how much the individual Partner States actually use the service -- in the case of Scientific Services, however, so this variable is added to Table 3. Activities/Field Sites, on the other hand, did not seem to apply to Services nearly as much as it did to Research Projects so that column was dropped. The internal EAAFRRO, foreign, or national origins of Scientific Services were not sought because many of the services began with the establishment of EAAFRRO and most of the others evolved out of EAAFRRO's own research requirements, the Specialist Committee system designed to select research projects -- not services -- and the regional or national orientation of the service was found to be redundant with the Utilization variable -- therefore all these variables were not included in Table 3.

In looking at the results shown in Table 3, several trends are evident. Firstly, most of these services are highly applicable in all Partner States, and the exceptions do not fit into any particular causal pattern: the armyworm does not seem to be a critical threat in Uganda; there is no Field Trials Officer in

Table 3: A SUMMARY OF EAAFR0 SCIENTIFIC SERVICES

Scientific Service	Involvement/ Cooperation			Applicability			Utilization		
	K	U	T	K	U	T	K	U	T
I.1 Quarantine	H	M	M	H	H	H	H	M	M
I.2 Library	O	O	O	H	H	H	H	L	L
I.3 E.A.L.S.	O	O	O	H	H	H	H	H	H
I.4 Herbarium	M	L	H	H	H	H	H	L	H
II.1 Armyworm	H	M	H	H	L	H	H	L	H
II.2 Journal	?	?	?	H	H	H	?	?	?
II.3 Statistics	O	O	O	H	H	H	H	L	L
II.4 Machinery Coordination	H	H	H	H	H	H	H	H	H
II.5 Liaison - Cereals	O	H	H	O	H	H	O	H	H
II.6 Assistance - Cereals	H	M	M	H	H	H	H	H	H
III.1 Soil & Plant Analysis	O	O	O	H	H	H	H	L	H
III.2 Feed & Animal Analysis	O	O	O	H	H	H	H	L	H
IV.1 Fungi Collection	H	O	O	H	H	H	N.A.	-	-
IV.2 Insect Collection	H	H	L	H	H	H	H	H	L
IV.3 Virus Collection	O	O	O	H	H	H	L	O	O
IV.4 Nematode Collection	O	O	O	H	H	H	N.A.	-	-
V.1 Carcass Analysis	O	O	O	H	H	H	H	H	H
V.2 Experimental Animals	O	O	O	H	L	H	M	L	L
V.3 Quarantine Facilities	L	O	O	H	L	L	L	O	O

Kenya to perform a liaison function with the Kenya cereals program; the analyses of feed and animal samples and the provision of experimental animals services are not as applicable to Uganda because these services have been oriented towards rangeland experiments and Uganda has relatively little rangeland; and the provision of quarantine facilities to carry out experiments is largely applicable only in Kenya because the facilities are located there. For the most part, the services are generally applicable in nature, dealing with basic information, analytical, or advisory issues that all Partner States should need.

One of the principal factors that affects the national Involvement/Cooperation with and Utilization of these Services is EAAFR0's location and the distance from it, however. The slight edge given to Kenya for the Plant Quarantine Service in both these variables, for example, is due to Kenya's ability to take advantage of this service for unplanned, plant arrivals at her airport which is relatively close to the Quarantine Station. Although there is no national Involvement/Cooperation in the operations of the joint EAAFR0/EAVR0 Library, the national Utilization of the Library's services is heavily oriented in Kenya's favor because one must utilize these services usually at the Library itself -- which means that distance is a governing factor. The services of the Statistics Division also seem to be heavily oriented towards Kenya at least partly because of the distance factor. The relationship that seems to be necessary for the provision of this service is one of a great deal of give and take, back and forth between the national level recipient and the EAAFR0 provider -- a relationship that is more difficult to develop over greater distances. This effect is reinforced by communications difficulties and by the fact that internal EAAFR0 demands on this statistical service are quite heavy. It may also be true, however, that -- particularly in the case of Tanzania -- a national research system may have less of a capacity or need for this service if its own efforts are chaotic and disorganized anyway. The slight edge that Kenya has over the other two Partner States in the Utilization of the Virus Reference Collection, the Provision of Experimental Animals, and the Provision of Quarantine Facilities services also seems to be due to the location factor, but these services are very low in importance anyway.

Most of the other imbalances seem to be more reasonable. The reason Uganda reportedly doesn't utilize the Herbarium's services or the Soil and Plant Analyses service is that she has the capacity to carry these out herself. Since the armyworm does not usually invade Uganda, there is less need for her to utilize the Armyworm Forecasting Service, and since the main EAAFR0 cereals unit of interest -- the Maize Genetics Division -- is located at the same site as Kenya's national maize breeding program, there was no need to create a special Field Trials Officer for liaison with Kenya. There is the one case of the Forest Insect Reference Collection where both the Involvement/Cooperation and Utilization variables are

relatively low for Tanzania and where the cause would appear to be a hostile attitude on the part of Tanzania. This reflects some similar cases in Forestry Research Projects, but, again, it must be remembered that these results are based on raw data from EAAFRO sources only.

In sum, it would appear to be fair to say that EAAFRO's scientific services are generally oriented in theory to the entire region, but due to location and distance effects, some of the most important ones are more oriented in fact toward Kenya than the other two Partner States.

Appendix III

The Determination of National Agricultural and Forestry Priorities
in East Africa

NATIONAL PRIORITIES IN AGRICULTURE AND FORESTRY^a

Now that we have some index of the subjects of EAAFRO's activities and a ranking of the priorities which EAAFRO gives to those activities, it is time to turn to the national priorities of Kenya, Uganda, and Tanzania in order to estimate, from this national point of view, (1) how valuable EAAFRO is in general, and (2) if there is any imbalance among the Partner States of the value of EAAFRO's activities. The primary source of information for this section will be the national development plans of each of the Partner States.¹⁾ Although there may be some difficulties in equating plans developed for different five-year periods, the discrepancy is not believed large enough to significantly affect the following interpretations. And in order to assess national priorities, certainly the national development plans must be the primary source of information!

Three different types of information will be sought in the plans:

- (1) The overall agricultural and forestry development expenditure plans;
- (2) the agricultural and forestry R&D budget plans; and
- (3) data on agricultural or forestry production at the times the plans were developed and expected or target goals.

This author would contend that any one of these measures by itself might prove to be misleading, and that a judicious interpretation of a combination of all three measures would more accurately reflect reality. For example, a consideration of only the first measure above might reflect a country's "opportunity-seeking" priorities, but not its "potential disaster prevention" priorities.

¹⁾ Republic of Kenya, Development Plan 1970-1974, Government Printer, Nairobi, 1969; Republic of Uganda, Uganda's Plan III - Third Five-Year Development Plan 1971/2-1975/6, Government Printer, Dampala, 1972; The United Republic of Tanzania, Tanzania Second Five-Year Plan for Economic and Social Development 1st July, 1969 - 30th June, 1974, Government Printer, Dar es Salaam--Volume I: General Analysis, 1969; Volume II: The Programmers, 1969; Volume III: Regional Perspectives, 1970; Volume IV: Survey of the High and Middle Level Manpower Requirements and Resources, 1969.

An already extremely valuable natural resource or resource developed through past governmental investments might not be perceived as a good focus for further developmental investment, but might well be a highest priority focus for research if some disease or insect pest threatened what was already there.²⁾

In another case, examining only the country's R&D budget plans (the second measure above) might be misleading since, if the research were already being done by some other non-national body, it would be only prudent for the country not to duplicate it. Therefore, a combination of all three of the above measures will be used as indicators of national priorities in agriculture and forestry.

When appropriate, foreign aid support will be included in these measures. It could be argued that in many cases foreign aid represents the perceived priorities of the donor country as to what the needs of the recipient developing country are, rather than the priorities of the developing country itself. Nevertheless, since most foreign aid is applied to projects which the developing countries at least agree upon, to some extent this aid is a national governmental resource for them that can reflect their own priorities as well. Therefore, if foreign aid funds are included in development plans and devoted to specific projects or subjects in agriculture or forestry, they will be included in these measures.

²⁾ Tanzania's national plan explicitly recognizes this difficulty: "The crop policies are composed of two elements: a set of production aims and a set of Government actions designed to achieve these aims. These two elements are inter-related but it is useful to distinguish between them. The output of some crops can be rapidly increased with very little Government contribution (e.g., ashews), whereas others require support from the whole range of instruments which the Government can use to encourage agricultural expansion. Equally, a particular form of public action (e.g., research to combat Coffee Berry Disease) may be of high priority although little or no increase in production is aimed at for the crop in question." (The United Republic of Tanzania, Volume I, op. cit., p. 42.)

KENYA

Chapter 8 of Kenya's Development Plan begins as follows:

When judged by the level of its contributions to Gross Domestic Product (GDP), exports and employment, agriculture is the most important sector of the economy... For many reasons the Government places a very high priority on rapid agricultural development. Especially important is the fact that so high a proportion of the population will continue to depend on agriculture for their livelihood. Likewise, because agriculture is such an important component of the economy, rapid development of the agricultural sector has a major role to play in contributing to the growth of the whole economy. In particular, increased agricultural incomes are important both in providing additional savings and foreign exchange needed for development and in creating expanded markets for the goods produced in the non-agricultural sectors of the economy. (Kenya, p. 191.)

Indeed, the data on which the Plan was based does support the above statements.

In 1967, the agricultural sector of the economy³⁾ was estimated to have contributed about 34 percent of total GDP--13 percent from the monetary part and 21 percent from the non-monetary. (See Table 1 below). The Plan calls for a

TABLE 1*

Agriculture and Gross Domestic Product - 1967 and 1974

Item	1967	1974 (b)	Rate of Growth 1967 to 1974	Share of Total GDP	
				1967	1974
	K\$Million	K\$Million	Percent Per Annum	Percent	Percent
Gross Domestic Product (a)	54.52	81.98	6.0	13.4	12.8
Monetary Agric. Sector					
Non-Monetary Agric. Sector	85.19	108.34	3.5	20.9	16.9
Agriculture in Total	139.71	190.32	4.5	34.4	29.6
Total GDP	406.69	642.17	6.7	100.00*	100.00

(a) At Factor Cost

(b) In 1967 Prices

Source: *Taken from Table 8.1, Kenya Development Plan 1970-1974, p. 192.

³⁾ Forestry is considered in another sector of natural resources along with mines and fisheries.

calls for a 6 percent annual growth rate for monetary agriculture and 3.5 percent for non-monetary agriculture (or 4.5 percent for agriculture as a whole), and, although the economy as a whole is expected to grow at 6.7 percent annually so that agriculture's share will decline from 34.4 to 29.6 percent, in absolute terms agriculture's contribution to GDP should be about \$50 million higher in 1974 than it was in 1967.

Table 2 below shows how agriculture has dominated Kenya's exports, accounting for between 55 and 60 percent of total exports from 1964 through 1968, and for around \$45 million annually of badly needed foreign exchange. Table 3 demonstrates the same situation of agricultural dominance with respect to employment, and a summary of agriculture's overall importance is emphasized in the quote on the following page.

Table 2

Agricultural and Total Exports - 1964 to 1968

<u>Year</u>	<u>Total Exports</u> K\$Million	<u>Agricultural Exports</u> K\$Million	<u>Percent of Total</u>
1964	77.3	46.5	60.1
1965	78.0	43.7	56.0
1966	86.8	51.9	59.7
1967	79.0	44.1	55.8
1968	83.9	47.7	56.8

Source: Taken from Tables 2.11 and 2.12, Kenya Development Plan 1970 - 1974, p. 36.

Table 3

Agricultural and Total Employment - 1968 and 1974.

		Total Economy (000's)	Agricultural Sector Percent of Total	
			(000's)	
1968	Wage Employment	1,056.9	556.6	52.7%
	Total Employment	4,300.0	3,679.4	85.6%
1974 (Estimated)	Wage Employment	1,425.0	7.25.0	50.9%
	Total Employment	5,150.0	4,300.0	83.5%
Average Growth Rates 1968-1974	Wage Employment	5.1%	4.5%	
	Total Employment	3.1%	2.7%	

Source: Taken from Table 4.1, Kenya Development Plan 1970-1974, p. 108

In 1967 agriculture is estimated to have contributed over 30 percent of GDP, to have absorbed over 50 percent of all wage employment and produced about 60 percent of the total value of exports, either as raw or processed products. (Kenya, p. 168.)

This dominance is reflected in the overall public sector development expenditures of the Central Government for the plan period 1969/70 - 73/74 as shown in Table 4 on the following page. Direct expenditures on agriculture and forestry production account for 23.6 percent of total central government expenditures during the plan period, and this does not include investments in agricultural-based manufacturing, (e.g., food processing industries), social services (e.g., agricultural education), or basic services, (e.g., sugar plantation roads).⁴⁾ The expenditures are more for the development of the rural infrastructure (e.g., rural housing or rural water supply), and for the diversification of the rural economy than for the direct improvement of agriculture.

⁴⁾ Ibid., pp. 196-197. £1.7 million is to be spent on a "tea roads programs" and £3.6 million on "improving roads in sugar producing areas," as discussed, under Transport and Communications--not Agriculture.

Table 4

PUBLIC SECTOR DEVELOPMENT EXPENDITURE

KE thousands

	1969/70	1970/71	1971/72	1972/73	1973/74	Total	Total Central Govt. only
AGRICULTURE—							
Agricultural Development	2,952	3,241	3,008	3,654	4,765	17,620	17,620
Land Settlement and Transfer	2,702	1,818	2,006	1,303	798	8,627	8,627
Land Adjudication	1,049	1,306	1,321	1,295	1,324	6,295	6,295
Livestock Development	813	886	853	938	1,036	4,526	4,526
Irrigation	535	696	476	509	310	2,526	2,526
TOTAL	8,051	7,947	7,664	7,699	8,233	39,594	39,594
NATURAL RESOURCES—							
Forestry	1,063	1,172	1,186	1,255	1,255	5,931	5,931
Fisheries	308	300	210	271	267	1,356	1,356
Mines and Geology	130	112	30	30	30	332	332
TOTAL	1,501	1,584	1,426	1,556	1,552	7,619	7,619
TOURISM—							
Tourism	395	693	793	453	351	2,685	2,685
Game Department	162	154	154	148	139	757	645
National Parks	224	133	131	116	112	716	200
TOTAL	781	980	1,078	717	602	4,158	3,530
MANUFACTURING, COMMERCE AND CONSTRUCTION—							
Manufacturing	756	1,084	1,420	1,416	1,468	6,144	6,144
Commerce	526	685	942	1,198	1,350	4,701	4,701
National Construction Corporation Limited.. .. .	112	118	75	83	90	478	478
TOTAL	1,394	1,887	2,437	2,697	2,908	11,323	11,323
SOCIAL SERVICES—							
Education	2,073	3,759	4,114	3,620	3,010	16,576	14,134
Housing	2,260	2,470	2,870	3,320	3,970	14,890	14,890
Health	2,354	2,980	3,100	3,127	3,202	14,763	14,763
Local Authorities	300	600	900	1,200	1,500	4,500	4,500
Information and Broadcasting	303	319	411	388	377	1,798	1,798
National Social Security Fund	500	500	—	—	—	1,000	—
Social Programmes (1)	201	179	168	186	165	899	899
Cultural Programmes (2)	27	106	232	83	76	524	524
Labour	—	292	73	—	—	365	365
TOTAL	8,018	11,205	11,868	11,924	12,300	55,315	51,873
RURAL DEVELOPMENT—							
Rural Development	250	250	500	500	1,000	2,500	2,500
TOTAL	250	250	500	500	1,000	2,500	2,500
BASIC SERVICES—							
Roads	8,080	8,931	7,699	8,792	9,538	43,040	43,040
East African Railways	4,142	4,691	4,468	4,408	3,590	21,292	—
East African Harbours	1,200	2,215	2,770	2,765	2,625	11,575	—
Government Buildings	1,365	1,500	1,600	1,750	1,940	8,155	8,155
Water Supplies	855	1,280	1,580	1,895	2,350	7,960	7,960
Airports	486	715	1,360	2,340	2,525	7,426	7,426
Posts and Telecommunications	1,374	1,714	1,333	1,145	1,241	6,807	—
East African Airways	1,375	1,390	1,415	1,265	855	6,300	—
Government Press	137	—	—	—	60	197	197
TOTAL	19,014	22,436	22,225	24,353	24,724	112,752	66,778

Table 4 --(Contd.)

PUBLIC SECTOR DEVELOPMENT EXPENDITURE

K£ thousands

	1969/70	1970/71	1971/72	1972/73	1973/74	Total	Total Central Govt. only
INTERNAL SECURITY AND DEFENCE—							
Police	300	916	706	744	505	3,171	3,171
Defence	344	300	300	300	300	1,544	1,544
Prisons	291	244	234	236	236	1,241	1,241
Judiciary	76	105	105	105	109	500	500
Other (3)	78	73	60	6	10	227	227
TOTAL	1,089	1,638	1,405	1,391	1,160	6,683	6,683
FINANCIAL INSTITUTIONS							
East African Development Bank	600	600	—	—	—	01,200	1,200
National Bank of Kenya Ltd.	300	200	75	—	—	575	575
Kenya National Assurance Company Ltd.	100	100	100	100	100	500	500
Workers Investment Trust	150	100	—	—	—	250	250
State Reinsurance Corporation of Kenya	100	100	—	—	—	200	200
TOTAL	1,250	1,100	175	100	100	2,725	2,725
TOTAL PUBLIC SECTOR EXPENDITURE*	41,348	49,027	48,778	50,937	52,579	242,669	192,625
<i>Less</i> Expenditure by public bodies not financed by the Central Government	9,368	11,183	10,618	10,072	8,803	50,044	—
<i>Equals</i> CENTRAL GOVERNMENT DEVELOPMENT EXPENDITURE	31,980	37,844	38,160	40,865	43,776	192,625	192,625

(1) Community Development, Social Welfare, Adult Education and National Youth Service.

(2) Library Services, Museums, Archives, Theatre and Sports.

(3) Immigration, Approved Fellows and Remand Homes, Probation Services and Government Chemist.

*Converted from calendar year figures.

†Excluding expenditure by Local Authorities and some other public bodies not financed by the Central Government. Total estimated development expenditure by Local Authorities is given in Chapter 7. All development expenditure (including that financed from non-Government sources) by the F. A. Corporations, University College and some other public bodies is included. For the remaining public bodies, expenditure from non-Government sources is excluded, but such expenditure, if any, will not be large in relation to the expenditure financed from Government sources.

Source: Taken from Table 5.3 in Kenya Development Plan 1970-1974, pp. 148-150.

The real question, however, is what are the national priorities of Kenya within the sector of agriculture and forestry, including livestock development and water resources and land use topics. Unfortunately, the development expenditures are not so clearly broken down in Kenya's plan, but Table 5 on the following page shows 12 categories into which the #39.6 million expenditures on agriculture shown above have been divided.

Table 5

DEVELOPMENT EXPENDITURE ON AGRICULTURE, LAND SETTLEMENT AND CO-OPERATIVES

K'000

Item	Estimated Expenditure	Projected Expenditure in Plan Period					
		1968/69	1969/70	1970/71	1971/72	1972/73	1973/74
1. Land Settlement ^(*)	1,314	1,334	1,393	1,581	878	373	5,559
2. Transfer and Development of Large-Scale Farms	1,975	1,368	425	425	425	425	3,068
3. Land Acquisition	929	1,049	1,306	1,321	1,295	1,324	6,295
4. Livestock Development including research, education and credit for range areas	481	813	886	853	938	1,035	4,526
5. Research	294	674	640	644	661	598	3,217
6. Agricultural Education and Extension	226	380	495	493	544	287	2,199
7. Credit for Small-Scale Farmers and Farmers in Range Areas	266	686	337	1,050	1,025	1,050	4,748
8. Irrigation	653	535	696	476	509	310	2,526
9. Sugar	340	432	176	150	800	2,550	4,108
10. Tea	364	380	293	208	22	80	1,185
11. Wheat and Maize Storage	226	200	500	163			863
12. Miscellaneous	200	200	300	300	300	200	1,300
Total	7,268	8,051	7,927	7,664	6,699	8,232	39,594

(*) Since the inception of the Million Acre Settlement Scheme Government expenditure on settlement administration and agricultural extension on settlement schemes, etc., has been classified as development expenditure. It is also noted that these settlement schemes are essentially established, this expenditure is more of a recurrent nature. For this reason, it has been excluded from the figures in the table for any of the years in the Plan period, and, in order to maintain comparability, estimated expenditure of K 2950,000 on these items in 1968/69 has been excluded.

Source: Taken from Table 8.2 in Kenya National Plan 1970-1974, p. 195.

Due to the nature of the historical white settlement in colonial Kenya, much of the government's effort in the agricultural sector in the years immediately after Independence was devoted to land transfer and land settlement programs in the former "white highlands." In 1963/64, for example, about three-quarters of all agricultural development expenditures went into these activities. This proportion fell to less than 50 percent in 1968/69, and this trend is expected to continue through the plan period, with only K5.6 million (14%) and K3.1 million (7.7%) to be spent on settlement and transfer programs respectively.

Instead of concentrating on land transfer schemes, agricultural policies and programs will be much more broadly based. A much higher proportion of the development funds will be used for programmes which are designed to have wide-spread effects on agricultural productivity and efficiency and which will involve

a high proportion of farmers; the accent will be placed on modernizing agriculture on a broad front. (Kenya, pp. 193-194.)

For the purpose of deriving priorities, the only expenditure in this category that is tied to a specific crop or activity, is the allocation of \$486,000 during the plan period for sugar settlement schemes.

The land adjudication and registration program will be allocated \$6.3 million--almost 16 percent of the total development expenditures for agriculture. It had long been felt by the government that the traditional African land tenure system had to be reformed before rapid agricultural development could take place; that title deeds had to be provided to land owners, and that scattered fragments of land had to be consolidated into single economical holdings. This type of activity has been going on since 1956, but almost entirely in the high rainfall agricultural areas of Kenya, as opposed to the low rainfall range land or pastoral areas. A report submitted by a Lawrence Mission on the land adjudication question in 1966 recommended, among other things, the following:

The mission also proposed that adjudication should be given priority in those areas where the greatest benefits were expected to result from the reform...The Lawrence Mission's programme involved adjudicating 3.1 million hectares of land and was scheduled for the period 1966/67 to 1969/70. It was expected to cost K\$3.4 million. Of the total area involved, 1.1 million hectares were in the high rainfall agricultural areas while 2.1 million hectares were in lower rainfall pastoral or range areas. (Kenya, p. 211.)

Since the program for the range areas involved a new practice of registering ranches under group ownership, there were delays in passing the necessary legislation and by 1968/69, only 222,000 hectares of rangeland had been adjudicated compared to 1,396,000 hectares of agricultural land. Of the 7.4 million hectares proposed for 1970-74, however, only 2.5 million are to be in agricultural areas and the remaining 4.9 million in the rangeland areas. Assuming that costs are

proportional to areas adjudicated, about two-thirds of the adjudication expenditures, or #4.2 million, are directly tied to the range/beef product. Moreover, this amount is not included in the expenditures for range areas later detailed.

Approximately four-fifths of Kenya is too dry for reliable agricultural cultivation, and even in the higher rainfall areas much of the land is unsuitable for crop production. Much of the rangeland is suitable for livestock production of some sort, however, although about half of the country's cattle population is found in the higher rainfall areas. In both 1967 and 1968, the total value of marketed livestock production amounted to about #20 million, which represented approximately 30 percent of total gross revenue in Kenya.⁵⁾ (See table 6 below.) About 88 percent of this total value of marketed livestock production came from cattle, either in the form of beef or dairy products, with the remainder coming from other livestock such as sheep, goats, poultry, etc.

Table 6
LIVESTOCK PRODUCTION, 1967, 1968 AND 1974

Item	Value of Production (K£'000)			Growth in Production 1967/1974	Average Annual Rate of Growth 1967/1974
	1967 ^(a)	1968 ^(a)	1974 ^(b)		
MARKETED PRODUCTION:				Per cent	Per cent
Cattle for Slaughter ..	10,654	11,153	14,550	36.4	4.5
Dairy Products ..	6,626	6,571	9,330	40.6	5.0
Hides and Skins ^(c) ..	630	653	880	39.7	4.9
Pigs ..	577	565	676	17.2	2.3
Wool ..	520	550	623	19.8	2.6
Sheep and Goats for Slaughter ..	404	445	500	23.8	3.1
Poultry and Eggs ..	312	324	439	40.7	5.0
Total Marketed Production	19,743	20,261	26,998	36.7	4.6
Non-Monetary Production	16,195	15,797	20,006	23.5	3.0
TOTAL	35,938	36,058	47,004	30.8	3.9

(a) In current prices.

(b) In 1967 prices.

(c) The figures shown for hides and skins refer only to production which does not originate from abattoirs, for these are treated as part of the manufacturing sector. It is assumed that all production outside abattoirs is exported and that the domestic tanning industry receives its hides and skins from abattoirs.

Source: Kenya Development Plan 1970-1974, p. 253.

⁵⁾ It is estimated that subsistence livestock production amounted to a further #16 million in both those same years. Kenya, p. 252.

But the potential opportunity for further livestock development over the plan period is perceived to be quite high; (see Table 6, previous page), and \$4.5 million--excluding research, education, and credit for range areas--is to be allocated to it, which represents 11.4 percent of agricultural expenditures as shown in Table 5. As Kenya's plan states:

Much greater emphasis will also be given to developing livestock production... (Kenya, p. 196.)

The potential for further development of livestock production in Kenya is very promising. At present, the productivity of most types of livestock is very low and there is considerable scope for increasing it... Likewise, the potential for increasing the productivity of grazing is enormous. In an attempt to realize some of this potential, considerable resources will be allocated to livestock production programmes in this Plan period. (Kenya, p. 252.)

Livestock--particularly cattle--production is perceived to be so important, both because it can open up the under-utilized rangeland areas of Kenya to productive enterprises, and provide a promising means of diversification for the mixed farmer, and because the market--both domestic and foreign--for livestock products is expected to be strong. Livestock products are also important as a raw material source for processing industries in Kenya, accounting for 39 percent of the total output of \$37.2 million of all food processing industries.

Total public development expenditures on livestock production over the Plan period are shown in Table 7, on the following page. Category A includes expenditures by other government departments or statutory organizations; and Category C includes expenditures by international agencies that do not pass through the development budget. These figures show that \$8.8 instead of \$4.5 million will be spent by the central government on livestock development, and that an additional \$2.4 million will be provided by external aid sources for a total of \$11.2 million.

Table 7

DEVELOPMENT EXPENDITURE ON LIVESTOCK,

K£'000

Item	1969/70	1970/71	1971/72	1972/73	1973/74	Total
A. Direct Expenditure by Livestock Departments:						
Range Management Division	223	216	168	184	195	986
Animal Husbandry Division	192	225	226	231	266	1,140
Veterinary Department:						
Research and Vaccine Production ..	96	172	156	208	268	899
Veterinary Field Services	156	213	230	260	299	1,158
Artificial Insemination ..	26	54	15	17	27	139
Tsetse Fly Eradication ..	74	75	75	80	83	387
Total Veterinary Department ..	352	514	476	565	677	2,583
Livestock Marketing ..	156	174	167	184	184	866
Total All Departments ..	923	1,129	1,037	1,165	1,322	5,575
B. Expenditure by other Government Departments or Statutory Organizations:						
Water Development ..	224	104	76	72	75	551
Range Credit ..	355	437	550	600	500	2,442
Rural Dairies ..	1	15	20	25	30	91
Beef Finishing ..	—	25	30	40	50	145
Total ..	580	581	676	737	655	3,229
Total Central Government Development Expenditure (A + B): ..	1,503	1,710	1,713	1,902	1,977	8,804
C. Expenditure Outside the Development Budget: ..	633	580	437	388	395	2,433
GRAND TOTAL (A+B+C)	2,136	2,290	2,150	2,290	2,372	11,237

Source: Kenya Development Plan 1970-1974, p. 256.

There are two major livestock production programs in Kenya which have their own special ecology and requirements and form the basis for analyzing priorities: the rangeland beef program in the low-rainfall areas of Kenya, and the mixed dairy and beef program in the high-rainfall areas. Of the \$11.2 million on livestock development expenditures shown in Table 7, about 58 percent or \$6.6 million is allocated to the rangeland areas; (see Table 8, following page), \$5.2 million of which comes directly from the Central Government. Items

included in this budget--such as Ranch Credit, £2.4 million--are included under the "Credit" category in Table 5, rather than under "Livestock Development," which is the reason for the apparent discrepancy. As can be noted by comparing Table 7 and 8, the Range Management Division is the Ministry of Agricultural organization specifically set up for administering the livestock programs in the rangeland areas, while the Animal Husbandry Division administers the livestock programs in the higher rainfall areas. The Veterinary Department provides some common services for both divisions, but £167,000 appears to go directly to the rangeland areas. "Livestock marketing," "Beef Finishing," and "Water Development" apply solely to the rangeland areas; Agricultural Credit, in general, will be discussed below; and almost two-thirds of the external aid in Category C is allocated to the rangeland programs.

Table 8

DEVELOPMENT EXPENDITURE IN THE RANGE AREAS

Item	K'000					Total
	1969/70	1970/71	1971/72	1972/73	1973/74	
A. Expenditures by Government Departments and Statutory Organizations						
1. Range Management Division	223	216	168	184	195	986
2. Ancillary Veterinary Services	39	35	33	30	30	167
3. Livestock Marketing	156	174	167	185	184	866
4. Ranch Credit	355	437	550	600	500	2,442
5. Water Survey and Development	224	104	76	72	75	551
6. Beef Finishing	—	25	30	40	50	145
TOTAL A	997	991	1,024	1,111	1,034	5,137
B. Expenditure Outside the Development Budget	329	366	298	219	248	1,460
TOTAL A AND B	1,326	1,357	1,322	1,330	1,282	6,617

Source: Kenya Development Plan 1970-1974, p. 256.

The objective of the range development program is to convert traditional pastoralism that exists in the low rainfall four-fifths of the country to commercial livestock production. By the end of 1974, it is planned that 2.2 million hectares of rangeland will be under relatively intensive development and a further 11.4 million hectares under extensive development. Four types of ranches are envisaged: (1) Group ranches, mostly in Masai land, to be owned collectively by the group according to special legislation passed expressly for this purpose; (2) Company ranches, to be owned by shareholders, operated by paid employees, and governed by a board of directors on land leased from the government; (3) Individual ranches; and (4) Commercial ranches which are already in existence. The development of water supplies is a critical part of the rangeland program, and a special Range Water Section in the Water Development Division of the Ministry of Agriculture was established to carry out these plans. Most of the expenditures of the Livestock Marketing Division will be devoted to new stock routes and holding grounds directly related to the rangeland program, and the fattening of immature stock under the Beef Finishing Program will also be an integral part of the rangeland-related activities.

The Plan indicates that "all but a small proportion of development expenditures on beef production" are allocated to the rangeland programs, so only dairy programs need yet to be identified. Apart from outlays that go into research or education/training, direct expenditures by the Animal Husbandry Division on stock improvements schemes, a progeny-testing program, housing, etc., amount to #247,000 over the plan period, (Kenya, p. 260); expenditures on rural dairies amount to #91,000; and the artificial insemination program will amount to #139,000 from the Kenya government and #211,000 from Swedish aid. It can also be assumed that part of the Veterinary Department's expenditures will be applied to dairy livestock, but there are no specific allocations

for this as is the case with the rangelands. The basis for the proposed expansion of dairy products, (see Table 7), is once again the expectations of a highly income elastic domestic market and favorable ecological conditions that exist for the expansion of dairy production.

Agricultural research--Item 5 in Table 5--accounts for KSh3.2 million, or 8.1 percent of total agricultural expenditures over the plan period, a "much greater emphasis" as it is described in the plan. (Kenya, p. 223.) The specific development expenditures are shown in Table 9 below, and the general priority

Table 9
DEVELOPMENT EXPENDITURE ON AGRICULTURAL RESEARCH

Item	KSh'000					Total for Plan Period
	1969/70	1970/71	1971/72	1972/73	1973/74	
VETERINARY RESEARCH—						
Vaccine Production Unit	70	55	6	1	1	133
Construction of Veterinary Investigation Laboratories	24	56	83	90	190	443
Tick-Borne Diseases Project	—	16	17	17	16	66
Foot and Mouth Disease Research	—	15	15	15	20	65
Parasitology Laboratory	—	—	19	30	15	64
Biological Assay Laboratory	—	—	—	41	—	41
Wildlife Disease Research Project	—	5	7	8	10	30
Other Veterinary Research Projects	2	25	9	6	16	58
Total	96	172	156	208	268	899
ANIMAL HUSBANDRY RESEARCH—						
Beef Finishing Project	139	80	86	75	75	455
Dairy Research and Miscellaneous	23	23	35	39	47	167
Total	162	103	121	114	122	622
RANGE RESEARCH—						
Range Research Station	53	55	10	12	15	145
CROP RESEARCH—						
Coffee(*)	222	146	159	143	105	775
Sugar Cane	52	38	15	—	—	105
Grain Legumes	—	—	32	50	46	128
Horticultural Crops	30	80	20	24	—	154
Oilseeds	—	—	40	40	10	90
Potatoes	16	20	10	10	—	56
Cotton	—	—	20	17	12	49
Maize	28	6	6	5	—	45
Other Crops	5	—	25	18	—	49
Total	353	290	327	307	173	1,451
FARM MECHANISATION RESEARCH—						
Nakuru Farm Mechanisation Research Centre	10	20	30	20	20	100
TOTAL	674	640	644	661	595	3,217

(*)The figures shown for coffee research are not strictly comparable with the figures for other research expenditure. In the case of coffee all Government expenditure on research is expected to come from the Development Budget whereas development expenditure for other items of research is largely for capital development only. Capital expenditure on coffee research is expected to amount to about KSh112,000 over the Plan period.

policy is as follows:

In general, when choosing between possible research projects, priority will be given to applied research in areas where the returns in terms of increased farm incomes are expected to be highest...A large part of the research effort will comprise technical research directed at breeding more productive crops and livestock, at finding better means of controlling pests and diseases, and developing more efficient production techniques...Despite this, technical research has been confined to a somewhat limited range of products and research designed to find more efficient production techniques, such as agronomic and farm mechanization trials, has been too limited in scope...Technical research will be intensified on the traditionally important agricultural products...At the same time, research will be expanded on new crop and livestock enterprises in order to facilitate diversification into hitherto unimportant agricultural products. Another deficiency in previous research work has been the lack of attention given to studying the economic aspects of agriculture. For this reason, more emphasis will be given to research in the fields of farm management and market research... (Kenya, p. 224.)

Despite the all-inclusiveness of the above remarks, the specific research priorities relevant to EAAFRRO's portfolio are detailed in the Range Research, Crop Research, and Farm Mechanization Research sections of Table 9. During the Plan Period, \$145,000 of development expenditures will go to range research, \$100,000 to farm mechanization research, and \$788,000 to crop research as detailed in that category. In decreasing order of expenditures, the specific crops listed are as follows: horticultural crops, grain legumes, coffee, sugar cane, oil seeds, potatoes, cotton, and maize. There are very few specifics about the research to be done on these crops.

Two major objectives are established for farm mechanization research, however: (1) to identify the most efficient methods of using the farm equipment already available in Kenya; and (2) to test under field conditions farm equipment not available in Kenya but used successfully elsewhere and thought to be suitable for Kenya. Particular emphasis in these two areas is to be placed on cultivation techniques which might achieve better soil water conservation and intermediate machinery such as ox-drawn equipment, small tractors,

etc. The range research program is described only in terms of the general investigation of soil, ecological, and climatic conditions representative of range areas.

Under the heading of Agricultural Education and Extension in Table 5, \$2.2 million would be spent, accounting for 5.5 percent of the total agricultural expenditures. Since the expenditures included under this section primarily concern agriculture in general or are already included under other categories, no implications for Kenya priorities can be stated.

Under item 7 in Table 5, concerning agricultural credit, it has already been pointed out that \$2.4 million of this will be devoted to the rangeland credit program. Of the remaining \$2.3 million to be used for credit to small-scale farmers, four categories of Agricultural Finance Corporation (AFC) administered loans are included: an IDA Credit Project, A Kisii/Kericho Project, Pineapple Loans, and Other New Loan Programmes. All except one of these projects are for "a wide range of farm development," and the amount to be devoted to pineapple loans is only \$10,000 during the plan period. An additional \$425,000 worth of loans will be administered through Co-operative Banks, again for general agricultural purposes.⁶⁾

⁶⁾ Ibid., pp. 214 and 218. An additional category of credit covered in the plan section on Agricultural Credit but not in Table 5, is Credit for Large-Scale Farmers. "During the new Plan period it is expected that about K\$1.5 million of Central Government development funds will be provided to the AFC for issue as long- and medium-term loans to large-scale farmers...for land purchase and development loans." (Kenya, p. 216.) Thus a total of \$6.3 million is devoted to all agricultural credit. In previous years, short-term loans to large-scale farmers were made under a Minimum Financial Return (MFR) system in which the farmer's maize and wheat crop acted as insurance for the loan. The loans were used for seasonal inputs needed in a wide range of farming activities; however, not just for maize and wheat production, but in the new plan period, insurance and credit arrangements did not need to be linked.

The remaining items 8 through 12 in Table 5 all concern development expenditures for crop priorities. The \$2.5 million to be spent on Irrigation projects is principally devoted to rice and cotton production. In the breakdown of irrigation expenditures shown below in Table 10, the projects concerning the Mwea scheme and mill, the Ahero pilot scheme, the Kano scheme, the Nyanza mills, and

Table 10

CENTRAL GOVERNMENT DEVELOPMENT EXPENDITURE ON IRRIGATION

Item	1969/70					Total for Plan Period
	1969/70	1970/71	1971/72	1972/73	1973/74	
Extension to Mwea Irrigation Scheme	130	97	51	—	—	278
Mwea Rice Mill	107	—	—	—	—	107
Tana River (Galole)	80	116	146	56	56	454
Ahero Pilot Scheme	55	19	15	14	—	103
Kano Phase II (Second Pilot Scheme)	82	200	200	150	—	632
Kano Phase III	—	—	—	—	200	200
Nyanza Rice Mills	—	200	—	200	—	400
Taveta Pilot Scheme	—	39	39	18	18	114
Yala Swamp	51	—	—	5	10	66
Minor Irrigation Schemes	21	15	15	15	15	81
Irrigation Board Expenses	9	10	10	11	11	51
TOTAL	535	646	476	569	310	2,526

Source: Table 8.10, Kenya Development Plan 1970-1974, p. 230.

the Yala swamp project--a total of \$1.8 million--are all to produce rice. An expenditure of \$454,000 is devoted to cotton at the Tana River (Galole) scheme, and the Taveta Pilot Scheme is to investigate which crops and production techniques are best suited to the area. The remaining expenditures are for "minor" schemes or administrative expenses.

The emphasis on irrigation schemes stems from the relative lack of high rainfall, high production agricultural land in Kenya and the abundance of low rainfall rangeland. Kenya's plan estimates that the potential for irrigated high potential land is more than 160,000 hectares, as compared to the 6,000 hectares under irrigation in 1969/70. By 1973/74, it is expected that only 7,850 hectares will be under irrigation, so there will be plenty of room for

expansion in this area. Possible methods of diversifying production on irrigation schemes to such crops as kenaf and sugar cane are also to be carried out on some schemes during the plan period. (Kenya, pp. 228-282.)

Kenya's overall agricultural policy on crops for the plan period is largely dictated by domestic and foreign market expectations. The Gross Farm Revenue (GFR) from all crops is expected to rise from #43.9 million (65 percent of total GFR) in 1967 to #69.3 million (in 1967 prices) in 1974; an average annual rate of 6.8 percent. (See Table 11 below.) The overall policy can be roughly broken

Table 11

CROP PRODUCTION AND GROSS FARM REVENUE FROM CROPS, 1967, 1968 AND 1974

	Quantity of Output (Metric tons)			Gross Farm Revenue in 1967 Prices (K£'000)		Annual Growth Rate 1967 to 1974(*) Per cent	Gross Farm Revenue in 1968 Prices (K£'000)		Annual Growth Rate 1968 to 1974(*) Per cent
	1967	1968	1974	1967	1974		1968	1974	
Permanent Crops:									
Coffee	48,005	39,601	64,000	13,995	16,763	2.6	12,676	17,931	5.9
Tea	22,811	29,764	45,750	8,927	17,904	10.4	9,280	14,279	7.5
Sisal	51,630	50,280	45,750	2,391	2,117	(1.8)	2,193	1,996	(1.6)
Wattle Bark	54,800	50,100	45,000	860	706	(2.4)	702	631	(1.6)
Coconuts and Coconut Products	n.a.	n.a.	n.a.	480	530	1.4	490	530	1.3
TOTAL				26,653	38,020	5.3	25,351	35,367	5.8
Cereals:									
Wheat	162,228	216,309	230,000	4,575	6,486	5.1	6,779	7,208	1.0
Maize	248,839	352,557	610,000	4,218	10,340	13.6	5,361	9,278	9.6
Rice Paddy	15,938	18,747	40,600	387	986	14.2	454	983	13.7
Oats, Barley and Others	n.a.	n.a.	n.a.	460	903	10.1	489	787	8.3
TOTAL				9,640	18,715	10.0	13,083	18,256	5.8
Temporary Industrial Crops:									
Seed Cotton	12,715	14,279	20,000	603	948	6.7	700	960	5.8
Sugar Cane	706,300	950,000	1,750,000	1,598	4,025	14.1	2,185	4,025	10.7
Pyrethrins	132	150	150	2,699	3,067	1.9	2,629	2,629	—
Castor and Oil Seeds	n.a.	n.a.	n.a.	443	750	7.8	370	750	12.4
Tobacco	n.a.	n.a.	n.a.	10	40	21.9	18	40	14.2
TOTAL				5,353	8,830	7.4	5,902	8,424	6.1
Other Crops:									
Pineapples and Other Fruit	n.a.	n.a.	n.a.	806	1,800	12.1	810	1,800	14.2
Cashew Nuts	11,800	8,693	15,250	422	545	3.7	325	570	9.8
Peas	n.a.	n.a.	n.a.	466	600	3.7	490	600	3.4
Potatoes	n.a.	n.a.	n.a.	298	400	4.8	290	400	5.5
Vegetables	n.a.	n.a.	n.a.	275	400	5.4	313	400	4.2
TOTAL				2,257	3,745	7.5	2,228	3,770	9.1
TOTAL ALL CROPS				43,903	69,310	6.8	46,564	65,817	5.9

Source: Table 8.11, Kenya Development Plan 1970-1974, p. 236.

into two parts: crops for export and food crops for domestic consumption.

These two general policies can be summarized as follows:

...the market prospects for many of the crops produced in Kenya are not good. The quantity of coffee that Kenya can sell in the important overseas coffee markets is restricted by the quota allocated to Kenya by the International Coffee Organization. The world markets for both sisal and pyrethrum have been adversely affected by competitive synthetic products. Likewise, the world market price of tea may decline still further if production continues to grow faster than demand. For these reasons, the country will not be able to expand rapidly production of several traditionally important crops; in fact, production will remain static or even decline for a few of these crops. In some cases, where increased production is planned, this will be possible only if we can compete more effectively in world markets through increasing efficiency in both production and distribution. Output will also be increased through diversifying production and concentrating more on hitherto unimportant crops. (Kenya, pp. 234-235.)

During this plan period, food production policies will be aimed at providing local food supplies at reasonable prices and exporting surpluses whenever this can be done profitably. In practice, this will involve exporting maize, and possibly rice, to overseas markets, exporting some wheat to the other East African countries, but otherwise producing primarily for the Kenya market. (Kenya, p. 235.)

Looking at Table 11 above, of the significant crops, production is expected to increase rapidly (average annual growth rate greater than 10 percent, 1967-1974), only in the case of tea, maize, sugar cane, rice and pineapples. The output of other important crops such as pyrethrum, coffee, or wheat is expected to increase more slowly, while that of sisal and wattle is expected to decline.

Detailed plan comments on specific crops are shown below:

Maize - Maize is the staple food of the people. It is also the most important crop grown, both in terms of its value and the amount of land devoted to it. In the 1968/69 season it was estimated that more than one million hectares of land were planted to maize and that total production was about 1.4 million metric tons. A high proportion of this maize was consumed by the people living on the farms where it was produced; had it all been sold at the 1968/69 producer price...this crop would have been worth about K\$21 million (instead of the \$5.4 million

shown in Table 11 above)...it is planned to increase maize production substantially. Marketed production in 1974 is projected at 610,000 metric tons compared with the 1967 and 1968 production levels of 249,000 and 353,000 metric tons respectively. This will mean that maize will be an important export crop by the end of this Plan period. Maize exports in 1974 are projected at 430,000 metric tons with an estimated K£7.6 million. (See Table 12 on the following page.) (Kenya, p. 237.)

In Table 5, K£863,000 is allocated to "Wheat and Maize Storage," and no other development expenditures on either wheat or maize during the plan period are identified. Since maize production in 1974 is expected to be just over two-and-a-half times as great as wheat production, the K£863,000 will be divided in those same proportions: K£617,000 for maize storage and K£246,000 for wheat storage.

Wheat - Next to maize, wheat is the most important cereal grown...The cumulative effect...has been a substantial increase in the volume of wheat production (and) the net result has been that a substantial surplus of wheat has been built up...Some of this wheat has been used to increase the country's wheat reserves, but much of it will have to be exported overseas as flour, at a considerable loss for the producer price of wheat has recently been far higher than the overseas export parity price...Accordingly, the policy for wheat during this Plan period will not be to export wheat except to Uganda (see Table 12), and to bring production into line with the market requirements in Kenya and Uganda...Taking account of these factors and the estimated size of the market outlets available in Uganda, it is expected that Kenya will be able to sell about 230,000 metric tons of wheat in 1974; this has been set as the target production figure. (See Table 11.) This target is only a little higher than the 1968 production level of 216,000 tons. (Kenya, pp. 238-239.)

Rice - The bulk of the rice crop is produced on irrigation schemes...the target output has been set at 40,600 metric tons of paddy in 1974, (see Table 11). This is equivalent to about 26,800 tons of rice... The 1974 rice production target is almost double the present level of consumption in Kenya...During the Plan period, several measures will be undertaken with the objective of encouraging local consumption of rice...However, it seems unlikely that domestic consumption will rise sufficiently to absorb all of the increase in production. Probably some rice will have to be exported; (see Table 12). (Kenya, pp. 239-240.)

Development expenditures on rice were considered under the irrigation schemes.

Table 12

COMMODITY EXPORTS BY PRODUCING INDUSTRY, 1967 AND 1974

Table 5.4

KE thousands in 1967 prices (f.o.b.)

	Export Values £'000		Share of Total per cent	
	1967	1974	1967	1974
AGRICULTURAL PRIMARY PRODUCTS—				
Coffee	15,614	20,000	19.7	16.7
Tea	7,810	15,900	9.9	13.2
Maize	1,414	7,600	1.8	6.3
Wheat	1,618	1,650	2.0	1.4
Rice	1.6	570	0.2	0.5
Sisal	2,011	1,750	2.6	1.5
Cotton	6.9	880	0.8	0.7
Other Agricultural Products	4,818	6,600	6.1	5.5
1. Total Agricultural Products	34,310	54,950	43.1	45.8
PROCESSED AGRICULTURAL PRODUCTS—				
Milk Products	3,416	4,000	4.3	3.3
Dairy Products	2,117	1,000	2.7	0.8
Canned Fruits and Vegetables	1,117	3,150	1.5	2.6
Pyrethrum Products	2,918	3,650	3.7	3.0
Wattle Products	813	700	1.1	0.6
Animal and Vegetable Oils and Fats	311	700	0.5	0.6
Other Processed Agricultural Products	1,512	2,200	1.9	1.8
2. Total Processed Agricultural Products	12,414	15,400	15.6	12.8
3. Total Primary and Processed Agricultural Products (1+2)	46,824	70,350	58.7	58.6
4. Forestry, Hunting and Fishing	672	750	0.8	0.6
5. Minerals	1,727	1,750	2.2	1.5
OTHER MANUFACTURED PRODUCTS—				
Beverages and Tobacco	957	920	1.2	0.8
Textiles	2,343	3,020	2.9	2.5
Clothing and Footwear	2,123	4,200	2.7	3.5
Wood Products	1,366	1,950	1.7	1.6
Paper and Printing	2,231	3,110	2.8	2.6
Leather Products	322	1,050	0.4	0.9
Rubber Products	337	2,200	0.4	1.8
Chemical Products	3,632	8,800	4.6	7.3
Petroleum Products	11,715	14,500	14.7	12.1
Other Mineral Products	1,981	3,200	2.5	2.7
Metal Products and Machinery	2,961	3,250	3.7	2.7
Miscellaneous Products	496	950	0.6	0.8
6. Total "Other" Manufactured Products	30,464	47,150	38.3	39.3
7. Total All Manufactured Products (2+6)	42,928	62,550	53.9	52.1
8. Total Exports in 1967 prices (1+4+5+7)	79,637	120,000	100.0	100.0
9. Total Exports in "Current Prices" ¹	79,637	120,000		
10. Balance of payments adjustments	-663	-1,000		
11. Total exports on balance of payments basis	79,024	119,000		

¹ It has been assumed here that a price fall for some commodities will be counterbalanced by increased export prices for other commodities so that the total export value in "current prices" will not be significantly different from exports in "constant prices".

Source: Table 5.4, Kenya Development Plan 1970-1974, p. 153.

Other

Cereals - The other cereals grown...are barley, oats, sorghum and millet. Sorghum and millet are grown principally for subsistence in the small scale farming areas; in some of these areas they are extremely important subsistence crops...In the past, the Ministry of Agriculture has made persistent efforts to popularize the cultivation of more productive varieties of sorghum and millet. These efforts have been largely unsuccessful, primarily because of the susceptibility of these improved varieties to various pests and diseases. Furthermore, with the advent of drought resistant synthetic maize, the possibilities for developing sorghum and millet as important crops in the drier areas of the country seem even more remote. Nevertheless, research on these crops is still being carried on...

Barley and oats are produced primarily in the large-scale farming areas, although they are not important cereal crops...In recent years production of both barley and oats has declined...However, with the recent fall in the producer price of wheat it is expected that some land previously used for wheat production will now be used for producing barley and oats...Gross Farm Revenue from these crops amounted to about K£460,000 in 1967 and this is expected to increase to K£900,000 by 1974; (see Table 11). (Kenya, pp. 240-241.)

Sugar - In the Development Plan 1966-1970 programmes designed to bring about a substantial increase in sugar production were outlined...During the new Plan period sugar production will continue to grow rapidly in the existing four factory zones...In addition, a new sugar scheme may be established at Mumias in Western Province.

Recent developments in the sugar industry have involved large capital investments. The two new sugar schemes at Chemelil and Mukuroni cost about K£6.3 million and K£3.2 million respectively. The first phase of a sugar roads improvement programme will have been almost completed at a cost of K£2.8 million...

In order to fully develop the existing four sugar schemes, additional investments will be made during the new Plan period...The largest investment in these areas will be for sugar roads...K£380,000 will be required during the Plan period to finish this phase (one). The second phase...is expected to cost about K£1.8 million...As well as the investments to be made in sugar roads, it is expected that about another K£600,000 of public funds will be invested in the two factories...for new equipment...About another K£500,000 will also be invested in improving the arrangements for harvesting and transporting cane...

By 1974, sugar production from the existing four factories is expected to be about 165,000 metric tons, or a little more than

twice the 1968 production level ⁷⁾...If the production target of 165,000 metric tons is obtained in 1974, present indications are that Kenya will be almost self-sufficient in sugar at that time... If consumption continued to grow after 1974, the existing four factories would be operating near to their maximum capacities...With a view to meeting this expected need, a sugar pilot project was started at Mumias in 1967...A decision on whether to proceed with the full-scale project will have to await the outcome of this feasibility report. However, present indications are that sugar will grow better in the Mumias area than in any of the existing sugar producing areas...Central Government development funds, totalling K£3.3 million have been tentatively allocated to this project... (Kenya, pp. 241-243.)

The minimal total of the expenditures specifically detailed above is £6.6 million compared to the £4.1 million shown on Table 5, ⁴⁾ and even though the £2.2 million of expenditures for sugar roads are more than covered under the Roads Programme of the Transport and Communications development expenditures (see Kenya, p. 385); this still leaves £4.4 million above as compared to the £4.1 million shown in Table 5--a discrepancy for which no explanation will be attempted.

Beans and
Other

Pulses - Development of beans and other pulses has been largely ignored in the past...Nevertheless, pulses are a significant source of protein to the population. They are also important cash crops in some areas. In 1967, Gross Farm Revenue from pulses was estimated to be K£466,000 and that is expected to increase to K£600,000 by 1974, (see Table 11) ...Pulses are an attractive crop not just because they provide a means for diversifying production, but also because they can be grown in many of the drier parts of the country...However, before any large increase in production can be expected, more research needs to be undertaken... (Kenya, p. 243.)

Despite the interest expressed, no specific development expenditures on the pulses are mentioned.

⁷⁾ The figures shown in Table 11 are for the sugar cane production in metric tons rather than the factory output figures shown here. See Table 13 in the later section on industry for the monetary figures of the sugar industry.

Potatoes - Potatoes are an important crop, both for subsistence and for sale; especially at high altitude where maize does not grow well. In 1967, Gross Farm Revenue from potatoes was estimated to be K£288,000 and this is expected to increase to K£400,000 by 1974... (see Table 11). (Kenya, P. 243.)

Once again, no specific development expenditures are mentioned.

Coffee - Coffee is the most important cash crop in Kenya. Over the last few years coffee has contributed about 25 percent of total Gross Farm Revenue and about 30 percent of overseas exports. The coffee industry also provides wage employment for about 100,000 people. Production of coffee in 1967 amounted to 48,000 tons, worth K£14.0 million. By 1974, production is expected to have increased sufficiently to enable the 1974 production target to be obtained from an area of coffee perhaps 7,000 hectares less than the 1968 level. The 1974 production target of 64,000 tons is considerably higher than the present coffee export quota allocated to Kenya under the International Coffee Agreement. This was about 47,600 tons for the 1968/69 season... (see Table 12).

The coffee industry has been beset by a number of problems during the last few years. Primary among these has been the high incidence of coffee berry disease (CBD). This became widespread in the 1964/65 season and has since become even more serious. As a result, coffee quality has declined and coffee yields have fallen drastically... While an effective method of controlling CBD has now been found, this is very expensive and not suitable for the conditions of many coffee farms, especially on the small-scale farms. For these reasons, the profitability of coffee production has declined markedly together with the standard of coffee husbandry...

In view of the problems mentioned above, several remedial measures are being taken. Research on CBD is being intensified... The Government has also agreed to meet the full cost of coffee extension services and the majority of coffee research costs. These costs, which amount to about K£500,000 per annum, have up to the present time been paid by coffee producers out of cesses levied on production. Finally, the Government intends to encourage farmers in the more marginal coffee producing areas to diversify production and cease growing coffee. (Kenya, pp. 243-245.)

From Table 9, we have seen that £775,000 will be spent on coffee research during the plan period. This would leave £1.7 million to be spent on coffee extension work--as compared to the total amount of £2.2 million for all Agriculture Education and Extension shown in Table 5. Since £1.6 million is budgeted for general agricultural education alone (see Kenya, p. 221), another

ambiguous situation exists in this case of the governmental expenditures specifically mentioned for coffee. A likely assumption will be made, therefore, that the £500,000 expenditures have come from recurrent government funds rather than development funds, and the figure will be ignored in this analysis.

Tea - Recent expansion in tea production has made this commodity almost as important as coffee in terms of its contribution to farm incomes and export earnings. In 1967, tea production amounted to 22,800 metric tons worth K£8.9 million...Over the Plan period tea production should continue to expand rapidly. In 1974, the crop is expected to amount to 45,750 tons. This would be worth K£17.9 million in 1967 prices. (see Table 11)⁸⁾ Most of this expansion will take place on small-scale farms rather than on tea estates...

Tea production on small-scale farms is organized by the Kenya Tea Development Authority (KTDA)...For the five years of the Plan period, total public and private investment in the tea industry is projected at K£4.8 million. Of this total, K£1.1 million will comprise Central Government development funds to be lent to the KTDA... (Kenya, pp. 245-246.)

Sisal - Export prices of sisal have declined severely in the last few years... Sisal prices have been affected adversely by several factors, including competition from synthetic polypropylene substitutes...At the lower price levels prevailing today, only the most efficient producers can hope to produce sisal profitably...Production in 1974 is projected at 45,750 metric tons, compared with 50,280 tons in 1968. (See Table 11.) All of this sisal is expected to come from large-scale producers.

In order to help the existing sisal estates to operate profitably, several measures are planned. The on-going sisal research programme will be continued...Research intended to find alternative end uses for sisal will also be intensified and producers will be encouraged to diversify production...the amount of credit available to sisal growers from the AFC will be increased and this will be available for financing sisal production or for assisting estates to diversify and take up farm enterprises other than sisal. (Kenya, pp. 246-247.)

No specific development expenditures on sisal are identified.

⁸⁾ The large difference between 1967 and 1968 prices for some of the commodities shown in Table 11, especially tea, is caused primarily by the English devaluation that occurred during this period.

Cotton - The Government is anxious to see cotton production expanded considerably. Demand for cotton within Kenya will soon exceed the volume of local production...Cotton is also one of the few crops that can be sold easily in increased quantities on the world market. Cotton is also an attractive crop because it can be grown in many of the more marginal agricultural areas. But despite the fact that various measures designed to stimulate production have been taken already, results so far have been very disappointing...For this Plan period, the 1974 target production figure has been set at 20,000 metric tons. This represents a 40 percent increase over the 1968 production level ... (See Table 11). (Kenya, p. 247.)

The only development expenditures specified for cotton production, however, was the ₦454,000 for the cotton irrigation scheme mentioned earlier.

Pyrethrum-The output of pyrethrum has increased rapidly in the last few years ...During the present Plan period, however, continued expansion of pyrethrum production will probably not be possible. In fact, production of pyrethrins in 1974 is expected to be the same as in 1968. (See Table 11.) The major factor hindering expansion of output is the limited market outlets available for pyrethrum, especially in view of the recent development of competitive synthetic products in the developed countries... (Kenya, p. 249).

Once again, no specific development expenditures on pyrethrum are mentioned.

Horticulture

Crops -

A combination of factors has made horticultural crops potentially one of the strongest growth sectors in Kenya's agriculture. It thus offers much needed scope for diversifying agricultural production. The wide range of ecological conditions in the country make possible the production of a large number of different fruits and vegetables. Not only do these meet virtually the entire needs of the local market, but horticultural crops are being exported in increasing quantities ...In 1968, Gross Farm Revenue from horticultural crops amounted to about K₦1.1 million and this is expected to double by 1974... (See "Pineapples and Other Fruit" and "Vegetables" in Table 11). During the Plan period much of the increased output will come from pineapples and passion fruit...

Production of pineapples is expected to increase very rapidly during the Plan period. Most of this increased production will be used to supply the pineapple canning industry. Production of pineapples for canning amounted to about 10,500 tons in 1967...Output in 1974 is projected at about 120,000 tons...

At present, production of passion fruit is important only in the Kisii/Sotik area...During this Plan period, it is expected that production of passion fruit juice will increase rapidly to about 1.5 million litres in 1974, compared with only about 560 thousand litres in 1968. By 1974, exports of passion fruit juice are expected to be worth about KSh210,000... (Kenya, pp. 249-251).

No specific development expenditures for horticultural crops are mentioned.

Wattle Bark
and

Extract - In response to declining prices, wattle production has diminished over the last few years...However, the price of wattle is expected to remain relatively stable over the Plan period and the area of land planted to wattle should increase...production will continue to decline during the Plan period...Gross Farm Revenue from wattle was about KSh250,000 in 1967 and this is expected to decline to about KSh700,000 (in 1967 prices) in 1974. (See Table 11.) (Kenya, p. 251.)

No specific development expenditures for wattle are mentioned.

Cashew

Nuts - Production of cashew nuts has increased significantly in the last few years...Production is expected to continue to expand over the Plan period. In 1967, cashew nut production amounted to about 11,800 metric tons worth about KSh420,000 to the growers. By 1974, production is expected to have increased to 15,250 tons worth KSh545,000 (in 1967 prices). (See Table 11.) At present, most of Kenya's cashew nuts are exported raw overseas... (Kenya, p. 251).

No specific development expenditures for cashew nuts are mentioned.

Other

Minor

Crops - In addition to the major crops discussed so far, a number of other minor crops are produced. These include coconuts, oil seeds, tobacco, ground nuts and macadamia nuts. In 1967, Gross Farm Revenue from these products amounted to about KSh930,000. This is expected to increase to about KSh1.3 million by 1974. In the longer term production of some of these crops could become important. (Kenya, p. 251.)

No specific development expenditures on these other minor crops are mentioned.

Export expectations for various agricultural primary and processed products--another measure of their value to the Kenya economy--were shown previously in Table 12. Before leaving agriculture, however, priorities as related to agricultural-based industry will also be examined quickly. Tables 13 and 14, below and on the following page, give Gross Product/Output and Employment expectations by industry for the plan period. The significant categories for directly indicating agricultural priorities are all of those listed above food processing, of course: cotton ginning; cordage, rope and twine (sisal); and wood products, furniture and fixtures, and pulp and paper.

Table 13
PROJECTIONS* OF GROSS PRODUCT AND OUTPUT BY INDUSTRY
at 1967 Prices

INDUSTRY	GROSS PRODUCT (VALUE ADDED)			GROSS OUTPUT		
	1967 K£'000	Growth rate per cent	1974 K£'000	1967 K£'000	Growth rate per cent	1974 K£'000
Meat processing	719	7.5	1,193	6,865	7.5	11,396
Dairy products	1,066	6.0	1,600	7,620	6.0	11,430
Canning of fruit and vegetables	247	14.0	619	1,338	14.0	3,344
Grain milling	2,029	3.0	2,861	11,258	5.0	15,916
Bakery products	783	8.0	1,342	3,370	8.0	5,762
Sugar	582	15.0	1,550	2,804	10.9	5,777
Confectionery	72	7.8	122	241	7.8	408
Miscellaneous food	731	10.6	1,485	3,110	10.6	6,282
Total food processing	6,233	8.1	10,771	36,635	7.4	60,314
Beverages and tobacco	5,261	6.0	7,891	11,221	6.0	16,832
Cotton ginning	135	5.8	200	943	5.8	1,399
Knitting mills	248	7.5	411	778	7.5	1,291
Cordage, rope and twine	653	0.0	653	1,644	0.0	1,643
Spinning and weaving	762	24.0	3,438	2,842	20.1	10,232
Total textiles	1,798	14.7	4,703	6,206	12.6	14,565
Footwear	511	7.0	822	2,148	7.0	3,458
Clothing and made up textiles	1,356	8.0	2,319	4,748	8.0	8,118
Total Footwear and Clothing	1,867	7.7	3,140	6,895	7.7	11,576
Wood products	1,177	8.2	2,048	3,029	8.2	5,270
Furniture and fixtures	904	9.0	1,654	2,331	9.0	5,180
Pulp and paper	799	26.0	4,122	3,110	18.1	10,000
Publishing and printing	2,635	7.5	4,375	5,649	7.5	9,378
Leather and fur	198	9.0	248	506	9.0	1,659
Rubber	335	36.0	348	944	29.0	5,570
Chemicals and petroleum	463	8.0	9,337	25,470	8.0	43,738
Non-metallic minerals	2,246	6.0	3,669	5,911	7.5	9,812
Metal products	2,305	7.5	3,976	7,509	7.5	12,466
Machinery	2,774	8.3	4,854	5,320	8.3	9,310
Transport equipment	7,489	7.0	12,058	13,111	7.0	21,108
Miscellaneous	602	7.5	1,000	1,807	7.5	3,000
Total Manufacturing*	42,372	8.9	74,803	136,555	8.4	239,778

*Excluding small rural establishments, the total product of which was estimated at K£2.8 million in 1967 and is projected at K£5.3 million for 1974.

Table 14

INDUSTRIAL EMPLOYMENT PROJECTIONS*

Industry	Product growth 1967-74 per cent	Employment growth 1967-74 per cent	Numbers employed 1967	Numbers employed 1974	Increase in employment 1967-74
Meat processing	7.5	0.8	2,021	2,150	129
Dairy products	6.0	2.6	1,440	1,728	288
Canning of fruit and vegetables	14.0	6.5	1,715	2,659	944
Grain milling	5.0	2.7	2,273	2,750	477
Bakery products	8.0	3.4	1,425	1,795	370
Sugar	15.0	2.6	1,744	2,100	356
Confectionery	7.8	5.4	131	189	58
Miscellaneous food	10.6	7.5	1,231	2,049	818
Total Food Processing	8.1	3.7	11,980	15,420	3,440
Beverages and tobacco	6.0	3.7	3,534	4,555	1,021
Cotton ginning	5.8	7.7	126	212	86
Knitting mills	7.5	10.4	793	1,587	794
Cordage, rope and twine	—	neg	2,032	1,699	-333
Spinning and weaving	24.0	9.6	2,836	5,347	2,512
Total Textiles	14.7	6.3	5,737	8,836	3,099
Footwear	7.0	7.9	1,175	2,000	825
Clothing and made up textiles	8.0	1.4	3,727	4,100	373
Total Footwear and Clothing	7.7	3.1	4,902	6,100	1,198
Wood products	8.2	4.5	4,678	6,373	1,695
Furniture and fixtures	9.0	0.4	1,929	1,482	-55
Pulp and paper	26.0	11.9	1,004	2,210	1,206
Publishing and printing	7.5	3.5	3,127	4,000	873
Leather and fur	9.0	9.6	474	900	426
Rubber	16.0	10.1	382	750	368
Chemicals and petroleum products	8.0	3.4	3,217	4,058	841
Non-metals; minerals	6.0	3.4	2,056	2,600	544
Metal products	7.5	5.1	3,130	4,458	1,318
Machinery	8.3	2.5	3,946	4,703	757
Transport equipment	7.0	1.6	14,487	16,251	1,764
Miscellaneous	7.5	7.8	1,059	1,754	695
TOTAL Manufacturing	8.9	3.7	65,762	85,000	19,238

*Excluding small rural establishments and self-employed.

Source: Table 10.6, Kenya Development Plan 1970-1974, p. 314.

Table 15, on the following page, shows the source of investment funds for expanding the industrial sector, as divided between private and public sources. Unfortunately, this table is not exactly comparable to the development expenditure tables utilized in the agricultural sector of Kenya's plan; it overlaps with expenditures allocated during the previous plan period, and it repeats some expenditures already presented earlier. Therefore, it will not be used as an indicator of agricultural priorities.

Table 15

SOURCE OF INVESTMENT FUNDS FOR MANUFACTURING EXPANSION			
	K£'000		
Industry	Private	"Public"	Total
Meat processing	200	1,000	1,200
Dairy products	1,500	—	1,500
Canning of fruit and vegetables	1,000	100	1,100
Grain milling	1,300	100	1,400
Bakery products	500	50	550
Sugar	4,500	4,000	8,500
Confectionery	50	—	50
Miscellaneous food	1,450	50	1,500
Total Food Processing	10,500	5,200	15,800
Beverage and tobacco	4,500	500	5,000
Cotton ginning	100	—	100
Knitting mills	300	—	300
Cordage rope and twine	—	—	—
Spinning and weaving	7,500	2,000	9,500
Total Textiles	7,900	2,000	9,900
Footwear	300	—	300
Clothing and made up textiles	575	25	600
Total Footwear and Clothing	875	25	900
Wood products	1,200	500	1,700
Furniture and fixtures	500	100	1,000
Pulp and paper	9,000	3,500	12,500
Publishing and printing	1,450	350	1,800
Leather and fur	110	90	200
Rubber	5,500	500	6,000
Chemicals and petroleum	10,100	1,000	11,100
Metal products	2,000	500	2,500
Non-metallic minerals	3,700	150	3,850
Machinery	2,675	125	2,800
Transport equipment	3,570	500	4,000
Miscellaneous	250	—	250
TOTAL MANUFACTURING	64,160	15,175	79,300

Source: Table 10.9, Kenya Development Plan 1970-1974, p. 321.

The food processing industries constitute the second largest manufacturing group in Kenya, after the motor repair group. More importantly, of their K£30 million of purchased inputs in 1967, as much as £28 million worth was domestically produced by Kenya's agricultural sector, (see Table 13). Employment in this group made up about 18 percent of total manufacturing employment, (see Table 14).

The meat processing industry consists principally of the Kenya Meat Commission (KMC), a para-statal body that controls the sale and slaughter of beef cattle. The dairy products industry is similarly dominated by Kenya Co-operative Creameries (KCC), which is responsible for the processing of milk

and milk products. The fruit and vegetable canning industry is dominated by the canning of pineapples, although the processing of passion fruit juice and dehydrated vegetables is also mentioned. Kenya Cannery, Ltd., owned by California Packers (DelMonte) is the largest producer of canned pineapples, and the gross output of this commodity is expected to rise from \$1.3 million in 1967 to \$3.3 million in 1974. (See Table 13.) The grain milling and bakery products industries are based on maize and wheat, in unspecified proportions. Gross output value is expected to increase from \$11.3 to \$15.9 million (1967 to 1974) in the former industry, and from \$3.4 to \$5.8 million in the latter. (See Table 13.) The sugar industry is expected to achieve an increase from \$2.8 to \$5.8 million of gross output over the same period, and its dependent confectionary industry from \$241,000 to \$408,000. The miscellaneous food category consists largely of margarine, cashew nuts, and fish processing.

Under the textile industry category, cotton ginning is, of course, directly dependent on the production of cotton in Kenya. The knitting and spinning and weaving parts of the industry, however, involve the production of products such as rayon and cotton polyester poplin and are not directly tied to Kenya's cotton crop. Cordage, rope, and twine are made from sisal, and the competition from synthetic products is expected to affect the industry just as it has the primary product.

Directly related to forestry primary products are the wood products, furniture and fixtures, and pulp and paper industries. Saw mills and plywood factories are the two principal components of the wood products industry-- an industry which, by the way, has a relatively high proportion of its gross output coming from the value added during the industrial process. (See Table 13.) The furniture and fixture industry mainly involves the manufacture of

low cost furniture for the local market. A very large increase in the gross output of the pulp and paper industry--from #3.1 million in 1967 to #10.0 million in 1974--is expected with the completion of a factory at Broderick Falls. The principal output of the plant will be "kraft" paper to be used in the packaging industry. Both the wood products and pulp and paper industries are expected to require large increases in paid employment as well. (See Table 14.)

Forestry comes under a different ministry in Kenya: the Ministry of Natural Resources; along with a mines and geological department.⁹⁾ The principal distinction in the forestry field is between plantation softwoods (pine and cypress species) and natural hardwoods. Kenya's total forest reserves total about 1.7 million hectares, 1.6 million of which comprise natural hardwood forests and bush land, and the remaining 100,000 hectares is planted softwoods. The annual harvesting potential, however, is estimated to be 390,000 cubic meters of planted softwoods as opposed to only 110,000 cubic meters of indigenous hardwoods. Past history and future expectations of forestry sales in terms of softwoods versus hardwoods reinforce this emphasis; see Table 16 below. Development expenditures for forestry during the plan

Table 16

Sales From Government Forests of Timber, 1964-1974

	'000 Cubic Meters		
	1963	1967	1974 Forecast
Soft Woods	118.8	215.3	419.4
Hard Woods	13.9	16.4	31.9
Total	132.7	231.7	451.3

Source: Table 9.4, Kenya Development Plan 1970-1974, p. 288.

⁹⁾ Fisheries is included under Natural Resources in Table 4, but the Fisheries Department is now part of the Ministry of Tourism and Wildlife.

period are detailed in Table 17, on the following page. Although the headings in this table may not clearly indicate the same priority bias in favor of softwoods, it is definitely there. The largest single item in the £5.9 million budget is £2.2 million for plantation maintenance. Since this is a "Recurrent" expenditures, however, this is not strictly comparable with agricultural expenditures. The second largest item of £880,000 for the Turbo Afforestation Scheme is to provide future softwoods for the Broderick Falls pulp and paper plant. The plan calls for 36,600 hectares of softwoods to be planted during the plan period, which will take up the other local afforestation schemes allocation of £121,000. The Coast Forestry Development expenditure is once again related to forest plantations, and it is likely that almost all of the investment in "forest development" will occur in the plantations rather than the natural forests. In short, it is probably conservative to estimate that £ 3.1 million of the government's non-recurrent development expenditures go toward plantation softwoods, and less than £0.6 million to natural hardwoods.

In order to have some kind of forestry value figures comparable to those in Table 11 for agriculture, one more estimate will have to be made. Government revenues from the sale of timber totaled £153,000 in 1967/68, and were expected to total £302,000 in 1973/74.¹⁰⁾ A conservative estimate once again that five-sixths of this revenue comes from plantation softwoods, gives figures of £125,000 and £250,000 revenue from softwoods in 1967/68 and 1973/74 respectively, and a corresponding £25,000 and £50,000 from hardwoods.

In addition to monetary revenue, the Kenya plan recognizes that forests are an important and valuable asset for the preservation of water catchment

¹⁰⁾ Ibid., p. 288. Since almost all forests are owned by the government, this should be a reasonable comparison to Gross Farm Revenue in Table 11.

Table 17
DEVELOPMENT EXPENDITURE—FORESTRY KES '000

	1969/70	1970/71	1971/72	1972/73	1973/74	Total
PLANTATION DEVELOPMENT—RECURRENT	406	426	446	466	486	2,230
FOREST DEVELOPMENT—NON-RECURRENT						
Staff Housing	53	73	105	133	168	532
Offices, Stores and Ancillary Buildings	8	9	10	11	13	51
Water Supplies	5	6	7	7	8	33
Roads	9	10	11	12	13	55
Additional Vehicles and equipment	18	20	22	24	24	108
TOTAL FOREST DEVELOPMENT—NON-RECURRENT	93	118	155	187	226	779
Local Afforestation Schemes—RECURRENT	87	90	94	98	102	471
Works and Buildings	16	18	19	21	22	96
Additional Vehicles and equipment	4	5	5	5	6	25
TOTAL LOCAL AFFORESTATION SCHEMES—NON-RECURRENT	20	23	24	26	28	121
LOGGING UNITS						
Vehicles and Equipment	—	5	5	5	—	15
Operation Costs	11	13	13	13	13	63
TOTAL LOGGING UNITS	11	18	18	18	13	78
FOREST INDUSTRIAL TRAINING CENTRE						
Works and Buildings	1	4	4	4	—	13
Vehicles and Equipment	15	18	7	8	8	56
Operating Costs	68	73	68	68	68	345
TOTAL FOREST INDUSTRIAL TRAINING CENTRE	84	95	79	80	76	414
MISCELLANEOUS PROJECTS						
Forest Inventory	6	—	—	—	—	6
Forest Training School Improvements	7	—	—	—	—	7
TOTAL MISCELLANEOUS PROJECTS	13	—	—	—	—	13
MASAI FOREST DEVELOPMENT	10	10	10	10	10	50
TURBO AFFORESTATION SCHEME						
Purchase of Land	79	—	—	—	—	79
Payments to E.A.T.E.C. for Agricultural Vehicles, Equipment and Buildings	31	126	66	57	23	313
Payment to E.A.T.E.C. Working Capital	8	17	—	—	—	25
Afforestation Works and Buildings	6	10	11	14	6	47
Afforestation Vehicles and Equipment	4	11	4	2	1	22
Afforestation—Operation Costs	56	83	84	85	86	394
TOTAL TURBO AFFORESTATION SCHEME	184	247	165	168	116	880
EXTRACTION ROADS						
Works and Buildings	2	3	3	4	4	16
Vehicles and Equipment	15	6	50	50	49	161
Operation Costs	133	130	135	140	145	633
TOTAL EXTRACTION ROADS	150	139	188	194	189	810
COAST FORESTRY DEVELOPMENT MARKET AND FEASIBILITY STUDIES	4	5	6	7	8	30
	1	1	1	1	1	5
GRAND TOTAL	1,063	1,172	1,186	1,255	1,255	5,911

Source: Table 9.2, Kenya, Development Plan 1970-1974, pp. 285-286.

areas, the control of soil erosion, and the preservation of wild life. One important last theme in Kenya priorities as related to EAAFR0 is the area of water resources and land use. Although the provision water supplies formed a specific component under the rangeland program discussed previously, it is not this kind of direct provision that is of concern here; but the more underlying expenditures on the over-all water resources/land use issue in Kenya.

Not much of this topic is covered in the plan. Mention is made of the Water Development Division's (Ministry of Agriculture) "number of other aspects related to water" which included hydrological surveys; sewage, drainage, and minor irrigation works; land reclamation; flood and coastal protection; and water pollution. But total development expenditures on all these activities is only \$400,000 during the plan period. (Kenya, pp. 370 and 375.) Likewise, the establishment of a Land Use Committee to advise the Government on the best use of land where conflicting interests exist is mentioned, (Kenya p. 192), but nothing more is said and no expenditures are specified for it. Therefore, it must be concluded that this field is fairly low on Kenya's list of priorities.

A summary of Kenya's agricultural priorities in fields related to EAAFR0 projects is shown in Table 18. In explanation of the figures, development expenditures were included only when they were specifically designated for an item or items in the Table--general or all-purpose expenditures are not included. The principal criterion for determining the rankings was column 1, Central Government Development Expenditures (excluding research), but the other criteria shown--research expenditures, expected gross value, expected rate of increase, expected export value, and expected industrial value--were also deemed to be relevant to determining national priorities and entered into the

judgments. And finally, the non-quantifiable development plan discussions of the specific topics inevitably played a part in arriving at the final decisions.

In summary form, Kenya's Class I top priorities concern Rangeland/Live-stock, Maize, Sugar Cane, Tea, and Plantation Softwoods; the Class II priorities concern Dairy development, Coffee, Horticultural Crops (Pineapples), Rice and Wheat; the Class III priorities concern Cotton, Phrethrum; Class IV priorities concern Sisal, Legumes, Oil Seeds, Potatoes, Wattle, Cashew Nuts, Coconuts, Tobacco, Farm Mechanization, and Indigenous hardwoods; Class V priorities concern Water Resources/Land Use and all other crops mentioned but never specifically designated for any purpose, such as sorghum and millet, barley, oats, poultry, pigs, etc.

Table 18

KENYA'S NATIONAL AGRICULTURAL AND FORESTRY PRIORITIES

Priority Class	Project/Activity	Central Government Development Expenditures, Excluding Research		Central Government Development Expenditures On Research		Expected Gross Farm Revenue in 1974 (\$'000,000)	Expected Annual Growth Rate of Gross Farm Revenue 1967-1974 (j) (%)	Expected Value of Exports in 1974 (primary & processed)(n) (\$'000,000)	Expected Value Added to Gross Product in 1974 by Industry (g) (\$'000,000)
		(\$'000,000)	(\$'000,000)	(\$'000)	(\$'000,000)				
I	Rangeland/Livestock	9.4 (a)	145	14.5 (k)	4.5 (k)	4.0	1.2 (r)		
	Maize	0.6 (b)	45	10.3	13.6	7.6	2.1 (s)		
	Sugar Cane	4.1 (c)	105	4.0	14.1	---	1.7 (t)		
	Tea	1.2 (d)	---	17.9	10.4	15.9	---		
	Plantation Softwoods	3.1 (e)	---	0.2 (l)	---	1.9 (p)	7.8		
II	Dairy Dvlpmt.	0.5 (f)	167 (i)	9.3	5.0	1.0	1.6		
	Coffee Horticultural	---	112 (i)	16.8	2.6	20.0	---		
	Crops	---	154	2.2 (m)	12.1	3.1	0.6		
	Rice	1.8 (g)	---	1.0	14.2	0.6	---		
	Wheat	0.2 (b)	---	6.5	5.1	1.6	2.1 (s)		
III	Cotton	0.5 (g)	49	0.9	6.7	0.9	0.2		
	Pyrethrum	---	---	3.1	1.9	3.6	---		
	Sisal	---	---	2.1	1.8	1.7	0.7		
IV	Legumes	---	128	0.6	3.7	---	---		
	Oil seeds	---	90	0.7	7.8	---	---		
	Potatoes	---	56	0.4	4.8	---	---		
	Rattle	---	---	0.7	2.4	0.7	---		
	Cashew Nuts	---	---	0.5	3.7	---	---		
	Coconuts	---	---	0.5	1.4	---	---		
	Tobacco Farm	---	---	---	21.9	---	---		
V	Indigenous Hardwoods	---	100	---	---	---	---		
	Water Users/	0.6 (e)	---	---	---	---	---		
	Land Use Other	---	---	---	---	---	---		

See Footnotes Following Page

Footnotes From Table 18

- (a) \$5.2 million from Table 8, plus \$4.2 million from land adjudication, Table 5.
- (b) See Table 5 and the discussion of maize.
- (c) This figure is taken from Table 5; but see the discussion on sugar cane to note that the expenditures could be as high as \$6.6 million.
- (d) See Table 5.
- (e) See the discussion of forestry development expenditures.
- (f) See the discussion on dairy development expenditures.
- (g) See the discussion on irrigation.
- (h) See Table 9.
- (i) See footnote (a) in Table 9.
- (j) See Table 6 and Table 11.
- (k) This figure is for total "Cattle for Slaughter" and so is/may be too high.
- (l) This is expected revenue to the government from sawn timber, which may not be comparable with the other figures.
- (m) "Pineapples and Other Fruits" plus "Vegetables" in Table 11.
- (n) See Table 12.
- (o) This figure is for total "Meat Products" and so is too high.
- (p) "Wood Products" only from Table 12; "Paper and Printing" is not included.
- (q) See Table 13.
- (r) This figure is for total "Meat Processing" and so is too high.
- (s) "Grain Milling" and "Bakery Products" industries in Table 13 includes both wheat and maize. In the absence of any indication of the relative proportions of these grains, the total figure of \$4.2 million is divided in half.
- (t) Includes both the "Sugar" and the "Confectionary" industries listed in Table 13.
- (u) "Wood Products," "Furniture and Fixtures," and "Pulp and Paper" industries in Table 13 are all included. See the discussion of Table 13.

UGANDA

Uganda's Third Five-Year Development Plan covers the period from 1971/72 to 1975/76, and thus is the most recent national plan to be analyzed. As shown in Table 19, below, the total production target of the plan is to achieve a monetary Gross Domestic Products (GDP)--in 1966 prices--of 7,025 million shillings¹¹ by 1976, at an average annual growth rate of 5.6 percent from 1967/68 to 1975/76. Agriculture is the dominant field in the monetary GDP sector--only Transport,

Table 19
Gross Domestic Product 1967/69-1976
(1966-Prices)

	1967/69 Average	1976*	Breakdown Total Product		Breakdown Monetary Product		Annual Average Growth rate 1967/69-1976 -
			1967/69 Average	1976	1967/69 Average	1976	
			Shs. million	%	%	%	
Agriculture	1,671	2,375	24.7	24.4	35.6	33.8	4.8
Manufacturing including Crop Processing	556	996	8.4	10.2	12.2	14.2	7.6
Mining and Quarrying	109	116	1.7	1.2	2.4	1.7	0.5
Transport, Communications and Electricity Services	360	586	5.5	6.0	7.9	8.3	6.2
Government	1,225	1,782	18.6	18.3	26.9	25.4	4.8
Construction	589	1,013	8.9	10.4	12.9	14.4	7.0
	94	157	1.4	1.6	2.1	2.2	6.6
Total Monetary G.D.P. at Factor Cost	4,556	7,025	69.1	72.2	100.0	100.0	5.6
Subsistence Production	2,035	2,700	30.9	27.8			3.6
Total G.D.P. at Factor Cost	6,591	9,725	100.0	100.0*			5.0

*Based upon achievement of the minimum cotton production target of 600,000 bales in 1976.

Source: Table III.I, Uganda's Development Plan 1971/72 - 1975/76, p. 42.

Communications and Electricity even approaches it--and it is expected to stay that way during the plan period, only falling from 24.7 to 24.4 percent of total GDP by 1976. In addition, we can safely assume that the subsistence production,

¹¹) Hereafter, "million shillings" will be abbreviated "m. shs."

non-monetary sector, comprising about 30 percent of total GDP, is also almost entirely included in the agricultural field. In rough terms then, agriculture can be said to be directly responsible for over half of Uganda's GDP. Perhaps more significantly, over 90 percent of Uganda's population is dependent to some degree upon the agricultural sector¹²⁾ for its income. As Uganda's plan points out,

The need to bring about a transformation in the sectoral structure of the economy has already been stressed. However, due to the dominant position of agriculture in the economy and the obvious resource advantages which Uganda enjoys with respect to this sector, agriculture must continue to expand for there to be any appreciable growth in total Gross Domestic Product. Moreover, since such a large proportion of the country's population is directly engaged in agriculture, a Development Plan which did not provide for the growth of agricultural production and incomes would hardly have any impact on the welfare of the majority of the population. (Uganda, pp. 13-14.)

Corresponding to this dominant position of agriculture in Uganda's economy and society, activities relating to agriculture and livestock production will be receiving a large share of total development expenditures during the plan period.¹³⁾ As shown in Table 20 on the following page, 677 m. shs. in the high priority column are allocated to rural production, an amount accounting for 21.2 percent of total development expenditures and approached only by Transport and Communications. (In explanation of Table 20, the column of "Bank" development expenditures includes all projects which the Uganda Government feels it has sufficient managerial capacity to design, implement, and follow-up; and for which rudimentary cost-benefit analyses have indicated that such expenditures

12) It should be noted that forestry and fisheries activities are included in the "agricultural sector."

13) It should be noted here that the plan considers projects which, while not involving the creation of additional capital assets, nevertheless result in a real expansion of the national productive capacity: e.g., disease eradication schemes, the provision of credit and subsidies, the funding of parastatal organizations, etc., as included in the concept of "development expenditure." (Uganda, p.8.) This seems to generally agree with the definitions that Kenya and Tanzania use as well.

Table 20

Plan III—Development Expenditure (by Plan Chapter)

(Shs. million)

Plan Chapter*	"Bank"	"High Priority"	High Priority on Target Development Expenditure
			%
Population	1.0	1.0	—
Manpower and Employment	4.5	3.5	0.1
Regional Development	81.0	51.0	1.6
Allocation and Financing of Public Sector Expenditure	10.0	10.0	0.3
Functions and Machinery of Planning	20.0	10.0	0.3
Rural Production	878.3	677.0	21.2†
Manufacturing, Mining and Construction	352.8	338.3	10.6
Tourism and Wildlife	62.3	49.3	1.5
Commerce and Financial Institutions	52.0	52.0	1.6
Transport and Communications	761.1	480.3	15.0
Water	173.7	159.8	3.0
Health Service	267.8	183.5	5.7
Education	339.6	246.9	7.7
Housing	48.0	35.0	1.1
Community and Information Services	145.1	101.8	3.2
General Administration and Security Services	481.0	292.8	9.4
TOTAL	3,678.2	2,699.2	84.4†
Unallocated Balance (Paragraph 3.9)	—	500.0	15.6
Target Development Expenditure (Table VIII-3)	—	3,200.0	100.0

Source: Table VIII.4, Uganda Development Plan 1971/2 - 1975/6, p. 119.

would be justified. From within the "bank" of justifiable projects, those of highest priority have been identified which represent the minimum development effort that must be undertaken in order to achieve the major objectives of the Plan. These expenditures total up to 2,700 m. shs. An additional unallocated 500 m. shs. is provided to account for things like rises in prices, under-estimation of costs, the addition of new projects to the high priority list, and development expenditures on the Armed Forces during the plan period which are not listed elsewhere in the Plan. It is the "high priority" expenditures that will be used in this analysis. Most of this governmental expenditure on rural production will go through the Ministry of Agriculture and Forestry and the Ministry of Animal Industry, Game and Fisheries--see Table 21 on the following page.

Table 21
Plan III—Development Expenditure by Ministry

(Shs. million)

Ministry	"Bank"	"High Priority"	Percentage
President's Office	34.0	24.0	0.8
Judiciary	22.3	13.4	0.4
Public Service and Cabinet Affairs	76.9	40.0	1.3
Local Administration	10.0	5.0	0.2
Contribution to Local Authorities Loan Fund	115.0	57.0	1.8
Foreign Affairs	10.0	3.0	0.1
Attorney-General's Chambers	1.0	0.1	—
Finance and Planning	67.2	43.2	1.3
Contribution to Local Investment Fund	688.5	624.2	19.5
Agriculture and Forestry	344.0	225.3	7.0
Animal Industry Game and Fisheries	299.6	268.3	8.4
Commerce and Co-operatives	16.1	16.1	0.5
Industry	36.1	29.6	0.9
Mineral and Water Resources	109.8	98.4	3.1
Education	328.0	235.3	7.4
Health	265.0	183.7	5.7
Culture and Community Development	80.3	52.2	1.6
Works and Housing	630.9	371.1	11.6
Power and Communication	123.8	120.8	3.8
Labour	16.5	15.5	0.5
Information and Broadcasting	72.8	55.6	1.7
Internal Affairs	328.2	218.2	6.8
TOTAL	3,679.0	2,700.0	84.4
Unallocated Balance (Paragraph 8.9)	—	500.0	15.6
TARGET DEVELOPMENT EXPENDITURE	—	3,200.0	100.0

Source: Table VIII.5, Uganda Development Plan 1971/2 - 1975/6, p. 120.

Uganda is relatively well-endowed with good agricultural land and abundant supplies of water in East Africa—low rainfall and pastoral rangeland grazing occur only in the northeast Karamoja districts for the most part. The most favorable agricultural conditions exist in southern Uganda, stretching in a "fertile crescent" around the northern shores of Lake Victoria. Climate and soil conditions have led to the development of robusta coffee and bananas as the economic mainstay in this area, although other crops such as cotton, sugar, tea, and vegetables are also of considerable importance. With excellent natural agricultural resources, Uganda has, in the past, attempted to break out of the vicious circle of "the size of the market is a function of domestic incomes generated in production whose growth, however, is dependent on the growth of

markets" (Uganda, p. 7), through the production of agricultural crops for the export market--namely, coffee and cotton. Table 22 below shows the 1967-69 average values of different exports--besides coffee and cotton, the only other

Table 22

Exports: 1967-69 and 1976.

Commodity	1967-69 Average	1976	Annual Average Growth Rate 1967-69-1976
ARABICA COFFEE:			%
Quantity (metric tons)	18,337	20,000	1.9
Price (Shs. per metric ton)	5,700	6,600	
Value (Shs. millions)	104.6	132	2.9
ROBUSTA COFFEE:			
Quantity (metric tons)	145,560	140,000	0.5
Price (Shs. per metric ton)	4,287*	5,443*	
Value (Shs. million)	624.0	762	2.5
RAW COTTON:			
Quantity (metric tons)	62,170	94,000†	5.3
Price (Shs. per metric ton)	4,557	4,600	
Value (Shs. million)	283.3	433	4.1
TEA:			
Quantity (metric tons)	12,311	32,500	12.9
Price (Shs. per metric ton)	6,494	6,300	
Value (Shs. million)	80.0	205	12.5
SUGAR:			
Quantity (metric tons)	38,906	60,000	5.6
Price (Shs. per metric ton)	779	780	
Value (Shs. million)	30.3	47	5.6
ANIMAL FEEDS:			
Quantity (metric tons)	68,913	126,000	4.5
Price (Shs. per metric ton)	497	500	
Value (Shs. million)	44.2	63	4.5
TOBACCO:			
Quantity (metric tons)	2,443	5,000	9.3
Price (Shs. per metric ton)	8,129‡	10,000‡	
Value (Shs. million)	19.9	50	9.1
HIDES AND SKINS:			
Quantity (metric tons)	3,756	4,800	3.1
Price (Shs. per metric ton)	6,661	7,300	
Value (Shs. million)	25.0	35	4.3
COPPER:			
Quantity (metric tons)	15,749	17,000	0.2
Price (Shs. per metric)	8,463	8,500	
Value (Shs. million)	133.3	144	1.0
COTTON FABRICS:			
Quantity ('000 sq. metres)	15,616	15,000	-0.5
Price (Shs. per sq. metre)	3.27	3.3	
Value (Shs. million)	51.0	50	-0.3
OTHER MERCHANDISE DOMESTIC EXPORTS (Shs. million)			
	175.9	279	6.0
RE-EXPORT (Shs. million)			
	16.6	15	-1.3
MERCHANDISE EXPORTS ADJUSTMENTS (Shs. million)			
	-70.1	-100	
RECEIPTS ON THE INVISIBLE ACCOUNT (Shs. million)			
	187.6	370	8.9
TOTAL EXPORTS (Shs. million)	1,705.6	2,485	4.8

* Weighted average of quota and non-quota prices.

† Based on achieving minimum production target of 600,000 bales.

‡ Weighted average of fire-cured and flue-cured tobacco prices.

even barely significant items are copper and tea. One unavoidable element of Uganda's development strategy, therefore, is to continue this emphasis:

A careful examination of all possibilities reveals that we must continue to rely on export-oriented production as a main impetus to growth...Export promotion, therefore, constitutes a key element in the development strategy. (Uganda, p. 7.)

In all its facets, the (export) policy emphasizes the overriding fact that, over the period of Plan III, any significant growth in total export earnings must involve an expansion in quantity and/or a rise in the price of the three or four present major export items. This is why, in spite of our great need to diversify the range of export products, efforts must continue to be made to bring about greater export sales of cotton, coffee, copper and tea. (Uganda, p. 58.)

Another important and complementary element of the development strategy is--as was just mentioned--the need for diversification. Quite literally, Uganda's national economy over the past years has fluctuated with the price of and/or the weather conditions affecting cotton and coffee.

Quite apart from limitations on the growth in total export earnings, Uganda's export performance has been characterized by fluctuations which have had harmful direct effects on the welfare of large sections of the population and on overall economic growth. These fluctuations reflect changes in quantities exported and/or prices realized. Their root cause, however, is in the very structure of our export sector--the limited range of export items (mostly primary products), the predominant role of just two agricultural commodities in this range, and of less importance, the reliance on a small number of foreign markets. (Uganda, p. 58.)

Moreover, the past experience with and future prospects for these exports, and coffee in particular, are not encouraging. Exports of coffee are limited by an insufficiency of demand in foreign markets and sales quotas, whereas exports of cotton and some other crops are limited fundamentally by supply difficulties in Uganda! In addition to the principal export crops, therefore, the Plan lays "appropriate stress" on the expansion of groundnuts, sim-sim, cocoa, citrus, silk, haricot beans, soya beans, horticultural, and floricultural crops for export, and the investigation of pyrethrum, begarua, and pineapples for this purpose. (Uganda, p. 58.)

At the same time as efforts are made to increase total agricultural production, emphasis will continue to be placed on the development of non-traditional types of agricultural activity in order to achieve a better diversified agricultural sector much less dependent on cotton and coffee production and sales. This, however, is only a matter of relative emphasis. A greatly increased annual cotton crop remains a key element in the overall development strategy. With regard to coffee, while our membership of the International Coffee Agreement precludes any action to increase coffee production, the Government will step up the campaign to secure a general improvement in the quality of the country's coffee with a view to increasing the competitiveness and foreign exchange earning power of the crop. The policy of diversification only implies that in the allocation of total financial and other resources, cotton and coffee will receive a gradually decreasing share. Of the newer lines of agricultural activity to be accorded increased support, livestock farming will receive special attention... (Uganda, p. 14)

The principal objective of the agricultural development program is to achieve a greater volume of agricultural output through higher efficiency. (Uganda, p. 13.) "Two main lines of strategy" for this development are later identified: increasing farm yields and expanding productive acreages. (Uganda, p. 160.) These objectives are further operationalized into three Plan goals for the rural sector:

(i) The maintenance of self-sufficiency in the major food products, the achievement of self-sufficiency in maize,¹⁴⁾ onions, potatoes, rice, timber and sawn wood by the end of the Plan period, and a considerable reduction in the dependence on wheat and milk imports.

(ii) A sustained increase in agricultural production averaging 4.9 percent per annum for marketed output. The share of subsistence production in gross domestic product will decline by three percentage points from the 1967-69 base of 31 percent to 28 percent by 1976.

(iii) The expansion of agricultural exports at the maximum feasible rate. Despite the expected decline in average export prices due primarily to the behaviour of coffee prices, total receipts from agricultural export sales will rise to 4.5 percent annually from the 1967-69 base. (Uganda, p. 160.)

Government development projects and expenditures for rural production are listed in great detail in Table 23 on the following page. These projects will

14)

Note that, unlike Kenya, maize is not a major indigenous food crop in Uganda. Bananas and, to a lesser extent, sorghum and millet are the major food crops of the local people.

Table 23

Rural Production—Government Development Projects²

Project Code Number	Programme/Project Title	Implementing Agency ¹	Allocation	High.
			in Bank	Priority Allocation
			Shts. m.	Shts. m.
	SEED MULTIPLICATION PROGRAMME ..		23.3	23.3
10-1	Seed Multiplication Phase I ..	MAF	2.0	2.0
10-100	Seed Multiplication Phase II ..	MAF	21.3	21.3
	AGRICULTURAL MECHANISATION PROGRAMME ..		81.0	31.0
10-2	Tractor Hire Service Operating Costs ..	MAF	80.0	30.0
10-3	Ox Cultivation ..	MAF	1.0	1.0
	DAMS AND VALLEY TANKS PROGRAMME ..		20.0	13.0
10-76	Dams and Valley Tanks ..	MMWR	20.0	13.0
	RURAL SHORT-TERM CREDIT PROGRAMME ..		15.0	12.0
10-4	Contribution to Uganda Development Bank—Short-term Agricultural Credit ..	MFP	15.0	12.0
	RURAL SUBSIDY PROGRAMME ..		12.5	8.5
10-12	Crop-farming Subsidies ..	MAF	10.0	6.0
10-15	Livestock Equipment Subsidies ..	MAIGF	2.0	2.0
10-92	Fisheries Equipment Subsidies ..	MAIGF	0.5	0.5
	GENERAL CROP STORAGE PROGRAMME ..		36.0	36.0
10-95	Contribution to UDB—Primary Society Storage Facilities ..	MFP	10.0	10.0
10-94	Contribution to UDB—Co-operative Union Storage Facilities ..	MFP	6.0	6.0
10-8	Contribution to PMB—General Storage Facilities ..	MFP	20.0	20.0
	TSETSE ERADICATION PROGRAMME ..		40.0	40.0
10-16	Tsetse Eradication ..	MAIGF	40.0	40.0
	IRRIGATION AND RECLAMATION PROGRAMME ..		17.8	14.3
10-17	Mubuku Irrigation Development ..	MAF	10.0	10.0
10-19	Labora and Atera Irrigation Schemes ..	MAF	2.0	2.0
10-20	Omutnyal and Okokorio Irrigation Schemes ..	MAF	2.5	—
10-21	Swamp Reclamation, Kigezi and other areas ..	MAF	3.0	2.0
10-22	Agoro Irrigation Scheme ..	MAF	0.1	0.1
10-23	Assistance to Misc. Irrigation Works ..	MAF	0.2	0.2
	PRISON FARM DEVELOPMENT PROGRAMME ..		22.0	15.0
10-18	Mubuku Prison Farm ..	MIA	10.0	5.0
10-27	Development of other Prison Farms ..	MIA	12.0	10.0
	BUSH CLEARING AND ORGANISED SETTLEMENT SCHEMES PROGRAMME ..		53.5	31.5
10-25	Co-operative Settlement Schemes ..	MAF	3.0	3.0
10-26	NUYO Agricultural Settlement Scheme, Bunyoro ..	NICCD	4.0	2.0
10-29	Bush clearing units—replacement of equipment (Department of Agriculture) ..	MAF	30.0	10.0
10-28	Bush clearing units—operating costs (Department of Agriculture) ..	MAF	15.0	15.0
10-14	Bush clearing units—operating costs (Department of Veterinary Services) ..	MAIGF	1.5	1.5
	AGRICULTURAL AND LIVESTOCK RESEARCH PROGRAMME ..		28.5	20.8
10-30	Expansion of Agricultural Research sub-stations ..	MAF	1.0	1.0
10-31	Expansion of Variety Trial Centres ..	MAF	4.9	4.9
10-32	Horticultural Research Programme ..	MAF	2.1	2.1
10-33	Tobacco Research Programme ..	MAF	1.5	1.3
10-34	Plant Quarantine Station ..	MAF	2.7	—
10-35	Gen. Animal Husbandry Research facilities ..	MAIGF	2.0	2.0
10-36	Aswa Valley Past Breeding Beech Ranch ..	MAIGF	4.0	4.0
10-37	Transfer of Animal Health Centre Livestock Experimental Station ..	MAIGF	5.0	—

(continued)

Table 23
(continued)

Rural Production—Government Development Projects*—continued

Project Code Number	Programme Project Title	Implementing Agency†	Allocation in Bank	High Priority Allocator
			Shs. m.	Shs. m.
10-38	Regional Animal Health Research Laboratories	MAIGF	4.0	4.0
10-39	General Fisheries Research	MAIGF	1.0	1.0
10-90	Fish Processing Research	MAIGF	0.5	0.5
	RURAL EXTENSION PROGRAMME		10.5	6.0
10-41	Veterinary Dispensaries	MAIGF	2.5	2.5
10-42	Information and Visual Aid Centres	MAIGF	1.0	1.0
10-40	Information and Visual Aid Centres	MAF	2.0	1.0
10-43	Expansion of Local Planning Service	MAF	5.0	1.5
	AGRICULTURAL AND LIVESTOCK EDUCATION AND TRAINING PROGRAMME		26.4	26.0
10-44	Expansion at Arapai and Bukaha Agricultural Colleges	MAF	4.2	4.2
10-48	Establishment of National College of Agricultural Mechanisation	MAF	1.2	1.2
10-45	Establishment of Co-operative College, Kigumba	MCC	4.6	4.6
10-46	Veterinary Training Institute (Development of new site)	MAIGF	2.0	2.0
10-47	Expansion of Fisheries Training Institute	MAIGF	1.4	1.0
10-49	Development of Dist. Farm Institutes Rural Training Centres and Co-operative Wings	MAF	13.0	13.0
	COTTON DEVELOPMENT PROGRAMME		50.0	30.0
10-54	Cotton Spraying Subsidy Scheme	MAF	50.0	30.0
	TEA DEVELOPMENT PROGRAMME		63.3	37.0
10-11	Contribution to U.D.B.—Credit for Tea Outgrowers	MFP	28.6	18.0
10-55	Contribution to A.D.C.—Tea Programme—(leaf collection and project administration)	MFP	34.7	19.0
	TOBACCO DEVELOPMENT PROGRAMME		38.1	38.1
10-6	Contribution to U.D.B.—Credit for flue-cured tobacco outgrowers	MFP	20.4	20.4
10-7	Contribution to P.M.B.—Tobacco warehouse in Kampala	MFP	4.4	4.4
10-56	Flue-cured tobacco small-holders development (project administration costs)	MCC	11.5	11.5
10-57	Flue-cured tobacco development	MAF	1.8	1.8
	OTHER CROPS DEVELOPMENT PROGRAMME		65.5	56.5
10-79	Contribution to U.D.B.—credit for the production of other crops	MFP	10.0	6.0
10-5	Contribution to U.D.B.—credit for sugar out-growers	MFP	8.0	8.0
10-99	Contribution to U.D.B.—Groundnut grading units	MFP	1.5	1.5
10-58	Cocoa Development	MAF	10.0	10.0
10-59	Citrus Development	MAF	2.0	2.0
10-60	Kenaf Development	MIA	17.0	12.0
10-61	Silk Development	MAF	0.5	0.5
10-24	Kibimba Irrigation and Rice production scheme	MAF	10.0	10.0
10-63	Harrot Beans Development	MIF	2.5	2.5
10-65	Sim-sim Development	MAF	1.0	1.0
10-64	Horticultural Development	MAF	3.0	3.0
	FORESTRY DEVELOPMENT PROGRAMME		17.0	17.0
10-66	Softwood Afforestation Programme	MAF	14.5	14.5
10-67	Forest Roads	MAF	1.5	1.5
10-69	Additional Equipment—Forestry Dept.	MAF	1.0	1.0
	ANIMAL DISEASE CONTROL PROGRAMME		56.6	56.6
10-70	Tick Control	MAIGF	30.0	30.0
10-71	Foot and Mouth Disease Control	MAIGF	20.0	20.0
10-72	Mobile Epidemic Disease Control Scheme	MAIGF	2.6	2.6
10-73	Rinderpest Campaign	MAIGF	2.0	2.0
10-15	Stock Routes and Quarantines	MAIGF	2.0	2.0

(continued)

Table 23
(continued)Table X-6. Rural Production—Government Development Projects—*continued*

Project Code Number	Programme/Project Title	Implementing Agency†	Allocation	High Priority
			in Bank	Allocation
			Sht. m.	Sht. m.
			70.5	65.5
10-9	BEEF DEVELOPMENT PROGRAMME Contribution to U.D.B.—credit for beef development	MFP	20.0	15.0
10-74	Development of new beef ranches (other than Ankole Masaka)	MAIGF	20.0	20.0
10-98	Development of Ankole Masaka Beef Ranching Scheme	MAIGF	25.0	25.0
10-75	Development of Mbarara stock farm and other encircling ranching schemes	MAIGF	3.0	3.0
10-97	Improvement of Livestock Markets	MAIGF	2.5	2.5
	DAIRY DEVELOPMENT PROGRAMME		75.6	64.6
10-10	Contribution to U.D.B.—Credit for Dairy Development	MFP	20.0	15.0
10-77	Importation of exotic cattle	MAIGF	20.0	20.0
10-78	Dairy Breeding Farms	MAIGF	25.0	19.0
10-81	Artificial Insemination Services	MAIGF	3.0	3.0
10-80	Contribution to L.D.C.—Milk cooling and collecting centres	MFP	1.0	1.0
10-82	Dairy Supplies and Storage facilities	MAIGF	6.6	6.6
	OTHER LIVESTOCK DEVELOPMENT PROGRAMME		6.8	6.8
10-83	Pig Development	MAIGF	1.0	1.0
10-84	Goat Development	MAIGF	1.2	1.2
10-85	Bee-keeping Development	MAIGF	0.5	0.5
10-86	Poultry Development	MAIGF	2.5	2.5
10-87	Hides and Skins Development	MAIGF	1.6	1.6
	FISHERIES DEVELOPMENT PROGRAMME		9.9	8.0
10-88	Deep-water Fisheries Development	MAIGF	4.0	4.0
10-89	Fish-landing and Migrating Improvements	MAIGF	2.4	2.4
10-91	Fish farming, exploitation of new species	MAIGF	2.8	1.0
10-95	Launches for Demonstration and Experimental work	MAIGF	0.5	0.5
10-96	Fisheries Department Patrol Launches	MAIGF	0.2	0.1
	AGRICULTURE AND LIVESTOCK GENERAL ADMINISTRATIVE PROGRAMME		38.5	19.5
10-50	Non-project housing	MAF	25.0	11.0
10-52	Additional Vehicles	MAF	2.0	2.0
10-51	Non-project housing	MAIGF	10.0	5.0
10-53	Additional Vehicles	MAIGF	1.5	1.5

*The relationship between the 'bank' and the 'high priority' allocation to each project corresponding to 'bank' and 'high priority' is explained in Chapter Eight (paragraphs 8.7-8.10). The system of code numbers associated with each project is explained in Appendix I.

† M.F.P. = Ministry of Finance and Planning.

M.A.F. = Ministry of Agriculture and Forestry.

M.A.I.G.F. = Ministry of Animal Industry, Game and Fisheries.

M.C.C. = Ministry of Commerce and Co-operatives.

M.M.W.R. = Ministry of Mineral and Water Resources.

M.C.C.D. = Ministry of Culture and Community Development.

M.I.A. = Ministry of Internal Affairs.

Source: Table X-6, Uganda Development Plan 1971/2 - 1975/6, pp. 200-202.

be discussed further as they relate to specific crop or livestock topics, in the same order as they appear in Table 23.

In Uganda, seed selection, plant breeding, and seed multiplication have been responsibilities of the central government. Much of this past activity has been concerned with new cotton varieties, but in 1968 seed multiplication work on ground-nuts, maize, sorghum, beans, and pasture grasses was begun. The 2.0 m. shs. for Phase I of the Seed Multiplication Programme, as shown in Table 23 (Project #10-1) will be used to complete a specialized seed processing plant and ancillary facilities. Phase II (Project #10-100), which will cost 21.3 m. shs., will be used to establish a seed farm of 10,000 acres and a system of out-growers and processing, handling, and storage facilities. The Plan notes that "Particular attention will be paid to the production of groundnut seed." (Uganda, p. 161.) In terms of attempting to establish priorities within this seed scheme, it can be noted that seed acreage targets for specifically mentioned crops are as follows:

Groundnuts	2,000 hectares	4.6 m. shs.
Pasture Grasses	1,000 hectares	2.3 m. shs.
Beans	950 hectares	2.2 m. shs.
Maize	550 hectares	1.2 m.shs.
Sorghum	<u>500</u> hectares	<u>1.2</u> m.shs.
Total	5,000 hectares	11.6 m. shs.

There are two projects in the Agricultural Mechanization Programme: the Tractor Hire Service, (Project #10-2), and Ox Cultivation, (Project #10-3). The tractor hire service has been going on for some time, but the costs to the government have been extremely high and there is little conclusive evidence that tractor use alone has increased the output of any agricultural product. Therefore, the government has undertaken an extensive review of the program, and 30.0 m. shs. are allocated for maintenance and operating costs only until

the review is complete. At the same time, the plan allocates 1.0 m. shs. for a less expensive and perhaps more suitable form of mechanization: ox cultivation. In making a major effort to popularize the use of oxen for farm work, the money is to be used in achieving the plan target of training 800 pairs of oxen annually during the 5-year plan period.

Another project of virtually untapped potential is the Dams and Valley Tanks Programme (Project #10-76). Although most of Uganda enjoys adequate annual rainfall for agricultural purposes, the distribution of rainfall throughout the year is characterized by rainy and dry seasons. An allocation of 13.0 m. shs. is therefore provided to build the system of dams and valley tanks that should enable livestock production, in particular, to increase significantly during the dry seasons.

A new government institution, the Uganda Development Bank, is to be established to handle short-term agricultural credit, and also medium- and long-term credit to agriculture, industry, and commerce. Medium- and long-term agricultural credit is covered under other projects listed in Table 23: e.g., Project #10-11, "Contribution to U.D.B.--Credit for Tea Outgrowers," but a specific allocation of 12 m. shs. is made for short-term agricultural credit (Project #10-4). According to the plan, the major products to be assisted with these funds are "cotton, groundnuts, beans, maize and selected other food crops." (Uganda, P. 165.)

In order to encourage Ugandan farmers to utilize farming inputs such as fertilizers, insecticides etc. which should increase productivity, the government has operated a subsidy program at rates of from one-third to one-half the market price of these items. The plan calls for a review to assess the effectiveness of these subsidies during the plan period, but meanwhile allocates 6.0 m. shs. for general crop subsidies (Project #10-12), 2.0 m. shs. for livestock

subsidies (Project #10-13), and 0.5 m. shs. for fisheries subsidies (Project #10-92). These general subsidies do not include specified product subsidies that are listed later on in Table 23.

One of the principal problems that has plagued the marketing of agricultural products in Uganda in the past has been inadequate storage facilities at all levels of collection and distribution. The major institutions in Uganda are the Coffee and Lint Marketing Boards, which have, respectively, exclusive responsibilities for marketing coffee and cotton, and the Produce Marketing Board, which is to have a monopoly market only on flue-cured tobacco, but is to maintain a floor price under other crops as designated by the appropriate Government Ministers. Below this national level are cooperative unions and primary cooperative societies, which also need improved storage capacity. The plan allocates 10.0 m. shs. to primary society crop storage (Project #10-93), 6.0 m. shs. to cooperative union crop storage (Project #10-94), and 20.0 m. shs. to the Produce Marketing Board for crop storage (Project #10-8). In no case are any specific crops mentioned; it is a "General Crop Storage Programme."

There are a number of programs designed to expand the amount of acreage utilized by productive agriculture. One of these is the Tsetse Eradication Programme (Project #10-16), which is allocated 40.0 m. shs. in the Plan. Tsetse flies are carriers of trypanosomiasis disease which affects cattle and sleeping sickness which affects human beings. Past eradication programs in Uganda have cleared over 30,000 hectares of land of this pest, and most of this land has been used for large-scale beef ranching schemes. Beef livestock expansion has not kept pace with eradication, however, and since cleared land left idle is subject to reinfestation, new eradication projects will only be undertaken in parallel with feasible programs for land utilization. New eradication programs are therefore planned for only two acres in Uganda, and

the intent for the use of this land is only identified in terms of general agricultural purposes:

Irrigation and swamp reclamation programs are also intended to expand the acreage of productively utilized land. With irrigation, large quantities of moisture deficient soils can become productive, and there are almost 250,000 acres of clay and peat swamps in Uganda that have been proved to be highly productive when effectively reclaimed. There is still a general lack of technical information on these types of projects, however, and so a number of pilot irrigation and swamp reclamation projects are listed in the Plan; the specific purpose of which is to develop techniques that can be extensively applied in other, similar parts of the country. Thus, 10.0 m. shs. is allocated for Mubuku Irrigation Development (Project #10-17), 2.0 m. shs. to the Labora and Atera Irrigation Schemes (Projects #10-19), 2.0 m. shs. to Swamp Reclamation, Kigezi and other areas (Project #10-21), 0.1 m. shs. to Agoro Irrigation Scheme (Project #10-22), and 0.2 m. shs. for Assistance to Miscellaneous Irrigation Works (Project #10-23). No particular crops are mentioned in connection with any of the above projects.

As part of the Mubuku Irrigation Development project, the Prisons Department has been given 6,000 hectares of land to use as a prison farm, and 5.0 m. shs. is allocated for the development of this land (Project #10-18). For this project, it is mentioned that the Prisons Department plans "to initiate rice production." (Uganda, p. 187.) A number of agricultural farms are attached to other prisons in various parts of Uganda which produce crop receipts and rations valued at 4.0 m. shs. in 1970/71. A further expansion of this acreage is planned for at a cost of 10.0 m. shs. (Project #10-27). The activities mentioned to be undertaken on these farms included livestock ranching, dairying, poultry farming, and horticultural production.

A number of general agricultural oriented Bush Clearing and Organized Settlement Schemes projects are proposed in the plan. In encouragement of the development of farming cooperatives where uncultivated land is available, 3.0 m. shs. is allocated to Cooperative Settlement Schemes (Project #10-25) for such things as bush clearing and the installation of water supplies. In another project, the National Union of Youth Organizations (NUYO) has already started an agricultural settlement scheme, and 2.0 m. shs. are allocated for the development of 1,500 hectares of land (Project #10-26). In order to facilitate general bush clearing operations, the government has, in the past, purchased heavy equipment for the removal of stumps and other such tasks. An allocation of 10.0 m. shs. is made for the replacement of such equipment (Project #10-29), and allocation of 15.0 m. shs. and 1.5 m. shs. for operating costs of this equipment in, respectively, the Department of Agriculture and the Department of Veterinary Services (Projects #19-28 and #10-14).

The Agricultural and Livestock Research Programme listed in Table 23 only gives a brief indication of what Ugandan national priorities might be. Only very broad policy objectives are outlined:

Research is the foundation stone upon which rural development efforts ultimately depend. Research on new varieties, fertilizers, pesticides and disease control is essential. New production techniques must be field tested to determine their economic viability...During Plan III, research activities will be expanded in terms of programmes, facilities, manpower and geographical coverage of the country. Before most of the expansion is undertaken, however, the programmes and facilities in agriculture and animal health research centres will be examined in order to determine priority areas of activity and attendant physical requirements. Faced with serious limitations of trained manpower and other facilities, research efforts in Uganda will be concentrated on problems, the solution of which offers relatively immediate benefits to the economy. (Uganda, pp. 172-173.)

In 1971, the agricultural research infrastructure in Uganda consisted of one main center at Kawanda, one sub-station at Serere, and a number of variety trial centers in different parts of the country. Early in 1972, the Cotton

Research Station at Namulonge was turned over to the Ugandan government by the Cotton Research Corporation to become another main center. The development plan calls for the up-grading of Serere to become a third major center and for some new sub-stations to be created, one for each region of the country, and 1.0 m. shs. is allocated for this purpose (Project #10-30). In addition, 18 new variety trial centers are to be created and improvements carried out on the 35 already in existence at an allocated cost of 4.9 m. shs. (Project #10-31). The plan justifies the large number of these centers by the need to cover the wide range of soil and climatic conditions found in Uganda. None of these infrastructure expenditures are tied to any specific agricultural product.

Two crops, however, are cited for their need of specialized research facilities: horticultural crops and tobacco. A horticultural research program is to undertake work on fruits and vegetables which are expected to enjoy good prospects in both domestic and foreign markets, at an allocated cost of 2.1 m. shs. (Project #10-32). Research to support a planned expansion in tobacco acreage and production will be allocated 1.3 m. shs. (Project #10-33). Plans to build a plant quarantine station are mentioned in connection with these crops, but no high priority allocation is made for this purpose.

All government research on livestock and pastures is to be administered by the Ministry of Animal Industry, Game and Fisheries in the new plan period. General expansion and improvement of research facilities in this ministry are allocated 2.0 m. shs. (Project #10-35). In addition, 4 m. shs. is allocated for the operating costs of the Aswa Valley Fact-Finding Beef Ranch (Project #10-36), and 4 m. shs. are allocated for the establishment of two regional animal health research laboratories (Project #10-38), designed to make this type of activity more accessible to field workers and farmers.

No expenditures for forestry research are indicated in Table 23 or in the plan discussions, but four categories of forestry research done in the past and expected to continue during the plan period are mentioned:

(i) Studies of the effects of silvicultural treatment on the growth rate of tropical high forest species and fast growing softwoods, as well as specie trails and tree breeding.

(ii) Studies of present wood utilization patterns and possible methods of reducing waste in processing, and of utilizing plantation species.

(iii) Studies of forest plantation pests, and of methods for the control of termites and other timber and wood product pests.

(iv) Studies of charcoal production techniques, and the suitability of various species for charcoal-making. (Uganda, pp. 174-175.)

Research on fisheries will be expanded during the plan period. A study of the offshore fisheries potential of Oake Victoria and additional facilities required for fisheries research are allocated 1.0 m. shs. in the Plan, (Project #10-39), and a separate provision is made for 0.5 m. shs. for a new research program on fish canning and other forms of processing (Project #10-90). The ultimate objective of this research is the promotion of a commercial fisheries industry in Uganda.

In addition to research, extension and education/training programs are important agricultural supporting services listed and discussed in the Plan. Projects in extension institution-building include the creation of 30 new veterinary dispensaries in addition to the 20 already in existence (Project #10-41). These dispensaries are maintained by field staff of the Veterinary Department in order to provide extension and animal health services to farmers. These facilities, which the Plan says are in great demand, are allocated 2.5 m. shs. As part of the extension effort, an Information and Visual Aids Centre was established in the Ministry of Agriculture and Forestry at the beginning of the Second Development Plan. The Centre principally utilizes posters, films, and

printed news in attempting to make extension information more readily available to farmers. This Centre will be expanded and more and better visual aid facilities will be provided for its program at an allocated cost of 1.0 m. shs. (Project #10-40). As an integral part of its own extension program, the Ministry of Animal Industry, Game and Fisheries will be setting up its own center at an allocated cost also of 1.0 m. shs. (Project #10-42).

A concern for land use and other resource planning is mentioned several places in the Plan with relation to the need for the most productive utilization of these resources:

Thus, considerable Government expenditure is planned for geological surveys, mineral exploration, hydrological surveys, soil surveys, topographical mapping, general ecological research, the treatment of natural forest, soil conservation, game conservation, and numerous other projects pertaining to the scientific exploration and proper use of the country's natural resources. In an attempt to rationalize the utilization of our most important resource, it is planned to embark on a comprehensive land use survey of the country, and, on the basis of this, to eventually draw up an appropriate overall plan for the exploitation of our land resources. (Uganda, p. 13.)

For the most effective long-term development of the agricultural potential of the nation, available land should be directed to its most productive uses; there is no clear evidence that the present patterns of utilization or the pattern embodied in existing plans conforms to this requirement. As a first step in providing a basis for the promotion of optimal land allocation, a land use survey will be undertaken. The purpose of the survey will be to indicate the most productive uses of the land, taking into account projected market demand, yield potential and transport costs. Such a study will enable Government to direct its rural development efforts more effectively. (Uganda, p. 175.)

Although the general situation in terms of land and water resources and population pressures on them is relatively bright in Uganda, there are areas of high population pressures and of low rainfall, semi-arid land. A Land Planning Service was established in the Department of Agriculture, originally to aid in the physical development aspects of group farms. As group farms became of less interest, the service was made available to all farmers at subsidized rates. During the plan period, 1.5 m. shs. are provided for the expansion of

this service (Project #10-43), and agricultural economics and other land-use specialities will be added. This service is to evolve into a special division in the Department of Agriculture which will be responsible for all matters relating to land-use planning, irrigation and drainage, etc.

In the opinion of many knowledgeable people, however, the extension workers themselves are the crucial factor in extension services. Although there was a rapid increase in the number of agricultural extension workers during the second Development Plan, the third Plan states that the ratio is still too small: one extension worker per 1,800 farmers. The hierarchy of the extension service field staff, in descending order, consists of agricultural officers, assistant agricultural officers, and agricultural assistants. The emphasis during this plan period will be on more and better qualified agricultural assistants, and a target figure of one agricultural assistant per 1,000 farmers is made. The training programs of the agricultural colleges are to produce these people. Existing Agricultural Colleges at Arapai and Buhalasa are to be expanded to accommodate 300 students each, (up from 140), at an allocated cost of 4.2 m. shs. (Project #10-44). In addition to a three-year diploma course and a two-year certificate course, an in-service training program is to be introduced for the promotion of agricultural assistants who have had field experience.

Although extension services are usually designed to promote agriculture in general, there is a policy change in the Plan that has implications for specific crops:

It has become apparent that the agricultural extension service needs to move away from the general assistance approach it has concentrated upon in the past. A more sharply focused approach will assign staff to specific programmes where performance can, within limits, be more effectively assessed in terms of production targets...The major extension effort to be undertaken during Plan III is the expansion of cotton output. Field staff will be assigned to cotton and other crops grown in rotation with cotton...millet and maize, as well as groundnuts...Staff will also be assigned to rice cultivation and other food crops in the non-cotton growing areas. (Uganda, p. 176.)

The priorities indicated in this instance will be noted and figured into the final priority ratings.

In addition to the general agricultural colleges above, a National College of Agricultural Mechanization is allocated 1.2 m. shs. for its completion and the development of a college farm and estate (Project #10-48). When fully operational, the college will accommodate 350 students for training in agricultural mechanics. Another college near completion is the Kigumba Co-operative College which is allocated 4.6 m. shs. in the Plan (Project #10-45). The Co-operative Department has had a substantial field staff, but not sufficient to adequately supervise the 2,000 cooperatives that exist. The manpower target in Plan III is to provide one cooperative assistant for every five societies, and one assistant officer for every five assistants. The training at Kigumba will center around professional management and accountancy courses.

A Veterinary Training Institute offers training in beef, dairy, and pasture work for extension staff. This institute is to be moved in conjunction with a long-term development and transfer plan which is to be prepared for the area in which it is located, and 2.0 m. shs. is provided for the development of a new site (Project #10-46). The Nyabuyeya Forestry School was expanded sufficiently enough during the second development plan to provide for Plan III forestry extension manpower needs, so no new expenditures are listed. The only indication of priorities here is that the training programs for timber cutters, loggers, and those concerned with tool operation and maintenance are to be intensified. The Fisheries Training Institute, however, is allocated 1.0 m. shs. (Project #19-47) for expansion. Training programs in trawler operations, fish marketing, and fish processing are to be initiated.

Institutions called District Farm Institutes provide supplementary training to the agricultural extension service program by arranging short courses

for farmers on specific crops, farm inputs, farm management, and related matters. Several of these Institutes have co-operative "wings" attached to them which are used for training co-operative assistants, and several share facilities with Rural Training Centres which are administered by the Ministry of Cultural and Community Development. By the end of the second development plan, 15 Institutes were in operation. Plan III allocates 13.0 m. shs. for the establishment of six new Institutes/Centres, three of them to have cooperative "wings," and for improvements to existing ones, (Project #10-49). In order to economize on construction and management costs, the Institutes and Centres are to be fully integrated under the responsibility of the Department of Agriculture.

Most of the remaining projects directly involve specific crop or livestock programs, and the relevant discussions and expenditures are quoted below:

Coffee - Coffee production continued expanding over the Second Five-Year Development Plan period...Exports, however, could not keep pace because of Uganda's quota under the International Coffee Agreement and the fierce international competition for sales to non-quota countries...

To avoid overproduction of coffee and to increase export value, the strategy will be to encourage alternative agricultural activities such as dairying, cocoa, and horticultural production which offer a higher return than coffee; and to promote a significant improvement in the quality of the country's coffee crop...Quality improvement depends upon good husbandry practices and proper drying which are to be propagated mainly through intensified demonstration and education efforts. More rigorous quality tests will be instituted and price differentials used to encourage quality improvement...Spraying and other disease control work will be increased to cover all arabica producing areas by the end of the Plan period. (Uganda, pp. 180-181.)

In accordance with the overall tone of the above remarks, no development expenditures are listed in Table 23 for coffee. With regard to the final statement above, however, note on the following page in Table 24, and back on Table 22, that two types of coffee are involved: arabica and robusta. Both production and exports of robusta coffee are far greater than that of arabica, but they are

Table 24
Production of Selected Commodities, 1967/69 and 1976.

	Units	1967/69- Average	1976	Annual Average Growth Rate 1967/69-76
Arabica Coffee	'000 tonnes	13.6	20.0	4.9
Robusta Coffee	'000 tonnes	165.7	160.0	-0.4
Cotton	'000 bales	398	600-1,000	5.3-12.2
Sugar	'000 tonnes	143.2	240-250	6.7
Tea	'000 tonnes	14.7	38.4	12.8
Fire-cured Tobacco	tonnes	1.4	3.0	10.0
Flue-cured Tobacco	tonnes	2.5	5.0	9.0
Fish	'000 tonnes	107.4	171.0	6.0
Spirits (Waragi)	'000 litres	339.5	680.0	9.1
Beer	million litres	20.5	49.0	11.5
Cement	'000 tonnes	155.7	400.0	12.5
Super Phosphate	'000 tonnes	18.3	32.3	7.4
Bister Copper	'000 tonnes	15.5	17.0	1.2

Source: Table III-2, Uganda Development Plan 1971/2 - 1975/6, p. 44.

expected to decline during the plan period. Arabica coffee, on the other hand, is expected to increase production at an average annual growth rate of 4.9 per cent and increase in export value at an average annual growth rate of 2.0 per cent--from 1967/69 to 1976!

Cotton - Cotton is Uganda's second most important crop and does not face the same market limitations as coffee...In order to increase farmer incomes, to generate the additional foreign exchange needed to finance an expanding development programme, and to meet rising domestic requirements for cotton, the minimum cotton output target for 1976 is 600,000 bales. (See Table 24.) Depending on the response of farmers to the various measures embodied in this Plan for increasing both yields and acreage, and given favourable weather conditions, production may reach the range of 750,000 to 1,000,000 bales in 1976.

To implement the cotton programme, a cotton production unit will be established within the Department of Agriculture with specially assigned field staff to organize team spraying and to work with the farmers to ensure timely planting and efficient harvesting...

The subsidy on DDT for cotton spraying will be maintained...Insecticide use on cotton in 1970 was estimated at 200,000 tins. The Plan III target is to increase the number of tins used to about 1,000,000 by 1976... (Uganda, pp. 181-182.)

The Cotton Spraying Subsidy Scheme is the only development expenditure listed for this crop in Table 23, and it is allocated 30 m. shs. during the plan period. (Project #10-54.)

Sugar - Sugar-cane is grown on large estates attached to sugar mills, and on smallholder units...Sugar consumption in Uganda, after moving somewhat erratically during the early years of the Second Five-Year Development Plan, has returned to the six to seven percent annual growth trend...During Plan III, sugar-cane production must grow by at least 35 percent to meet the expected increase in domestic consumption, and by a larger amount if exports are to be resumed and expanded... (See Tables 22 and 24).

The major expansion of cane production will come from the estate and outgrowers supplying the National Sugar Works at Kinyala...¹⁵⁾ There will also be an expansion of cane cultivation to meet the increased requirements of the three existing sugar mills at Lugazi, Kakira, and Saffo Bay. All three will increase their sugar production during the Plan...

The expansion of outgrower production will be assisted through the provision of medium term credit. A sum of Shs. 8 million will be allocated to the Uganda Development Bank for this purpose.

The last expenditure is for the only sugar product (Project #10-5), listed in Table 23.

Tea - The Second Five-Year Development Plan stressed the need to diversify agricultural output in order to reduce dependence upon cotton and coffee. One of the crops selected for special attention was tea, which has made real progress over the Plan period...During Plan III, the second phase of the Smallholder Tea Programme will be undertaken. In this phase, tea acreage under the scheme will be expanded by about 10,000 hectares...The project will be administered by the Agricultural Development Corporation and will involve...the production of vegetative propagation cuttings, leaf inspection services, field supervision and other technical services, the general administration of the project, and working capital for the smallholders and the Agricultural Development Corporation. Government's contribution will amount to Shs. 37.0 million.¹⁶⁾ Of this, Shs. 18.0 million will be contributed through the Uganda Development Bank for credit to cooperatives and individual smallholders associated with the Programme (Project #10-11). The balance (Shs. 19.0 million)¹⁶⁾ will be a contribution to the Agricultural Development Corporation in respect of the capital and operating costs of the Programme... (Project #10-53).

¹⁵⁾ The cost of developing this sugar estate is included in the allocations under Manufacturing, to be covered later.

¹⁶⁾ This is the "High Priority Allocation." The original quotation uses the "Allocation in Bank" figure.

The 1976 output target is 38,000 tons, more than double the level attained in 1970. (See Table 24.) Although there are continuing discussions on fixing export quotas for tea producing countries, Uganda should be able to increase its exports as production expands... (See Table 22.) (Uganda, pp. 183-184.)

Tobacco - Uganda produces both fire and flue cured tobacco. Flue cured tobacco prices rose during the Second Five-Year Development Plan period, making production for export a profitable activity. Output expanded over the period... (See Tables 22 and 24).

An intensive smallholder development programme for flue cured tobacco was started in 1970. Over the four-year period up to 1974, an additional 1,500 hectares involving 6,000 farmers will be brought into production... Government's financial contribution will amount to Shs. 36.3 million. The bulk of this (Shs. 20.4 million) will be for credit, through the Uganda Development Bank, to smallholders for the purchase of inputs... (Project #10-6). Shs. 4.4 million of Government's contribution will finance the construction... of a tobacco warehouse in Kampala, (Project #10-7). The balance of Shs. 11.5 million will cover the general administrative costs of the project... (Project #10-56).

Marketing prospects for fire cured tobacco are excellent, and substantially more than present output can be sold without difficulty. An intensive development programme has been undertaken... The development cost of this programme is Shs. 1.8 million over the Plan period. (Project #10-57.) (Uganda, pp. 184-185.)

Ground-nuts

- The Second Five-Year Development Plan called for increased production of quality groundnuts... Plan achievements fell far short of targets... The shortfall can be attributed to the slow progress of the seed improvement programme and lack of farmer response to improved cultivation techniques.

With the improvement and expansion of the seed multiplication programme, yields should rise. Special attention will be given to groundnut production by the extension service, particularly in conjunction with the cotton development scheme, since the two are frequently grown in rotation. Additional shelling units will be installed by the cooperative movement as needed, to improve the quality of the shelled nuts. An export target of 10,000 tons has been set for 1976. The cost of capital improvements is Shs. 1.5 million, which is again included in the allocation to the Uganda Development Bank for on-lending to cooperative unions for the purchase of shelling nuts. (Project #10-99.) (Uganda, p. 185.)

Cocoa
Beans

- Cocoa beans are one of the most important perennial crops grown in the tropics... Prices reached a very high level in early 1970 and have since fallen, but at current and even lower levels of prices, cocoa is an economically remunerative crop in Uganda, and there is already considerable farmer interest in its production... In Plan III, emphasis will be placed on consolidating the existing cocoa acreage and cultivation practices. Expansion in plantings will be limited to two thousand hectares annually. A study of the cocoa industry will be made, and if market prospects are favourable, plantings will be increased beyond this level... The capital cost of the expansion programme will be Shs. 10 million, (Project #10-58). (Uganda, pp. 186-187.)

Citrus

- Citrus fruits in Uganda have traditionally been marketed by small holders who have a few trees on their farms and produce a poor quality product. To improve quality and expand output, three citrus farms were established during the Second Five-Year Development Plan... The future of the citrus programme depends upon markets for the crops. Early in Plan III, a market study will be undertaken and an expansion programme will be prepared in accord with market prospects. The Third Plan development costs of the three citrus farms will be Shs. 2 million... (Project #10-59). (Uganda, p. 186.)

Kenaf

- An alternative fibre source (to sisal) which has been under study is kenaf, to be mixed with imported fibres for the production of bags and sacking. An initial trail planting... was undertaken in 1970. The quality of the crop will be assessed and, if it proves acceptable for sacking purposes, a kenaf production programme will be implemented... The Plan III capital cost of the program is Shs. 12 million.¹⁷⁾ (Project #10-60). (Uganda, p. 186.)

Silk

- Trail plantings of mulberry trees from Japan were started late in the Second Five-Year Development Plan after a survey had indicated that Uganda's climatic conditions were suitable for silk production. A phased programme of expansion... will be implemented over the Plan III period at a cost of Shs. 500,000. (Project #10-61.) (Uganda, p. 186.)

Rice

- A limited quantity of rice, about 2,000 tons, is grown in Uganda every year. This is considerably less than domestic consumption. The Plan III target is to produce sufficient rice to meet domestic

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This is the "High Priority Allocation." The original quotation uses the "Allocation in Bank" figure.

consumption requirements and, if market potential exists, to produce an export surplus as well. There are several areas being considered for large-scale rice production. One of these is the Kikimba Swamp Reclamation Scheme...The estimated cost of developing the 800 hectares at Kikimba is Shs. 10.0 million over the Plan III period... (Project #10-24.) The Faculty of Agriculture at Makerere is now undertaking a trail programme, in which over 100 varieties of rice will be tested under irrigation and natural rainfall conditions to determine those best suited to Uganda. (Uganda, pp. 186-187.)

Haricot

Beans - Haricot beans, which are the raw material for baked beans, have a ready export market...The Plan III target is to set up 3,500 hectares under cultivation with an output of 10,000 tons, most of it for export. The cost of the project...is Shs. 2.5 million. (Project #10-63.) (Uganda, p. 187.)

Sim-Sim - Another food crop which will be given increased attention is sim-sim. Shs. 1.0 million is allocated for the expansion of sim-sim production... (Project #10-65). (Uganda, p. 187.)

Horticultural

Crops - A horticultural development programme will be implemented during Plan III...Horticultural products with an export potential will be given special attention...The horticultural production programme is estimated to cost Shs. 3.0 million in development expenditure during Plan III. (Project #10-64.) (Uganda, p. 188.)

Other

Crops - Soya bean production has had a chequered history in Uganda...Market prospects now appear brighter...In order to take advantage of the improved market conditions, soya bean acreage will be expanded to 4,000 hectares and it is expected that output will reach 32,000 tons by 1976...

Uganda's wheat imports totalled 20,000 tons in 1970...The Plan III target is to double output as a step towards the longer-term goal of self-sufficiency...A long-term development plan will be prepared and its implementation will be started over the Plan period...

The staple food crops are plantains (matoke), millet, maize and cassava. Production of these crops must grow at a rate in excess of the rate of population increase if self-sufficiency is to be maintained with stable prices. To achieve this, a number of steps will be taken...

Uganda has, in the past, considered the production of pyrethrum, but, with rapid growth of inorganic insecticides, market prices

have been discouraging...If prices recover, a programme for pyrethrum production will be initiated...

Research will be continued on local plants and herbs with medicinal qualities. One of the more promising is *sepa*, for which a feasibility will be made. *Bagarua*, a plant which grows wild in Uganda, will be investigated as a possible tanning agent. (Uganda, pp. 187-188.)

None of these other crops, however, are specifically allocated development expenditures in Table 23.

Forestry is in the same ministry as agriculture in Uganda, (the Ministry of Agriculture and Forestry), and allocations for forestry development expenditures are included in Table 23 for Rural Production. Forest reserves in Uganda total about 1.6 million hectares, almost all of which is owned by the Government. Economically, the forests produce fuelwood for household cooking and some industrial uses, poles for house construction and electric power transmission lines, and logs for sawmilling and then to various wood utilizing industries. Of all forest products, the timber logs are the most valuable component, and log production has been composed principally of indigenous hardwoods in the past.

Overall forestry policy is as follows:

Future demand for wood and wood products for final and intermediate use is expected to increase rapidly with the growth of population and income levels...The main specific objective of forestry development in Uganda is to ensure that output expands sufficiently to meet demand in the future and, as much as possible, make a start in the exploitation of the lucrative foreign markets for wood products. (Uganda, p. 189.)

Forestry development strategy in Uganda has followed two principal lines: the treatment of natural forest (Mainly hardwoods), and softwood afforestation of new areas. Both of these activities are to continue during the new plan period. The treatment of natural forests consists of thinning and weeding out useless species in order to promote the growth of commercially valuable trees. During Plan II, 18,000 hectares of natural forest were treated in this way, and the

target of Plan III is 34,000 hectares. This treatment absorbs the major portion of the recurrent expenditures of the Forestry Department, but no development expenditures are allocated for it.

Afforestation projects are confined to planting softwoods because of their relatively short maturing period, (as compared to the 80 years which it takes some hardwood species to mature). During the new plan period, 10,000 hectares of new softwood forests are to be planted at an allocated cost of 14.5 m. shs. (Project #10-66). Other development expenditures of 1.5 m. shs. and 1.0 m. shs. are allocated for forest roads (Project #10-67), and for equipment (Project #10-69), but these expenditures are general in nature and do not specifically apply to either softwoods or hardwoods.

The remainder of the projects listed in Table 23 are concerned with aspects of livestock production or general administration, and will only be covered briefly. Major cattle diseases such as east cost fever, foot-and-mouth disease, and contagious bovine pleuro-pneumonia pose a serious economic problem in Uganda, and their control and/or eradication are basic to the Government's strategy for the development of the livestock industry. Accordingly, 56.6 m. shs. is allocated for an Animal Disease Control Programme, which includes projects for tick control (Project #10-70), for Foot-and-Mouth Disease Control (Project #10-71), for a Mobile Epidemic Disease Control Scheme (Project #10-72), for a Rinderpest Campaign (Project #10-73), and for Stock Routes and Quarantines (Project #10-15). These projects are not designated especially for either beef or dairy livestock, but for the livestock industry in general.

An allocation of 65.5 m. shs. is made in Table 23 for a specific Beef Development Programme, however. The supply of meat in Uganda has not kept pace with demand, and an expanded cattle population and a higher proportion of total cattle to be held by commercial farmers are Plan III objectives. The

cornerstone of beef development is to be the expansion of commercial ranching schemes,¹⁸⁾ and separate allocations are made through the Uganda Development Bank (Project #10-9), and directly to the Ankole/Masaka Scheme (Projects #10-74 and #10-98), and the Mbarara stock farm and other ranching schemes (Project #10-75). An additional allocation was made for the improvement of livestock markets.

Dairy imports for Kenya provide about one-half of dairy consumption in Uganda, and the Plan III goal is to reduce this import ratio to 20 percent by 1976. A Dairy Development Programme is allocated 64.6 m. shs. in Table 23 to accomplish this. Since local cows produce very low milk yields, a major effort of the program will be to improve the local stock through the importation of foreign exotic stock and breeding programs. During the new plan period, 2,500 head of exotic stock are to be imported at an allocated cost of 20 m. shs. (Project #10-77); dairy breeding farms have been established and they are to be expanded and their number increased at an allocated cost of 19 m. shs. (Project #19-78); and the artificial insemination service, which works primarily for the benefit of dairy cattle, is also to be expanded at an allocated cost of 3 m. shs. (Project #10-81). In addition, an allocation of 15 m. shs. will be made through the Uganda Development Bank for loans to dairy farmers (Project #10-10), and allocations of 1.0 and 6.6 m. shs. are made respectively for a rationalization and expansion program of milk cooling and collecting centers (Project #10-80) and for general dairy supplies and storage facilities (Project #10-82).

Other minor livestock development expenditures include 1.0 m. shs. for Pig Development (Project #10-83), 1.2 m. shs. for Goat Development (Project

18)

Note that these are not rangeland ranching schemes as in the case of Kenya. The geographic locations of these schemes are not in the rangeland ecological area of Uganda, and so do not relate to rangeland research priorities.

#10-84), 0.5 m. shs. for Bee-Keeping Development (Project #10-85), 2.5 m. shs. for Poultry Development (Project #10-86), and 1.6 m. shs. for Hides and Skins Development (Project #10-87). A total of 8.0 m. shs. is allocated for a Fisheries Development Programme in Table 23. Investigations undertaken during Plan II indicated that there was substantial unexploited deep water fisheries potential in Lake Victoria, and a Deep Water Fisheries Development project (Project #10-88) and Fish Landing, and Marketing Improvements (Project #10-89) are designed to tap this resource. In addition, efforts to exploit new species in various lakes in Uganda and to establish fish farms and ponds will be intensified (Project #10-91). And, finally, to enable the Fisheries Department to carry out their work, three launches for demonstration and experimental work (Project #10-95) and two for licensing and patrol work (Project #10-96) are listed in Table 23.

General Administrative Expenditures for the Ministry of Agriculture and Forestry and the Ministry of Animal Industry, Game and Fisheries are allocated 19.5 m. shs. as the final item in Table 23. The projects listed are for Non-Project Housing (Project #10-50 and #10-51), and Additional Vehicles (Project #10-52 and #10-53).

Back in Table 20, it is shown that 338.3 m. shs. of High Priority development funds are to be spent on "Manufacturing, Mining and Construction"--the third largest sum after Rural Production and Transport and Communications, and accounting for 10.6 percent of total High Priority development expenditures. Table 25, on the following page, shows a detailed listing of the different projects in this sector and the expenditures for them.

Performance in the manufacturing sector had been limited during Plan II by constraints such as insufficient capacity, insufficient production of a primary product, or insufficient markets. Overall goals and strategies for this

Table 25

Manufacturing, Mining and Construction:
Government Development Projects*

Project Code Number	Programme/Project Title	Implementing Agency	Allocation	High
			in Bank	Priority Allocation
			<i>Shs. m.</i>	<i>Shs. m.</i>
11-1	INDUSTRIAL EXTENSION AND ADVISORY PROGRAMME Development of Management Training and Advisory Centre Industrial Development Centre		46.1	39.6
11-2	Contribution to UDB—Small-scale Industry	MI	8.3	8.3
11-3	Ntinda Industrial Estate	MFP	10.0	10.0
11-4	Industrial estates in urban areas other than Kampala	MI	14.8	14.8
	CROP PROCESSING PROGRAMME			
11-5	Contribution to UDB—Development of Cotton Ginning Industry	MI	13.0	6.5
11-6	Contribution to UDB—Improvement of Coffee Processing	MFP	31.4	76.4
11-7	Contribution to ADC—Tea Processing Factories	MFP	16.4†	16.4
11-8	Contribution to ADC—National Sugar Works	MFP	5.0	—
	FOOD MANUFACTURING PROGRAMME			
11-9	Contribution to LDC—Milk Processing Units	MFP	55.0	55.0
	MISCELLANEOUS MANUFACTURING PROGRAMME			
11-10	Contribution to UDC—Lira Textile Mill	MFP	2.0	1.0
11-18	Demonstration Saw Mill, West Nile	MFP	214.3	214.3
11-12	Government Printing Press—Phase II	MAF	60.0	60.0
11-13	Prisons Industries Development	OP	1.5	1.5
11-11	Contribution to UDC—Unspecified Industrial Projects	MIA	2.8	2.8
11-14	Contribution to LIF—Purchase of shares in industrial companies	MFP	10.0	10.0
	MINERAL INVESTIGATION PROGRAMME			
11-15	Equipment and Facilities for Mineral Exploration	MFP	40.0	40.0
	BUILDING RESEARCH PROGRAMME			
11-17	Expansion of Central Materials Laboratory	MMWR	100.0	100.0
		MWH	5.0	5.0
		MWH	4.0	2.0
		MWH	4.0	2.0

* The relationship between the bank and high priority allocation to each project is explained in Chapter Eight (paragraphs 8.7-8.10). The system of code numbers associated with each project is explained in Appendix I.

† O.P. = Office of the President.

M.F.P. = Ministry of Finance and Planning.

M.A.F. = Ministry of Agriculture and Forestry.

M.I. = Ministry of Industry.

M.M.W.R. = Ministry of Mineral and Water Resources.

M.W.H. = Ministry of Works and Housing.

M.I.A. = Ministry of Internal Affairs.

Source: Table XI-8, Uganda Development Plan 1971/2 - 1975/6, p. 229.

sector in Plan III are as follows:

- (i) a growth of output of 7.6 percent per annum between 1967/69 and 1976;
- (ii) a growth of manufactured export averaging 5.3 percent per annum over the same period;
- (iii) substantial progress in the Ugandanisation both of employment and of ownership and operation within the manufacturing sector;

(iv) a rapid growth of employment in manufacturing broadly in line with the growth of manufacturing output. (Uganda, pp. 207-208.)

Development expenditures of 39.6 m. shs. are shown in Table 25 for an Industrial Extension and Advisory Programme, which includes projects (Project #11-1, #11-2, #11-3, and #11-4), designed to build up the managerial manpower and physical infrastructure of industry in general. The next category of a Crop Processing Programme, however, is directly related to agriculture priorities. It includes four projects on cotton ginning, coffee curing, tea processing, and sugar refining.

In cotton ginning, the number of active ginneries available has not been able to deal efficiently with past cotton crops greater than 350,000 bales, let alone the expected increase during Plan III! In addition, many of the active ginneries are in such poor condition that the quality of lint has been adversely affected. Therefore, a program for the Development of the Cotton Ginning Industry has been allocated 16.4 m. shs. (Project #11-5) in Table 25, to be channeled through the Uganda Development Bank. This will support ginnery rehabilitation and expansion, and also an expansion of ginnery storage capacity.

Coffee curing is done either through a wet or dry process. The former is more costly than the latter, but produces a better quality bean that sells for a higher price. In line with primary product growth expectations, no major expansion of coffee processing capacity--wet or dry--is planned during Plan III. Improvements to existing processing facilities are needed, however, but although funds are provided for this in the "Allocation in Bank" column, no High Priority Allocation is listed. (Project #11-6.)

As tea acreage expands during Plan III, and previous plantings come into full bearing, additional tea processing factories will be needed. Therefore, one existing factory will be expanded and four new ones will be created at an

allocated cost of 5.0 m. shs. (Project #11-7). These funds will be channeled through the Agricultural Development Corporation.

Work was started on the Kinyala Sugar Scheme during Plan II, and it is expected to start initial production in late 1973. Together with planned expansion of existing mills, sugar production is expected to be 240,000 tons by 1976: an amount that should cover domestic consumption and leave an exportable surplus of around 60,000 tons. In order to complete the Kinyala sugar mill and nucleus estate, an allocation of 55.00 m. shs. is listed in Table 25, (Project #11-8).

Under a heading of "Food Processing, Beverages, and Tobacco Products," many opportunities for commercial processing development are mentioned: the processing of horticultural crops; small-scale activities such as grain milling, food canning, and bakeries; fish processing and canning; pig processing; oil milling, etc. Only one product in Table 25 is specifically funded, however: 1.0 m. shs. is allocated for Milk Processing Units, (Project #11-9).

Under the "Miscellaneous Manufacturing Programme" in Table 25, projects concerning textile mills (Project #11-10), or printing (Project #11-12), will not be considered in the analysis of Ugandan national agricultural priorities, just as they weren't in the case of Kenya. That leaves only one final manufacturing project to be mentioned: the 1.5 m. shs. expenditure for the West Nile Demonstration Saw Mill (Project #11-18). This saw mill is to be established to utilize the output of softwoods at that location, and at the same time to demonstrate efficient saw milling methods and to train Ugandans in the industry. Other forestry related to manufactured products are mentioned; e.g., plywood for tea chests, particle board, charcoal, but none is specifically allocated funds in Table 25.

The final development expenditure category to be analyzed in Uganda's National Plan is the 159.8 m. shs. expenditure for "Water" shown back on Table 20. Uganda's water resources are described in this section of the Plan as follows:

Uganda is a country well endowed with water resources. Eighteen percent of her surface area is covered with open water or swamp and 73 percent of the country receives not less than 1,000 millimetres of rainfall per annum. Nevertheless, water is a valuable resource whose use must be carefully planned. Despite its general abundance, there are many parts of the country where there is a general shortage of water... Government's objective in water development is to harness and utilize Uganda's water resources for the benefit of the entire population. (Uganda, p. 243.)

Table 26 below shows a detailed listing of the development projects in this sector, and the expenditures for them. The sections on Rural Water Supply

Table 26

Water: Government Development Expenditure

Project Code Number	Programme/Project Title	Implementing Agency†	Allocation in Bank	High Priority Allocation
			Shs. m.	Shs. m.
16-1	WATER RESEARCH PROGRAMME Hydro-meteorological Survey of Lakes Victoria, Kyoga and Albert		11.3	9.5
16-2	Equipment for River Basin Surveys	MMWR	3.0	3.0
16-3	Irrigation Engineering Services	MMWR	1.8	1.0
16-4	Investigations of Karamoja Sand Rivers	MMWR	1.0	0.5
16-5	Hydrological Investigations and Research Equipment	MMWR	4.5	4.5
	RURAL WATER SUPPLIES PROGRAMME		1.0	0.5
16-6	Bunyaruguru and Paicha Water Schemes	MMWR	68.9	66.8
16-7	Lake Nakiwale Water Supply—Phase I	MCCCD	0.4	0.4
16-8	Lake Nakiwale Water Supply—Phase II	MMWR	4.0	2.0
16-9	Other Rural Piped Water Supplies	MMWR	4.0	4.0
16-10	Borehole Construction Equipment	MMWR	7.0	7.0
16-11	Borehole Construction Operating Costs	MMWR	37.4	37.4
16-12	Maintenance of Boreholes	MMWR	10.0	10.0
16-13	Borehole Drilling Division—Transfer of Headquarters	MMWR	2.0	2.0
	URBAN WATER SUPPLY AND SEWAGE DISPOSAL PROGRAMME		93.5	83.5
16-14	Contribution to N.W.B.	MFP	93.5	83.5

* The relationship between the bank and high priority allocation to each project is described in Chapter Eight (paragraphs 5.7-5.10). The system of code numbering associated with each project is explained in Appendix I.

† MFP = Ministry of Finance and Planning.

MMWR = Ministry of Mineral and Water Resources.

MCCCD = Ministry of Culture and Community Development.

Source: Table XVI-I Uganda Development Plan 1971/2 - 1975/6, p. 300.

and Urban Water Supply and Sewage Disposal are concerned with boreholes and piped water, and do not relate to the water resource/land use priority issue that this analysis focuses on. The five projects under the Water Research Programme do, however, and these are allocated a total of 9.5 m. shs.

Plan III's discussion of the Water Research Programme states the following:

A basic pre-condition for the national exploitation of our water resources is that more should be known about the hydrological, geological and meteorological factors which determine water availability in all parts of the country. (Uganda, p. 293.)

The Hydrometeorological Survey of the catchment of lakes Victoria, Kyoga, and Albert (Project #16-1), was begun in 1967 as a multi-national project sponsored by the United Nations Development Program. Its objectives are to collect and analyze hydrometeorological data in these areas, in order to study the water balance of the Upper Nile. Although the first phase of this project was to end in 1972, the participating countries had already agreed to extend it for another five years. Uganda's contribution during Plan III was 3.0 m. shs.

In order to supplement the above data, the Water Development Department of the Ministry of Mineral and Water Resources has embarked upon a series of river basin surveys for the purpose of determining and designing the optimum use of known water yields of selected tributary rivers to the main Nile system. During Plan III, these surveys are to be continued at an allocated cost of 1.0 m. shs. for equipment (Project #16-2). A further 0.5 m. shs. is allocated for irrigation engineering services (Project #16-3). The Department has also been associated with the UN's International Hydrological Decade, and under this program it has initiated rural and urban catchment investigations, studies of the Ruwenzori (Mountains of the Moon) glaciers, etc. These studies are also to be continued and 0.5 m. shs. is allocated for these Hydrological Investigations and Research Equipment (Project #16-5).

The North and South Karamoja Districts in Northeastern Uganda present a special problem for Uganda in that these are the low-rainfall, semi-arid to arid areas referred to above. A major research project to investigate the potential of underground water supplies in this area, that was completed in 1968, concluded that no large underground reservoirs of water existed, although small fissure systems were located throughout the area. Areas of potentially high ground water yields were also delineated, but the cost to exploit them was prohibitive. During Plan III, therefore, the present knowledge of ground water resources in Karamoja is to be reviewed in order to identify areas where further investigation or study may be necessary. One such area is the investigation of "sand rivers" (Project #16-4), to determine the potential yield of seasonal water flows and to devise methods for the storage and utilization of this water. This project is allocated 4.5 m. shs. in Table 26.

A summary of Uganda's national agricultural priorities, similar to Kenya's in Table 18, is shown in Table 27 on the following page. According to this analysis, Uganda's Class I highest priorities concern cotton, sugar, and tea; Class II concerns coffee, tobacco, and beef development; Class III concerns horticultural crops, plantation softwoods, water resources/land use, dairy development, and farm mechanization; Class IV concerns groundnuts, cocoa, Kenaf, rice, beans, maize, and sorghum/millet; and Class V concerns silk, sim-sim, and all others.

Table 27

UGANDA'S NATIONAL AGRICULTURAL AND FORESTRY PRIORITIES

Priority Class	Product/Activity	Specific Central Gov't. Development Expenditures, Excluding Research (e) (m. shs.)	Specific Central Gov't. Development Expenditures on Research (h) (m. shs.)	Specific Product Mentioned in Connection with a General Agricultural Project (number of projects)	Expected Production of Selected Commodities in 1976 (i) ('000 tons)	Expected Annual Average Growth Rate of Selected Commodities 1967/69 to 1976 (i) (%)	Expected Value of Exports in 1976 (k) (m. shs.)
I	Cotton	46.4		3	600 - 1,000 (j)	5.3 - 12.2	433
	Sugar	63.0			240 - 250	6.7	47
	Tea	42.0			38.4	12.8	205
II	Robusta Coffee	----			20.0	4.9	132
	Fire-Cured Tobacco	38.1	1.3	1	160.0	-0.4	762
	Flue-Cured Tobacco	65.5	4.0	3	.003	10.0	50
	Beef Development (a)			3	.005	9.0	
III	Plantation Crops (b)	5.0 (f)	2.1	2			
	Plantation Softwoods	16.0		3			
	Water Resources/Land Use (c)	1.5		3			
	Dairy Development (a)	65.6	9.5	3			
	Farm Mechanization	32.2 (g)					
IV	Cocoa	1.5		2			
	Konaf	10.0					
	Rice	12.0					
	Eggs	10.0		2			
	Beans	2.5		3			
V	Maize	----		4			
	Sorghum/Millet	----		3			
	Silk	0.5					
Others (d)	Sim-Sim	1.0					
	Others (d)	0 to 2.5					

See Footnotes Following Page

Footnotes From Table 27

- (a) This does not include general expenditures on animal health or animal husbandry.
- (b) Fruits and Vegetables.
- (c) This does not include irrigation projects in order to be consistent with the analysis for Kenya. In Kenya's case, irrigation projects were identified with specific crops; in Uganda's case, most of the irrigation projects have the objective of developing irrigation techniques and no specific crops are mentioned.
- (d) Others, which were barely mentioned, included wheat, pasture grasses, hardwoods, hides and skins, cassava, plantains (bananas), pyrethrum, senna, bagarua, pigs, goats, bee-keeping, and poultry.
- (e) See Table 23 for Rural Product Expenditures and Table 25 for Manufacturing Expenditures.
- (f) Includes the 2.0 m. shs. allocated to citrus in Table 23.
- (g) 1.2 m. shs. for the National College of Agricultural Mechanization is included in this figure.
- (h) See Table 23 for Rural Products research expenditures and Table 26 for Water resources research expenditures.
- (i) See Table 24.
- (j) This figure is in terms of '000 bales.
- (k) See Table 22.

TANZANIA

The analysis of the national agricultural and forestry priorities in Tanzania will, once again, follow the outline of the national plan, Volumes I and II. Volume I presents a general analysis of the development plan, and Volume II presents the detailed projects and the development expenditures for them. Volumes III and IV, which concern, respectively, the regional perspectives of the national plan, and a survey of high and middle level manpower requirements of the plan, are not relevant to this analysis.

Imbedded in Tanzania's Development Plan is a relatively much more political or ideological base than is the case with Kenya or Uganda. The first page sets the tone by stating the philosophy of the plan in terms of five principles based on the Arusha Declaration:

(i) Social equality - The Plan aims to spread the benefits of development widely throughout society;

(ii) Ujamaa - The Plan emphasizes the development of forms of economic activity which encourage collective and cooperative efforts and avoid wide differences of wealth and income;

(iii) Self reliance - The Plan emphasizes development through the maximum mobilization of domestic resources; particularly through mobilization of the people;

(iv) Economic and Social Transformation - The Plan emphasizes rapid expansion of productive capacity to create the basis for future economic and social transformation;

(v) African economic integration - The Plan emphasizes the extension of economic cooperation with other African states. (Tanzania, Vol. I., p. 1.)

The principles of socialism and "ujamaa" permeate the Development Plan throughout, from broad objectives and strategies down to individual projects.

The overall output target of the Plan is an average annual growth of 6.5 percent per annum in real terms; a growth in GDP from 6,170 m. shs. in 1968/69 to 8,445 m. shs. (in 1968/69 prices) in 1973/74, (see Tables 28 and 29 on the following page). The major part of economic activity in Tanzania derives

Table 28

OUTPUT TARGETS: GROSS DOMESTIC PRODUCT AT CONSTANT 1968/69 PRICES

Shillings, Million.

	1968/69	1973/74	Change 1968/69- 1973/74	Per Cent Contri- bution of Sectors to Total Growth
<i>Agriculture:</i>				
Monetary	1,480	2,095	615	27.0
Subsistence	1,630	1,890	260	11.4
Mining	128	110	-18	-0.7
Manufacturing	384	707	323	14.2
Construction	278	448	170	7.5
Public Utilities	62	109	47	2.1
Commerce	850	1,220	390	17.1
Rent	347	464	117	5.1
Transport	316	486	170	7.5
Services	718	916	198	8.7
Total	6,170	8,445	2,275	100
<i>Monetary</i>				
Subsistence	1,630	1,890	260	11.4

Source: Table 3, Tanzania Second Five-Year Plan, Vol. I, p. 202.

Table 29

TARGET GROWTH RATES FOR G.D.P.

	Relative Importance 1968/69 per cent	Target Growth Rate per cent per annum	Relative Importance 1973/74 per cent
<i>Agriculture:</i>			
Monetary	24.0	7.2	24.8
Subsistence	26.4	3.0	22.4
Mining	2.0	-2.5	1.3
Manufacturing	6.2	13.0	8.4
Construction	4.5	10.0	5.3
Public Utilities	1.0	12.0	1.3
Commerce	13.5	8.0	15.4
Rent	5.6	6.0	5.5
Transport	5.1	9.0	5.8
Services	11.6	5.0	10.8
Total	100	6.5	100
<i>Monetary</i>			
Subsistence	26.4	3.0	22.4

Source: Table 4, Tanzania Second Five-Year Plan, Vol. I, p. 203.

directly from the rural, agricultural sector. Agriculture, monetary and subsistence, accounted for more than half of GDP in 1968/69 (see Table 29), and in addition is a major product objective of a number of service sectors such as transport and commerce. And lastly, but not least, agriculture is the direct source of income and livelihood for the bulk of Tanzania's population.

Therefore, the achievement of the overall plan target requires a significant planned increase in the growth of the marketed or monetary agricultural sector, although the relative importance of total agriculture in the entire economy is to decline somewhat by 1973/74. Marketed agriculture is expected to grow at an annual rate of 7.2 percent and increase from 1,480 m. shs. GDP in 1968/69 to 2,095 m. shs. GDP in 1973/74. This increase of 615 m. shs. represents, by itself, 27 percent of the total GDP increase from all sectors. (Subsistence agriculture is expected to grow only at an annual rate of 3 percent and contribute an additional 260 m. shs., or 11.4 percent, to the planned increase in GDP. Its relative importance in the total economy, however, is to drop from 26.4 percent to 22.4 percent over those years.)

Rural development is the key both to the achievement of the production targets in the Plan and the social goal of spreading development to the mass of the people. (Tanzania, Vol. I, p. 4.)

General policies for rural development were set along the following lines:

(i) The Plan emphasizes programmes to implement the principles of Ujamaa, and to extend the scope for cooperative and group activity. Major organizational changes have been implemented to ensure general mobilization of support for Ujamaa and to further the long-term objective of creating socialist forms of production throughout the rural sector. Priority is given to small-scale low cost projects by local communities, demanding a minimum of technical and financial assistance...

(ii) Crop priorities are formulated for all major agricultural and livestock commodities. These policies for each crop take account of the need for increased self-sufficiency and improved nutritional levels, expansion of local markets for agricultural and livestock products at prices which are consistent with Government income and wage policies, and maximum exploitation of export markets... (Tanzania, Vol. I, p. 4).

The Plan also takes note of things such as the need for measures to promote diversification in areas which are dangerously dependent on a single crop or on crops with uncertain or declining markets, and the need for a balanced pattern between cash crops grown for export (the "heavy colonial bias") and food crops grown for local consumption.

Although the creation of Ujamaa Villages and the provision of services (boreholes, irrigation schemes, credit, etc.) for them receive much direct attention in the Rural Sector plan, these types of priorities do not relate to this analysis and therefore we shall turn to crop priorities as they are specifically discussed in the Plan. In real terms, the Tanzania Plan is most explicit about these priorities.

High priority crops are tea, flue-cured tobacco, cotton, rice, wheat, cashewnuts, oil seeds, some fruits and vegetables, soya and seed beans. Locally (in appropriate areas) cocoa, copra and fishing will be of importance. Considerable attention will also be directed to the livestock industry. At the other end of the scale, care will have to be taken not to over-produce sisal, coffee, phrethrum and fire-cured tobacco, all of which face limited markets. (Tanzania, Vol. I, p. 4.)

Resources in developing Tanzania are scarce and efficient utilization is therefore of great importance. In stating this obvious fact, Tanzania sets the stage for the clearest understanding of the need for priorities amongst the three Partner States:

Systematic crop priorities define criteria for the allocation of diverse scarce resources to achieve a complex set of output objectives. (Tanzania, Vol. I, p. 42.)

And Tanzania also recognizes some of the complexities in setting priorities. Its crop policies are composed of two elements: production goals and a set of Government action projects designed to help achieve those production goals. These two elements are closely related in many cases, but not in others, and therefore it is useful to distinguish between them. The output of some crops

might be achieved with very little Government intervention; the output of others might require quite a lot. Or, Government action to combat a crop disease might be very important even though no increase in production of that crop was planned. Tanzania also recognizes that "there are many possible criteria for identifying crop priorities," (Tanzania, Vol. I, p. 42), but says that the main considerations can be stated simply as follows:

Crop priorities must be firmly founded upon a solid knowledge of production possibilities including both natural environment and farmers' attitudes. Achievement of efficient resource use also involves an assessment of market prospects both internally and externally. (Tanzania, Vol I, p. 42.)

The market problem is expected to be especially acute with relation to some major export crops.

Expected annual growth rates for major cash crops and their expected relative importance in 1973/74 are shown below in Table 30. When target annual growth

Table 30
MAJOR CASH CROPS *

	Target Growth Rate per cent Per annum	Growth Rate 1960-62- 67 per cent per annum	Relative Importance 1968-69 per cent	Relative Importance 1973-74 per cent
Sisal	-2.0	+0.9	16.9	10.5
Cotton	9.0	12.6	25.3	26.7
Coffee	6.0	12.1	19.7	18.1
Cashewnuts	10.0	11.7	7.5	8.3
Sugarcane	7.0	14.0	8.2	7.8
Tea	9.0	9.3	4.6	4.9
Tobacco (Flue cured)	25.0	23.2	4.2	8.8
(Fire cured)	6.0		0.7	0.6
Pyrethrum	4.0	25.4	2.3	1.9
Wheat	16.0	16.1	3.0	4.3
Rice	10.0	N.A.	3.7	4.1
Groundnuts and oil seeds	7.0	N.A.	3.9	3.8
Total	7.8	-	100	101

* The relative importance in 1968-69 is estimated on the basis of recent trends in farmers incomes derived from these crops particularly on data for the 1966-68 season.

Source: Table 1, Tanzania Second Five-Year Plan, Vol. I, p. 198.

rates are combined with the quantity base to which the growth rate is applied, a perhaps clearer picture of the relative importance of these marketed cash crops to Tanzania's growth is presented:

In turn, within the agricultural industry the most important contributions, in absolute terms, to growth in marketed output are, in order of absolute importance, cotton, tobacco, coffee, cashew, wheat, sugar, tea and paddy. Growth in cotton alone accounts for over one-quarter of the total increase in marketed output expected of agriculture, forestry and fisheries. Tobacco accounts for almost one-sixth of the total expected increase. (Tanzania, Vol. I, p. 202.)

In another section of the Plan, national production aims for a wider range of Tanzania's crops are summarized as follows:

Crops for which accelerated or rapid increases are aimed at:
Meat and dairy products, fish, rice, wheat,^{a)} fruit and vegetables (on a selective basis), tea,^{b)} flue-cured tobacco,^{b)} cotton, oil-seeds, cashewnuts,^{b)} grape vines, seed beans, soya beans, and kenaf;

Crops for which present or medium growth rate is required:
Maize,^{a)} sorghum and millet, bananas, other beans, and sugar;

Declining or limited market: Sisal,^{c)} coffee,^{b)} phrethrum,^{c)} and fire-cured tobacco.

Production goals do not relate only to an expansion in acreage quantity, but also to efficiency or productivity objectives and to quality improvements as are indicated in the footnotes.

When making a judgment on the best use of scarce Government resources, however, not only the priority as attached to production targets is considered, but also the availability and likely effect that specific types of resources will have on individual production goals and the overall availability of different resources within Tanzania. When these factors are taken into account,

a) Increased efficiency/lower costs and prices are an important part of the production aim.

b) Quality improvement is an important part of production aim.

c) Diversification effort required. (Tanzania, Vol. I, p. 43).

the Plan identifies eight "major national agricultural programmes of the Plan: Meat and Dairy Products; Fish; Rice; Wheat; Tea; Flue-Cured Tobacco; Cotton; Pulse Foods; Oil-Seeds; Vegetables and Fruits. Note that some crops in the above list for accelerated increases in production are not included here. Cashewnuts, for example, are not mentioned because the state of the art of research for this crop does not permit a large input of Government resources. Other crops, such as maize, coffee, and sisal, will receive attention from the Government, but they will not be the subject of comprehensive or large-scale programmes.

Plan remarks about specific crops are quoted below:

Cotton - The production aim for the Second Plan is 700,000 bales (in climatically favourable years) by 1973/74...Research will continue at its present level. The release in bulk of further new varieties should be a large factor in increased output...Large numbers of extension workers will be posted in the cotton areas, as at present...The expanded crop will require considerable investment in storage, ginning and transport capacity... (Tanzania, Vol. I, p. 44.)

Coffee - The production aim is to cut the growth rate severely compared with recent years. Even if the annual growth rate falls to about six percent a year, output in 1972/73 is likely to be about 1.2 million bags, whereas our quota under the new International Coffee Agreement...will probably be no higher than about 700,000 bags...

In this situation it is necessary both to make innovations in marketing and to discourage further production increases...increases will be actively discouraged by diversification within the major coffee areas and by pricing and marketing measures... (Tanzania, Vol. I, p. 45.)

Sisal - The aim is to increase the industry's efficiency and reduce its costs, while cutting its capacity from the present potential of over 200,000 tons to a level consistent with expected export and domestic sales. The level of sales is likely to fall considerably...Maximum efforts will be put into cost reduction and the development of new profitable end uses for sisal...The Tanzania Sisal Corporation, the Sisal Research Station at Milingano, and Kilimo will be experimenting with and carrying out diversification schemes. Those already under way include livestock, coconut, palms, cashewnuts, and oilseeds. Other possibilities include oil palms and forestry... (Tanzania, Vol. I, p. 45.)

Cashew-nuts

- Considerable production increase in the Plan period will result from new planting in the middle sixties. The aim will be to improve quality and to encourage further new plantings. Research will be stressed so that new varieties and new recommendations will be available...

Past increases in production and planting have occurred without any large scale government investment. During the Plan vigorous political and agricultural persuasion will be used to push new planting in suitable Regions where the crop is now small. (Tanzania, Vol. I, p. 46.)

- Tea - Production is likely to increase by about 50 percent during the Second Plan, almost entirely from existing acreage... The aim during the Second Plan will be to plant over 20,000 acres of smallholder tea... and to create an organization capable of handling an additional 50,000 new acres by the end of 1978/79.

As in the past farmers participating in the schemes will be provided with planting material and fertilizers on credit... with close supervision from extension workers, and with roads to the factory...

This ambitious programme involves a rapid build up of new acreage from an annual planting of 1,500 acres in 1969/70 to 7,500 acres in 1973/74... To help meet the staff needs, particularly for field work, a tea training school will be established at Amani in 1969/70... (Tanzania, Vol. I, p. 46.)

The growth target of 9 percent per annum (see Table 30) does not fully represent the emphasis given to this programme; due to the lag between planting and the maturity of the plant, full returns from the projected programme will not be reaped until the next Plan. (Tanzania, Vol. I, p. 198.)

- Tobacco - The expansion of smallholder production of flue-cured tobacco will be one of the major programmes of the Plan. The growth of the market for fire-cured tobacco means that production of that type can only rise modestly.

The output objective over the Plan is to achieve a rate of growth of 25 percent per annum reaching 35 million pounds by the end of the Plan period. This is an ambitious production programme requiring considerable supervision and infrastructural development to ensure the quality necessary to command a fast expanding share of the world market... (Tanzania, Vol. I, p. 47.)

- Pyrethrum - The production aim is to avoid producing more than can be marketed on a profitable basis... The two lines of action will be discouragement of output increases and search for new markets... One factor which will tend to discourage output is the price fall of about 20 percent... Diversification opportunities are being explored as are ways of tightening up the existing quota control system. (Tanzania, Vol. I, p. 47.)

The growth rate of 4 percent (see Table 30) represents a dramatic decline from past growth. (Tanzania, Vol. I, p. 198.)

Oil

Seeds - The aim is to increase production in contrast to the recent past when output has been stagnant or falling for groundnuts, castor, sim-sim and sunflower, and when soya has hardly been grown at all. Many of the actual and potential producing areas of these crops have a low farm income per head and will not be benefitting from other major programmes of the Second Plan. An increase in oilseed output is the best agricultural opportunity open to these areas.

In the past, oilseeds have not been given a high priority by public policy... In the new Plan period expansion will be encouraged by all available means... (Tanzania, Vol. I, p. 48.)

Rice - The aim is to transform Tanzania from being a net importer of rice on a modest scale into an exporter during the Plan period... At present world prices, the internal price reduction needed to make exports profitable will be smaller for rice than for maize or wheat.

As with wheat, paddy is produced in many different places and ways. There is great scope for improved methods and increased output from smallholders growing paddy with flood irrigation... (Tanzania, Vol. I, p. 48.)

Wheat - The aim is to achieve self-sufficiency in soft wheat (about 85 percent of total needs), preferably during the Second Plan. This could be achieved in good weather years if the acreage under wheat rises by about 15 percent a year cumulative. An average increase in acreage of 15,000 to 20,000 acres a year is therefore needed... an important element in long-term development must be the reduction of production costs and efficient location of production, storage and processing facilities in relation to the potential market. (Tanzania, Vol I, p. 49.)

Sugar - The production aim is self-sufficiency plus a small additional capacity. Production of 110,000 tons in 1974, compared with 70,600 tons in 1967 will allow for a six percent growth of mainland demand... (Tanzania, Vol. I, p. 49.)

Maize - Maize is by far the most important food crop in Tanzania. It is a major objective of agricultural policy to ensure that local production expands to meet the needs of a growing population and to allow for increasing levels of per capita consumption...

Most maize produced is either consumed by the farmer, sold locally or by other means by-passes the official marketing channels...

In the long-term, increases in farm productivity and improvement in transport and handling costs can be achieved through agronomic improvements and greater regional specialization in commercial maize production. Quite dramatic increases in yield should be possible...

During the Plan efforts will also be made to develop additional domestic uses of maize, both in the livestock industry and in processed forms. (Tanzania, Vol. I, pp. 49-50.)

In the case of livestock production, Tanzania has natural resources which should enable it to increase meat and dairy products; extensive areas of grass and woodland with relatively high rainfall that could carry very large livestock populations. Beef productivity from indigenous cattle had been low, but it was hoped that with better systems of land use, cattle management, and disease control, greater output could be obtained--particularly if improved cattle strains were introduced. The strategy then was to increase productivity from existing cattle rather than to increase cattle numbers, which might result in localized over-grazing and ecological damage. Annual production of carcass beef was estimated to be 220 million pounds at the time the plan was written; a 5 percent annual growth rate was expected. In addition, a limited market for high quality meat in Tanzania was being met largely by imports, and it was mentioned that areas in Tanzania suitable for producing high quality beef--high rainfall and temperate climate--would be developed to supply this growing demand. Tanzania's priorities are more clearly specified in the case of dairy products:

As dairy imports are the largest food item in the country's total import bill and as there are areas of the country suitable for much greater dairy production, development of dairy is accorded very high priority for the Second Plan. (Tanzania, Vol. I, p. 51)

These areas are once again the high rainfall, high altitude temperate areas of Tanzania.

Like Kenya, however, there are significant areas of Tanzania that fall within the rangeland ecological definition. Some 65 percent of total cultivatable land in Tanzania has a mean rainfall range of 20 to 40 inches, and the dry land farming that is attempted involves considerable risk. There are, however, pastoral peoples in these areas with cultures built around their large

cattle herds. In order to achieve higher production, a Range Act was passed in 1964 as a tool to evolve systems of organized and controlled grazing. Local Range Commissioners stimulated the formation of Ranching Associations received aid from the Government and land occupancy rights in exchange for accepting internal discipline over the management of their land and cattle. During the Second Plan, an agreement between Tanzania and the United Nations Development Programme was to take effect which would improve and extend the utilization of the Act and provide training in range management for Tanzania staff.

As was mentioned earlier, one of the interacting variables that affects the amount of Government funds expended on different activities is the need for direct Government intervention. Although Ujamaa Villages receive a great deal of attention in the Second Plan and the provision of services, such as water supplies, to them receives priority, it is also stated that state farms will receive "a significant share" of the total resources devoted to the rural sector. The reasoning behind this policy is as follows:

The extension of the principles of Ujamaa Vijijini will bring many Tanzanians into collective production activities; it will not, however, provide an answer to all the problems of agricultural organization. Certain agricultural products for which fast output growth is required and which benefit from mechanization and/or large scale irrigation, from organized innovation, and from centralized management of a large scale operation will be produced effectively on state farms. To meet this need, over 250,000 acres of new state farms are planned for the Second Plan period. (Tanzania, Vol. I, p. 30.)

Wheat and dairy production are mentioned in the discussion as being typical of the above criteria, but Table 31, on the following page, gives a full picture of the state farm program as it existed at the beginning of the Second Plan.

In forestry, it is estimated that there are about 160,000 square miles of forests in Tanzania, but out of this total only 50,000 square miles have been set aside as forest reserves. Plantation forests of coniferous softwoods totaled about 60,000 acres, and an additional 5,000 acres of fine hardwood

Table 31

State Farm Programme

	<u>Number of State Farms</u>	<u>Acreage</u>
Wheat	10	100,000
Ranches (Rangeland)	9	(a)
Rice	4	13,000
Dairy	2	(a)
Coconut	2	6,000
Oilseeds	1	4,000
Vine (Grapes)	1	1,000

(a) Acreage not yet delineated.

Source: Tanzania Second Five-Year Plan, p. 31.

plantations had been established. Of the remaining indigenous forests, about 23,000 acres had been brought under intensive management. The broad development policy for forestry is stated as follows:

To meet the future demand for lumber it is imperative that the afforestation programmes and the development of the indigenous forest be continued during this Plan period. It is also necessary that existing plantations and regeneration areas be tended and that necessary infrastructure required for the industrial utilization of these crops be developed. (Tanzania, Vol. I, p. 57.)

Accordingly, a softwood afforestation program is mentioned which is to plant 45,000 acres of new forests, plus maintain the previously planted 60,000 acres and provide the roads, housing, etc. necessary for the exploitation of the trees. There is also to be a hardwood afforestation program, but no goals are mentioned. By the end of the Second Plan, the annual yield from forest plantations is expected to rise from three to nine million cubic feet. There also is to be a program for the development of indigenous forests although no

figures are mentioned. The Plan does state, however, that the production from indigenous forests could be doubled during the five-year plan by utilizing more indigenous tree species, by investing in hardwood logging and sawmilling facilities, and by investing in effective exploitation control.

Of the wood production that was being achieved, however, only a small percentage of it was being utilized. Therefore, the Second Plan stressed the development of the entire forest industry--not just the forestry resource--for the efficient and full utilization of the resource. Domestic consumption of industrial wood (excluding fuelwood and poles) was increasing at an annual rate of 10 percent, and the Plan estimated that the annual requirement would be 14 million cubic feet by 1974. In addition, the prospects for export markets were judged to be good. Six softwood saw mills and four hardwood sawmills were mentioned as being in various stages of planning or construction during the Plan period, plus the logging units to supply them.¹⁹⁾

Discussions of "Co-operative Development," "Rural Training," and "Rural Credit" in the Plan do not include any strategy remarks that might pertain to this analysis of national priorities. There is some discussion of "Mechanization" that does relate to an EAAFRO activity, however. The Plan points out a previous error in past planning to think of mechanization primarily in the context of tractors. This led to the neglect of hand and animal drawn equipment, simple processing equipment, water lifting devices, etc., etc., and a concomitant neglect of training and of repair and maintenance facilities for these

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Intimately related to forestry is the forest beekeeping industry. Tanzania is the world's largest exporter of beeswax, worth 5 m. shs. annually at the time the Second Plan was written; plus one m. shs. annually for honey exports! This activity was based on traditional production methods, however, and a program to encourage beekeepers to adopt more modern and productive techniques.

less sophisticated forms of mechanization, as well as for tractors themselves. The Second Five-Year Plan, therefore, offers a more balanced program of mechanization and the provision of effective supporting services. In some selected areas, tractors and other expensive machinery will be introduced; in other areas, ox-drawn equipment will be stressed. The Tanganyika Agricultural Machinery Testing Unit (TAMTU) is to engage in designing simple and inexpensive farm implements --"intermediate technology"--which are to be manufactured by the Ubungo Farm Implements Manufacturing Company Ltd.

The discussions under the headings of "Water Development" and "Irrigation" concern the provision of adequate water supplies to rural areas, flood control, irrigation schemes, etc., and not basic issues of water resources/land use. Mention is made, however, of plans and strategies being developed by a National Water Resources Council which would logically seem to require studies and investigations of basic water resource/land use questions. Several criteria are listed for future irrigation schemes as a result of past experience, one of which states that they will be based on selected crops that have a high potential for increased yields under irrigation and not on general crop hopes.

Finally in the rural sector, the objective of crop protection from insect pests, vermin, and diseases is stressed. While virtually all cash crops are adequately taken care of in this respect, food crops are not. The Plan estimates that for cereal crops, which includes maize, losses of this nature in the field can be as high as 25 percent of the potential yield, and as much as 30 percent of the harvested crop can further be lost in storage. Therefore, greater emphasis will be placed on the application of known methods and on research to develop new and cheaper methods to reduce these losses during the Plan period.

In the industrial sector, the Manufacturing of Food, Beverages and Tobacco class was already the most developed, and it was to receive the most development expenditures during the Second Plan as well. The basis for its growth was, of course, the ambitious goals for agricultural expansion on the one hand, and rising demand from the growing urban market on the other. Ninety-seven projects, over one-quarter of the total industrial projects, were generated by direct domestic urban demand, import substitution possibilities, and export possibilities:

Projects aimed at meeting local demands are proposed in grain milling, sugar refining, bakery products, confectionary, brewing, tobacco-processing, animal and poultry slaughter and packing, fishing processing, animal food concentrates and dairying.

Projects emphasizing the export market are proposed in meat canning and cashewnut processing.

Oil milling and fruit and vegetable preserves will be developed both for the domestic and export markets. (Tanzania, Vol. I, p. 68.)

Most of the investments in the industrial sector will be made in the para-statal corporations, once again in keeping with the Arusha Declaration.

Wood Products, including furniture and pulp and paper products is another industrial sector classification that receives attention in the Plan. "Energetic efforts" will be made to develop sawmill, fibre board, plywood, veneer, and parquetry manufacturing capabilities to utilize Tanzania's unexploited timber resources. Many of the project possibilities in this area are appropriate for small-scale development - e.g., furniture making - but others are only possible on a large scale - e.g., pulp and paper production. But over the long term, the Plan states, wood products industries have the potential for very high rates of growth.

The detailed projects and development expenditures of Tanzania's Second Five-Year Plan are contained in Volume II. A total investment of 8,085 m. shs. is expected to be undertaken during the five years of the plan in order to achieve

its objectives and targets. This total is broken down by source as shown below in Table 32. The total development expenditures for the Second Plan; however,

Table 32

<u>Source of Total Investment Funds</u>		
	<u>Shs. Million</u>	<u>Percent Share</u>
Central Government (a)	3,055	37.8
Parastatals and Cooperatives	2,300	28.4
East African Corporations	580	7.2
Private Sector	2,150	26.6

(a) Excluding contribution to Parastatal Corporations

Source: Tanzania Second Five-Year Plan, Vol. II, p. 4.

amount to only 2,750 m. shs., as shown on Table 33 on the following page, along with the relative amounts and percentages allocated to different ministries and divisions. From this table, it can be seen that over 635 m. shs. are allocated to the Ministry of Agriculture, Food and Cooperatives; over 23 percent of total development expenditures and exceeded only by the allocation to the Ministry of Communications, Transport and Labour which is a special case, influenced by the Tan Zam highway with its political implications. The total allocation to the Ministry of Agriculture, Food and Cooperatives is divided amongst seven divisions: the Water Development and Irrigation Division (187 m. shs. or 6.8 percent); the Agriculture and Food Division (99 m. shs. or 3.6 percent); the Production Division (100 m. shs. or 3.7 percent); the Training and Research Division (110 m. shs. or 4.0 percent); the Natural Resources Division (120 m. shs. or 4.3 percent); the Cooperative Development Division (5 m. shs. or 0.2 percent); and the Administration and Planning Division (14 m. shs. or 0.5 percent). The detailed projects and expenditures are listed in tables by divisions.

Table 33
SUMMARY TABLES
(i) CENTRAL GOVERNMENT DEVELOPMENT EXPENDITURE 1969/70-73/74

Ministry/Division	1969/70	1970/71	1971/72-1973/74	Total Second Plan	% Share
President's Office	53,000	48,000	88,000	189,000	—
Central Establishments	6,000,000	9,000,000	15,000,000	30,000,000	1-1
Ministry of Regional Administration and Rural Development:					
Rural Development Division	25,021,395	32,480,100	110,010,000	167,520,495	6-2
Local Government Division	500,000	1,100,000	1,832,500	3,432,500	0-1
Regional Administration Division	1,930,400	2,565,800	4,930,000	9,426,200	0-3
Total	27,451,795	36,154,900	116,772,500	180,379,495	6-6
Ministry of Foreign Affairs	2,600,000	4,000,000	4,700,000	11,300,000	0-4
Second Vice-President's Office	171,000	162,000	50,000	392,000	—
Defence	40,690,000	35,000,000	29,952,664	104,952,664	3-9
National Service	6,857,800	10,019,650	8,122,700	25,000,150	0-9
Judiciary	290,000	250,000	530,000	1,070,000	—
Ministry of Agriculture, Food and Co-operatives:					
Water Development and Irrigation Division	26,030,000	32,750,000	127,770,000	186,600,000	6-8
Agriculture and Food Division	13,671,550	17,610,000	68,108,750	99,430,300	3-6
Production Division	16,811,200	13,915,100	69,611,600	100,340,000	3-7
Training and Research Division	13,667,500	18,000,750	78,089,550	109,817,750	4-0
Natural Resources Division	16,422,700	20,905,600	82,542,700	119,921,000	4-3
Co-operative Development Division	819,000	968,500	3,113,000	4,900,500	0-2
Administration and Planning Division	1,376,800	2,556,800	10,558,000	14,492,200	0-5
Total	88,868,750	106,889,750	439,786,250	635,544,750	23-1
Ministry of Economic Affairs and Development Planning	3,500,000	4,600,000	5,200,000	13,300,000	0-5
Ministry of National Education:					
Primary Education	15,977,000	20,899,000	84,340,000	121,216,000	4-4
Secondary Education	23,377,500	28,502,000	35,362,000	87,241,500	3-2
Technical and Commercial Education	900,000	3,230,000	4,900,000	9,030,000	0-3
Training of Teachers	9,380,000	11,916,000	11,124,000	32,450,000	1-1
University Education	2,525,000	11,142,000	16,917,500	30,584,500	1-1
Other Projects	2,162,000	1,935,000	6,465,000	10,562,000	0-4
Culture and Antiquities	1,890,000	3,119,000	1,043,300	6,052,300	0-2
Total	56,211,500	80,773,000	160,151,800	297,136,300	10-8
Ministry of Commerce and Industries:					
Minerals Division	6,411,540	5,730,400	13,799,960	25,942,200	0-9
Industries Division	1,205,040	—	—	1,205,040	—
Rural Electrification	—	1,060,000	4,000,000	5,060,000	0-2
Total	7,616,880	6,730,400	17,799,960	32,147,240	1-1
Ministry of Communications, Transport and Labour:					
Roads and Aerodromes Division	264,780,000	250,670,000	301,550,000	817,000,000	29-7
Building and Housing	14,431,751	14,190,467	57,879,053	86,501,271	3-1
Others	2,048,000	3,038,000	13,762,000	18,858,000	0-7
Total	281,259,751	267,908,467	373,191,053	922,359,271	33-5
Ministry of Lands, Housing and Urban Development:					
Land Division	8,935,500	9,674,500	26,980,000	45,590,000	1-7
Survey Division	5,020,000	5,390,000	17,075,000	27,485,000	1-0
Valuation Division	—	101,700	67,800	169,500	—
Town Planning Division	9,400,000	16,700,000	53,810,000	79,910,000	2-9
Urban Water Supplies Division	21,700,000	29,500,000	105,400,000	156,600,000	5-7
Total	45,055,500	61,266,200	203,332,800	302,654,500	11-3

(continued)

Table 33
(continued)

CENTRAL GOVERNMENT DEVELOPMENT EXPENDITURE (contd.)

Ministry/Division	1969/70	1970/71	1971/72-1973/74	Total Second Plan	% Share
<i>Ministry of Home Affairs:</i>					
Police	5,390,000	5,800,000	47,210,000	58,400,000	2.1
Prisons	3,300,000	3,000,000	4,500,000	10,800,000	0.4
Immigration	396,750	398,290	1,004,960	1,800,000	0.1
Total	9,086,750	9,198,290	52,714,960	71,000,000	2.6
<i>Ministry of Health and Social Welfare:</i>					
Train	1,677,000	180,000	501,000	2,358,000	0.1
Public Health Programme	3,842,000	3,719,000	23,402,500	31,025,500	1.1
Hospital Services	7,807,000	9,260,500	38,968,590	56,036,090	2.0
Ancillary and Special Services	1,291,000	620,000	2,424,000	4,335,000	0.2
Welfare and Probation	1,994,000	1,092,000	1,984,000	5,070,000	0.2
Total	16,613,000	14,931,500	67,280,090	98,824,590	3.6
<i>Ministry of Information and Tourism:</i>					
Information Services and Broadcasting	1,450,000	3,500,000	7,800,000	12,750,000	0.5
Tourism	600,000	250,000	3,150,000	4,000,000	0.1
Total	2,050,000	3,750,000	10,950,000	16,750,000	0.6
GRAND TOTAL	593,685,726	650,682,197	1,505,632,077	2,750,000,000	100.00

Source: Table III, Tanzania Second Five-Year Plan, Vol. II, pp. 10-12.

Before turning directly to them, however, the system for classifying and numbering projects will be briefly explained. Each project has a four-digit code number; the first digit of which indicates the six main categories of economic classification; i.e.:

- 10 - Directly Productive Activities
- 20 - Research, Surveys and Investigations
- 30 - Power, Water and Sanitary Services
- 40 - Other Economic Infrastructure
- 50 - Social Infrastructure
- 60 - Administration and Security

The second digit indicates a subhead in a main category, and the last two digits indicate the number of the project within the subhead of the economic classification. Table 34, on the following page, shows the classification system and the total development expenditures for each subhead and main category. Note the classification numbers directly relevant to agriculture.

Table 34

ECONOMIC CLASSIFICATION OF DEVELOPMENT EXPENDITURE		
CENTRAL GOVERNMENT		
	Expenditure '000e.	% Share
10—Directly Productive Activity		
11—Mining	28,230	1-03
12—Manufacturing and Processing	44,385	1-61
13—Agriculture—Food	67,662	2-47
14—Agriculture—Commercial Crops	39,654	1-44
15—Agriculture—Livestock and Fishery	25,650	0-93
16—Tourism	11,599	0-42
17—Others	—	—
Total ...	217,153	7-90
20—Research, Surveys and Investigations		
21—Agricultural Research	48,655	1-77
22—Other Research	40,391	1-47
23—Surveys and Investigations	81,955	2-98
Total ...	171,001	6-22
30—Power, Water and Sanitary Services		
31—Electricity	5,000	0-18
32—Rural Water and Sanitary Services... ..	83,600	3-04
33—Urban Water and Sanitary Services	156,500	5-69
34—Others	—	—
Total ...	245,100	8-91
40—Other Economic Infrastructure		
41—Roads and Aerodromes	813,030	29-56
42—Communication and Broadcasting... ..	13,036	0-47
43—Technical Education and Training	260,114	9-46
44—Agricultural Improvement—Crops	27,261	0-99
45—Agricultural Improvement—Livestock and Fishery	90,070	3-28
46—Agricultural Improvement—Forestry	9,150	0-33
47—Drainage and Irrigation	47,255	1-72
48—Storage	13,800	0-50
49—Others	353,935	12-87
Total ...	1,627,621	59-18
50—Social Infrastructure		
51—Primary Education	121,216	4-41
52—National Service	25,000	0-91
53—Housing	56,472	2-05
54—Health	88,255	3-21
55—Culture and Welfare... ..	10,952	0-40
56—Others	13,784	0-50
Total ...	315,679	11-48
60—Administration and Security		
61—Defence	104,953	3-82
62—Police	58,400	2-13
63—Prisons	7,223	0-26
64—Others	2,870	0-10
Total ...	173,446	6-31
70—Grand Total ...	2,750,000	100-00

Source: Tanzania Second Five-Year Plan, Vol. II, p. 13.

The program list of projects and expenditures for the Agriculture and Food Division of the Ministry of Agriculture, Food and Cooperatives is shown on Table 35 below. This division is basically concerned with agricultural and

Table 35
Agriculture and Food Division Programme

Code No.	Project Designation	Estimated Expenditure 1969/70	Estimated Expenditure 1970/71	Estimated Expenditure 1971/72-1973/74	Total Estimated Expenditure 1969/70-1973/74
4501	Dairy Cattle Importation ...	—	—	496,400	496,400
4502	Livestock Mult. Unit, Iringa ...	300,000	300,000	273,800	873,800
4503	Livestock Mult. Unit, Mbeya ...	200,000	100,000	215,400	515,400
4504	Livestock Mult. Unit, Sukumaland ...	1,750,000	500,000	473,500	2,523,500
4505	Livestock Mult. Unit, Mtwami ...	—	700,000	2,500,000	3,200,000
4506	Livestock Mult. Unit, Kitere ...	—	—	1,530,000	1,530,000
4507	Livestock Mult. Unit, Rungwani ...	—	500,000	1,000,000	1,500,000
2125	Poultry Performance Testing Centre ...	—	50,000	—	50,000
4401	Land Consolidation, Mara ...	50,000	—	—	50,000
4901	Mobile Building Units ...	—	204,500	204,500	409,000
4402	Extension Equipment ...	—	100,000	400,000	500,000
4403	Agricultural Input Demonstration ...	100,000	500,000	2,375,000	2,775,000
4404	Horticulture ...	150,000	150,000	700,000	1,000,000
4405	Vermine Control ...	200,000	300,000	1,137,000	1,637,000
4405	Produce Inspection Service ...	100,000	124,300	358,000	582,300
4508	Regional Poultry Distribution Centre ...	—	165,000	90,000	255,000
4509	Smallholder Dairy Extension ...	—	200,000	1,269,000	1,469,000
4510	Grazing Survey and Evaluation ...	150,000	140,000	390,000	880,000
4511	Range Development ...	800,000	986,000	18,214,000	20,000,000
4512	Livestock Development ...	2,042,800	1,804,500	1,921,500	5,868,800
4513	Cattle Dips ...	1,500,000	1,700,000	9,056,500	12,056,500
4514	Dips for Sheep and Goats ...	100,000	100,000	200,000	400,000
4515	Rinderpest Control ...	118,000	115,000	36,000	269,000
4516	Permanent Inoculation Crushes ...	250,000	114,000	1,054,000	1,418,000
4517	Veterinary Centres ...	50,000	50,000	458,000	558,000
4518	Veterinary Clinic, Dar es Salaam ...	—	—	50,000	50,000
4519	Veterinary Equipment ...	60,000	120,000	420,000	600,000
4520	Veterinary Vehicles ...	—	150,000	1,040,000	1,190,000
4521	Quarantine Station, Dar es Salaam ...	—	100,000	587,700	687,700
4522	Veterinary Bush Clearing Unit ...	—	1,858,300	860,000	2,727,300
4523	Tsetse Control, Kitanga ...	450,000	210,000	558,000	1,218,000
4524	Sheeping Sickness, Arosha Reg. ...	190,000	136,000	93,300	420,000
4525	Tsetse Control, Range Development Areas ...	150,000	150,000	2,700,000	3,000,000
4526	Tsetse Control, Nachingwea ...	—	—	1,115,000	1,115,000
1701	Livestock Markets ...	1,000,000	1,500,000	2,256,200	4,756,200
4527	Stock Routes and Holding Grounds ...	3,010,750	3,353,100	8,312,150	14,676,000
4302	Hides and Skins Training Centre ...	—	—	140,000	140,000
4528	Hides and Skins Demonstration Unit ...	—	—	196,000	196,000
4529	Abattoirs ...	300,000	600,000	2,400,000	3,300,000
4530	Artificial Insemination ...	400,000	283,200	1,504,200	2,187,400
4531	Urban Milk Centres ...	250,000	150,000	1,600,000	2,000,000
	Total—Agriculture and Food Division ...	13,671,550	17,643,000	68,108,750	99,423,300

Source: Tanzania Second Five-Year Plan, Vol. II, p. 33.

livestock extension services, animal disease control, and livestock marketing. The total cost of this program is 99.4 m. shs. The projects from Table 35 specifically related to individual agricultural products or activities are as follows:

Dairy Development:

4501	Dairy Cattle Importation	496,400 shs.
4509	Smallholder Dairy Extension	1,469,800 shs.
4530	Artificial Insemination (to high potential dairy areas)	2,187,400 shs.
4531	Urban Milk Centres	<u>2,000,000 shs.</u>
	Total	6,153,600 shs.

Horticultural Crops:

4404	Horticulture	1,000,000 shs.
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Rangeland Development:

4510	Grazing Research and Survey (in Range Development Areas)	880,000 shs.
4511	Range Development	20,000,000 shs.
4512	U.N. Livestock Project (aimed at encouraging the formation of Ranching Associations under the Range Act)	5,869,000 shs.
4525	Tsetse Control, Range Development Areas	<u>3,000,000 shs.</u>
	Total	29,749,000 shs.

Beef Development:

4523	Tsetse Control - Kitengule (beef ranching)	1,218,000 shs.
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It should be remembered that general livestock or animal health projects are consistently not included in this analysis for any of the three countries.

Table 36, on the following page, shows the program list of projects and expenditures for the Production Division of the Ministry of Agriculture, Food and Cooperatives. The primary function of this Division is to develop State

Table 36

Production Division Programme

Code No.	Project Designation	Estimated Expenditure 1969,70	Estimated Expenditure 1970,71	Estimated Expenditure 1971,72-1973,74	Total Estimated Expenditure 1969,70-1973,74
1501	Breeding Centres for Dairy Cattle, West Lake ...	—	—	5,284,000	5,284,000
1502	Breeding Centres for Dairy Cattle, Kitulo ...	1,000,000	1,240,000	2,941,100	5,181,100
1503	Breeding Centres for Dairy Cattle, Essimangar ...	1,182,300	1,123,100	6,601,100	8,913,500
1504	State Dairy Farm, Ujoro ...	985,000	—	—	985,000
1505	State Dairy Farm, Mara ...	352,400	312,300	307,200	971,900
1506	Livestock Scheme, Kitulo ...	348,000	220,000	875,000	1,443,000
1507	State Ranch, Uvinza ...	417,700	510,000	722,600	1,649,700
1508	State Ranch, Singida ...	—	—	1,649,700	1,649,700
1509	Beef Ranching Scheme, Handeni ...	—	—	3,532,000	3,532,000
1510	Pig Breeding Farms ...	150,000	—	—	150,000
1511	State Ranch, Geita ...	—	—	949,000	949,000
1401	Oil Seed State Farm, Kigoma ...	—	1,071,000	493,000	1,564,000
1402	Oil Palm State Farm ...	750,300	1,110,100	3,144,400	5,004,800
1301	Vine Growing, Dodoma ...	600,000	447,700	556,900	1,604,600
1302	Wheat State Farm, Sumbawanga ...	666,000	260,500	2,015,000	2,941,500
1303	Wheat State Farm, Ilmoribo ...	—	666,000	373,400	1,039,400
1304	Wheat State Farm, Syutilya ...	—	—	1,039,400	1,039,400
1305	Wheat State Farm, Niombe ...	666,000	666,000	1,988,000	3,320,000
1306	Wheat State Farm, Mara ...	—	570,000	102,400	672,400
1307	Rice State Farm, West Lake ...	—	400,000	234,200	634,200
1308	Rice State Farm, Kigoma ...	—	1,107,500	329,000	1,436,500
1309	Rice State Farm, Likuledi ...	—	—	1,436,500	1,436,500
1310	Rice State Farm, Kilingali ...	800,000	320,000	307,500	1,427,500
1311	Cocoon State Farm, Zegarani ...	550,000	950,000	3,625,200	5,125,200
1312	Cocoon State Farm, Lindi ...	—	—	5,108,100	5,108,100
1313	State Farm, Mbandakwa ...	284,250	285,550	3,563,100	4,102,900
1314	State Farm, Rwankoma ...	47,000	20,000	4,181,200	4,248,200
1403	Uiyankulu Tobacco Settlement Scheme, Tabora ...	65,000	65,000	124,000	254,000
1404	Matwiga Tobacco Settlement Scheme, Chunya ...	—	—	155,000	155,000
1405	Lupatingatinga Tobacco Settlement Scheme, Chunya ...	—	—	155,000	155,000
1406	Kaliua Tobacco Settlement Scheme, Tabora ...	115,000	70,000	220,000	405,000
1407	Ussole Tobacco Settlement Scheme, Tabora ...	50,000	—	155,000	205,000
1408	Uyowa Tobacco Settlement Scheme, Tabora ...	65,000	65,000	124,000	254,000
1409	Kipanga and Igaliela Tobacco Settlement Scheme, Tabora ...	92,000	90,000	155,000	337,000
1410	Urambo Tobacco Settlement Scheme, Tabora ...	68,000	—	155,000	223,000
1411	Lualaje Tobacco Settlement Scheme, Chunya ...	92,000	70,000	220,000	382,000
1412	Mwanda Tobacco Settlement Scheme, Mwanda ...	9,500	48,500	74,000	102,000
1413	Karuru Tobacco Settlement Scheme, Iringa ...	49,000	21,000	68,000	138,000
1414	Mafyeko Tobacco Settlement Scheme, Chunya ...	11,000	8,000	21,000	40,000
1415	Tunderu Tobacco Settlement Scheme, Tunduru ...	31,000	8,000	21,000	60,000
1416	B.A.T. Schemes—Tabora ...	214,000	23,000	93,000	330,000
1417	Kiwere Tobacco Settlement Scheme, Iringa ...	20,000	—	—	20,000
1418	Stores Orders ...	3,984,700	—	—	3,984,700

(continued)

Table 36
(continued)

Code No.	Project Designation	Estimated Expenditure 1969/70	Estimated Expenditure 1970/71	Estimated Expenditure 1971/72-1973/74	Total Estimated Expenditure 1969/70-1973/74
1315	State Farm, Wheat, Sumbawanga II	—	604,400	3,629,600	4,234,000
1316	State Farm, Wheat, Sumbawanga III	—	—	4,234,000	4,234,000
1317	State Farm, Wheat, Buha Highlands	—	887,500	3,346,500	4,234,000
1512	State Farm, Dairy, Arusha II	—	—	3,839,500	3,839,500
1513	State Farm, Dairy, Moyo-goro	—	735,100	3,009,500	3,744,600
1318	State Farm, Mixed, Dodoma I	—	—	2,244,800	2,244,800
1319	State Farm, Mixed, Dodoma II	—	—	2,012,300	2,012,300
1320	State Farm, Mixed, Dodoma III	—	—	2,012,300	2,012,300
1321	State Farm, Mixed, Tabora	—	—	2,012,300	2,012,300
1322	State Farm, Mixed, Buha Highlands I	—	—	2,012,300	2,012,300
1323	State Farm, Mixed, Buha Highlands II	—	—	2,012,300	2,012,300
4705	Irrigation, Usangu Plain	—	—	100,000	100,000
4706	Smallholder Irrigation	—	—	100,000	100,000
4408	Mechanical Advisory Service	471,000	505,500	3,105,400	4,081,900
4315	Ox Training, Demonstration	185,400	98,500	657,400	941,300
4409	Production and Distribution of Seeds	415,500	415,500	1,915,400	2,746,400
4410	Bird Control	787,600	823,500	993,700	2,604,800
1520	Poultry Multiplication Centre	460,000	332,400	—	792,400
1521	Poultry Breeding Centre, Kibaha	300,000	—	—	300,000
4411	Soil Conservation	245,000	—	—	245,000
4412	Farm Planning	—	—	2,194,000	2,194,000
1316	Cattle Production—Breeding Farm, Tunduru	317,000	372,100	1,973,900	2,663,000
	Total—Production Division	16,831,250	16,454,050	100,196,900	133,482,200
	Less Anticipated Income (Trading a.c.)	—	2,538,950	30,553,250	33,092,200
	Total—Government Funds Required	16,831,250	13,915,100	69,643,650	100,390,000

Source: Tanzania Second Five-Year Plan, Vol. II, pp. 38-39.

Farms and Ranches under the control of the Ministry, plus projects for specific technical services. Total expenditures in this division amount to 100.4 m. shs., and the projects from Table 36 that specifically relate to individual agricultural products or activities are as follows:

Dairy Development:

1501	Breeding Centre for Dairy Cattle, West Lake	5,284,000 shs.
1502	Dairy Cattle Breeding Centre and Milk Production Plant, Kitubo	5,181,000 shs.
1503	Breeding Center for Dairy and Beef Cattle, Esseningor ²⁰⁾	4,456,750 shs.
1504	State Dairy Farm, Oljora	985,000 shs.
1505	State Dairy Farm, North Mara.	971,900 shs.
1512	State Farm and Dairy, Arusha	3,839,800 shs.
1513	State Farm and Dairy, Morogora	3,744,800 shs.
1516	Cattle Production Breeding Farm (dairy cattle)--Tunduru	5,793,800 shs.
	Total	30,257,150 shs.

Beef Development: 21)

1503	Breeding Centre for Dairy and Beef Cattle, Esseningor ²⁰⁾	4,456,750 shs.
1318-1323	State Farms, Dodoma I, II, III, Tabora, and Buha Highlands I & II (mixed farms, beef cattle)	12,306,300 shs.
	Total	16,763,050 shs.

Rangeland Development: 21)

1507-1508	State Ranches--Ulvinza and Suigida	1,649,700 shs.
1509	Beef Ranching Scheme, Handeni	3,532,000 shs.
	Total	5,181,700 shs.

Oil Seeds and Oil Palms:

1401	Oil Seed State Farm	1,564,000 shs.
1402	Oil Palm State Farm	5,004,800 shs.
	Total	6,568,800 shs.

Horticultural Crops:

1301	Vine-growing, Dodoma (grapes)	1,604,600 shs.
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20)

The expenditure is split evenly between Dairy Development and Beef Development.

21)

It is assumed that "State Farms" to produce beef come under this category, and that "State Ranches" to produce beef come under Rangeland Development.

Wheat:

1302	Wheat State Farm, Sumbawanga I	2,941,800 shs.
1303-1304	Wheat State Farms, Ilemba and Syritila	2,078,400 shs.
1305	Wheat State Farm, Kipengere	3,320,000 shs.
1306	Wheat State Farm, Mara	672,400 shs.
1313-1314	State Farms, Milundikiwa and Rwankoma (Wheat)	8,351,000 shs.
1315	State Farm, Wheat Sumbawanga II	4,234,000 shs.
1316-1317	State Farms, Wheat, Sumbawanga III and Buha Highlands	<u>8,468,000 shs.</u>
	Total	30,065,700 shs.

Rice:

1307	Rice State Farm, West Lake	634,200 shs.
1308-1310	Rice State Farms, Kigoma, Lukuledi, and Kilingali	<u>4,309,500 shs.</u>
	Total	4,943,700 shs.

Coconut:

1311-1312	Coconut State Farms, Zegereni and Lindi	10,212,200 shs.
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Tobacco:

1403-1418	Tobacco Schemes (flue-cured tobacco)	7,044,700 shs.
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Cotton:

4411	Soil Conservation (to ensure the continued production of cotton)	2,194,000 shs.
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Farm Mechanization:

4408	Mechanical Advisory Service	941,100 shs.
4315	Ox-Training and Demonstration	<u>2,746,400 shs.</u>
	Total	5,881,500 shs.

The Natural Resources Division of the Ministry of Agriculture, Food and Cooperatives is responsible for forestry, fisheries, and game development and utilization. The Division's total program is allocated 119.9 m. shs., but this analysis is only concerned with the forestry projects and expenditures which total 79.5 m. shs. and are shown in Table 37, on the following page. Past

Table 37

Natural Resource Division Programmes

Code No.	Project Designation	Estimated Expenditure 1969/70	Estimated Expenditure 1970/71	Estimated Expenditure 1971/72-1973/74	Total Estimated Expenditure 1969/70-1973/74
1202	Logging Units—Softwood	—	600,000	1,000,000	1,600,000
1203	Logging Units—Hardwood	—	—	2,880,000	2,880,000
1204	Sawmills, Softwood	—	2,600,000	2,000,000	4,600,000
1205	Sawmills, Hardwood	—	—	3,400,000	3,400,000
1206	Charcoal Production	50,000	200,000	650,000	900,000
1207	Transmission Posts and Fence Posts	—	—	400,000	400,000
1419	Hardwood Planting	1,500,000	1,000,000	4,917,700	7,417,700
1420	Softwood Planting	6,122,400	5,031,600	27,837,000	41,991,000
4603	Conservation Forests	550,000	450,000	2,786,600	3,786,600
4604	Forest Industries Development Project (U.N.D.P.)	156,000	36,000	—	192,000
1421	Development of Indigenous Forests	500,000	500,000	2,830,000	3,830,000
4605	Miscellaneous Forest Services	400,000	300,000	1,508,000	2,208,000
4607	Forest Management	537,000	250,000	248,400	1,035,400
4608	Reforestation	720,000	63,000	1,285,700	2,068,700
4609	Regeneration Nurseries	200,000	200,000	200,000	600,000
1705	Central Timber Marketing Project	—	—	2,806,000	2,806,000
	Sub-Total—Forestry	10,735,400	14,230,600	54,549,000	79,515,000

Source: Tanzania Second Five-Year Plan, Vol. II, p. 47.

afforestation programs are now coming into production, so emphasis is placed upon utilization projects as well as continued planting programs. The projects from Table 37 which specifically relate to plantation softwoods or to plantation and indigenous hardwoods are as follows:

Softwood:

1202	Logging Units (Softwood)	1,600,000 shs.
1204	Sawmills (Softwood)	4,600,000 shs.
1420	Softwood Planting	<u>41,991,000 shs.</u>
	Total	48,191,000 shs.

Hardwood:

1203	Logging Units (Hardwood)	2,880,000 shs.
1205	Sawmills (Hardwood)	3,400,000 shs.
1419	Hardwood Planting	7,417,700 shs.
1421	Development of Indigenous Forests	<u>3,830,000 shs.</u>
	Total	17,527,700 shs.

A total of 186.6 m. shs. is allocated to the Water Development and Irrigation Division of the Ministry of Agriculture, Food and Cooperatives, as shown below in Table 38. The overall strategy of the Division, as has been discussed

Table 38

Water Development and Irrigation Division Programmes

Code No.	Project Designation	Estimated Expenditure 1969, 70	Estimated Expenditure 1970, 71	Estimated Expenditure 1971, 72-1973, 74	Total Estimated Expenditure 1969, 70-1973, 74
2301	Surveys and Investigations throughout the country ...	500,000	1,000,000	10,500,000	12,000,000
4701	Irrigation Development and Flood Control ...	—	1,000,000	14,670,000	15,670,000
4701	Sarikitte Ujamaa Village Irrigation ...	500,000	500,000	2,000,000	3,000,000
2302	Hydrometeorological Survey ...	450,000	600,000	2,000,000	3,050,000
2305	Kagera River—Feasibility Study	150,000	450,000	500,000	1,100,000
2304	Sungor's Gorge—Feasibility Study ...	1,500,000	3,000,000	5,500,000	10,000,000
2101	Katrin Research and Training	1,000,000	1,000,000	800,000	2,800,000
2305	Rural Water Supply Surveys and Investigations ...	5,000,000	5,800,000	16,200,000	27,000,000
3201	Rural Water Supply Development ...	10,000,000	12,000,000	51,000,000	73,000,000
4702	Mbarali Irrigation Scheme ...	2,500,000	2,500,000	6,600,000	11,600,000
4703	Kalio Irrigation Scheme ...	2,500,000	2,500,000	7,800,000	12,800,000
4301	Training—Rural Water Supply	1,000,000	1,000,000	2,000,000	4,000,000
4302	Expansion of W.D.I.D. Facilities ...	1,600,000	1,400,000	8,200,000	10,600,000
	Total for the Division ...	21,650,000	32,750,000	127,770,000	186,600,000

Source: Tanzania Second Five-Year Plan, Vol. II, p. 47.

previously, is oriented more towards the provision of rural water supplies, irrigation schemes and techniques, etc., than towards basic water resource/land use issues. Nevertheless, a few of the projects in Table 38 do involve these basic issues:

2302 - Hydrometeorological Survey, of the catchments of Lakes Victoria, Kyoga, and Albert. This is the multinational study being sponsored by UNDP, and Tanzania's contribution to it is 3,030,000 shs.

2301 &

2305 - Both of these projects involve "Surveys and Investigations" and so are related to water resources/land use issues. They both recognize the need for "careful study of soils, water, topography and engineering considerations" and for "detailed field investigations into sources and quality of water." But in addition to the

topographical surveys; and economic agronomic studies called for; detailed engineering designs for irrigation schemes and rural water supplies are mentioned. Project 2301 is allocated 12 m. shs., and Project 2305 is allocated 27 m. shs.

The three of these projects total 42 m. shs., but only half of this will be used as an indication of the water resource/land use priority for the above reasons. No mention is made in the Plan of any land use planning activities.

Since expenditures for the Cooperative Development and Administration and Planning Divisions of the Ministry of Agriculture, Food and Cooperatives do not relate to this analysis, the final direct government expenditures listed will be for the Research and Training Division. A total of 109.8 m. shs. is allocated for this Division as shown in Table 39 on the following page. The two functions will be considered separately for this analysis, but in any event most of the projects are general in nature. The ones which are specifically related to individual agricultural products or activities are as follows:

Training:

4308	Dairy Training Centre	320,000 shs.
4309	Forest School, Olmotanyi	1,070,000 shs.

Research:

2117	Banana Research	20,000 shs.
2118	Sorghum Research	7,000 shs.
4413	TAMTU (farm mechanization)	528,000 shs.
2124	Research Station, Mtwara (cashewnuts)	1,500,000 shs.

Some of the research projects are defined in more general terms or in specific terms that do not relate to this analysis: Project 2109, the livestock breeding station at Mpwapwa (846,200 shs.), concerns the breeding development of dual purpose--beef and dairy--cattle; Project 2111 (2 m. shs.) is a soil chemistry laboratory with no specific products or activities mentioned; Project 2112 (200,000 shs.) is a plant pathology laboratory to investigate plant diseases such as coffee berry disease, tobacco blight, wheat rust, aflatoxin in ground-

Table 39

Research and Training Division Programmes

Code No.	Project Designation	Estimated Expenditure 1969/70	Estimated Expenditure 1970/71	Estimated Expenditure 1971/72-1973/74	Total Estimated Expenditure 1969/70-1973/74
1201	Vaccine Production Plant ...	—	—	10,000,000	10,000,000
4532	Improvement of Local Meat Goats ...	—	127,300	12,700	140,000
4533	Improvement of Local Dairy Goats ...	—	—	104,000	104,000
4303	Rural Training Centres (new) ...	1,590,750	2,190,750	5,972,250	9,753,750
4304	Improvement to F.T.Cs ...	240,000	240,000	720,000	1,200,000
4305	Completion of 2 D.T.Cs— Mbeya, Musoma ...	400,000	—	—	400,000
4305	Mobile Training Units ...	—	84,700	300,500	385,200
4307	Primary Leavers Training ...	70,000	140,000	—	210,000
4308	Dairy Training Centre ...	—	329,000	—	329,000
4309	Forest School, Oinotonyi ...	221,000	261,000	588,000	1,070,000
4310	In-Service Training Centre ...	200,000	200,000	300,000	700,000
4311	M.A.T.I., Mtwara ...	—	1,500,000	3,308,000	4,808,000
4312	M.A.T.I., Mbeya ...	1,500,000	2,000,000	6,116,000	9,616,000
4313	New M.A.T.I. ...	—	1,000,000	3,808,000	4,808,000
4314	Improvements to existing M.A.T.I.s ...	500,000	500,000	—	1,000,000
4316	Agricultural Diploma College ...	1,000,000	2,000,000	11,000,000	14,000,000
4317	Fisheries Training and Marine Research, Kunduchi ...	720,000	700,000	700,000	2,120,000
2102	Nordic Research Station, Mbeya ...	1,000,000	1,000,000	6,334,000	8,334,000
2103	Sub-station, Ukiriguru ...	605,000	136,000	—	741,000
2104	Sub-station, Lyamungu ...	130,000	—	—	130,000
2105	Sub-station, Mtwara ...	282,000	108,000	—	390,000
2106	Sub-station, Ilonga ...	225,000	180,000	175,000	580,000
2107	New Sub-station ...	—	500,000	3,800,000	4,300,000
2108	Veterinary Chemistry Extension, Temeke ...	80,000	—	—	80,000
2109	Livestock Breeding Station, Mpwapwa ...	241,200	200,000	405,000	846,200
2110	Livestock Breeding Station, Tanga ...	—	200,000	—	200,000
2111	Central Soil Laboratory ...	—	—	2,000,000	2,000,000
2112	Plant Pathology Laboratory ...	—	—	200,000	200,000
2113	National Food and Nutrition Institute ...	—	1,000,000	4,446,000	5,446,000
2114	Plant Quarantine Station ...	650,000	—	—	650,000
2115	Tsetse Control Research Institute ...	100,000	500,000	132,700	732,700
2116	Forest Research Station, Puga ...	—	888,800	3,191,200	4,080,000
2117	Banana Research, Maruku ...	20,000	—	—	20,000
2118	Sorghum Research, Ukiriguru ...	3,500	3,500	—	7,000
2119	Village Storage Research ...	100,000	100,000	100,000	300,000
2120	Forestry Research ...	500,000	500,000	6,692,500	7,692,500
2121	Lake Victoria Fisheries Research Lake Tanganyika Fisheries Research ...	168,400	—	—	168,400
2122	Research ...	100,000	100,000	1,555,700	1,755,700
2125	East Coast Fever Control ...	551,600	551,700	548,000	1,651,300
4413	T.A.M.T.U. ...	269,000	259,000	—	528,000
4502	Extension Aids Workshops ...	500,000	300,000	—	800,000
4414	Agriculture and Co-operative Plans ...	200,000	200,000	1,300,000	1,700,000
4903	Mobile Extension Vans ...	—	—	550,000	550,000
2123	Pasture Research Institute ...	—	—	4,000,000	4,000,000
2124	Cashew Research Station, Mtwara ...	1,500,000	—	—	1,500,000
Total—Training and Research Division ...		13,667,450	18,090,750	78,059,550	109,817,750

Source: Tanzania Second Five-Year Plan, Vol. II, p. 44.

nuts, etc; Project 2113, a National Food Science and Nutrition Institute (5,446,000 shs.), is to improve standards of nutrition by the production of "high protein food-stuffs;" Project 2115 concerning tsetse control research (732,700 shs.) would affect cattle in general as well as sleeping sickness in humans; Projects 2116 and 2120 (4,080,000 and 7,692,500 shs. respectively) concern forestry research in general and make no mention of hardwoods or softwoods; Project 2119 (300,000 shs.) concerns traditional village methods of food storage; and finally, Project 2123 concerns a Pasture Research Institute (4 m. shs.) to investigate grazing problems. The remainder of the projects is completely general in nature, or involves things like animal health or fisheries that are not being considered in this analysis.

The last indication of national agricultural priorities in Tanzania to be studied here is the expenditures of the Parastatal Corporations. Although the Tanzania Government is to contribute only 25 percent (609 m. shs.) of their total funds, 41 percent (1,003 m. shs.) will come from their own resources and 34 percent (822 m. shs.) will come from external sources. These Corporations are directly influenced by the Government's policies and so their expenditures should be a fair indication of Governmental priorities. The total list of Parastatal Corporations and their investments during the Second Five-Year Plan are shown in Table 40 on the following page. The ones that are involved in agriculture or agriculture-based industries will be discussed briefly.

The National Agriculture and Food Corporation is to handle the large-scale production of foodstuffs. It has an investment program of 112.3 m. shs. during the Second Plan, which will be expended on four projects as follows:

Mafia Coconut Scheme	7.8 m. shs.
Sugar Expansion, Kagera - Mtibwa	94.0 m. shs.
Basuto Wheat Scheme	10.1 m. shs.
Mbeya Abattoir (livestock butchering)	0.4 m. shs.

Total 112.3 m. shs.

Table 40

(iii) PARASTATALS: INVESTMENT PROGRAMME (1969/74)

in '000 Shs.

	1969/70	1970/71	1971/72- 1973/74	Total 1969/74
TANESCO	43,819	94,109	319,020	456,948
National Development Corporation ...	147,500	154,000	794,587	780,733
National Agriculture and Food Corporation ...				112,500
Tanzania Tourist Corporation ...				203,004
National Small-Scale Industries Corporation ...	622	3,568	2,342	6,532
State Trading Corporation ...	5,930	7,090	7,000	20,020
Tanzania Sisal Corporation ...	14,000	17,000	61,471	92,471
Lint and Seed Marketing Board ...	—	3,550	8,450	12,000
National Agricultural Products Board ...	5,436	13,638	5,926	25,000
Tanzania Tobacco Board ...	5,547	750	729	7,166
Tea Authority ...	12,450	8,920	67,150	88,520
National Dairy Board ...	7,500	500	700	9,000
National Milling Corporation ...	1,740	590	7,770	10,000
National Housing Corporation ...	27,500	28,000	222,500	278,000
National Parks ...	4,450	6,500	18,690	29,440
National Computer Corporation ...	—	2,000	2,000	4,000
Bank of Tanzania ...	1,110	2,405	1,055	4,770
National Insurance Corporation ...	5,180	5,320	4,500	15,000
National Bank of Commerce ...	4,000	4,000	18,000	26,000
National Co-operative Bank ...	360	120	800	1,350
National Development Credit Agency ...	400	400	824	1,624
Co-operatives ...	10,000	11,000	79,000	100,000
Others ...	1,000	1,000	2,000	4,000
Total ...	298,844	364,500	1,624,514	2,287,858
N.D.C.A. (medium and long term credit) ...	27,700	26,300	89,000	143,000
N.S.I.C.—net lending ...	601	700	2,373	3,674
Total ...	327,145	391,500	1,715,877	2,434,532

Source: Tanzania Second Five-Year Plan, Vol. II, p. 17.

The Tea Authority is to develop new activities pertaining to smallholder producers. The expansion of tea production is given a high priority in the Second Plan, and objectives are to plant 24,000 additional acres of tea during the plan period and to process the output in Tea Authority controlled factories. Investments of 88.5 m. shs. are therefore planned for the Authority to expend of factories, nurseries, roads, etc., as well as the establishment of tea.

The Tanzania Sisal Corporation manages that part of the sisal industry which is publicly owned. It has an investment program totaling 92.5 m. shs., but only 79.9 m. shs. of this will be spent to promote sisal; 77.9 m. shs. for

sisal replantation on neglected estates and 2.0 m. shs. for processing sisal fibre into ropes and twine. The remaining 12.6 m. shs. will be used to diversify production into such fields as cattle ranches, cashewnuts, rice, tea, and an integrated maize and pig operation.

The National Milling Corporation manages the milling companies in Tanzania and has the responsibility of meeting the demand for milled flour at minimum prices. The investment program of this corporation totals 10.1 m. shs., and includes direct expenditures of 2.24 m. shs. on wheat mills, 240,000 m. shs. on a maize mill, and 90,000 m. shs. on three rice mills. The remainder of the investments is for general storage, a feed plant, a canning division, and other administrative matters.

The Lint and Seed Marketing Board is only concerned with cotton, a crop on which the Plan places considerable emphasis. This board has a total investment program of 12.0 m. shs., most of which will be expended on storage facilities. Likewise, the Tanzania Tobacco Board will have to cope with the expansion of this priority crop by investing in storage facilities, better marketing arrangements, and better processing equipment. An investment program of 7.1 m. shs. is designed to fulfil these requirements.

The major objective of the National Agricultural Products Board is to provide adequate storage facilities for the crops it handles and to thus avoid wastage and re-handling and marketing costs. The total investment program for this Board amounts to 25.0 m. shs. Bag Stores and Silos for the three main food grains--maize, wheat, and rice--will account for 19.5 m. shs. of that. In addition, a storage silo in Sumbawanga will be built in conjunction with a wheat mill there at a cost of 2.4 m. shs., a maize cleaning plant will cost 0.9 m. shs., and a groundnut selection plant will also take 0.9 m. shs. The remainder is allocated for "machinery."

The National Development Corporation (NDC) is responsible for manufacturing, processing, and mining activities in the public sector. Total investments by NDC during the plan period are expected to be 780.8 m. shs., and a list of their projects and expenditures is shown below in Table 41. Those projects that directly relate to a specific agricultural product or activity are as follows:

Table 41

National Development Corporation Investment Programme

PROJECT DESCRIPTION	Total Estimated Expenditure 1959 70- 1973/74
Tanzania Tanneries	5,245,000
Coastal Dairy Industries	5,066,000
Tanzania Farmers Company	112,307,000
Tembo Chipboards Ltd.	5,076,000
Tabora Mills	1,740,000
Sisal pulp	360,030,000
Steel rolling mill	2,739,000
Tanzania Gemstones	1,000,000
General Tyre E.A.	62,000,000
Kaelin Survey	185,000
Distillery	2,850,000
Cashew processing	600,000
Bicycles	4,250,000
Detergents	2,000,000
Sawmills—development	7,200,000
Keraj processing	25,000,000
Fruit and Vegetable processing	960,000
Steel diversification	700,000
Salt expansion	3,000,000
Tegry plastics	500,000
Shoe expansion	2,500,000
Asbestos pipes and sheets	22,400,000
Fibreboard—manufacture	18,000,000
Furniture	5,000,000
Bicycle tyres and tubes	6,150,000
Fishery	5,000,000
Parquet flooring	1,000,000
Sisal bags	7,965,000
Starch—manufacture	1,700,000
Sisal carpets	13,000,000
Towels—manufacture	2,500,000
Textiles diversification	12,000,000
Warp knitting stretch fabrics	2,000,000
Steel pipes	10,600,000
Cement expansion	24,600,000
Making	41,000,000
Car Batteries	2,710,000
I.P.S. Building	12,000,000
Total	780,783,000

Source: Tanzania Second Five-Year Plan, Vol. II, p. 77.

Coastal Dairy Industries	5,066,000 shs.
Sisal:	
Sisal Pump	360,000,000 shs.
Sisal Bags	7,965,000 shs.
Sisal Carpets	<u>13,000,000 shs</u>
Total	380,965,000 shs.
Cashew Processing	600,000 shs.
Kenaf Processing	25,000,000 shs.
Fruit and Vegetable Processing	960,000 shs.
Wood Products:	
Sawmills Development	7,200,000 shs.
Fibreboard Manufacture	18,000,000 shs.
Furniture	5,000,000 shs.
Parquet Flooring	<u>1,000,000 shs.</u>
Total	31,200,000 shs.

And finally, the National Development Credit Agency is the government's principal institution for providing agricultural credit to smallholders, mainly through their cooperatives. The investment program of 1.6 m. shs. shown in Table 40 is only for office and housing accommodations and transport equipment, which gives no indication of priorities. Their lending policy, however, does give some indication:

- At least 98 m. shs. for flue-cured tobacco; seeds, fertilizers, etc;
- 51 m. shs. for farm machinery related to cotton, coffee, maize, wheat and tobacco;
- about 38 m. shs. for the establishment of tea;
- 5 m. shs. each for dairy development, for poultry development, and for beef production and bee-keeping;
- 38 m. shs. for tea factories and cotton ginneries.
(Tanzania, Vol. II, p. 59.)

A summary of Tanzania's national agricultural priorities--similar to those for Kenya and Uganda--is shown in Table 42 on the following page. This analysis was the hardest one for distinguishing between priority classes; but the results are as follows: The Class I highest priorities, Cotton, Wheat, Dairy Development, Softwoods, Tea, and Flue-Cured Tobacco; Class II, Sugar, Sisal, and Maize; Class III, Cashewnuts, Coffee, Rice, Groundnuts and Oil Seeds/Beans, Horticultural Crops, Rangeland Development, Beef Development, Hardwoods; Class IV, Coconuts, Kenaf, Farm Mechanization, Water Resources/Land Use, Pyrethrum, and Fire-Cured Tobacco; and Class V, Sorghum/Millet, Bananas, and all others. ⁽²²⁾

22) This analysis and the resultant priorities are generally supported by a USAID Appendix to their own study on Agricultural Research Needs of Tanzania, "Agricultural Aspects of the Second Five-Year Plan," Appendix B. In particular, the development expenditure figures agree pretty closely with those in Table 42. See H.B. Sprague, et al, The Agricultural Research Needs of Tanzania, United States Agency for International Development, Washington, D.C., April 1971, pp. 179-188.

Table 42

TANZANIA NATIONAL AGRICULTURAL PRIORITIES

Class	Product/ Activity	Specific Central Gov't. Development Expenditures, Including Research ^(b) (m. shs.)	Expected Annual Growth Rate During Plan Period ^(c) (%)	Specifically Mentioned in Annual Growth Rate ^(d) (H - Increasing) (N - Stay Same) (L - Decreasing)	Expected Relative Importance in 1973/74 ^(e) (%)	Parastatal Investment Expenditures ^(f) (m. shs.)	Agricultural Credit Allowances ^(h) (m. shs.)	Specifically Mentioned as "High Priority Crop" ⁽ⁱ⁾ (X)
I	Cotton	2.2	9.0	H	26.7	12.0	(1)(j)	X
	Wheat	20.1	16.0	H	4.3	21.2	(j)	X
	Dairy Dvlt.	36.5	---	H	---	14.1	5.0	X
	Softwoods	48.2	---	---	---	31.2(g)	---	---
	Tea	---	9.0	H	4.9	88.5	38.0(i)	X
	Flue-Cured Tobacco	7.0	25.0	H	8.8	7.1	90.0(j)	X
II	Sugar	---	7.0	M	7.8	94.0	(j)	---
	Sisal	---	-2.0	L	10.5	460.9	---	---
	Maize	---	---	M	---	7.6	(j)	---
	Cashewnuts	1.5	10.0	H	8.3	0.6	---	X
III	Coffee	---	6.0	L	10.1	---	(j)	---
	Rice	4.9	10.0	H	4.1	6.6	---	X
	Groundnuts & Oil Seeds/Beans	6.6	7.0	H	3.8	0.9	---	X
	Horticultural Crops ^(a)	2.6	---	H(e)	---	1.0	---	X(e)
	Rangeland Dvlt.	34.9	---	---	---	---	---	---
	Beef Development	19.0	---	H	---	---	(j)	---
	Hardwoods	17.5	---	---	---	31.2(g)	---	---
	Coconuts	10.2	---	---	---	7.6	---	---
	Kenaf	---	---	H	---	25.0	---	---
	Farm Mech. Water Resources/ Land Use	6.4	---	---	---	---	---	---
IV	Pyrethrum	21.0	4.0	---	---	---	---	---
	Fire-Cured Tobacco	---	6.0	L	1.9	---	---	---
	Sorghum/Millet	---	---	M	0.6	---	---	---
V	Bananas	---	---	M	---	---	---	---
	All Others	---	---	M	---	---	---	---

See Footnotes Following Page

Footnotes From Table 42

- (a) Includes grapes.
- (b) See Tables 35, 36, 37, 38 and 39.
- (c) See Table 30.
- (d) See Discussion of Table 30.
- (e) Only for selected horticultural crops.
- (f) See Tables 40 and 41.
- (g) 31.2 m. shs. in the Parastatal investment in general forestry activities without being able to distinguish between hardwoods and softwoods.
- (h) See the discussion just prior to this Table.
- (i) An additional 38 m. shs. is to be allowed for cotton ginneries and tea factories.
- (j) An additional 51 m. shs. is to be allowed for farm machinery for cotton, coffee, maize, wheat, and tobacco.
- (k) See the discussion just prior to Table 30.

Tables 43, 44, 45, and 46 on the following pages are used to compare the national agricultural and forestry priorities of Kenya, Uganda, and Tanzania, as analyzed from their respective national development plans, to EAAFR0's own research priorities. In Table 1, EAAFR0's research projects are listed in their order of priority, just as they were in the previous chapter. The national priorities that Kenya, Uganda, and Tanzania place on that project--as analyzed in this chapter--are then listed across the Table; and a final column labeled the Balance of National Interest attempts to summarize which Partner State or States appear to have more of an interest in the project due to their own priorities. Arabic number symbols are used instead of Roman Numerals to indicate these national priorities, but the highest priority is still indicated by the number one. The symbols used in the final column have much the same meaning as they did in the previous chapter: R means that all three countries are interested in this project to about the same degree; (note that this common interest can be high or low); the interest is regionally balanced; k, u, and t mean that, respectively, Kenya, Uganda, or Tanzania is slightly more interested in this project than the other Partner State or States, but that there is still some regional balance to it; K, U, and T mean that, respectively, Kenya, Uganda, or Tanzania is much more interested in this Project than the other Partner State or States, and that regional imbalance is fairly great.

In looking at EAAFR0's highest priority Class I projects, in Table 43, the first thing noticeable is that two of the five projects in this class are of medium to very low priority in all three Partner States! None of the national development plans has much of anything to say about sorghum, and legumes--although mentioned and discussed--are not assigned a high priority. Therefore, two of the projects in Class I that have regionally balanced interest in them actually are balanced because of a common low or dis-interest on the part of the Partner

Table 43

A COMPARISON OF EAAFR0 AND NATIONAL PRIORITIES
BY EAAFR0 PROJECTS IN PRIORITY ORDER

EAAFR0 Research Projects In Order of EAAFR0 Priorities	Kenya's Priorities	Uganda's Priorities	Tanzania's Priorities	Balance of National Interest
I.1 Sugar Cane Breeding	1	1	2	R
I.2 Softwoods - Breeding	1	3	1	k,t
I.3 Sorghum Breeding	5	4	5	R
I.4 Maize Breeding	1	4	2	k,t
I.5 Legumes - Virus Survey	4	4	3	R
II.1 Millet Breeding	5	4	5	R
II.2 Water Resources/Land Use	5	3	4	u
II.3 Hard & Softwoods - Decay	2.5	4	2	k,t
II.4 Basic Research - Herbarium	NA	---	---	---
III.1 Groundwater Resources	5	3	4	u
III.2 Maize - Soil Fertility	1	4	2	k,t
III.3 Horticultural Propagation - Quarantine	2	3	3	R
III.4 Tobacco - Virus	4	2	1	u,t
III.5 Rice - Nematode	2	4	3	k
III.6 Rangeland - Compensatory Growth	1	5	3	K,t
III.7 Rangeland - Nutrient Requirements	1	5	3	K,t
III.8 Softwoods - Insect	1	3	1	k,t
III.9 Softwoods - Root Rot	1	3	1	k,t
III.10 Sorghum/Millet Agronomy	5	4	5	R
IV.1 Rangeland - Silage	1	5	3	K,t
IV.2 Rangeland - Cultivation	1	5	3	K,t
IV.3 Water Requirements - Selected Crops	5	3	4	u
IV.4 Pulp and Paper Industry	X	---	---	K
IV.5 Charcoal/Steel Industry	---	X	---	u
IV.6 Softwoods - Woolly Aphid	1	3	1	k,t
IV.7 Bean, Citrus & Banana - Nematode	?	?	?	R
IV.8 Bean - Nematode	2	3	3	R
IV.9 Horticultural Cuttings - Quarantine	2	3	3	R
IV.10 Sugar Cane - Chemical Control	1	1	2	R
IV.11 Basic Research - Herbarium	NA	---	---	---
V.1 Wheat - Tract Elements	2	5	1	K,T
V.2 Mechanized Cultivation - Seed Bed	4	3	4	R
V.3 Natural Forest - Pin Hole Borer	5	5	3	t
V.4 Softwoods - Cypress Canker	1	3	1	k,t
V.5 Rangeland - Body Composition	1	5	3	K,t

States. Of the three remaining projects in Class I, Kenya and Tanzania seem to have more interest in two of them, Softwood Tree Breeding and Maize Breeding, than Uganda does. Both these projects are given a high priority by both Kenya and Tanzania, however. Only one Class I project, Sugar Cane Breeding, exhibits a regionally balanced and high priority interest from all Partner States.

In Class II projects of the three eligible ones, only one of them, Millet Breeding, exhibits regionally balanced interest by the Partner States, but this is again another case of their common disinterest, as shown by the low priority they all assigned to this crop. Uganda seems to be more interested in water resources/land use research than Tanzania or Kenya; but even their assigned priority is not high. The national priority scores for the Hard and Softwoods-Decay projects are the averages of the separate hardwood and softwood priorities. While the effect of the inclusion of hardwoods has been to lower the national priority scores from their higher softwoods level, the balance of interest in this forestry research has stayed the same: Kenya and Tanzania appear to be more interested in this project than Uganda. Although the latter two projects exhibit some imbalance in the national interest shown in them, there is still some common regional interest shown.

Class III projects nearly all exhibit some degree of national interest imbalance. The only exceptions are the common disinterest already shown for sorghum and millet, Sorghum/Millet Agronomy, and the common medium-to-high interest shown for horticultural crops, Horticultural Propagation. In projects on crops or activities which have already been commented on, the work on Groundwater Resources again appears to be of more interest to Uganda than to Kenya or Tanzania; the Soil Fertility work with Maize again appears to be of more interest to Kenya and Tanzania than to Uganda; and the two softwoods projects on insect defoliators and root rot disease also again appear to be of more interest

to Kenya and Tanzania than to Uganda. Tobacco is a research subject that only has a medium EAAFRO priority, but both Uganda and Tanzania have assigned it a high priority and are thus more interested in it than Kenya is. Rice, on the other hand, is another medium EAAFRO priority item in which Kenya appears to be more interested than either Uganda or Tanzania. Kenya exhibits a much greater interest in the rangeland research projects than does Uganda, with Tanzania in the middle.

Most of the national priority bases for Class IV projects have already been discussed above. In the case of project IV.3, Water Requirements - Selected Crops, the national priorities for water resources research were used instead of averaging the priorities for the four crops investigated in this project. This was because the discussion of the project in the previous chapter seemed to orient it more towards the need to conserve water in the dryer areas of East Africa than to the specific crops themselves. Both projects IV.4 and IV.5 are oriented toward industrial rather than agricultural or forestry priorities, so the national priorities developed in this chapter are not applicable to them. However, Kenya had allocated quite a substantial sum of money to developing a pulp and paper industry in the Broderick Falls area in their Development Plan, and this appeared to be a quite high priority project for them. Tanzania and Uganda, on the other hand, only mentioned the general opportunity for developing such an industry, but allocated no funds and had no specific plans. Therefore, it is indicated for project IV.4, Pulp and Paper Industry, that Kenya appears to be much more interested in it than either Uganda or Tanzania. Similarly, Uganda's Development Plan is the only one which discusses the need for a charcoal/steel industry. No money is allocated, however, and so Uganda's interest in this project is still probably quite low. Therefore, Uganda is indicated to be only slightly more interested in this project than are Tanzania

and Uganda. The national priorities for the nematode survey which has focused on bean, citrus, and banana are impossible to score by averaging priorities for the individual crops. It is believed, however, that these national priorities would be low in all cases and so the national interest would be regionally balanced. The national priorities for horticultural crops are used for the Bean-Nematode project instead of the soya bean or legume priorities, because it is the vegetable bean for canning and export that seems to be the subject of this project.

Class V EAAFRRO projects are so insignificant that the national interest in them is not so important. The only project concerning wheat is in this class, and both Kenya and Tanzania appear to have a much greater interest in this crop than Uganda does. All three countries appear to have a medium-to-low interest in mechanized cultivation. Although this is the only research project EAAFRRO carries out in this area, it should be remembered that the services of the Machinery Coordinating Unit are quite extensive. National priorities for hardwoods are used for the Natural Forest project, because the two terms almost always refer to the same conditions. Tanzania appears to have more interest in these indigenous natural forest hardwoods than do either Kenya or Uganda, although even Tanzania's priority is still only at a medium level.

Summing up Table 43, when those projects in the top two priority classes that are of common disinterest are eliminated from consideration, it appears that both Kenya and Tanzania exhibit more interest in EAAFRRO's top priority projects than Uganda, due principally to their greater priorities assigned to softwoods and maize. The only project in these classes which exhibits a common, high priority interest on the part of all Partner States is Sugar Cane Breeding. In Class III, this regional imbalance is reinforced, and due to the greater Kenyan interest in rangeland research and rice, Kenya appears to have more interest

in these medium-priority EAAFRO projects than Tanzania does. Tanzania, however, still appears to have more interest in this class than Uganda. Much the same is also true in Classes IV and V. Therefore, two points can be made. Based on an analysis of national agricultural and forestry priorities from their Development Plans, (1) some of EAAFRO's top priority research projects do not seem to be of much interest to any of the Partner States, and (2) Kenya and Tanzania exhibit more interest in EAAFRO's projects than Uganda, with Kenya's interest becoming more disproportionately greater as the EAAFRO's priority level goes down.

Another, perhaps better, way to summarize these results is to examine Table 44 below. All of EAAFRO's research projects have been combined into

Table 44

A Comparison of EAAFRO and National Priorities
By EAAFRO Priorities

Priority Class	EAAFRO Research Foci	Kenya Priorities	Uganda Priorities	Tanzania Priorities	Balance of National Interest
I	Softwoods	1	3	1	k,t
	Sorghum & Millet	5	4	5	R
II	Rangeland	1	5	3	K,t
	Sugar Cane	1	1	2	R
III	Water Resources/ Land Use	5	3	4	u
	Maize	1	4	2	k,t
	Horticultural Crops	2	3	3	R
	Legumes	4	4	3	R
IV	Tobacco	4	2	1	u,t
	Rice	2	4	3	k
	Hardwoods	4	5	3	t
V	Wheat	2	5	1	K,T
	Farm Mechanization	4	3	4	R
	Other	-	-	-	-

Research Foci and ranked once again into five priority classes on the basis of the manpower devoted to the research projects on each particular focus. Thus, four or more EAAFRO officers were working on softwoods oriented projects; three

to four officers were working on Sorghum and Millet, Rangeland, and Sugar Cane projects; one-and-a-half to three officers were working on Water Resources/Land Use, Maize, Horticultural Crops, and Legumes; one officer was working on Tobacco, Rice, and Hardwoods; and less than one officer was working on Wheat and Farm Mechanization. The conclusions from Table 44 are much the same as from Table 43, except that a greater interest on the part of Kenya is shown more in the top than the medium priority projects due to the combining of relatively many medium to low priority EAAFRO projects into a Class II priority focus.

Table 45 simply rearranges EAAFRO's projects and their national priority scores into EAAFRO divisions. In several cases, where there are only a few projects in a division which all concern the same crop or activity, that one factor dominates the balance of national interest in the whole division. Thus, the entire Sugar Cane Division exhibits high interest from all Partner States; the entire Sorghum and Millet Division exhibits low interest from all Partner States; the entire Maize Genetics Division is of more interest to Kenya and Tanzania than to Uganda, but still exhibits some regional interest; the entire Plant Quarantine Service research exhibits medium interest from all Partner States; and the entire Animal Production Division exhibits great interest from Kenya, less from Tanzania but still some, and even less from Uganda. In the Forestry Division, the dominance of projects oriented towards softwoods has influenced the greater interest exhibited by Kenya and Tanzania. The Plant Pathology and Nematology and the Physics and Chemistry Divisions both do work on a variety of crops and/or activities, and both divisions also seem to exhibit a reasonably well-balanced interest from among the Partner States.

Table 46 on a following page attempts to compare regional and national agriculture priorities from the national viewpoint; i.e., the national priorities as analyzed in this chapter are listed and the EAAFRO research priority assigned

to the particular focus in Table 44 is then shown along side. If the national crop or activity is not covered at all by EAAFR0, the symbol 0 (zero) is used; otherwise, numbers are used to represent the Roman numeral priority classes. If any other regional oriented research agency or group besides EAAFR0 is doing research in the specific crop or activity, that is also indicated, since what will be looked for in this table are gaps where no regional institution is doing research on a crop or activity of some interest to the individual Partner States.

In examining Table 46, it appears that Kenya's Class I, top priority needs are reasonably well covered. EAAFR0 is doing medium to high priority work in four of the five areas, and the remaining crop, tea, is covered by the Tea Research Institute of East Africa, which is located right in Kenya at Kericho. Uganda's three top priority crops also seem covered, but perhaps to a lesser degree. EAAFR0 is working on only one of them, sugar cane, and cotton is well covered by the Cotton Research Corporation's research unit at Namulonge. But, although the Tea Research Institute of East Africa does try to do work on a regional basis, their efforts are heavily oriented towards their headquarters location in Kenya. Tanzania definitely has some gaps for its top priority crops. Flue-cured tobacco is a low priority crop for EAAFR0, and no one else is working on it. Similarly, wheat is a low priority crop for EAAFR0; and although a Canadian aid team has been attempting to do wheat research on a regional basis, so far most of their efforts have been confined to Kenya. The Tea Research Institute suffers from the same limitations in Tanzania as were described above for Uganda. The Cotton Research Corporation does have a strong research unit stationed at Ukiriguru in Tanzania, so that is reasonably well covered, and research work on Dairy topics would be more appropriately done by EAVRO. Out of Tanzania's six top priority crops or activities, however, EAAFR0 is doing some high priority work on only one of them: softwoods.

Table 45

A COMPARISON OF EAFRO AND NATIONAL PRIORITIES
BY EAFRO DIVISION

	EAFRO Research Projects By Division	Kenya's Priorities	Uganda's Priorities	Tanzania's Priorities	Balance of National Interest
Sugar Cane Breeding	I.1 Sugar Cane Breeding	1	1	2	R
	IV.10 Sugar Cane - Chemical Control	1	1	2	R
Forestry	I.2 Softwoods - Breeding	1	3	1	K,t
	II.3 Hard & Softwoods - Decay	2.5	4	2	K,t
	III.8 Softwoods - Insects	1	3	1	K,t
	III.9 Softwoods - Root Rot	1	3	1	K,t
	IV.4 Pulp and Paper Industry	X	---	---	K
	IV.5 Charcoal/Steel Industry	---	X	---	u
	IV.6 Softwood - Woolly Aphid	1	3	1	K,t
	V.3 Natural Forests - Pin Hole Borer	5	5	3	t
	V.4 Softwoods - Cypress Canker	1	3	1	K,t
Sorghum and Millet	I.3 Sorghum Breeding	5	4	5	R
	II.1 Millet Breeding	5	4	5	R
Maize Genetics	III.10 Sorghum/Millet Agronomy	5	4	5	R
	I.4 Maize Breeding	1	4	2	K,t
Plant Pathology and Nematology	I.5 Legumes - Virus Survey	4	4	3	R
	II.4 Tobacco - Virus	4	2	1	u,t
	III.5 Rice - Nematode	?	4	3	k
	IV.7 Bean, Citrus, Banana - Nematode	?	?	?	R
	IV.8 Bean Nematode	2	3	3	R
	II.2 Water Resources/Land Use	5	3	4	u
	III.1 Groundwater Resources	5	3	4	u
Physics and Chemistry	III.2 Maize - Soil Fertility	1	4	2	u
	IV.1 Rangeland - Silage	1	5	3	K,t
	IV.2 Rangeland - Cultivation	1	5	3	K,t
	IV.3 Water Requirements - Selected Crops	5	3	4	U
	V.1 Wheat - Trace Elements	2	5	1	K,T
	V.2 Mechanical Cultivation - Seed Bed	4	3	4	R
	III.3 Horticultural Propagation	2	3	3	R
Plant Quarantine Service	IV.9 Horticultural Cuttings	2	3	3	R
	III.6 Rangeland - Compensatory Growth	1	5	3	K,t
Animal Production	III.7 Rangeland - Nutrient Requirements	1	5	3	K,t
	V.5 Rangeland - Body Composition	1	5	3	K,t
Herbarium	II.4 Basic Research - Herbarium	NA	---	---	---
	IV.11 Basic Research - Herbarium	NA	---	---	---

In the Partner States' Class II priorities, few gaps seem apparent. Both Horticultural Crops and Rice for Kenya are only medium or low priorities for EAAFRO, but there is some work being done. The Canadian wheat research unit at Njoro is adequately covering that crop; EAVRO would more appropriately be concerned with beef research, and the Coffee Research Foundation located at Ruiru in Kenya should cover that crop reasonably well. In Uganda's Class II priorities, the tobacco gap emerges again and, although the Coffee Research Foundation is meant to be a regional institution, it is heavily oriented towards Kenya where it is located. Two of Tanzania's three Class II priority crops, Sugar and Maize, are being worked on by EAAFRO, and the third, sisal, is a declining crop that is still important to Tanzania. More research on sisal, however, would not likely be advocated even by Tanzania, because its future is not bright.

For Class III, Kenya's medium priorities on cotton and pyrethrum are partially covered by a small unit of the Cotton Research Corporation stationed there. Four of Uganda's five Class III priorities are worked on by EAAFRO, although Farm Mechanization is a very low priority for EAAFRO, and no one else is working on it. The International Hydrological Decade of the United Nations is also doing some work in East Africa on water resources/land use. Cashewnuts research is Tanzania's largest gap in Class III; neither EAAFRO nor anyone else is working on this crop. Coffee is covered to some extent by the Coffee Research Foundation, although this institution is heavily oriented toward Kenya. With the exception of beef, which EAVRO should be covering to some extent, all the remaining crops or activities, Rice, Legumes/Oil Crops, Horticultural Crops, Rangeland, and Hardwoods, are worked on to some degree by EAAFRO, although its priorities for Rice and Hardwoods are low.

In the medium-to-high national priorities of the three Partner States, therefore, there seems to be only a few gaps that need filling: research on

Table 45

A COMPARISON OF NATIONAL AND REGIONAL PRIORITIES
BY NATIONAL PRIORITIES

National Priority Classes	Kenya		Uganda		Tanzania		Other Research Agency
	EAAPRO Research Priority	Other Research Agency	EAAPRO Research Priority	Other Research Agency	EAAPRO Research Priority	Other Research Agency	
I	Rangeland	2	UNDP	Cotton	0	Cotton	CRC
	Maize	3		Sugar	2	Wheat	CIDA
	Sugar Cane	2		Tea	0	Dairy	ENVRO
	Tea	0	TRI			Softwoods	
	Softwoods	1				Tea	TRI
II	Dairy	0	EAURO	Coffee	0	Sugar	Flue-Cured Tobacco
	Coffee	0	CRF	Tobacco	4	Sisal	
	Horticulture Crops	3		Beef	0	Maize	
	Rice	4					
	Wheat	5	CIDA				
	Cotton	0	CRC	Horticulture Crops	3	Cashewnuts	
	Pyrethrum	0		Softwoods	1	Coffee	
				Water Resources/Land Use	3	Rice	
				Dairy	0	Legumes/Oil Crops	
				Farm Mechanization	5	Horticultural Crops	
III	Sisal	0		Legumes/Oil Crops	3	Hardwoods	
	Legumes/Oil Crops	3		Cocoa	0	Coconuts	
	Potatoes	0		Kenaf	0	Kenaf	
	Wattle	0		Rice	4	Farm Mechanization	
	Cashewnuts	0		Maize	3	Water Resources/Land Use	
	Coconut	0		Sorghum/Millet	2	Pyrethrum	
	Tobacco	4				Fire-Cured Tobacco	
	Farm Mechanization	5					
	Hardwoods	4					
	Water Resources/Land Use	3	UN-IHD	Silk	0	Sorghum/Millet	
	Others	---		Sim-Sim	0	Bananas	
				Others	---	Others	
	IV						
V							

UNDP=United Nations Development Program - Range Management Program
 TRI =Tea Research Institute
 EAURO=East African Veterinary Research Organization

CRF=Coffee Research Foundation
 CIDA=Canadian-International Development Agency
 CRC=Cotton Research Corporation
 UN-IHD=United Nations - International Hydrological Decade

pyrethrum and cashewnuts for, respectively, Kenya and Tanzania, might be considered; and it could be very important that work being done on coffee, tea, and wheat by other regionally-oriented agencies be expanded or more oriented to ensure that they operate on regional basis. Many Class IV national priorities concern new crops or activities which cannot be considered to be nearly as important to the nation as the already established or proven successful ones. Nevertheless, these new crops or activities are mentioned in the development plans and some are allocated small sums of funding; they represent opportunities for which research is especially important. In examining Class IV, some of the crops listed on which no EAAFRÖ or other agency research is being done are as follows: Potatoes, Wattle, Cashewnuts, Coconuts, Cocoa, and Kenaf. Work on these crops might be considered. EAAFRÖ is already doing some medium-priority work on Legumes/Oil Crops, and this might be expanded also.

Appendix IV

Tables for Significant Statistical Relationships

FILE Ncname (CREATION DATE = 07/28/73)

CROSS TABULATION OF OPINION FAC BY GPEAC

GENCP GENERAL OPINION

GENCP	VERY	FAVORABL	COL PCT IF FAVORABL	TOT PCT I	RCW TOTAL
	1.00	1.00	1.00	2.00	
	29	5	14.7	34	
	85.3	14.7	50.0	79.1	
	97.9	11.6			
	67.4				
	4	5		9	
	44.4	55.6		20.9	
	12.1	50.0			
	9.3	11.6			
COLUMN TOTAL	33	10		43	
TOTAL	76.7	23.3		100.0	

CORRECTED CHI SQUARE = 4.56156 WITH 1 DEGREE OF FREEDOM. SIGNIFICANCE = .0327

PHI = .39336
 CONTINGENCY COEFFICIENT = .36606
 KENDALL'S TAU B = .39336
 KENDALL'S TAU C = .27042
 GAMMA = .75758
 SOMER'S D = .37879
 NUMBER OF MISSING OBSERVATIONS = 1

FILE NONAME (CREATION DATE = 07/26/73)

 GENOP GENERAL OPINION

 CROSSTARS TABULATION OF OBJECTIVE KNOWLEDGE - NO. PAGES
 BY OBJKNL *****

GENOP	COUNT	1 GREATER	2	3	4	5	6	7	8	9	10	TOTAL
VERY	1.00	9	23	35	42	42	36.5	5.2	6	115		74.2
	1-2	7.8	20.0	30.4	36.5	42.9	42.9	27.1	3.9			
	2.00	5.8	14.8	22.6	27.1	27.1	27.1	14	8	40		25.8
	3-5	10.0	10.0	32.5	35.0	20.0	20.0	57.1	5.2			
		10.0	14.8	27.1	25.0	9.0	9.0	56	14	155		100.0
		.6	2.6	8.4	9.0	5.2	5.2	36.1	9.0			
COLUMN TOTAL		10	27	48	56	56	56	56	56	56	56	56
		6.5	17.4	31.0	36.1	36.1	36.1	36.1	36.1	36.1	36.1	36.1

RAW CHI SQUARE = 10.24862 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .0364
 CRAMER'S V = .25714
 CONTINGENCY COEFFICIENT = .24904
 KENDALL'S TAU B = .17561
 KENDALL'S TAU C = .18581
 GAMMA = .32746
 SOMER'S D = .12711
 NUMBER OF MISSING OBSERVATIONS = 10

FILE MNAME (CREATION DATE = 07/26/73)

CROSSSTARS GENERAL OPINION OF PERKIN BY PERKIN PERCEIVED TRANSFER PAGE

GENOP	COUNT	PERTRN	VERY UN SUCCESSF	POW TOTAL
VERY	1.00	1-2	5.001	115
	50	44	21	75.7
	43.5	38.3	18.3	
	84.7	75.9	60.0	
	32.9	28.9	13.8	
	2.00	1-2	5.001	37
	9	14	14	74.3
	24.3	37.8	37.8	
	15.3	24.1	40.0	
	5.9	9.2	9.2	
COLUMN TOTAL	59	58	35	152
	38.6	38.2	23.0	100.0

RAW CHI SQUARE = 7.30647 WITH 2 DEGREES OF FREEDOM. SIGNIFICANCE = .0259

CRAMER'S V = .21925
CONTINGENCY COEFFICIENT = .21416
KENDALL'S TAU B = .20104
KENDALL'S TAU C = .19685
GAMMA = .39275
NUMBER OF MISSING OBSERVATIONS = 13

FILE NNAME (CREATION DATE = 07/28/73)

***** CROSSTABLATION OF PERIVED TRANSFER BY PERIRN *****
***** GENERAL OPINION ***** PAGE

GENP	VERY	FAVORABL	COL PCT	ICL PCT	IVERY SUC	PERIRN	VERY UN	SUCCESSF	ROW	TOTAL
	1.00		1.000	1.000		3.000	5.000			
		20	19	10					49	
		40.8	38.8	20.4					74.2	
		90.9	79.2	50.0						
		30.3	28.8	15.2						
	2.00								17	
		11.8	29.4	58.8					25.8	
		9.1	29.8	50.0						
		3.0	7.6	15.2						
COLUMN		22	24	20					50	
TOTAL		33.3	36.4	30.3					100.0	

RAW CHI SQUARE = 9.64646 WITH 2 DEGREES OF FREEDOM. SIGNIFICANCE = .0080

CRAMER'S V = .58231

CONTINGENCY COEFFICIENT = .35710

KENDALL'S TAU B = .34782

KENDALL'S TAU C = .35078

GAMMA = .63880

SCHEFF'S D = .26381

NUMBER OF MISSING OBSERVATIONS = 11

FILE NONAME (CREATION DATE = 07/25/73)

REGST REGIONALITY STATEMENT BY COLLABORATION OF COLLABORATION

COLLAB

REGST	COUNT	COL PCT	ROW PCT	TOTAL
1.00	5	100	13	13
STRONGLY AGREE	15.6	61.5	8.8	8.8
	3.4	6.9		
	17	49	66	66
2.00	25.8	74.2	44.6	44.6
	53.1	42.2		
	11.5	33.1		
3.00	1	41	42	42
	2.4	97.6	28.4	28.4
	3.1	35.3		
	.7	27.7		
4.00	9	18	27	27
	33.3	66.7	18.2	18.2
	28.1	15.5		
	6.1	12.2		
COLUMN TOTAL	32	116	148	148
TOTAL	21.6	78.4	100.0	100.0

.0926

RAW CHI SQUARE = 14.20193 WITH 3 DEGREES OF FREEDOM. SIGNIFICANCE =

CRAMER'S V = .30977

CONTINGENCY COEFFICIENT = .29590

KENDALL'S TAU B = .09246

KENDALL'S TAU C = .08875

GAMMA = .18437

SOMER'S D = .13093

NUMBER OF MISSING OBSERVATIONS = 17

FILE NONAME (CREATION DATE = 07/25/73)

SCICOM SCIENTIFIC COMPLEMENTARITY C R O S S T A B U L A T I O N O F R E S U L T B Y R E S U L T R E S E A R C H U T I L I Z A T I O N

D-7

SCICOM	RESULT	COUNT	I	NO	ROW	TOTAL
		ROW PCT	IYES	NO	ROW	TOTAL
		COL PCT	I	NO	ROW	TOTAL
		TCT PCT	I	NO	ROW	TOTAL
HIGH	1.00	20	I	23	I	43
	46.5	I	53.5	I	26.5	
	41.7	I	20.2	I		
LOW	12.3	I	14.2	I		
	13	I	26	I	39	
	33.3	I	66.7	I	24.1	
LOW	27.1	I	22.8	I		
	8.0	I	16.0	I		
	15	I	65	I	80	
TOTAL	18.7	I	81.3	I	49.4	
	31.3	I	57.0	I		
	9.3	I	40.1	I		
COLUMN	48		114		162	
TOTAL	29.6		73.4		100.0	

.J048

RAW CHI SQUARE = 10.67571 WITH 2 DEGREES OF FREEDOM. SIGNIFICANCE =

CRAMER'S V = .25671
CONTINGENCY COEFFICIENT = .24865
KENDALL'S TAU B = .24294
KENDALL'S TAU C = .24859
GAMMA = .44393
SOMER'S D = .29806
NUMBER OF MISSING OBSERVATIONS = 3

FILE NUNAME (CREATION DATE = 07/25/73)

CROSSTARS A T I O N O F S C I E N T I F I C C O M P L E M E N T A R I T Y R E S U L T R E S E A R C H U T I L I Z A T I O N PAGE

RESULT

COUNT	ROW PCT	COL PCT	TOT PCT	NO	ROW TOTAL
1.00	I	I	I	8	18
	I	I	I	44.4	24.3
	I	I	I	36.4	
	I	I	I	10.8	
2.00	I	I	I	8	16
	I	I	I	50.0	21.6
	I	I	I	36.4	
	I	I	I	10.8	
3.00	I	I	I	0	45
	I	I	I	15.0	54.1
	I	I	I	27.3	
	I	I	I	1.1	
	I	I	I	24	74
				29.7	100.0

RAW CHI SQUARE = 9.16663 WITH 2 DEGREES OF FREEDOM. SIGNIFICANCE = .0102

CRAMER'S V = .35190
 CONTINGENCY COEFFICIENT = .33199
 KENDALL'S TAU B = .30588
 KENDALL'S TAU C = .30679
 GAMMA = .52764
 SOMER'S D = .36713
 NUMBER OF MISSING OBSERVATIONS = 3

FILE NONAME (CREATION DATE = 07/26/73)

EXPSTA EXPERIENCE AT STATION CROSS TABULATION OF SERVICE UTILIZATION BY SERUTL

***** EXPSTA EXPERIENCE AT STATION CROSS TABULATION OF SERVICE UTILIZATION BY SERUTL ***** PAGE

EXPSTA	COUNT	SERUTL	1.000	2.000	3.000	4.000	5.000	VERY LOW	ROW TOTAL
60 - 99	2.00	ROW PCT IVERY	3	6	13	9	3		34
		COL PCT IHIGH	8.8	17.6	38.2	26.5	8.8		21.0
	1-2	TOT PCT I	60.0	30.0	34.2	13.0	10.0		
			1.9	3.7	8.0	5.6	1.9		
30 - 59	3.00		1	8	10	11	5		35
			2.9	22.9	28.6	31.4	14.3		21.6
			20.0	40.0	26.3	15.9	16.7		
			.6	4.9	6.2	6.8	3.1		
10 - 29	4.00		0	5	10	29	12		56
			0.0	8.9	17.9	51.8	21.4		34.6
			0.0	25.0	26.3	42.0	40.0		
			0.0	3.1	6.2	17.9	7.4		
0 - 9	5.00		1	1	5	20	10		37
			2.7	4.7	13.5	54.1	27.0		22.8
			20.0	5.0	13.2	29.0	33.3		
			.6	.6	3.1	12.3	6.2		
COLUMN TOTAL	5		20	38	69	30			162
			3.1	12.3	23.5	42.6	18.5		100.0

.0064

RAW CHI SQUARE = 27.58310 WITH 12 DEGREES OF FREEDOM. SIGNIFICANCE =
 CRAMER'S V = .23823
 CONTINGENCY COEFFICIENT = .38144
 KENDALL'S TAU B = .29443
 KENDALL'S TAU C = .28471
 GAMMA = .39801
 SOMER'S D = .29945
 NUMBER OF MISSING OBSERVATIONS = 3

FILE NONAME (CREATION DATE = 07/26/73)

***** C R O S S T A B U L A T I O N O F * * * * *
CRITISZ CRITICAL SIZE BY COMPBN COMPOSITE BENEFITS

CPTSIZ	VERY	LOW	TOTAL	ROW
1.00	9	40	49	8
HIGH	11.0	48.8	59.8	50.9
1-2	81.4	63.5	144.9	
	5.6	24.8	30.4	
2.00	2	23	25	35
3-5	2.5	29.1	31.6	44.3
	18.2	36.5	54.7	81.4
	1.2	14.3	15.5	21.7
COLUMN	11	25	36	43
TOTAL	6.8	15.5	22.3	26.7

RAW CHI SQUARE 39.21621 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .0000
 CRAMER'S V = .49354
 CONTINGENCY COEFFICIENT = .44257
 KENDALL'S TAU B = .43932
 KENDALL'S TAU C = .53177
 GAMMA = .67701
 SCHER'S D = .36281
 NUMBER OF MISSING OBSERVATIONS = 4

151 - 300	2.00	I 17.3	I 11.1	I 21
		I 6	I 15	13.0
		I 28.6	I 71.4	
		I 10.0	I 14.7	
		I 3.7	I 9.3	
301 - 450	3.00	I 25	I 33	
		I 24.2	I 75.8	20.4
		I 13.3	I 24.5	
		I 4.9	I 15.4	
451 - 600	4.00	I 17	I 35	52
		I 32.7	I 67.3	32.1
		I 28.3	I 34.3	
		I 10.5	I 21.6	
GREATER THAN 600	5.00	I 9	I 10	
		I 10.0	I 90.0	6.2
		I 1.7	I 8.8	
		I .6	I 5.6	
COLUMN TOTAL	60	102	162	
TOTAL	37.0	63.0	100.0	

RAW CHI SQUARE = 17.72168 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .0014

CRAMER'S V = .33075
 CONTINGENCY COEFFICIENT = .31402
 KENDALL'S TAU H = .23385
 KENDALL'S TAU C = .27740
 GAMMA = .38543
 SOMER'S D = .29739

CROSSTABLATIONS *Total Sample*
FILE NONAME (CREATION DATE = 07/28/73)

PERKLN PERCEIVED KNOWLEDGE
BY OBJKNL OBJECTIVE KNOWLEDGE - NC. PEOPLE
CROSS TABULATION OF

PERKLN
ALMOST EVERYTHG
ALMOST NOTHING

PERKLN	OBJKNL	4	6	ZERO	ROW TOTAL
1.00	12	10	2	24	
50.0	41.7	8.3	14.9		
32.4	20.4	2.7			
7.5	6.2	1.2			
3.00	18	31	31	80	
22.5	38.8	38.8	49.1		
48.6	63.3	41.3			
11.2	19.3	19.3			
5.00	7	8	42	57	
12.3	14.0	73.7	35.1		
18.9	16.3	55.0			
4.3	5.0	26.1			
COLUMN TOTAL	37	49	75	161	
TOTAL	23.0	30.4	46.6	100.0	

RAW CHI SQUARE = 35.89935 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .0000
 CRAMER'S V = .33390
 CONTINGENCY COEFFICIENT = .42099
 KENDALL'S TAU B = .39936
 KENDALL'S TAU C = .37221
 GAMMA = .60270
 SCMER'S D = .38920
 NUMBER OF MISSING OBSERVATIONS = 4

FILE NNAME (CREATION DATE = 07/28/73)

PERKLN PERCEIVED KNOWLEDGE CROSSTABLATION OF OBJECTIVE KNOWLEDGE - NO. PEOPLE

OBJKNL

PERKLN	COUNT	IGREATER	4 - 6	ZERO	ROW TOTA
ALMCS	1.00	6	7	2	15
EVERYTHG	40.0	46.7	13.3	17.2	
	31.6	24.1	5.1		
	6.9	8.0	2.3		
3.00	9	17	17	43	
	20.9	39.5	39.5	49.4	
	47.4	58.6	43.6		
	10.3	19.5	19.5		
5.00	4	5	20	23	
NOTHING	13.8	17.2	69.0	33.3	
	21.1	17.2	51.3		
	4.6	5.7	23.0		
COLUMN	19	29	39	87	
TOTAL	21.6	33.3	44.8	100.0	

RAW CHI SQUARE = 14.04719 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .0071

CRAMER'S V = .28413

CONTINGENCY COEFFICIENT = .37265

KENDALL'S TAU B = .33523

KENDALL'S TAU C = .31550

GAMMA = .51026

SOMER'S D = .32852

NUMBER OF MISSING OBSERVATIONS = 1

FILE NCNAME (CREATION DATE = 07/28/73)

PERKNL PERCEIVED KNOWLEDGE CROSSTABLATION OF SUBJECTIVE KNOWLEDGE - NC. PEOPLE

PERKNL	CBJKNL	COUNT	ROW PCT	IGREATER	4 - 6	ZERO	ROW TOTAL
ALMOST	EVERYTHG	1.00	6	1.00	3.00	5.00	9
			56.7	33.3	15.0	0.0	12.2
			33.3	15.0	0.0	0.0	
			8.1	4.1	0.0	0.0	
ALMOST	NOTHING	3.00	9	14	14	14	37
			24.3	37.8	37.8	37.8	50.0
			50.0	70.0	38.9	18.9	
			12.2	18.9	18.9	18.9	
ALMOST	NOTHING	5.00	3	3	3	22	28
			10.7	10.7	73.6	17.8	37.8
			16.7	15.0	61.1	29.7	
			4.1	4.1	29.7	74	
COLUMN	TOTAL	18	20	36	74	100.0	
		24.3	27.0	48.6	100.0		

RAW CHI SQUARE = 23.67579 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .0001

CHAMER#S V = .39996

CONTINGENCY COEFFICIENT = .49233

KENDALL#S TAU B = .47621

KENDALL#S TAU C = .43663

GAMMA = .71097

SOMER#S D = .46123

NUMBER OF MISSING OBSERVATIONS = 3

FILE Ncname (CREATION DATE = 07/28/73)

PERKLN PERCEIVED KNOWLEDGE BY OBJKNL CROSSSTABLATION OF OBJECTIVE KNOWLEDGE - NO. PEOPLE

PERKLN	OBJKNL	COUNT	IGREATER	4 - 6	ZERO	RCW TOTAL
1.00	I	6	1.001	3.001	5.001	11
ALMOST EVERYTHG	I	54.5	I	36.4	I	14.9
	I	37.5	I	20.0	I	
	I	8.1	I	5.4	I	
3.00	I	6	I	14	I	36
	I	16.7	I	38.9	I	48.6
	I	37.5	I	70.0	I	
	I	8.1	I	18.9	I	
ALMOST NOTHING	I	4	I	2	I	20
	I	14.0	I	7.4	I	36.9
	I	25.0	I	10.0	I	
	I	5.4	I	2.7	I	
COLUMN TOTAL		16		20		74
		21.6		27.0		100.0

RAW CHI SQUARE = 20.40852 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .0004

CRAMER'S V = .37134

CONTINGENCY COEFFICIENT = .46494

KENDALL'S TAU B = .40562

KENDALL'S TAU C = .37253

GAMMA = .60932

SCWER#5 D = .40284

NUMBER OF MISSING OBSERVATIONS = 1

FILE NONAME (CREATION DATE = 07/25/73)

***** CROSSTABULATION OF PERKNNL OF PERCEIVED KNOWLEDGE *****
***** RESEARCH UTILIZATION *****
***** BY PERKNNL *****
***** PERKNNL *****
***** PAGE *****

RESULT	YES	NO	COUNT	PERKNNL	ALMOST NOTHING	4.00I	3.00I	2.00I	1.00I	PERKNNL	ROW TOTAL
1.00	2	0	2	I	12	21	12	1	I	I	48
4.2	I	4.2	I	25.0	I	43.8	I	24.0	I	2.1	I
100.0	I	100.0	I	54.5	I	26.3	I	27.9	I	7.1	I
1.2	I	1.2	I	7.5	I	13.6	I	7.5	I	6.1	I
2.00	0	0	0	I	10	59	31	I	13	I	113
0.0	I	0.0	I	8.8	I	52.2	I	27.4	I	11.5	I
0.0	I	0.0	I	45.5	I	73.8	I	72.1	I	92.9	I
0.0	I	0.0	I	6.2	I	36.6	I	15.3	I	8.1	I
COLUMN TOTAL	2	2	22	22	43	49.7	26.7	8.7	14	161	100.0

RAW CHI SQUARE = 15.13808 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .0044

CRAMER'S V = .30664

CONTINGENCY COEFFICIENT = .29316

KENDALL'S TAU B = .20685

KENDALL'S TAU C = .21666

GAMMA = .38152

SOMER'S D = .16529

NUMBER OF MISSING OBSERVATIONS = 4

FILE Ncname (CREATION DATE = 07/28/73)

***** C R C S T A B U L A T I O N O F *****
***** BY EXPSTA EXPERIENCE AT STATION *****

INTPRE INTERPERSONAL RELATIONS

	EXPSTA	99	30	59	10	29	0	9	ROW TOTAL
COUNT	I	18	19	18	18	18	18	18	66
COL PCT I	I	27.3	28.3	27.3	27.3	27.3	27.3	27.3	40.0
TOT PCT I	I	2.001	3.001	4.001	5.001	5.001	5.001	5.001	
GREATER THAN 2	I	1.00							
ZERC	I	3.00	16	16	16	16	16	16	99
	I	16.2	16.2	16.2	16.2	16.2	16.2	16.2	60.0
	I	47.1	45.7	49.0	71.1	71.1	71.1	71.1	
	I	9.7	9.7	24.2	16.4	16.4	16.4	16.4	
COLUMN TOTAL		34	35	58	38	38	38	38	165
		20.6	21.2	35.2	23.0	23.0	23.0	23.0	100.0

RAW CHI SQUARE = 9.22548 WITH 3 DEGREES OF FREEDOM. SIGNIFICANCE = .0264

Cramer's V = .23646

CONTINGENCY COEFFICIENT = .23011

KENDALL'S TAU B = .19541

KENDALL'S TAU C = .23229

GAMMA = .32102

SCMER'S D = .15702

FILE NONAME (CREATION DATE = 07/25/73)

SCICOM SCIENTIFIC COMPLEMENTARITY BY COLLABORATION OF COLLABORATION

SCICOM	COUNT	COLL	NO	ROW	TOTAL
HIGH	1.60	21	22	43	26.5
		48.8	51.2		
		60.0	17.3		
		13.0	13.6		
LOW	2.00	6	33	39	24.1
		15.4	84.6		
		17.1	26.0		
		3.7	20.4		
	3.00	8	72	80	49.4
		10.0	90.0		
		22.9	56.7		
		4.9	44.4		
COLUMN		35	127	162	
TOTAL		21.6	78.4	100.0	

RAW CHI SQUARE = 26.07964 WITH 2 DEGREES OF FREEDOM. SIGNIFICANCE = .0000

GRAMER'S V = .40123

CONTINGENCY COEFFICIENT = .37237

KENDALL'S TAU B = .34127

KENDALL'S TAU C = .31474

GAMMA = .64350

SOMER'S D = .46457

NUMBER OF MISSING OBSERVATIONS = 3

FILE NONAME (CREATION DATE = 07/25/73)

***** C R O S S T A B U L A T I O N O F *****
SCICOM SCIENTIFIC COMPLEMENTARITY BY COLLAB COLLABORATION *****
***** PAGE

	COLLAB		ROW TOTAL
	COUNT	NO	
SCICOM	1.00	1.00	2.00
HIGH	11	14	25
	44.0	56.4	28.4
	57.9	20.3	
	12.5	15.9	
2.00	3	20	23
	13.0	87.0	26.1
	15.8	29.0	
	3.4	22.7	
3.00	5	35	40
	12.5	87.5	45.5
	26.3	50.7	
	5.7	39.8	
COLUMN	19	69	88
TOTAL	21.6	78.4	100.0

RAK CHI SQUARE = 10.36096 WITH 2 DEGREES OF FREEDOM. SIGNIFICANCE =

.0056

CRAMER'S V = .34313

CONTINGENCY COEFFICIENT = .32456

KENDALL'S TAU B = .27535

KENDALL'S TAU C = .25723

GAMMA = .54013

SOMER'S D = .37986

FILE NONAME (CREATION DATE = 07/25/73)

SCICOM SCIENTIFIC COMPLEMENTARITY CROSSTABULATION OF COLLABORATION BY COLLABORATION

***** PAGE

	COLLAB		NO	ROW
	COUNT	I	TOTAL	TOTAL
SCICOM	1.00	43	11	24
HIGH		54.2	45.8	32.0
		81.3	18.6	
		17.3	14.7	
		1	17	18
	2.00	5.6	94.4	24.0
		6.3	28.8	
		1.3	22.7	
		2	31	33
LOW	3.00	6.1	93.9	44.0
		12.5	52.5	
		2.7	41.3	
		16	59	75
	TOTAL	21.3	78.7	100.0

RAW CHI SQUARE = 22.67340 WITH 2 DEGREES OF FREEDOM. SIGNIFICANCE = .0000

CRAMER'S V = .54983
 CONTINGENCY COEFFICIENT = .48180
 KENDALL'S TAU B = .44884
 KENDALL'S TAU C = .41813
 GAMMA = .81440
 SOMER'S D = .62288

FILE NONAME (CREATION DATE = 07/26/73)

SCICOM SCIENTIFIC COMPLEMENTARITY CROSSTARULATION OF INTERPERSONAL RELATIONS
BY INIPRF

SCICOM	COUNT	INIPRF	IGREATER	ZERO	ROW	TOTAL
1.00	I 20	I 23	I 43			
	I 46.5	I 53.5	I 26.1			
	I 30.3	I 23.2				
	I 12.1	I 13.9				
2.00	I 22	I 17	I 39			
	I 56.4	I 43.6	I 23.6			
	I 33.3	I 17.2				
	I 13.3	I 10.3				
3.00	I 24	I 59	I 83			
	I 24.9	I 71.1	I 50.3			
	I 36.4	I 59.6				
	I 14.5	I 35.8				
COLUMN	66	99	165			
TOTAL	40.0	60.0	100.0			

RAW CHI SQUARE = 9.38475 WITH 2 DEGREES OF FREEDOM. SIGNIFICANCE = .0092
 CRAMER'S V = .23849
 CONTINGENCY COEFFICIENT = .23198
 KFNDALL'S TAU B = .18160
 KFNDALL'S TAU C = .19864
 GAMMA = .31559
 SOMER'S D = .20692

FILE NNAME (CREATION DATE = 07/28/73)

***** CROSS TABULATION OF ***** OPINION EAC
***** GENERAL OPINION ***** BY OPEAC *****

GENCP	VERY	FAVORABL	GENCP	VERY	FAVORABL	GENCP	VERY	FAVORABL	ROW TOTAL
1.00	38	6	2.00	8	5	1.00	38	6	44
79.2	12.5	8.3	50.0	31.3	48.7	79.2	12.5	8.3	75.0
82.6	54.5	57.1	17.4	45.5	42.9	82.6	54.5	57.1	115
59.4	9.4	6.3	12.5	7.8	4.7	59.4	9.4	6.3	25.0
2.00	46	11	2.00	46	11	2.00	46	11	57
71.9	17.2	10.9	71.9	17.2	10.9	71.9	17.2	10.9	100.0

RAW CHI SQUARE = 5.06931 WITH 2 DEGREES OF FREEDOM. SIGNIFICANCE = .0794

CRAMER'S V = .28133
 CONTINGENCY COEFFICIENT = .27082
 KENDALL'S TAU B = .26629
 KENDALL'S TAU C = .21680
 GAMMA = .52607
 SCHEFFÉ'S D = .24530
 NUMBER OF MISSING OBSERVATIONS = 13

FILE NONAME (CREATION DATE = 07/25/73)

REGST REGIONALITY STATEMENT BY COLLABORATION OF CITIZENS

REGST	COUNT	I	COLLAB	NO	ROW	TOTAL
STRONGLY AGREE	1.00	I	5	I	5	10
		I	50.0	I	50.0	12.5
		I	26.3	I	8.2	
		I	6.3	I	6.3	
		I	11	I	33	44
	2.00	I	25.0	I	75.0	55.0
		I	57.9	I	54.1	
		I	13.8	I	41.3	
		I	1	I	15	16
	3.00	I	6.3	I	93.8	20.0
		I	5.3	I	24.6	
		I	1.3	I	18.7	
		I	2	I	8	10
	4.00	I	20.0	I	80.0	12.5
		I	10.5	I	13.1	
		I	2.5	I	10.0	
COLUMN			19		61	80
TOTAL			23.8		76.3	100.0

848

RAW CHI SQUARE = 6.62640 WITH 3 DEGREES OF FREEDOM. SIGNIFICANCE =

CRAMER'S V = .28780
 CONTINGENCY COEFFICIENT = .27658
 KENDALL'S TAU B = .22441
 KENDALL'S TAU C = .21375
 GAMMA = .46216
 SOMER'S D = .29508
 NUMBER OF MISSING OBSERVATIONS = 8

FILE NONAME (CREATION DATE = 07/25/73)

***** SCICOM SCIENTIFIC COMPLEMENTARITY C R O S S T A B U L A T I O N O F R E S U L T R E S E A R C H U T I L I Z A T I O N P A G E

SCICOM	COUNT	RESULT	NO	ROW TOTAL
HIGH	1.00	I	2.00	
		I	12	13
		I	48.0	52.0
		I	46.2	21.0
		I	13.6	14.8
		I	5	10
		I	21.7	78.3
		I	19.2	29.0
		I	5.7	20.5
LOW	3.00	I	9	31
		I	22.5	77.5
		I	34.6	50.0
		I	16.2	35.2
		I	26	62
		I	29.5	70.5
		I		88
		I		100.0

RAW CHI SQUARE = 5.71739 WITH 2 DEGREES OF FREEDOM. SIGNIFICANCE = .05173

CRAMER'S V = .25489

CONTINGENCY COEFFICIENT = .24700

KENDALL'S TAU B = .19896

KENDALL'S TAU C = .20610

GAMMA = .36707

SOMER'S D = .24752

0269

FILE NONAME (CREATION DATE = 07/25/73.)

SCICOM SCIENTIFIC COMPLEMENTARITY CROSS TABULATION OF RESEARCH UTILIZATION BY RESULT

COUNT		RESULT		NO		ROW	
COL PCT	TOT PCT	COL PCT	TOT PCT	COL PCT	TOT PCT	COL PCT	TOT PCT
1.00	1.00	8	1.00	3	2.00	11	25.0
		72.7	72.7	27.3	27.3		
		47.1	47.1	11.4	11.4		
		18.2	18.2	6.8	6.8		
2.00	2.00	3	1.00	7	2.00	10	22.7
		30.0	30.0	70.0	70.0		
		17.6	17.6	25.9	25.9		
		6.8	6.8	15.9	15.9		
3.00	3.00	6	1.00	17	2.00	23	52.3
		26.1	26.1	73.9	73.9		
		35.3	35.3	63.0	63.0		
		13.6	13.6	38.6	38.6		
		17	17	27	27		
		38.6	38.6	61.4	61.4		
		TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL

RAW CHI SQUARE = 7.23456 WITH 2 DEGREES OF FREEDOM. SIGNIFICANCE =

CRAMER'S V = .40549
 CONTINGENCY COEFFICIENT = .37577
 KENDALL'S TAU B = .33352
 KENDALL'S TAU C = .35950
 GAMMA = .55769
 SOMER'S D = .37908

FILE NONAME (CREATION DATE = 07/25/73)

SCICOM SCIENTIFIC COMPLEMENTARITY BY RESULT RESEARCH UTILIZATION

	COUNT	RESULT	NO	ROW
	ROW PCT	COL PCT	TOT PCT	TOTAL
SCICOM	1.00	4	1.001	8
HIGH		50.0	50.0	18.6
		40.0	12.1	
		9.3	9.3	
	2.00	5	1.6	11
		45.5	54.5	25.6
		50.0	18.2	
		11.6	14.0	
LOW	3.00	1	23	24
		4.2	95.8	55.8
		10.0	69.7	
		2.3	53.5	
COLUMN		10	33	43
TOTAL		23.3	76.7	100.0

JJ38

RAW CHI SQUARE = 11.14338 WITH 2 DEGREES OF FREEDOM. SIGNIFICANCE =

CRAMER'S V = .50907
 CONTINGENCY COEFFICIENT = .45367
 KENDALL'S TAU B = .47439
 KENDALL'S TAU C = .43483
 GAMMA = .77011
 SOMER'S D = .60909
 NUMBER OF MISSING OBSERVATIONS = 3

FILE NNAME (CREATION DATE = 07/28/73)

***** C R O S S T A B U L A T I O N O F S E R V I C E U T I L I Z A T I O N B Y S E R U T L S E R V I C E U T I L I Z A T I O N *****
EXPSTA EXPERIENCE AT STATION

EXPSTA	COUNT	RCW PCT IVERY	COL PCT IHIGH	TOT PCT I	1.001	2.001	3.001	4.001	5.001	VERY LOW	RCW TOTAL
60 - 99	2.00	1	1	1	4	6	5	0	14		14
		7.1	28.6	42.9	21.4	30.0	7.7	0.0	15.9		
		50.0	25.0	30.0	6.8	3.4	0.0	0.0			
		1.1	4.5	6.8	3.4	0.0	0.0	0.0			
30 - 59	3.00	1	8	7	9	2	27		27		27
		3.7	29.6	25.9	33.3	7.4	30.7				
		50.0	50.0	35.0	23.1	18.2					
		1.1	9.1	8.0	10.2	2.3					
10 - 29	4.00	0	3	4	16	4	27		27		27
		0.0	11.1	14.8	59.3	14.8	30.7				
		0.0	18.7	20.0	41.0	36.4					
		0.0	3.4	4.5	18.2	4.5					
0 - 9	5.00	0	1	3	11	5	20		20		20
		0.0	5.0	15.0	55.0	25.0	22.7				
		0.0	6.3	15.0	28.2	45.5					
		0.0	1.1	3.4	12.5	5.7					
	COLUMN TOTAL	2	16	20	39	11	88				
		2.3	18.2	22.7	44.3	12.5	100.0				

RAW CHI SQUARE = 21.28155 WITH 12 DEGREES OF FREEDOM. SIGNIFICANCE = .00464

CRAMER'S V = .28392
 CONTINGENCY COEFFICIENT = .44129
 KENDALL'S TAU B = .38206
 KENDALL'S TAU C = .36605
 GAMMA = .51828
 SOMER'S D = .39067

FILE Ncname (CREATION DATE = 07/28/73)

SCICOM SCIENTIFIC COMPLEMENTARITY CROSSTABLATION OF COMPOSITE BENEFITS BY COMPN

PAGE

COMPHN

SCICOM	HIGH	LOW	VERY LOW	TOTAL
1.00	15	15	13	43
	34.9	34.9	30.2	26.5
	41.7	23.4	21.0	
	9.3	9.3	8.0	
2.00	9	18	12	39
	23.1	46.2	30.6	24.1
	25.0	28.1	19.4	
	5.6	11.1	7.4	
3.00	12	31	37	80
	15.0	38.8	46.3	49.4
	33.3	48.4	59.7	
	7.4	19.1	22.8	
COLUMN TOTAL	36	64	62	162
	22.2	39.5	38.3	100.0

RAW CHI SQUARE = 8.30333 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .0811

CRAMER'S V = .16009

CONTINGENCY COEFFICIENT = .22081

KENDALL'S TAU B = .18233

KENDALL'S TAU C = .17444

GAMMA = .28051

SMER'S D = .17944

NUMBER OF MISSING OBSERVATIONS = 3

FILE NNAME (CREATION DATE = 07/28/73)

CROSS TABULATION C F COMPOSITE BENEFITS
CRITICAL SIZE BY COMPBN
CRISIS

CRISIS	VERY LOW	4.001	3.001	2.00L	1.001	COMPBN	RCW TOTAL
1.00	4	9	29	9	4	I	49
HIGH	8.2	18.4	59.2	18.4	8.2	I	55.7
	60.0	75.0	64.4	33.5	23.5	I	
	4.5	10.2	33.0	3.4	4.5	I	
2.00	1	3	16	6	13	I	39
	2.6	7.7	41.0	15.4	33.3	I	44.3
	20.0	25.0	35.6	66.7	76.5	I	
	1.1	3.4	18.2	6.8	14.8	I	
COLUMN TOTAL	5	12	45	9	17		88
	5.7	13.6	51.1	10.2	19.3		100.0

RAW CHI SQUARE = 13.35637 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .0097
 CRAMER'S V = .38959
 CONTINGENCY COEFFICIENT = .36301
 KENDALL'S TAU B = .34521
 KENDALL'S TAU C = .39669
 GAMMA = .57058
 SCHER'S D = .29653

FILE Ncname (CREATION DATE = 07/28/73)

CROSSSTABLATION OF COMPOSITE BENEFITS BY COMPN

CCMPBN

CRISIS	VERY	LOW	VERY LOW	TOTAL	RCW
1.00	5	11	11	33	33
HIGH	15.2	33.3	33.3	81.8	45.2
2.00	1	2	7	9	40
	2.5	5.0	17.5	24.5	54.8
	16.7	15.4	38.9	71.0	
	1.4	2.7	9.6	13.7	
COLUMN	6	13	18	37	73
TOTAL	8.2	17.8	24.7	50.7	100.0

RAW CHI SQUARE = 25.41028 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .0000
 CRAMER'S V = .58999
 CONTINGENCY COEFFICIENT = .50814
 KENDALL'S TAU B = .51544
 KENDALL'S TAU C = .63051
 GAMMA = .75540
 SOMER'S D = .41750
 NUMBER OF MISSING OBSERVATIONS = 4

FILE NNAME (CREATION DATE = 07/28/73)

CRSIZ CRITICAL SIZE C R C S T A H U L A T I O N O F C O M P O S I T E B E N E F I T S
BY COMPN

COMPN

CRSIZ	VERY	HIGH	1.00	2.00	3.00	4.00	VERY LOW	RCW TOTAL
1.00	5	11.9	12	20	47.6	2.4	4	42
2.00	6.7	83.3	80.0	69.0	14.3	22.2	5.3	56.0
3.00	1	3	9	14	33	44.0		
4.00	16.7	9.1	27.3	16.2	42.4	77.8		
5.00	1.3	4.0	12.0	8.0	18.7			
COLUMN TOTAL	6	15	29	7	18	75		
	8.0	20.0	38.7	9.3	24.0	100.0		

RAW CHI SQUARE = 20.58245 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .0004

CRAMER'S V = .52386

CONTINGENCY COEFFICIENT = .46494

KENDALL'S TAU B = .43695

KENDALL'S TAU C = .52693

GAMMA = .67180

SOMER'S D = .35711

FILE NONAME (CREATION DATE = 07/26/73)

CROSSSTARS - TOTAL SAMPLE
CROSS TABULATION OF INTERPERSONAL RELATIONS
BY INTPPE
PROX PROXIMITY
PAGE

PROX	COUNT	INTPPE	IGREATER	ZERO	ROW TOTAL
0 - 150	1.00	14	32	3.001	46
		30.4	69.6		27.9
		21.2	32.3		
		8.5	19.4		
151 - 300	2.00	4	17		21
		19.0	81.0		12.7
		6.1	17.2		
		2.4	10.3		
301 - 450	3.00	15	19		34
		44.1	55.9		20.6
		22.7	19.2		
		9.1	11.5		
451 - 600	4.00	30	23		53
		56.6	43.4		32.1
		45.5	23.2		
		18.2	13.9		
GREATER THAN 600	5.00	3	8		11
		27.3	72.7		6.7
		4.5	8.1		
		1.8	4.8		
COLUMN TOTAL		66	99		165
		40.0	60.0		100.0

RAW CHI SQUARE = 12.66556 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .0130
 CRAMER'S V = .27706
 CONTINGENCY COEFFICIENT = .26700
 KENDALL'S TAU B = -.16256
 KENDALL'S TAU C = -.19585
 GAMMA = -.26559
 SOMER'S D = -.26401

Tommy

FILE NNAME (CREATION DATE = 07/28/73)

07/28/73

PAU

PERKLN PERCEIVED KNOWLEDGE CROSSTABLATION OF SUBJECTIVE KNOWLEDGE - NC. PEOPLE

PERKLN	OBJKLN	COUNT	IGREATER	4	6	ZERO	ROW TOTAL
1.00	EVERYTHG	2	1	1	0	3	7.0
3.00	ALMST	2	6	11	19	44.2	
5.00	NOTHING	0	4	17	21	48.8	
	TOTAL	4	11	28	43	100.0	

RAW CHI SQUARE = 16.19900 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .0028

CRAMER'S V = .43401
 CONTINGENCY COEFFICIENT = .52310
 KENDALL'S TAU B = .41163
 KENDALL'S TAU C = .32774
 GAMMA = .68707
 SCNER'S D = .43534
 NUMBER OF MISSING OBSERVATIONS = 3

FILE NNAME (CREATION DATE = 07/28/73)

***** CROSS TABULATION OF *****
EXPSTA EXPERIENCE AT STATION BY OBJKNL OBJECTIVE KNOWLEDGE - NO. PEOPLE

EXPSTA	OBJKNL	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	TOTAL
60 - 99	2.00	4	4	9	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	20
		20.0	20.0	45.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	26.0
		57.1	36.4	45.0	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	
		5.2	5.2	11.7	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	
30 - 59	3.00	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	8
		12.5	25.0	12.5	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	10.4
		14.3	18.2	5.0	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.8	
		1.3	2.6	1.3	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	
10 - 29	4.00	1	5	8	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	31
		3.2	16.1	25.8	41.9	41.9	41.9	41.9	41.9	41.9	41.9	41.9	41.9	41.9	41.9	41.9	41.9	41.9	41.9	41.9	41.9	40.3
		14.3	45.5	40.0	48.1	48.1	48.1	48.1	48.1	48.1	48.1	48.1	48.1	48.1	48.1	48.1	48.1	48.1	48.1	48.1	48.1	
		1.3	6.5	10.4	16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.9	
0 - 9	5.00	1	0	2	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	18
		5.6	0.0	11.1	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	23.4
		14.3	0.0	10.0	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	
		1.3	0.0	2.6	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	
		7	11	20	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	77
		9.1	14.3	26.0	35.1	35.1	35.1	35.1	35.1	35.1	35.1	35.1	35.1	35.1	35.1	35.1	35.1	35.1	35.1	35.1	35.1	100.0

DRAW CHI SQUARE = 25.41912 WITH 12 DEGREES OF FREEDOM. SIGNIFICANCE = .00130

CRAMER'S V = .33172

CONTINGENCY COEFFICIENT = .49818

KENDALL'S TAU B = .39027

KENDALL'S TAU C = .38005

GAMMA = .51619

SCHMER'S D = .37673

CROSSTABLATIONS *Non Estrogen*

FILE NNAME (CREATION DATE = 07/28/73)

PERKLN ***** C R O S S T A B U L A T I O N C F ***** RESEARCH UTILIZATION
PERKLN PERCEIVED KNOWLEDGE ***** BY RESULT *****

RESULT

COUNT	ROW PCT	COL PCT	TOT PCT	NO	ROW TOTAL
1.00	6	3	9	2.001	
ALMOST EVERYTHG	65.7	33.3	12.2		
	27.3	5.8			
	8.1	4.1			
3.00	12	25	37		
	32.4	67.6	50.0		
	54.5	48.1			
	16.2	33.8			
5.00	4	24	28		
ALMOST NOTHING	14.3	85.7	37.8		
	18.2	46.2			
	5.4	32.4			
COLUMN TOTAL	22	52	74		
	29.7	70.3	100.0		

RAW CHI SQUARE = 9.20380 WITH 2 DEGREES OF FREEDOM. SIGNIFICANCE = .0100

CRAMER'S V = .35267

CONTINGENCY COEFFICIENT = .33259

KENDALL'S TAU B = .31870

KENDALL'S TAU C = .31702

GAMMA = .59452

SOMER'S D = .37937

NUMBER OF MISSING OBSERVATIONS = 3

FILE NONAME (CREATION DATE = 07/28/73)

PERKNL PERCEIVED KNOWLEDGE CROSS TABULATION OF SERVICE UTILIZATION BY SERUTL

SERUTL

PERKNL	1.000	2.000	3.000	4.000	5.000	VERY LOW	ROW TOTAL
ALMOST EVERYTHG	4	2	7	8	3		24
	16.7	8.3	29.2	33.3	12.5		14.9
	80.0	10.0	18.4	11.6	10.3		
	2.5	1.2	4.3	5.0	1.9		
3.00	1	15	19	30	15		80
	1.3	18.7	23.8	37.5	18.7		49.7
	20.0	75.0	50.0	43.5	51.7		
	.6	9.3	11.8	18.6	9.3		
5.00	0	3	12	31	11		57
	0.0	5.3	21.1	54.4	19.3		35.4
	0.0	15.0	31.6	44.5	37.9		
	0.0	1.9	7.5	19.3	6.8		
COLUMN TOTAL	5	20	38	69	29		161
TOTAL	3.1	12.4	23.6	42.5	18.0		100.0

RAW CHI SQUARE = 25.88784 WITH 8 DEGREES OF FREEDOM. SIGNIFICANCE = .0011

CRAMER'S V = .28354 CONTINGENCY COEFFICIENT = .37218

KENDALL'S TAU B = .17946 KENDALL'S TAU C = .17673

GAMMA = .26993 SOMER'S D = .16553

NUMBER OF MISSING OBSERVATIONS = 4

FILE NCVNAME (CREATION DATE = 07/28/73)

CROSSTABLATIONS OF SERVICE UTILIZATION BY SERUTL PERKLN PERCEIVED KNOWLEDGE SERVICE UTILIZATION PAGE

PERKLN	SERUTL	VERY LOW								TOTAL
		1.000	2.000	3.000	4.000	5.000	6.000	7.000	8.000	
1.00	ALMOST EVERYTHG	2	2	4	5	1	1	15	17.2	
		13.3	13.3	26.7	40.0	6.7	1	15	17.2	
		100.0	12.5	20.0	15.4	10.0				
		2.3	2.3	4.6	6.9	1.1				
3.00	ALMOST NOTHING	0	12	8	15	7	43	49.4		
		0.0	27.9	18.6	37.2	16.3				
		0.0	75.0	40.0	41.0	70.0				
		0.0	13.8	9.2	18.4	8.0				
5.00	ALMOST NOTHING	0	2	8	17	2	29	33.3		
		0.0	6.9	27.6	58.5	6.9				
		0.0	12.5	40.0	43.5	20.0				
		0.0	2.3	9.2	19.5	2.3				
COLUMN		2	16	20	39	10	87	100.0		
TOTAL		2.3	18.4	23.0	44.3	11.5				

RAW CHI SQUARE = 16.28315 WITH 8 DEGREES OF FREEDOM. SIGNIFICANCE = .0192
 CRAMER'S V = .32415
 CONTINGENCY COEFFICIENT = .41672
 KENDALL'S TAU B = .13143
 KENDALL'S TAU C = .12921
 GAMMA = .19710
 SCOMER'S D = .12330
 NUMBER OF MISSING OBSERVATIONS = 1

FILE NONAME (CREATION DATE = 07/26/73)

EXPSTA EXPERIENCE AT STATION CROSSTABULATION OF PERKNI BY PERKNI PERCEIVED KNOWLEDGE

EXPSTA	COUNT	PERKNI	2.001	3.001	ROW TOTAL
GREATER THAN 100	1.00	1.2	4	2	9
	ROW PCT	33.3	44.4	22.2	5.6
	COL PCT	12.5	5.0	3.5	
	TOT PCT	1.9	2.5	1.2	
60 - 99	2.00	10	12	3	25
	ROW PCT	40.0	48.0	12.0	15.5
	COL PCT	41.7	15.0	5.3	
	TOT PCT	6.2	7.5	1.9	
30 - 59	3.00	6	21	8	35
	ROW PCT	17.1	60.0	22.9	21.7
	COL PCT	25.0	26.3	14.0	
	TOT PCT	3.7	13.0	5.0	
10 - 29	4.00	4	25	27	56
	ROW PCT	7.1	44.6	48.2	34.8
	COL PCT	16.7	31.3	47.4	
	TOT PCT	2.5	15.5	16.8	
0 - 9	5.00	1	18	17	36
	ROW PCT	2.8	50.0	47.2	22.4
	COL PCT	4.2	22.5	29.8	
	TOT PCT	.6	11.2	10.6	
COLUMN TOTAL	24	80	49.7	35.4	161
TOTAL	14.9	49.7	35.4	100.0	

RAW CHI SQUARE = 29.52719 WITH 8 DEGREES OF FREEDOM. SIGNIFICANCE = .0003
 CRAMER'S V = .30282
 CONTINGENCY COEFFICIENT = .39367
 KENDALL'S TAU B = .31345
 KENDALL'S TAU C = .31741
 GAMMA = .45239
 SQUARED = .34990

FILE NONAME (CREATION DATE = 07/28/73)

PERKLN PERCEIVED KNOWLEDGE CROSSTABLATION OF EXPSTA EXPERIENCE AT STATION
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PERKLN	EXPSTA	1.000	2.000	3.000	4.000	5.000	ROW TOTAL
ALMOST EVERYTHG	1.00	1	5	3	1	1	11
		9.1	45.5	27.3	9.1	9.1	14.9
		33.3	38.5	20.0	4.4	4.5	
		1.4	6.8	4.1	1.4	1.4	
3.00	1	1	7	9	7	12	36
		2.8	19.4	25.0	19.4	33.3	48.6
		33.3	53.8	60.0	33.3	54.5	
		1.4	9.5	12.2	9.5	16.2	
5.00	1	1	1	3	13	9	27
		3.7	3.7	11.1	48.1	33.3	36.5
		33.3	7.7	20.0	51.9	40.9	
		1.4	1.4	4.1	17.5	12.2	
COLUMN TOTAL		3	13	15	21	22	74
		4.1	17.6	20.3	28.4	29.7	100.0

RAW CHI SQUARE = 18.54207 WITH 8 DEGREES OF FREEDOM. SIGNIFICANCE = .0175
 CRAMER'S V = .35396
 CONTINGENCY COEFFICIENT = .44762
 KENDALL'S TAU B = .29705
 KENDALL'S TAU C = .30241
 GAMMA = .42073
 SOMER'S D = .26615
 NUMBER OF MISSING OBSERVATIONS = 1

FILE NONAME (CREATION DATE = 07/26/73)

EXPSTA EXPERIENCE AT STATION CROSS TABULATION OF TRANSACTION VISITS BY TRANS

EXPSTA	TRANS	COUNT	ROW PCT	COL PCT	TOT PCT	1.001	2.001	3.001	ROW TOTAL
GREATER THAN 100	1-2	5	55.6	0.0	44.4	0	4	9	9
	3	16.7	0.0	3.5	0.0	0.0	2.5	5.6	5.6
	4-5	3.1	0.0	2.5	0.0	0.0	0.0	2.5	2.5
60 - 99	8	32.0	32.0	36.0	36.0	8	9	25	25
	9	26.7	26.7	8.8	8.8	4.9	5.6	15.4	15.4
	10	4.9	4.9	5.6	5.6	0	0	10.5	10.5
30 - 59	5	25.7	14.3	60.0	60.0	5	21	35	35
	6	30.0	16.7	20.6	20.6	0	0	21.6	21.6
	7	5.6	3.1	13.0	13.0	0	0	18.6	18.6
10 - 29	4	7.1	21.4	71.4	71.4	4	40	56	56
	5	13.3	40.0	39.2	39.2	0	0	34.6	34.6
	6	2.5	7.4	24.7	24.7	0	0	27.1	27.1
0 - 9	4	10.8	13.5	75.7	75.7	5	28	37	37
	5	13.3	16.7	27.5	27.5	0	0	23.8	23.8
	6	2.5	3.1	17.3	17.3	0	0	20.3	20.3
COLUMN TOTAL		30	30	102	102	18.5	63.0	162	162
TOTAL		18.5	18.5	63.0	63.0	0	0	101.0	101.0

KAW CHI SQUARE = 25.42739 WITH 8 DEGREES OF FREEDOM. SIGNIFICANCE = .0013
 CRAMER'S V = .28014
 CONTINGENCY COEFFICIENT = .36833
 KENDALL'S TAU B = .25581
 KENDALL'S TAU C = .24383
 GAMMA = .38831
 SOMER'S D = .30385

CROSSTABS - NON CITIZENS
FILE NONAME (CREATION DATE = 07/25/73)

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

EXPSTA EXPERIENCE AT STATION

TRANS

COUNT	I	VERY LOW	LOW	HIGH	VERY HIGH	ROW TOTAL
1.00	2	0	0	0	2	6
GREATER THAN 100	33.3	0.0	0.0	0.0	33.3	8.1
2.00	40.0	0.0	0.0	0.0	40.0	10.0
3.00	2.7	0.0	0.0	0.0	2.7	0.7
4.00	2	6	0	0	8	14
5.00	14.3	21.4	42.9	0.0	88.6	18.9
60 - 99	40.0	42.9	18.7	0.0	101.6	26.0
30 - 59	2.7	4.1	8.1	0.0	14.9	3.8
10 - 29	1	0	5	1	7	1.8
0 - 9	12.5	0.0	62.5	12.5	87.5	22.5
	20.0	0.0	15.6	5.9	41.5	10.8
	1.4	0.0	6.8	1.4	9.6	2.5
	0	1	2	0	3	0.8
	0.0	3.4	41.4	31.0	75.8	19.7
	0.0	14.3	37.5	52.9	104.7	27.3
	0.0	1.4	16.2	12.2	30.8	7.9
	0	1	9	5	15	3.9
	0.0	5.9	52.9	29.4	98.2	25.4
	0.0	14.3	28.1	29.4	71.8	18.4
	0.0	1.4	12.2	6.8	20.4	5.3
COLUMN TOTAL	5	7	32	17	61	15.7
TOTAL	6.8	9.5	43.2	23.0	82.5	21.3

RAW CHI SQUARE = 29.78325 WITH 16 DEGREES OF FREEDOM. SIGNIFICANCE = .0192

CRAMER'S V = .31721
CONTINGENCY COEFFICIENT = .53570
KENDALL'S TAU B = .30368
KENDALL'S TAU C = .27621
GAMMA = .406631

FILE NUNAME (CREATION DATE = 07/25/73)

SCICOM SCIENTIFIC COMPLEMENTARITY CROSS TABULATION OF COLLAR COMPARATION BY COLLAR COMPARATION PAGE

	COUNT	ROW PCT	COL PCT	TOT PCT	NO	ROW TOTAL
SCICOM HIGH	10	55.6	44.4	18	24.3	
SCICOM LOW	2	18.7	81.3	16	21.6	
COLUMN TOTAL	10	21.6	78.4	74	100.0	

.0002

RAW CHI SQUARE = 17.01570 WITH 2 DEGREES OF FREEDOM. SIGNIFICANCE = .0002

CRAMER'S V = .47952

CONTINGENCY COEFFICIENT = .4323R

KENDALL'S TAU B = .42372

KENDALL'S TAU C = .38276

GAMMA = .75072

SOMER'S D = .56466

NUMBER OF MISSING OBSERVATIONS = 3

FILE NAME (CREATION DATE = 07/25/73)

INTPRE INTERPERSONAL RELATIONS BY TRANS TRANSACTION VISITS

INTPRE	COUNT	TRANS	ROW PCT IVERY	COL PCT IHIGH	TOT PCT I	1.000I	2.000I	3.000I	4.000I	5.000I	VERY LOW	ROW TOTAL
GREATER THAN 2	1.00	I	3	I	2	I	4	I	2	I	1	12
	25.0	I	16.7	I	33.3	I	16.7	I	8.3	I	7.4	7.4
	25.0	I	11.1	I	13.3	I	2.9	I	3.0	I		
	I	1.9	I	1.2	I	2.5	I	1.2	I	.6	I	
1 - 2	2.00	I	3	I	8	I	10	I	26	I	7	54
	5.6	I	14.8	I	18.5	I	48.1	I	13.0	I	33.3	33.3
	25.0	I	44.4	I	33.3	I	37.7	I	21.2	I		
	I	1.9	I	4.9	I	6.2	I	16.0	I	4.3	I	
ZERO	3.00	I	6	I	8	I	16	I	41	I	25	96
	6.3	I	8.3	I	16.7	I	42.7	I	26.0	I	59.3	59.3
	50.0	I	44.4	I	53.3	I	59.4	I	75.8	I		
	I	3.7	I	4.9	I	9.9	I	25.3	I	15.4	I	
COLUMN TOTAL	12	18	30	69	33	162						
TOTAL	7.4	11.1	18.5	42.8	20.4	100.0						

RAW CHI SQUARE = 14.81336 WITH 8 DEGREES OF FREEDOM. SIGNIFICANCE = .0629

GRAMER'S V = .21382

CONTINGENCY COEFFICIENT = .28945

KENDALL'S TAU B = .19212

KENDALL'S TAU C = .17901

GAMMA = .30278

SOMER'S D = .16462

NUMBER OF MISSING OBSERVATIONS = 3

January 1, 1973

Name: THEODORE W. SCHLIE

Present Address: Home: 913 Michigan
Evanston, Illinois 60202
(312) 864-5566

Office: Department of Industrial Engineering
and Management Sciences
The Technological Institute
Northwestern University
Evanston, Illinois 60201
(312) 492-3576

Description: Marital Status: Single
Height: 5 ft. 11 in.
Weight: 170 lbs.
Date of Birth: March 21, 1940
General Health: Excellent

Present Position: Research Engineer - Program of Research on the
Management of Research and Development*
Project Leader on National Science Foundation and
Environmental Protection Agency projects*

Employed By: Dr. Albert H. Rubenstein - Department of Industrial
Engineering and Management Sciences, Northwestern
University

*See attached papers for more information.

Educational Background:

High School Diploma: from Belle Plaine High School
Belle Plaine, Iowa
in 1958

B.A.: from Valparaiso University
Valparaiso, Indiana
Major in Mathematics
Minor in Sociology
in 1963

M.S.: from Northwestern University
Evanston, Illinois
Department of Industrial
Engineering and Management
Sciences
in 1969

Ph.D. Qualifying Exams and
Admission to Candidacy: from Northwestern University
Evanston, Illinois
Department of Industrial
Engineering and Management
Sciences
in 1970

Ph.D. (Expected date of
completion and awarding
of degree): June 1973

(A list of the graduate level courses taken at Northwestern
University is on the attached page.)

Graduate Level Courses Taken at Northwestern University:

<u>Department</u>	<u>Course Title</u>
Fall Quarter, 1967	
IE/MS	Organization Theory
IE/MS	Projects in R&D Management
Anthropology	Economic Anthropology
Anthropology	Traditional Political Systems
Winter Quarter, 1968	
IE/MS	Field Research in Organization Theory
Anthropology	Community Change and Development
Political Science	African Political Systems
Spring Quarter, 1968	
IE/MS	Seminar on R&D Management
IE/MS	Selected Topics in IE/MS
Political Science	The New Nations
Business Administration	Seminar in International Administration
Fall Quarter, 1968	
IE/MS	Seminar in R&D Management
IE/MS	Organizational Design
Economics	Rise of Industrial Society
Winter Quarter, 1969	
IE/MS	Seminar in R&D Management
IE/MS	Organizational Design
IE/MS	Systems Simulation
Economics	Theories of Economic Development
Spring Quarter, 1969	
IE/MS	Research
Fall Quarter, 1969	
IE/MS	Seminar in R&D Management
IE/MS	Systems Analysis
Psychology	Social Psychology
Winter Quarter, 1970	
IE/MS	Seminar in R&D Management
Management	Behavior in Organizational Systems
IE/MS	Analysis of Variance and Design of Experiments
Spring Quarter, 1970	
Psychology	Social Attitude Measurement
Management	Organizations in Their Environment
Management	Empirical Research in Organizational Behavior
Other Courses (taken, but not for credit):	
Geography	Africa South of the Sahara
English	Contemporary African Literature
History	History of Science and Technology in American Society
History	East Africa
	Computer Programming - FORTRAN

Professional and Work Experience:

September 1963 - December 1965: United States Peace Corps Volunteer
Secondary School Mathematics teacher
in Malawi (Africa)

February 1966 - June 1967: High School Mathematics teacher
Bellflower High School
Bellflower, California

April - September 1969¹⁾: Scientific Affairs Officer
Office for Science and Technology
United Nations
New York

1970²⁾: Consultant
Office for Science and Technology
United Nations
New York

January 1971 - May 1972³⁾: Visiting Research Associate
Institute for Development Studies
University of Nairobi
Nairobi, Kenya (Africa)

July 1972 - present⁴⁾: Consultant
National Science Foundation
Washington, D. C.

October - December 1972²⁾: Consultant
Office for Science and Technology
United Nations
New York

1) This was a special and temporary position to work on developing the framework for the "World Plan of Action for the Application of Science and Technology to Development," which was the scientific component of the Second United Nations Development Decade - International Development Strategy. (See United Nations Document Sales Number E.71.II.A.18.) (Mr. R. C. Desai was my superior.)

2) Continued work on the "World Plan of Action" and related topics while residing in Evanston. (Mr. R. C. Desai was my superior.)

3) During this period, I was carrying out the field research for my Ph.D. dissertation on "Some Aspects of Regional (Multi-National) - National Scientific Relationships in East Africa." See attached papers for more information.

4) This work involved the development of a new "Experimental R&D Incentives Program" for the NSF, in which the innovation process - from idea to utilization - in the public and private sectors will be studied and experimented with. See the attached papers for more information. (Dr. Donald Cunningham was my superior.)

TECHNICAL PAPERS

T.W. Schlie, "The ACAST Targets for Science and Technology in the World Plan of Action - In Perspective" -

T.W. Schlie, "Part I: The Nature and Quantity of R&D in the Developed Countries" -

T.W. Schlie, "Part II: Some Quantitative Estimates of How R&D in the Developed Countries Has Hurt Development in Developing Countries" -

T.W. Schlie, "Part III: Some Statistical Tables in R&D in Some Selected Developed Countries," technical reports prepared for the Office for Science and Technology of the United Nations, Expert Group on Science and Technology Targets for the International Development Strategy meeting, January 15 - 19 1973.

INVITED PAPERS AND PAPERS SUBMITTED FOR PUBLICATION

- T.W. Schlie, et al., "Organization and Funding of Applied Research Institutes in Developing Countries," paper to be submitted for publication, IE/MS No. 69/18 (Rev. May 1972), May 1972.
- T.W. Schlie, "Research on Social Science Research - Some Thoughts and Ideas from the Programme of Research on the Management of Research and Development," invited paper presented to the Workshop on the Co-ordination of Production, Dissemination and Utilization of Social Science Research Findings, Institute for Development Studies, University of Nairobi, January 20-22, 1972.
- T.W. Schlie, "Appropriate Technology: Some Concepts, Some Ideas, and Some Recent Experiences in Africa," paper submitted for publication, IE/MS No. 72/81, September 1972.
- T.W. Schlie & A.H. Rubenstein, "Applied Research and Technology Transfer in Developing Countries," invited paper to be presented at the TIMS XX International Meeting in June 1973.

THESIS AND DISSERTATION WORKING PAPERS

- T.W. Schlie, "Government Science Organizations and Federal-Provincial Relations in Canada," M.S. Thesis, IE/MS No. 70/67, December 1970.
- T.W. Schlie, "Some Economic Aspects of Regional Integration Theory," dissertation working paper, 1971.
- T.W. Schlie, "A Short History of Regionalism in East Africa," dissertation working paper, 1971.
- T.W. Schlie, "The Benefits/Activities of a Regional Organization and their Locational Implications," dissertation working paper, IE/MS No. 72/49, December 1971.
- T.W. Schlie, "A Case for the Study of Regional Research and Development Institutes in East Africa," dissertation working paper, IE/MS No. 72/47, March 1971.
- T.W. Schlie, "Some Aspects of Political Integration Theory," dissertation working paper, 1971.
- T.W. Schlie, "The Organization of Regional Research in East Africa - The National Interview," dissertation working paper, IE/MS No. 72/48, February 1972.
- T.W. Schlie, "Some Aspects of Regional-National Scientific Relationships in East Africa - A Revision," Institute for Development Studies Working Paper No. 36, University of Nairobi, April 1972.

DEPARTMENTAL AND PROJECT WORKING PAPERS

- T.W. Schlie, A.H. Rubenstein, & C.F. Douds, "Semi-Controlled Experiments, Natural Experiments, and the National Science Foundation's Experimental Incentives Program," working paper for NSF/EIP, IE/MS No. 72/76, September 1972.
- T.W. Schlie, et al., "Potential NSF Proposal Selection Flow Diagram, Revision 1," working paper for NSF/EIP, IE/MS No. 72/69, August 1972.
- T.W. Schlie, "Ideas on Proposal Selection," working paper for NSF/EIP, IE/MS No. 72/68, August 1972.
- T.W. Schlie, "Some Comments on Industrial Innovation to the Public Sector," working paper for NSF/EIP, August 1972.
- T.W. Schlie, "Notes on Potential Categories for Experiments," working paper for NSF/EIP, IE/MS No. 72/53, July 1972.
- T.W. Schlie & A.H. Rubenstein, "A Possible Experimental Setting in EPA," IE/MS No. 72/58, July 1972.
- T.W. Schlie & A.H. Rubenstein, "EPA Sponsored R&D and the Emergence of a Pollution Control Industry in the United States - And the Response of the Public Sector in the United State to EPA Sponsored Demonstration Grants," IE/MS No. 72/101, November 1972.
- T.W. Schlie, "Appropriate Technology Information Outline," IE/MS No. 73/9, January 1973.

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