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**AGRICULTURAL ECONOMICS BULLETIN
FOR AFRICA**

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**FOOD AND AGRICULTURE ORGANIZATION
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FOR AFRICA

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THE APPLICATION OF MODERN FARM MANAGEMENT TECHNIQUES TO PEASANT FARMING

by

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A common feature of countries in the early stages of economic development is their high income elasticity of demand for food. This means that as incomes increase, a relatively high proportion of additions to income is spent on food. The consequence of development is, therefore, increasing pressure on food supplies and thus an urgent need to improve the efficiency of agriculture. An important obstacle to increased agricultural efficiency is related to the problem of raising farm productivity. It is this problem which is primarily the concern of departments of agriculture in developing countries and it is the theme of this paper. In considering how agricultural economists might help to raise the productivity of peasant agriculture, their efforts should be looked upon as supplementary to the activities of the agricultural research and extension services. For it is obvious that great advances have been made in the efficiency of some overseas peasant agricultures on a technical base, where advice was neither sought nor needed from the economist. The successful introduction of the Skynnerton Plan in Kenya is a clear example of this. This plan of agricultural development, based on land consolidation, the introduction of cash crops and farm planning was conceived and carried through by officials who had no formal economic training. However, after a certain stage of agrarian development, increasing attention must be paid to the economic base; to the allocation of resources and to product or enterprise combinations on the farm, from the economic point of view. Indeed, the aim of this paper is to show that, if resources are not to be wasted or invested in the wrong direction, the planning of increased farm productivity must take economic criteria into account as well as technical restraints.

The responsibility of departments of agriculture in developing countries are now much greater than they used to be. Agricultural policies are nowadays not only concerned with purely agricultural aims -

with raising production efficiency and rural incomes - they are concerned with the larger issue of providing a base for overall economic development. The fundamental role of agriculture in the development of low-income economies is now generally recognised. In promoting economic development, domestic agriculture is looked upon as the main source of increased food supplies to nourish the urban dwellers; as the provider of enlarged agricultural exports and imports substitutes and a procurer of scarce foreign currencies; as the source of urban manpower without which industrialisation cannot take place; as an important source of savings with which to finance investment and capital formation; as a market for industrial products which increased rural cash incomes would provide and, finally, as the major source of taxable incomes. In performing this crucial role, as a catalyst of economic growth, it is clear that the commercialisation, and consequently the increased efficiency, of peasant agriculture is a critical need. In practical terms, this means increasing the profitability of peasant farms, for without this the goal of sustained economic development is impossible. If this is considered a realistic assessment, it follows that the appointment of agricultural economists to departments of agriculture should be looked on as a "must" and not as a luxury. And where sufficiently experienced personnel are not available a serious training programme should be initiated.

In an effort to reduce misunderstanding between agriculturalists and economists, it may be helpful to draw attention briefly to the development of farm management economics in the United Kingdom and the attitude of the National Agricultural Advisory Service to this development. The growth and application of farm management techniques was a slow and lengthy process in the U.K., lagging significantly behind that of the United States. It was only in the early nineteen-fifties, that the newer techniques of forward planning and farm budgeting were devised for the U.K., but their application required the help and co-operation of the N.A.A.S. extension officers. Since the more conservative-minded

agricultural economists were themselves dubious of the newer techniques, it is no reflection on the N.A.A.S. officers to say that they were not enthusiastic to learn about these techniques or to apply them to practical farm situations. Indeed, it took some years before they could be persuaded of the importance of the farm business aspect of agricultural production. But once perceived, the techniques were avidly accepted and now, a decade later, there are farm management specialist officers in N.A.A.S. itself. A few years ago, a rather more complicated technique called linear programming was adapted for farm management purposes and its acceptance again met with resistance both from the more conservative economists and from the practical extension officers. Again a few years elapsed before this too gained general acceptance as a valuable analytical tool of the farm business.

As the need is more urgent in tropical agricultures, it would be of great value if agricultural officers could overcome their instinctive resistance and so cut down this period between the initial introduction and ultimate acceptance of the newer farm management techniques as applied to the conditions of peasant agriculture. In recent years, there has been a slow but gratifying increase in the interest of African departments of agriculture in the tasks of the agricultural economist. But there has been a tendency for agricultural officers, as was the case with N.A.A.S., to absorb the more conservative content of farm management economics - to think of it that is, in terms of farm accounting and economic surveys and to discount the more advance forward-planning techniques. The consequence of this has been to ignore the opportunity costs of peasant farming systems and, in particular the real labour costs as opposed to the imputed cash labour costs of farm families. In other words, physical farm planning and early budgeting studies have usually ignored the opportunity costs of family farm labour which, as this paper will show, are of crucial economic importance in assessing the efficiency of peasant agriculture.

The application of linear programming to farm management problems will now be discussed, in some detail, for the following reasons. First, because it is the most mathematical of the farm management devices, often involving the use of the electronic computer, a fact which seems to create an instinctive resistance on the part of the practical agriculturist; second, because its application to low-income, peasant agriculture is just beginning; and third, in order to show how it illuminates the complicated, organic relationships of peasant farming situations, expressed in the form of opportunity costs, which no other technique is able to do. The simplest, though not the least important, purpose of linear programming is to devise farming systems or plans which so arrange the resources available to a holding, including land, labour and where applicable capital, that a maximum profit solution is obtained. In other words, it provides a basis for economic farm planning rather than solely technical farm planning. This does not mean that vital technical factors are ignored, but rather that economic considerations are added to the technical constraints involved in this kind of forward farm planning. In other words, it takes into account, not only the value of production, but also the availability of resources and the limitations which these resources impose upon farming systems.

In this regard, it differs markedly from the physical planning which is often undertaken by African departments of agriculture. For example, the farm planning done in Kenya takes heed only of certain technical and political postulates such as cash crop/arable ratios, arable/ley ratios, level of stocking and so on. All of these are balanced so that a farm plan in theory achieves fertility maintenance, family subsistence, a minimum cash income, an adequate level of manuring, etc. But this kind of technical planning pays little heed to the availability of resources or the maximum income obtainable from these resources. For example, the farm plan is related to the available land, that is size of holding, but not to the available labour. This omission

may gravely impair the effectiveness of the extension service. If, for example, a farmer was encouraged to adopt a plan which required more labour than he had available, not only would he be unable to implement the plan on his holding but the expected income from the plan would be exaggerated and, therefore, unobtainable. This might well discredit the advisory services. If, on the other hand, the labour requirements of a farm plan fall short of those available, it may mean lost opportunities for increased income. Concrete examples of these shortcomings of technical planning can be seen in a recent study of Kenyan agriculture.¹ The merit of linear programming is that it produces a maximum-profit plan which violates neither resource availabilities (of land and labour) nor any other technical postulate that it is desired to introduce. In other words, husbandry and other technical restraints are not subordinated to the sole aim of making maximum profits. Instead, linear programmes produce maximum-profit systems within the framework of specified technical requirements. Now, if agriculture is regarded as the prime-mover of economic development in an emerging country, then clearly planning methods must be used which get the best out of farm resources from an economic point of view. This can only be done by linear programming or similar resource-allocating devices.

Perhaps a more important purpose of linear programming is that of regional development planning. Briefly, the technique used for this is the selection of typical farm situations from a region of fairly homogeneous ecology; maximum profit farm plans can then be computed for these farm situations using a range of assumptions relating to resource availabilities and technical ratios relevant to the farming conditions of the area under study. The maximum profit solutions can then be inspected and compared and if recurring patterns and relationships are clearly defined, they can reasonably be taken to be valid general

1. Eric Clayton. *Agrarian Development in Peasant Economics*. Pergamon Press. Oxford. 1964.

characteristics of the agricultural region under study, on which policy decisions and recommendations can be based. Some examples taken from a recent study of peasant farming in Kenya¹ should illustrate this method more clearly.

In this study, for example, it is shown that on most of the typical family farms which it studied, labour and not land is the factor which limits increased production. In other words, assuming unchanged methods, the hiring of additional paid labour to supplement the efforts of the family is essential for net income to be increased. It follows that, in these situations, land is relatively plentiful (which is shown by the frequent presence of fallow in the maximum-profit solutions) hence more land, in the sense of a higher land/labour ratio, would not improve the income position. It would be reasonable to generalise from this that, in some circumstances of intensive cash-crop farming in Kenya, the inability of family farms to employ hired labour will inhibit the raising of productivity and farm incomes. It emphasises too why the existence of fallow land in optimal plans being run by farm families is perfectly consistent with the position of maximum profit. But the idea that idle land can be economic not only goes against the universal practice of the Kenya farmer but also contradicts the teaching of the agricultural department as embodied in their technical farm plans. In both cases, that is, the total arable acreage of a holding is cropped in both growing seasons. This is an example of how technical and economic efficiency can sometimes diverge.

Another interesting generalisation to emerge from the study was that on most of the farms studied, the maximum profit solution provided a relatively large dairying enterprise. However, if family farmers were encouraged to adopt these optimal plans, it would give rise to a new, peasant milk-producing industry. This would almost certainly result in the domestic over-production of milk and raise the difficult problem of

1. Eric Clayton. Economic Planning in Peasant Agriculture. Wye College. 1963.

finding external markets for butter. Indeed, experience suggests that tropical peasant butter fat producers would find it difficult to compete with the highly-organised and experienced temperate exporters. Consequently, it is necessary to limit the size of the dairy enterprise in the optimal plans, by an appropriate arable/ley ratio, to that necessary for fertility maintenance only. The effect of this is to reduce farm incomes on the holdings by 5% to 10% which measures the opportunity costs of diverting some of the farm resources away from dairying into other enterprises.

In situations where labour is a factor which limits the economic expansion of agricultural production, the substitution of capital for labour, in the form of mechanisation, might well appear to be a sensible way of delaying the limiting effect of labour. But this of course will depend, among other things, upon how effectively mechanisation can economise the use of labour and on the cost of mechanisation itself. In the study referred to, it was found that although labour is invariably limiting on the family farm, mechanisation (in the form of seed-bed preparation by hired tractor) is not in all cases economic. This arises because the effective substitution of capital for labour, in the physical sense, is not always possible. In the context of Kenyan peasant agriculture, the use of a tractor only economises labour during seed-bed preparation periods, in the long and short rain season. Hence, if restricting seasonal labour peaks do not coincide with these periods, which is possible in a mixed cash-crop farming complex, then the economic effectiveness of mechanisation will almost certainly be reduced. The maximum benefit of mechanisation was found to be a 20% gain in net income over the hand labour economy but in most cases only modest increases in net income of between 3% and 6% followed from the use of the tractor. It might be added here, that the common tendency of technical farm

planners to devise farming systems which spread labour requirements more evenly throughout the season thereby minimising peaks and troughs of labour needs, is by no means economic in all cases. In the high value cash-crop farming systems of Kenya, the employment of paid labour gives rise to quite substantial seasonal underemployment of the labour force but, on the other hand, it results in a significant increase in net farm incomes.

The extent to which family farm labour limits the economic expansion of production is seen, in the study, to be substantial. For example the labour force has, on average, to be doubled by the employment of paid labour before it ceases to be limiting. But at this level, net income is almost double that which family labour alone can secure and the holdings are given over almost entirely to cash crop production. Providing therefore the supply of hired labour is relatively elastic, it would seem desirable to encourage cash-crop specialisation on many farms. This conclusion, based on research evidence, reinforces the wider notion based on comparative cost doctrine, of regional specialisation within the agricultural sector. As far as Kenya is concerned, this development has been retarded so far by the creed of mixed farming, which implies farm self-sufficiency, and which has dominated official policies. But as the author has said elsewhere¹, "if true factor opportunity costs were allowed to determine the pattern and location of production, they would give rise to marked regional specialisation of agricultural production, particularly between the food and cash-crop growing areas. In this way, the resources within agriculture would be put to their most economic use and would lead to the integration of the whole agricultural economy. In what are now called the areas of "high potential", farmers would specialise almost entirely in the production of

1. A Note on the Alien Enclave and Development.
East African Economics Review. June 1963.

high-value cash crops - tea, coffee, pyrethrum, pineapples, etc. appropriate to their location. Specialist food-producing regions would export their surplus output to feed the cash-crop specialists and urban dwellers. The consequence of this policy would be a large expansion in cash-crop production, a significant increase in rural incomes and probably an improvement in the balance of payments position."

These examples are intended to illustrate how the regional planning approach, whereby maximum-profit farm systems are legitimately generalised within an area, can point the way for the advisor and the farmer to increased productivity and higher farm incomes. The regional approach has a further advantage - at the extension level. In the developed countries, when linear programming is used to solve farm problems it is usual to deal with each farmer individually by devising an optimal farm plan for his own use. This is clearly not feasible in low-income countries where extension services are spread thinly on the ground. In this case, a more practical approach is to provide maximum-profit plans which can be generalised to apply to the more common groups, of a particular area, which have homogeneous characteristics - as in the above examples of regional planning. In peasant agriculture, it is often possible to define group homogeneity on the basis of two factors only - these are ecology and the land/labour ratio. This means that the applicability of optimal plans will not be circumscribed by farm size. For example, the plan relevant to a holding of five acres with two men should also be relevant (when doubled) to a holding with ten acres and four men.

Two last points remain to be clarified. It is not intended that the application of linear programming to peasant farming problems should be carried out by agriculturists, this is an exercise for the trained agricultural economist. As far as the agricultural officer is concerned,

the results of this so-called complicated technique merely take the form of relatively simple farm plans which visually will not appear different from those devised by technical planning methods. Hence the feeling that they are too complicated for them to be relevant to simple peasant farmers is not well-founded anymore than this might be so in regard to technical farm plans. Secondly, it may be objected that the application of linear programming is irrelevant to traditional peasant societies where the profit motive does not greatly influence farming decisions. But this is to misconceive the role and purpose of the technique. The results of linear programming have the same function as any other scientifically-based recommendations. They are, in short, extension or advisory tools. And just as it is wrong to condemn a policy recommending the adoption of ley husbandry principles (where this is technically desirable) because the peasant is ignorant of the need for fertility maintenance, so it is wrong to condemn a policy which fosters maximum-profit farm systems when economic motivation is lacking. In both cases, it is essential to know the right direction to take even though it is difficult to achieve. Obviously, ley farming will be adopted more readily if fertility needs are understood and, likewise, maximum-profit plans will be increasingly practised where the commercial instinct is strong. The issue being raised here is not, in fact, the applicability of recommendations but the efficacy of extension services.

To sum up, although this paper seeks to show the benefits of linear programming as a device for raising the productivity of peasant agriculture, this is not to say that it is the only farm management technique of value in this field. The different farm management tools have their appropriate part to play in different circumstances; for example, in areas where comparatively little is known of the economics of peasant farming systems, the first essential would be an economic

farm survey which would provide an insight into the basic structure of the farm economy. Linear programming could not be used, in the first instance, under such conditions. However, it is the claim of this paper that at a certain stage of knowledge, linear programming is a most valuable planning technique, particularly on a regional basis. Indeed, it is a technique which is uniquely useful for the study of peasant farming with its simplicity of economic organisation, and which is, in some ways, even more appropriate to peasant than to fully commercial large-scale farming conditions.

This paper also seeks to emphasise the folly of an intolerant attitude towards the application of new and complicated farm management techniques to peasant agriculture. Indeed it is concerned that directors of agriculture should encourage their use if valid policies, for improving the productivity of farm resources, are to be devised. Directors of agriculture can help, in a concrete way, to encourage this forward-looking approach; for example, by urging their agricultural economists to undertake the difficult task of collecting labour data relating to peasant farming operations. This information is of crucial importance since labour is the major cost item in peasant agriculture. Moreover, although to the uninstructed, labour studies may appear to have no immediate practical value, in the long-term, they are of immense value in providing basic data for the kind of forward-planning studies that have been discussed in this paper.

AN INTRODUCTORY NOTE ON DEVELOPMENT PROSPECTS FOR
INTRA-AFRICAN TRADE IN AGRICULTURAL COMMODITIES^{1/}

By

Prof. René Dumont

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1. General remarks

Agricultural specialization in an area is useful whenever that area offers some marked advantage for the product or products under consideration. It can well, and in fact should, be combined with national diversification, in which the various areas of a single country each specialize in one or more different products. This makes it possible to avoid national monoculture and leads to development of the different areas of a single country, many of which have so far, often been more or less neglected. Even if natural economic conditions allow wide diversification of production in a given area, it is always wiser not to disperse it too much, especially as less technical knowledge will have to be acquired and disseminated and less specialized equipment will have to be purchased.

The dispatch of the commodity to the processing factory or to the port will be less expensive if production is concentrated more closely and grouped within a restricted area.

Such concentration or specialization is even more necessary for low-value commodities (bananas, oil-palm, beetroot, sugar-cane, etc.) or for

^{1/} This is an initial draft summarizing certain basic concepts and indicating some directions of trade flows which can be precisely defined in later studies. It is at present very difficult to foresee the over-all future development of African agricultural production, its rate of progress. In fact, the present rates are far from adequate, but it is not known when and how far it will be possible to alter or improve them. The development of demand will depend upon future purchasing power, and therefore, ultimately on progress in production itself. In an attempt to be specific it is therefore necessary to make rough hypotheses based on future rates of increase both of population and of production. It would be wiser henceforth to refrain from making hypotheses that are always over-optimistic.

perishable goods (milk,^{1/} vegetables, fruit, etc.). There are, however, different degrees of specialization of which an outline can be attempted. In general, African peasants still produce most of their own food themselves on their own farms. Areas which are already somewhat developed have added one or two export products to this subsistence production. In this case, the farmer buys very little food outside, which does not cause any serious problems. He can specialize, even if there is no very marked natural advantage for the commodity in which he chooses to specialize.

Problems arise, however, when specialization leads to such a restricted monoculture, as in southern Ghana, that the farmers or the agricultural labourers are obliged to buy a large part of their food. Great care must be taken before suggesting such a highly developed stage of cultivation for any given area. In such cases, it is much more important for the present natural and economic conditions to be completely suitable for the chosen specialization, than if it were simply a case of adding an export production to subsistence production, for agricultural productivity must be greatly increased, otherwise the specialization would no longer bring any economic advantage to the peasants. In fact, the peasant will have to pay much more for his purchases of foodstuffs than he did before, because they will have to carry the burden of transport and distribution costs, which are often high. Such intensive specialization therefore becomes more acceptable in the vicinity of a port, of a navigable waterway or of a railway, which reduces the transport costs. In addition, it may cause an uneven distribution of work throughout the year, sometimes aggravating rural under-employment. Let it be plainly stated that such a degree of specialization is hardly ever advisable. Even in the case of cocoa production in southern Ghana, it would seem desirable to include the parallel production of foodstuffs. This is especially the case with a "speculative" commodity such as coffee or cocoa, and it is almost always the case for garden vegetables and

^{1/} In 1961, 11 million litres of milk were collected throughout the whole island of Jamaica, requiring 1.6 million kilometres of lorry transport. This milk, produced over too wide an area, often arrived at the factory in poor condition and was of such low quality that it could not be made into cheese or condensed milk.

fruit grown on a small scale for marketing. Furthermore, such specialization in one area should encourage, first, neighbouring areas and then neighbouring countries to produce the required foodstuffs. So, for a number of products, the specialization of different areas within a single country would be a logical precursor of international specialization. The Economic Commission for Africa might propose this scheme of studies to different countries as a first step towards the market economy, and one which would not prejudice the balance of payments.

The development of intra-African trade in agricultural products should not then be accelerated artificially and should be promoted with some caution. First of all, it requires the production of large agricultural surpluses obtained under rather competitive conditions. In addition, Africans should not have to pay much more for commodities bought from other countries within their own continent (sugar and oils) than if they bought them from the exterior. A form of customs protection which would favour African products within the framework of an internal free trade area, or a sort of sub-regional common market (West, North, East or Central Africa) could be justified; but it would not be wise to establish this protection at too high a level, because this would reduce the competitiveness of African export industries. We are, therefore, going to give below a simplified introductory outline of the trade flows which it seems possible to develop within the two sub-regions of North and West Africa. This will be followed by a study of the trade that can be forecast between the two sub-regions themselves, which seems much more promising than the trade within such a homogeneous natural region as Mediterranean Africa. On the other hand, in West Africa, where there is such a marked distinction between the savannah and forest areas, it is already possible to predict better prospects for international division of labour in agriculture. Nevertheless, the majority of the States on the west coast border on these two great natural regions. Let us begin with North Africa.

2. Agricultural trade within North Africa

Libya in particular, but also the UAR, Tunisia and Algeria will probably find it more and more difficult to be self-sufficient for the main food products such as cereals, dairy products and meat. Libya has the least natural advantages because of its water shortage, but the income from petroleum is now making possible a rapid increase in imports of food supplies. This position as a major importer, especially of cereals, oils, timber and animal products, will certainly continue for some time. A preliminary development of irrigation making use of economically accessible ground water, would make it possible to attain self-sufficiency in the greater part of horticultural production, i.e. fruit and vegetables, and even to allow modest exports of some of these commodities. When the desalinization of sea water becomes economic, it will be possible to develop increasingly large coastal areas. Libyan agriculture will then rest upon a completely different basis. At that time - which we are at present unable to specify - Libya will be largely self-sufficient for foodstuffs and will even be able to develop agricultural exports. We will not repeat this assertion for the other Mediterranean countries bordering on the Sahara, for which it is also valid. The same would also be true for Mauritania and Senegal, which have arid and semi-arid zones bordering the sea. However, although such distant prospects, whose economic aspects are as difficult to estimate as their technical achievement is to foresee, are not to be forgotten in the long-term view, they need not be included in our short and medium-term studies.

Tunisia's position as an importer may also be sharply aggravated in the future, especially if, as seems likely, its population explosion continues. This country, however, already has outstanding export possibilities, especially with olive oil, production of which fluctuates around 50,000 tons. Through modernization of production, this figure could be rapidly increased if modern Italian oleoculture techniques were applied. Irrigation of the olive groves might be considered, but a more thorough comparative study of the markets for the various products that irrigation would make possible should precede such a decision. Such a study is

necessary at the level of the Mediterranean countries as a whole, but goes far beyond the framework of intra-African trade. Tunisia, like the other Maghrib countries, could develop its olive-canning industry, as consumption of preserved olives has increased so rapidly in Europe. This country also exports wine, early vegetables and fruit.

In Algeria, wine still remains by far the most important source of income from agricultural exports in spite of a small reduction. The wine used to be produced for the French market where outlets are rapidly declining, which obliges Algeria to plan for a re-conversion of its wine-growing industry.^{1/} Early vegetables, citrus and other fruit can make up for the recent recession and develop afresh, especially if wine production declines. In future, however, Algeria will doubtless import more and more cereals and animal products, just like Tunisia. Furthermore, it could greatly reduce or even almost eliminate its deficit in animal products if it combined the fight against erosion with intensification of production especially of fodder crops (the rural modernization scheme originated by Monjauze, of the forestry authority). This would mean promoting intensive fodder production, mainly for dairy farming and the rearing of sheep giving high yields of wool and meat (two lambings per year). The import of cereals would make it possible to develop agriculture, which is a very useful source of employment, with improved technical skills.

The greatest possibilities of development in agricultural production are to be found in Morocco, the Sudan and the United Arab Republic. In the latter country, however, the population seems at present to be growing somewhat faster (3 per cent) than agricultural production (2 - 2.5 per cent). As a result, meat rationing has recently had to be introduced, as there is not enough foreign exchange to purchase as much outside as is demanded by consumers with high purchasing power. Likewise, the UAR exports large quantities of rice and citrus fruit and would be quite capable of consuming the entire amount if domestic purchasing power could

1/ See E/CN.14/342: African Economic Development. French version published by University Presses of France in the Tiers-Monde series, November 1965; English version, February 1966, by ECA.

absorb it. The major export commodity remains long staple cotton. But this high-quality product is not purchased in large quantities by the other North African countries. There remains a large export trade in onions, but the other African countries can easily produce enough of this commodity to satisfy their own needs, as natural conditions are favourable.

If the industrial production of the UAR were to develop more rapidly, the rural areas would no longer be over-crowded and the average purchasing power would be increased. This would enable this country also to become a larger importer of cereals and animal products. At present, the UAR has been obliged to reduce the area under cotton in order to remedy a rapidly growing shortage of foodstuffs. However, this cannot be done on a large scale since it means reducing foreign exchange resources and thus, ultimately, the country's possibilities of equipping itself. Morocco has much greater agricultural possibilities than Algeria or Tunisia and above all, Libya, owing to its two large rivers, the Sebou and the Oum er R'bia; it therefore has more abundant water resources and vaster plains and is open to climatic influences, particularly from the sea. Besides the traditional Mediterranean trio of cereals, cattle rearing and cultivation of hardy species of trees, Morocco is developing the production of citrus fruit, mostly intended for export, but very little sold in Africa. More recently, industrial crops are being promoted, in particular sugar beet and cotton. The country is sometimes able to export barley, durum wheat and a little rice, but it will still doubtless have to import soft wheat in ever greater quantities. The cereal shortage in Morocco is also likely to grow, especially as fodder cereals, the raw material of animal products, should preferably be transformed into milk or meat on the spot, instead of being exported in the crude state.

It is true that major progress in cattle rearing and industrial crops would make Morocco almost or completely self-sufficient for cotton, dah (Hibiscus cannabinus) and sisal and even for sugar and animal products. By making an even greater effort, the country could sell a

certain amount of cotton, sugar and milk products. However, the likelihood of there being large surpluses of these commodities seems so faint that it should not be relied upon too much, since it would be necessary to combine very rapid agricultural progress in this country (in contrast with the present state of semi-stagnation) with an extremely sharp and rapid reduction of the birth-rate. The conjunction of these two conditions seems highly unlikely at present, especially as the second one is considered undesirable.

If the Sudan were better cultivated, it could, in addition to its cotton, develop large exports of bovine cattle and later even of cereals, but only if a very great effort were made in this sphere, especially in the south of the country.

Apart from the Sudan, the other countries of North Africa are, it is true, at varying stages of agricultural development, but they have more or less identical natural conditions (the so-called Mediterranean type ^{1/}). Their chief exports are similar and often include citrus fruit and early vegetables and sometimes wine (Maghrib). They are mainly oriented towards exports to non-African countries, and it seems preferable for them to maintain and develop this tendency. The Mediterranean countries are becoming more and more the "winter garden" of the wealthy European countries, which can provide them with equipment in exchange, and their products are gaining increasing access to the markets of Eastern Europe. They should not cease to take advantage of their privileged climate with its winter sunshine. This in no way prevents the increase of a parallel - but not a substitute - intra-African trade flow. Consequently, the Algerian vineyards could be partly converted to the production of non-alcoholic grape products. It would, however, be difficult to compete with Greece or Turkey in selling raisins in the UAR or Sudanese markets, as those countries have a great technical advance. Although Tunisia exports olive oil, Algeria and Morocco prefer to import cheaper oils or oilseeds such as the soya bean and groundnut. Some of the latter is already being supplied from West Africa and it will be seen that this trend could be greatly developed. Almost all of these

^{1/} See E/CN.14/342, Part VII, North Africa.

countries have shortages of cereals, timber and animal products, although there are considerable variations from country to country. It must now be admitted that in the fairly near future, concerning which some attempt at a forecast can be made, the prospects of developing agricultural trade within North Africa seem very slight.

Of course, agreements might be made, by which certain countries would specialize more, particularly in the new industrial crops, such as sugar-beet, cotton, dah, or tobacco so as to be able to supply large quantities to the other countries. It seems, however, more likely that each of them will try to be self-sufficient, especially for sugar, which requires an industry with a high prestige. This trend towards self-sufficiency should not, however, be allowed to result in excessive costs (Tunisia). Tobacco offers the advantage of providing a great deal of productive employment, which makes it especially interesting today in Kabylie in Algeria and will shortly make it interesting in the Rif in Morocco, where it could well replace kif (Cannabis indica), which is after all much more toxic.

Each country in North Africa, as in the other sub-regions, could be asked to provide a broad outline of its agricultural policy, over middle, long and very long term, for its neighbours and the Economic Commission for Africa. The study of these "draft prospective plans" would make it possible to specify future trade prospects more accurately. At a later stage, common programmes would prepare the way for agricultural development oriented towards the desired aim of increasing intra-African trade. These programmes should not, however, be effected to the detriment of the overall productivity of this sub-region, nor by a marked increase in the cost of its food supplies.

3. Trade between the coast and the interior, or between the forest and the savannah, in West Africa

This is already highly developed but not often well-known because of the number of products in the hands of the Dioulas and other merchants, African or not, who try to avoid customs control and duties, which is not very difficult. Cola-nuts, which are sent from the humid zones towards the interior, dried and smoked fresh-water fish, and cattle, which are

sent in the opposite direction, escape control to an even greater degree especially as an attempt is thus made, e.g. in Guinea and Mali, to obtain foreign currency that is considered to be more valuable. Cattle from Niger was and is sometimes sold in Nigeria even at a loss, because the money thus obtained can be used to buy cheap textiles in the latter country which are then resold in Niger at a very high profit.

Accurate data are therefore not available for the imports themselves, as they very often enter the continent through the countries where they are least taxed, and are then taken across frontiers illegally. A really effective watch cannot be kept over such immense distances and corruption may also play a part. Instead of studying this problem country by country, as in the preceding section, which would entail too much repetition, we are going to examine the matter product by product, drawing a distinction between the two trade flows, which are roughly from south to north and from north to south.

A. From the coast towards the interior: cola-nuts, fish, oils, plantation crops, timber, etc.

It is difficult to make a definite statement on future demand for cola-nuts, but it is certain that production could easily follow the development of this demand if prices remained attractive. For this, however, a middle-term forecast is necessary, since a tree plantation is involved.

The production or rather the catching of salt-water fish is developing more and more, but most of the catch is sold outside of Africa or else on the coast itself. If this fish were dried and smoked and lightly salted it could find an increasing number of outlets within the continent, if it could compete with the traditional fresh-water fish prepared in the same way. Fish meal, especially from Angola and South Africa, is at present exported to feed the cattle of Europe. It is the most valuable form of animal protein for nutrition purposes and is also the most economical and the easiest to transport and to distribute. As we have already said elsewhere^{1/}, it would be of the greatest possible value to distribute it widely and expand its consumption by the peasant populations of the interior.

^{1/} See E/CN.14/342, Part X.

When the latter keep little or no livestock and have few valuable products to sell outside, they often suffer from serious deficiencies in animal protein. The transport of salt-water fish, whether refrigerated or by plane, is much too expensive to be widely adopted and to compete with fresh-water fish in the interior, especially as the latter has the advantages of prejudice, custom and tradition.

Oil is produced both on the coast and in the interior, but unpurified, red palm oil, which is so rich in carotene, could quickly be used to overcome vitamin A deficiency, which is known to be serious in certain regions, particularly in the north of Togo. This trade could not, however, develop very much, since the interior already possesses valuable sources of local oils in groundnuts and cottonseed. The latter will be even cheaper when the fullest use can be made of oilcake through the development of cattle rearing in the savannah.

Plantation products, such as coffee, cocoa and later on, tea, would doubtless be sold in increasing quantities in the interior, especially if purchasing power rises quickly there. This trade is at present small in volume and sometimes, paradoxically and uneconomically, it even passes via Europe. It will not be possible to use rubber locally until after industrialization, but for certain products this could be accomplished in small workshops.

Tropical fruit and vegetables, such as bananas, pineapples and many others, do not at present seem to have much chance of creating any very considerable intra-African trade flow. Only a small amount of water is necessary to produce these commodities on the spot, in the interior, under generally more advantageous conditions (freshness, lack of transport costs).

Although teak can be planted in the savannah region and pine trees at a high altitude, as well as eucalyptus and many other trees, it is not usually possible to develop such large-scale timber industries as on the coast. When the latter area becomes industrialized,^{1/} there will be some important outlets for wood products (plywood, fibreboard and particle

1/ See E/CN.14/342, Part IX.

board, paper pulp, paperboard and paper) in the interior; but fuel wood and even ordinary sawwood will be more advantageously produced by the countries of the interior, except on the periphery of the desert. This latter area can be supplied with ordinary planks, fuelwood and building poles from the less arid savannah zones which are much closer than the coastal forests.

B. From the interior towards the coast: fish, cattle and meat, dairy products, fibres, cereals.

Paradoxically, dried and smoked fresh-water fish, in particular from Senegal, the flood plain of the Niger, and Lake Chad and its affluents (Logone and Chari), is at present sold even on the coast, the reason being that its flavour is very much appreciated even when the price is high. Although it is not always desirable to go too far in this direction, especially if there is a shortage of proteins in the savannah, this trade flow could be increased by improving quality and fish-preservation techniques.

More important still are the possibilities of expanding cattle-rearing, which already provides cattle on the hoof and meat for the coastal countries. If intensification of cattle-rearing became economically profitable in West Africa, as it already is in Kenya, this trade could become much more extensive. It could perhaps, at an even later date, be augmented by dairy products. The latter would be more economically produced at high altitudes and it seems highly desirable that tropical Africa should rapidly increase its milk consumption without equally increasing its imports. It would therefore be worthwhile to grant priority to this production in fairly moist high altitude zones, which are more favourable to dairy production - from Fouta-Djalon to Mount Cameroon and to the Bamiléké country, including all the higher plateaux (Northern Ghana and Nigeria, and Man in Ivory Coast). It could be combined, first of all, with valuable high-altitude crops, such as Arabica coffee or tea, as for example, in the Kikuyu reserve in Kenya. If artificial fodder gives high yields, it might even be possible one day to reserve certain of

these areas for dairy production exclusively. In order for this to be economic, production costs would have to be as advantageous as those in Kenya. If not, it would one day be worthwhile, when transport is less expensive, to import dairy products from East Africa - from Kenya to begin with and then from Kivu and later on from Ethiopia, Rwanda and Burundi - for there, natural conditions are much more favourable for such products.

A great intensification of forage crops, in rotation with high-yield sown pastures in the fairly moist savannah areas, would make possible a great increase in the output of cereals, sorghum and even maize, especially if the use of fertilizers often proves economically feasible in such areas. Then, countries in the interior might envisage selling large quantities of grain to coastal countries, which would improve their level of nutrition, as the present diet is deficient in protein, being based on tubers and bananas. As far as North Africa is concerned, however, one may wonder whether the continued importation of non-African cereals might be envisaged, as long as these can be obtained at such advantageous special conditions. This would not, however, be a step towards African economic independence, hence this question is intrinsically a political one. Nevertheless, Africa should consider carefully the price that it would be prepared to pay for such independence, in order to avoid future disappointments. Progressively systematic and accelerated development would reduce this price, but it will be hard. Some vegetables which are difficult to produce near the coast, such as potatoes or onions, could be sold to coastal areas in increasing quantities by the savannah areas. It seems more difficult to foresee any important trade flow for fruit, nor does there seem to be any reason for it. Nevertheless, grafted varieties of mangoes and some canned fruits and vegetables might one day increase trade.

Sisal is better adapted to the semi-arid savannah areas, but it is not sure that West Africa, which once produced it in small quantities, could compete in this sphere with East Africa where production costs have, so far, been very much lower. Cotton, which is cultivated in both of

these sub-regions, could be advantageously restricted to the savannahs by an agreement which would have to be negotiated, since these areas have few valuable crops to choose from. The fibre requirements of the coast could thus be largely supplied from the interior. Jute and Urena lobata, on the other hand, are more suited to the forest areas. More precise forecasts will be particularly difficult to make in this field, since the competition of synthetic fibres represents too great an unknown.

Sugar, one of the principal import items, can be produced in the forest area, watered by rainfall alone, or in savannah areas, in which case irrigation is preferable. It is rarely possible to state any general rule of superiority for one area over another as regards cost of production, since it will depend on the conditions peculiar to each project. Again with a view to providing these less-favoured areas with another means of intensifying progress, we would advise that most of the sugar required in West Africa should be produced in the savannah, so long as production costs remain fairly comparable.

4. Trade between North Africa and West Africa

A. From south to north

Timber and timber products remain a heavy import item for all the North African countries. West Africa will largely meet its own requirements once it becomes industrialized.

West African medium-staple cotton and perhaps later on, ramie, dah and other jute substitutes (where there is no sisal) could cover part of the North African fibre shortage. Imports of coffee and cocoa from West Africa are already more significant and would develop more quickly with general prosperity. Tea is, however, more imported in Morocco and in Tunisia and it will by preference be purchased from East Africa, if that sub-region produces green tea.

If high yields of sugar cane can be obtained in West Africa, it could doubtless supply sugar more cheaply than the North African countries can from their sugar-beet. It is, however, probable that the latter will soon give up producing their own sugar, at least, unless they receive

appreciable compensation. It is not easy to envisage a very large trade flow in meat and cereals from West Africa to North Africa, because the surpluses of the savannah areas in the interior will probably not exceed the requirements of the coast in the foreseeable future, even should they increase.

Bananas and pineapples could still be supplied to North Africa but in smaller quantities because the great majority of Europeans have left and scarce foreign currency must be reserved chiefly for capital goods.

B. From north to south

In the fairly distant future, North Africa may hope to produce more wool than it needs by improving the feeding of its flocks and by introducing better wool-bearing breeds of sheep; but this prospect remains very uncertain even at long term. Tobacco and cigarettes are already exported in this direction, but there is nothing to prevent a number of West African countries from developing their own production in the near future. Algerian wine flows like water in some of the towns of Cameroon, but this is far from being a desirable phenomenon. Olive oil, tins of sardines, grapes, oranges and other Moroccan fruits already sold at Dakar, as well as many high-quality vegetables and fruits, which West Africa imports or used to import from France could, in fact, be supplied by North Africa. Most of these, however, are luxury imports, therefore a policy of austerity and investment would naturally seek to reduce them.

Today it is not possible to recognize any major prospects for the development of agricultural exports from North Africa to West Africa. Since a flow in the other direction may, on the other hand, grow in importance, North Africa could try to offset it partly, at least, by developing the sale to West Africa of some manufactured or semi-finished products of petroleum and its derivatives until such time as it can sell capital goods to this sub-region.

5. Tentative conclusion

The development of intra-African trade does indeed seem to be eminently desirable, but it should not be effected regardless of the cost,

for example, by sacrificing trade flows that will be more valuable to Africa in the long run. There does not seem to be anything to be gained by carrying this objective to the point of aiming at a kind of African self-sufficiency, for this would ultimately retard the entire development of the continent. Prices may be a little higher for imports from African countries, but should not be much higher than those of extra-continental imports. It does not seem possible to determine by economic calculation alone the degree of African Customs protection which would make possible the maximum economic development of the continent, since a number of hypotheses would have to be made, many of them conjectural. Decisions on this subject will therefore be essentially political in nature. It would, however, be useful to try to determine, solely from the economic point of view, a degree of protection that would not fall too far short of the optimum; the development of intra-African trade will depend not only on the objective conditions of which we have given a first outline, but also on the trade agreements which may soon be made and on the stages which Africa will then have to pass through successfully on the way to economic unity. This will be easier to attain if difficulties are not under-estimated. "Free trade area", "common market", "political unity" - there is no miraculous slogan but only hard realities, which makes development increasingly difficult. Consequently, an effort must be made to achieve it within the most advantageous framework, by a flexible type of planning implemented within larger economic groupings.

The co-ordination, doubtless by very gradual stages, of the African national economies (most of which are now much too small to facilitate development), should be undertaken in a fashion that combines audacity with caution. An effort will have to be made to reconcile as well as possible interests that often are, and must be, divergent. If an attempt is made to conceal them, these divergences will quickly become exacerbated, thus ultimately jeopardizing progress towards unity. The process of co-ordination might begin with bilateral or, better still, multilateral preferential trade agreements. Harmonization of industrial development plans is also necessary and is, happily, already under way. Examination of the

possibilities of intra-African agricultural trade will also necessitate comparison and co-ordination of agricultural development plans.

In conclusion, the development of intra-African trade will be a most worthwhile undertaking if it is not too long delayed and if it is realized that it will not remove the necessity of much additional effort for development. It is certainly not a panacea, as no miracle is possible - at any rate in our time.

GROUP FARMING AND TRACTOR USE ^{1/}

By

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For the great majority of African land users emerging from a near-subsistence economy the logical pattern of agricultural development now and for some time to come is that of the family farm. Exceptions to this generalisation may be visualised where the ecological conditions do not favour production of farm crops, as in low rainfall areas suited for cattle development, but even under conditions which cannot offer long-term stability for progressive family farming this pattern is likely to emerge in the early stages. Development of the family farm is in accordance with the dualism of traditional sociological patterns in which the family unit for crop production is meshed with communal interest in the land as a whole and with the communal pattern of use of the grazings.

The progressive African family farmer, seeking to make headway in the market economy, is likely to be handicapped by the limited area he can crop with the resources at his disposal. Where there is no population pressure on the land early progress in the market economy is made by increasing the area of cropland but for the average family expansion by

^{1/} This article is part of a longer study by the outline, "Problems in African Agricultural Development".

that means is soon brought to a halt by the difficulty of maintaining a reasonable standard of cultivation as the crop area is increased. There is good evidence that family farming standards tend to decline as cropland increases beyond about twenty acres per family under present conditions and one of the governing factors in this position is the reliance on draught oxen for ploughing and cultivation, with consequent lack of timeliness in operation.

Advancing family farmers are induced to extend their crop area in part to get bigger incomes and in part to enlarge their land holding. These incentives are likely to result in expansion to the stage of negative returns on the additional inputs. So for instance the farmer who could get a 5 bag yield on his 16 acre holding may have stretched his effort to the point at which his yield drops to $3\frac{1}{2}$ bags an acre off 22 acres, with his gross return declining from 80 bags to 77 bags before he becomes aware of the effect of the area expansion. Two probable consequences of this position may be noted. First, the farmer is unlikely to reduce his crop acreage: it follows therefore that if a large segment of the most progressive farmers have advanced to the stage of reduced return through extensification the overall effect must constitute a serious drawback within the agricultural economy. Second, if the expansion of crop area has taken place under circumstances which hinder other farmers from expanding to their optimum areas there is a double effect in resource waste, and that position is likely to occur in areas of increasing population density under existing systems of tenure.

Although the indications are that the average optimum area of

cropland for the family farmer at this stage of development is about 20 acres there is, of course, likely to be wide variation in accord with differences in ability and differences in farming conditions, cropping patterns and techniques. Instances of 'enlarged families' are not uncommon, moreover, with the unit perhaps consisting of the resource equivalent of two or more normal families and there are likely to be gains in such grouping in regard to the area that may be efficiently commanded.

It is to be expected that against the foregoing general background the progressive family farmer tends to look towards the means of getting over what probably appears to him to be his worst handicap, the inability to plough and cultivate more land. A tractor offers him command over much more land, with a much bigger income and enhanced prestige. Unfortunately the gap between the capacity at average level of the progressive family farm and that required for a successful tractorised farm is very wide. A major advantage of the tractor over oxen is the ability to plough early and to get maximum use from the tractor in subsequent cultivations, factors which call for adequate power and proper equipment with relatively high cost in terms of capital, maintenance and running expenses in comparison with the very low cost of ox power. For economic use the tractor must not only command a large acreage but the yields from the greatly expanded area must be higher than those of the average progressive family farmer. To get such yields the farmer must make adequate use of fertiliser and to cope with the considerable increase in manual work resulting from the expansion he must employ labour. In addition, if he is not capable of servicing the tractor and operating the new equipment with reasonable efficiency the risk of failure is appreciable.

Some progressive farmers will bridge the wide gap that has to be spanned before the family farm can become a mechanised farm but they are likely to be very few at the present stage. Assistance designed to increase the rate of such a move would not be justified. Sound progress for early stage advance by family farmers calls for intensification and not mechanisation. The average annual crop output on the Northern Rhodesia Peasant Farms, which are typical family farms, probably varies from £4 to £6 an acre according to season, giving a total return, including crops consumed, of between £80 and £120 per farm from a farm of about 20 acres cropland: on the Native Purchase Area farms of Southern Rhodesia the crop output was assessed at about £8 an acre in 1960, with total farm outputs of £211. There is no doubt that such outputs could be doubled by intensification and this method of increasing the size of the enterprise has many advantages over tractor mechanisation. The inducement to more intensive practices as a means of advancement in place of the urge to expand the cropland area depends upon much better extension cover than has so far been available.

Two main conclusions emerge from the foregoing outline. First that the general pattern for African agricultural development at this stage is that of the family farm, partly because it is the logical outgrowth from subsistence agriculture, partly because of safeguards and enhances the family stake in the land, partly because it is in full conformity with the sociological background and partly because it is compatible with the varying degrees of ability emerging at what is still a relatively low level. The second is that the family farm will best

develop by intensification, that the gap between the family farm and the tractorised farm is very wide and that the tractor is not likely to play an important part in the overall advance of African agriculture at this stage.

It is not difficult to recognise that any rapid introduction of tractors on to African family farms, as by injudicious loan schemes, would fail badly because family farming is generally incompatible with efficient and economical tractor use. Nonetheless those benefits of large scale operation and of control that are associated with mechanised farming turn attention towards the possibility of gaining advantage and accelerating development through some form of group mechanisation. Such schemes offer a solution to a major difficulty in the way of tractor use by the family farmer, that of adequate employment for the tractor, but other formidable problems have to be faced.

A simple form of introduction of tractor use into the African farming pattern is that by which tractor operations are undertaken on contract amongst a group of farmers providing sufficient scope to give the tractor adequate working time. But although the distribution of the work over a number of farms may keep the tractor fully occupied the unit cost of operating is likely to be well above that of a tractor engaged on one large farm because of such factors as time lost in shifting over bad roads, relatively small lands, difficulty of supervision and maintenance, distance from operational base. For comparative purposes it is perhaps pertinent to note that the unit costs of tractor operations under these conditions are probably well in excess of the similar costs on European

farms of average efficiency. Few African farmers are likely to be able to meet the charges for such a service without loss because few have adequate overall output per acre. It is an incidental feature of this system that the tractor hire does little to displace existing input factors: so unless the hire service is used only on expanded acreage the farmer's oxen and equipment do less work, and the farmer himself may not make fully productive use of the time bought through the hire of services. The crux of the difficulty, however, is that a relatively high standard of farming is the necessary complement of mechanisation and there are likely to be few areas in which sufficient farmers have reached a high enough standard to enable a tractor hire service to operate economically.

Both the problem arising from the scattered location of individual lands and that due to the relatively low average standard of ability of emergent farmers may be countered by some form of group farming with centralised control and direction. The economic viability of such schemes will generally vary in relation to the extent of the control that may be imposed. Their framework is properly that of the paternalist system, for the higher the degree of regimentation in the scheme the better the prospects of economic viability in the early stages. If the authority responsible for funding and direction does not have full control of the land the likelihood of success will be greatly reduced for the heavy investment of scarce capital in such schemes necessitates a tenancy system with tight regulation. It will be clear that a project of this nature has none of the earmarks of a settlement scheme for the development of individual enterprise and it is questionable if the residual

freedom left to the tenant can justify the risk that it imports into the project.

The more important specific difficulties of reaching economic viability with a mechanised group farming scheme, apart from lack of full control, include the following. First, the heavy capital investment calls for highly efficient operation and relatively intensive farming systems: on the one hand, efficient labour application may be difficult to attain from operators of varying capacities not subject to the discipline of supervision: on the other, if the scheme has to provide for the production of subsistence crops unitary output may be inadequate and if the tenants produce subsistence crops outside the scheme their scheme effort may suffer. Second, unless the scheme makes provision for the differing work abilities of the tenant families (a difficult problem) there will be both unused capacity and inefficient unit cover: compared with the stimulation of independent individual enterprise, the grouping into uniform allocations with heavy capital commitment is likely to result in some measure of waste of ability in the top sector and of waste of resource in the bottom sector. Third, it should be recognised that the remuneration of the labour-tenants under a scheme in which management is provided must properly consist in the wages of labour and the rewards (if any) of risk after capital has been serviced: if as a result of poor season, market recession or over-optimistic assumptions, the rewards are small then there is likely to be a good deal of dissatisfaction and heavy tenant turnover, prejudicial to success in the following season. Fourth, and linked with the foregoing, economic viability must depend in large

measure on full-scale operation: if insufficient tenants come forward or if there are desertions after a poor year the scheme will be seriously jeopardised.

Waste of scarce resources through the initiation of schemes which are too far in advance of sector ability is likely to be accompanied by other consequences which need to be taken to full account. Thus a mechanised group farming tenant scheme implies selection of tenants and, apart from the fact that selected tenants would presumably be men of above average ability likely to advance as individual farmers within their own communities if given only a fraction of the comparable aid, their withdrawal from those communities would be almost certain to retard development there under normal circumstances. There must be some doubt, moreover, as to whether the more able emergent farmer should be induced or advised to move to an unproven labour tenancy scheme if it would involve probable loss of his customary land rights as well as some restriction of his capacity to expand, and in this connection it should be noted that such managerial ability as would contribute to an improving income as an emergent farmer would be unused (and of course unrewarded) as a labour-tenant.

CREDIT ASPECTS OF LAND REFORM IN AFRICA ✓

By

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Scope of this paper

This paper is confined to the examination of certain aspects of agricultural credit systems in relation to land reform programmes. More precisely, it is concerned with the aspects of agricultural credit measures, which are designed to alter tenure conditions favourably, so that they may act as a stimulus to agricultural development. It is necessary therefore to relate these measures to the economic setting of African agriculture, and to the process of its commercialization. The paper also deals with the concept of land reform and the use of credit to initiate and implement land reform programmes. Finally, basic guidelines for future agricultural credit policy in Africa will be considered.

It should be noted from the outset that economic development is a process consisting of a number of stages which correspond to different stages of developmental programme. Most African countries are still at an early stage of development where the transition of agriculture to a higher level is needed. An essential factor for this transition is land reform.

Goal of African agricultural policy

In the last few years, it appears that total food production in Africa has not kept pace with the rate of population growth. According to FAO estimates, the per capita food production index compared with that for the period 1953-1957 amounted to 97, 98, 96 and 97 in the years 1949-1953,

1/ This paper is based on an earlier presentation made at the FAO/ECA Development Centre on Agricultural Credit for Africa, Addis Ababa, May 1962.

1959, 1960 and 1961 respectively.

On the other hand, the majority of the African population is still in the "high potential growth" phase where little or no control could be exercised over birth or death rates. At this stage, the birth rate approximates the physiological maximum while the death rate acts as a brake preventing population from outrunning the food supplies. Prospects for rapid population growth are greater in the next phase consisting of "transitional growth", and in which death rates could be kept under control by improving sanitary, medical and educational services while birth rates remain at a high level. According to recent estimates by the United Nations, the overall rate of population growth in Africa is now over 2 per cent per annum and will soon reach 2.5 per cent by 1980. It is only in the "incipient decline" phase, when both birth and death rates are very low that a cumulative decline in population growth rate could be expected.

Thus Africa is confronted with a very serious problem which is likely to be more acute in the future; for example the problems of how to provide and maintain a level of output sufficiently high to meet the requirements of its growing population, and at the same time expand exports in order to increase foreign exchange earnings for the importation of capital and consumption goods. Emphasis of African agricultural policies should be directed at these objectives if the low level of per capita agricultural output is to be raised.

Basic factors in agricultural transition

In terms of its contributions to national employment, production, and

consumption, agriculture is the main industry in most African countries. Paradoxically, the rigid structure of African agriculture is not compatible with the aspirations of a progressive population: it is well nigh impossible to maintain the current framework of subsistence agriculture and still expect to achieve the objectives of a developing economy. Various economic and social factors are impeding the course of this process. For example, on account of the old-fashioned systems of land tenure still prevalent on the continent, it is not possible to work out credit arrangements to meet essential agricultural needs, to create incentives for investment in land, and greater security of tenure. The system of agricultural production is geared mainly to subsistence uses and not for the market, so that a high proportion of the labour force is literally tied to the soil, producing enough for subsistence in a state of stagnation, immobility and poverty. The rural sector is largely in a static state of equilibrium, at a very low level. Of course, other factors such as lack of alternative employment opportunities outside agriculture aggravate this problem.

In order to increase agricultural output, the farm producers must have incentives. They must be assured of a substantial increase in cash income. Economic and social changes have to be introduced, including changes in agricultural production techniques, land tenure system; credit availability, market facilities, resource use, and whatever social adjustments these economic factors imply.

Concept of land reform

While land reform is not necessarily a panacea for national development,

it is essentially a means of altering the structure and organization of agriculture to establish an economic framework that will ensure economic progress in agriculture.

Land reform is not confined to the redistribution of land ownership by dividing the land into small units among a new class of owners. It includes a wide variety of policies which alter "man-land" relationships and usually result in the redistribution of agricultural income and/or total farm output, as well as the creation of incentives for larger investments and increased productivity. It may therefore take one or more forms, such as changes in landlord-tenant relations, farm ownership, agricultural credit or land taxation. The concept of land reform, both in its legal and expanded developmental context, might be clarified by a study of a recent United Nations definition of land reform:

"Land reform is regarded as comprising an integrated programme of measures designed to eliminate obstacles to economic and social development arising out of defects in the agrarian structure. Included here are particularly: (a) the provision of opportunities for ownership; (b) measures to promote land settlement and security of tenure; (c) improvement of tenant conditions, e.g. by reduction of excessive rent or share payments; (d) improvement of employment conditions and opportunities for agricultural labour; (e) protection of cultivators living under tribal, communal and other traditional forms of tenure; (f) organization of farms of economic size - land consolidation; (g) land title registration; (h) extension of agricultural credit and reduction of indebtedness; (i) promotion of co-operative organizations used by farmers; (j) organization of farm machinery services; (k) fiscal and financial policy in relation to land reform, including tax measures to promote improved land utilization and distribution; (l) measures concerning land tenure as related to aspects of forestry; (m) measures to promote the equitable use of limited water supplies; (n) other related measures such as, for instance, establishment or expansion of agricultural research or education services."^{1/}

^{1/} United Nations, Progress in Land Reform, 1956 (Catalogue No.1956.11.B.3)

A variety of land reform programmes undertaken in Africa indicate non-conformity with the orthodox and restricted concept of "land ownership opportunity." They include programmes for land settlement and better land utilization like the Gezira Scheme in the Republic of Sudan, the land consolidation schemes in Kenya, individualization of land tenure in Uganda, and redistribution of ownership in the U.R.

Alternative measures for initiating land reform programmes

Drawing on the relevant experience of other countries, it seems that land reform programmes were mainly initiated by three distinctive measures: (1) political change (2) the use of credit and (3) the regulation of landlord-tenant relationships, all of which are inter-related.

Where a powerful class of landlords has a substantial control over the mass farm population and the Government is incapable of meeting the needs of a long-impooverished majority of the population, political instability may result unless drastic measures are taken. It would be necessary to introduce also reform programmes designed to improve the economic and social conditions of the masses. The U.R. land reform programme was given very high priority immediately after the revolution of 1952 although other measures, such as credit, co-operatives, and regulation of rent were used to implement the programme, it took a revolution to enact them. Similar measures of this type are relatively rare in Africa.

Although agricultural credit measures, especially the extension of land purchase and farm enlargement loans to small farm owners and tenants, may prove to be very effective in improving tenure conditions and altering land

distribution, they have not been used extensively in Africa. The Farm Home Administration in the U.S., which extends 100 per cent loans to low-income farmers for the purchase of efficient farm units is a case in point. Similarly, farm ownership is stimulated in Ireland by long-term government credit extended for 70 years or more. The result has been a significant increase in the number of owner-operated farms from 3 per cent in 1870 to about 97 per cent in 1930.

The regulation of landlord-tenant relationships in the forms of rent ceilings, long-term leases and compensation for unexhausted improvements, would increase security of tenure, provide greater incentives for farm producers, and bring about changes in the tenure system that are more favourable to the low-income farmers. Programmes of this nature in England, New Zealand, Ireland and many Latin American countries demonstrate what may be accomplished with similar programmes in the African region.

Credit aspects of land reform

Agricultural credit and land tenure are inter-related and each is affected in its organization by the nature of the other. A system of commercial agriculture with private ownership requires a credit system entirely different from that which is needed for a subsistence agriculture with communal tenure. On the other hand, if the credit system is designed to serve the various needs of agricultural development, improvement in the tenure system may be achieved while the lack or inadequacy of credit institutions may tend to freeze tenure conditions.

In view of the extreme diversities of social and economic conditions in Africa, it is impossible to outline a uniform credit policy consistent with the requirements of land reform projects. Credit principles, programmes and policy would have to be adapted to the needs of each country. Thus the cost and volume of credit needed for land purchase, farm improvement and enlargement compensation for land acquired from certain classes of large owners, farm operation, infra-structure, and various settlement and consolidation will vary substantially from one country to another. Basic economic factors determining credit requirements and objectives include the content of the land reform programme itself, and population pressure which in turn determine land value, the type of farming, the tenure system, pattern of land utilization, and other factors.

If public loans are used to finance the programmes rather than payment of compensation in bonds, the burden will fall on the public rather than the landlords. Furthermore, the various means of implementing land reform programmes - e.g. graduated taxation, the regulation of landlord-tenant relationship, or complete or partial confiscation of landed property - affect the volume of credit required.

Land values and rents are high and credit requirements are greater in a densely populated country like the U.R., than in a thinly populated one such as the Sudan. Another important factor determining the cost of the programme is the pattern of land ownership. For example, financial requirements are much lower when ownership of land is vested in the hands of a few landlords than when, as in the Sudan, much of the land is controlled by the government.

Variations in types of farming (dairy, fruit, food-crops etc.), in tenure conditions (freehold, communal, co-operative) and in land utilization (extensive, intensive subsistence) play an important role in designing credit programmes for land reform measures under these heterogeneous circumstances.

However, it should be emphasized that the execution and implementation of various land reform programmes call for the reorganization of pre-reform credit arrangements. Since the financial needs of the beneficiaries will increase the demand for capital, provisions should be made to extend short, medium and long term loans to new class of cultivators for various agricultural purposes such as farm requisites, farm machinery, livestock, farm buildings and land improvements. If institutional credit is not available on reasonable terms, the beneficiaries of land reform would have no alternative but to borrow at their own perils from money-lenders, local merchants, commercial banks and big landlords with inadequate resources, and who are not likely to be concerned with producers' welfare. Finally, if credit is to be effective at the transitional stage, it should be combined with measures pertaining to agricultural extension, marketing and co-operatives.

Compensation for dispossessed landowners is another important credit aspect of land reform programmes. Many of the considerations mentioned above, such as the content of the programme, the degree of expropriation, the burden of financing and the use of compensation funds must be taken into account. Provisions should also be made for infra-structure and public services such as roads, housing, educational and medical facilities essential for the success of land reform programmes.

~~This is perhaps the highest cost item connected with land reform~~
programmes in Africa. For example, because of the inadequacies of internal sources of finance in most African countries, much reliance is placed on external sources for additional capital as in the case of the Gezira Scheme which will be mentioned later on.

Contrasting experience in agricultural credit in Africa

The experience of two African countries, the Republic of Sudan and the UAR, illustrate credit requirements under contrasting economic conditions. The former is a sparsely populated country, most of the land is owned by the Government, and land rents and values are generally low. On the other hand, the UAR is densely populated; until 1952 land ownership was concentrated in the hands of a few landlords and land values as well as rents were excessively high.

The pattern of land reform in the Sudan, especially with regard to the predominance of tribal tenure systems, may be used as a model that is applicable to African countries interested in speeding up their agricultural transition. The Gezira scheme constitutes the biggest land reform project ever carried out in Sudan. The project was started in the early 1920's, when land reform movement was hardly perceptible in Africa. At that time the country's annual revenue was less than half a million pounds, communications were lacking and the people were semi-nomadic. The underlying motive behind the formulation of the Scheme was the provision of adequate source of revenue for the government. However, although unforeseen to its planners, the scheme gained world-wide popularity for its socio-economic impacts.

For example, the inhabitants of the area, who before the scheme were semi-pastoral and living under the tribal system, were introduced to an entirely different system of agriculture. Settlers had to adjust to new economic and social conditions including changes in land rights, introduction of cotton as a cash crop, the adoption of adequate rotation systems and improved techniques. Superior managerial supervision and extension were also introduced. As a result of all this the settlers enjoyed higher income and living standards.

The Government received blanket authority under the Gezira Ordinance of 1921 to acquire land needed for the project, on a rental basis from the former occupiers for a period of 40 years at a maximum annual rent of 10 piasters^{1/} per feddan.^{2/} The land thus acquired was redistributed free of rent in holdings of 30 feddans (later increased to 40 feddans) to tenants. The project now covers an area of about 2 million feddans. Private transfers were prohibited with the exception of a few transactions among members of the family, thus much of the land was acquired by the Government which holds control of about half of the total cultivated area. The purchase price varies from 1 to 2 pounds per feddan.

The credit requirements of the beneficiaries are met from internal resources. The scheme is run on a partnership basis between three partners: the Government, the managing board, and the tenants. Each partner

^{1/} One pound equals 100 piasters

^{2/} One feddan equals 1.03 acres

contributes to the process of production and receives a share from the net proceeds of the cotton produced. The tenants benefit from two methods of financing. Firstly, the costs of some farm requirements (e.g. seeds, fertilizers and insecticides) are charged to a joint account and deducted from the gross proceeds from the sale of the cotton. They could also retain all of the grain and fodder grown in rotation with cotton. Secondly, the managing board extends to tenants interest-free loans for production and marketing purposes. These loans amounted to about 3 million pounds in 1960. Technical guidance and marketing services are also provided by the board.

The net proceeds from cotton sales are distributed as follows: to the tenants - 42 per cent plus 2 per cent earmarked for tenants' reserve; to the Government - 42 per cent; to the Board - 10 per cent; to local governments - 2 per cent, while 2 per cent of the distributed profit is spent on social services.

The major problem in financing the Gezira Scheme was the procurement of adequate initial capital to cover the cost of constructing the Sennar Dam, to dig the irrigation canals, to level and clear the area for cultivation, and to establish transport facilities for marketing. For these, Government had no alternative but to resort to outside sources for finance.

However, other financial aspects, such as the compensation of original land-owners and methods by which the beneficiaries purchased the land did not pose serious financial problems since land value was nominal. The government had the power to acquire land by enforced compulsory leases for long periods, and the rent was paid to the land-owners from revenue

derived from the scheme. For instance, there was no need for Government to issue compensation bonds for suitable amortization periods, to fix terms for repayment of the purchase value of the land by the beneficiaries, etc. In other words, it was not necessary to establish a system of credit or extend the various types of loans necessary for other land reform programmes. The basic reasons for this situation stem from the fact that the usual problems of densely populated low-income countries, - mal-distribution of land ownership, fragmentation of land holdings, excessive land values and high levels of rent - were absent in the Sudan.

The U.R. offers a contrasting situation. While, in Sudan the initial capital required for land development and the construction of necessary infrastructures and irrigation facilities had to be borrowed from outside sources. In the U.R., land reform was financed from internal sources. In addition the main financial problems were not merely connected with land development and infrastructures but rather with the compensation of landlords for their high value land and the extension of production and marketing credit to beneficiaries in order to enable them to increase their productivity and raise their incomes. Landlords were compensated with non-transferable bonds, and credit was made available through the Agricultural and Co-operative Bank to the beneficiaries who were organized by law into co-operatives.

Furthermore, economic conditions in the U.R. before 1952 were in contrast to those prevailing in Sudan. It was estimated at the time that about 6 per cent of the land ~~were~~ owned approximately 60 per cent of the cultivable lands. Land values and rents were excessively high, per capita

income was low, the supply of land was inadequate in relation to population, and the prospects for improvement were dim. The majority of the population depended on agriculture for employment and income. There was a strong demand on the part of the people for better living conditions to which the landed governing aristocracy did not effectively respond.

Thus land reform programmes had a high priority in the new regime's plans. Fundamentally, it was designed on two basic principles. One was to limit land ownership to 200 feddans per owner, plus another 100 feddans which could be transferred to heirs. This ceiling was reduced to only 100 feddans in 1961, and rent was fixed at seven times the land tax. Land thus acquired, which amounted to about 600,000 feddans or about 9 per cent of the cultivable area, was redistributed among tenants in small plots usually not exceeding five feddans. Compensation to previous landlords was made in non-transferable bonds originally payable in 30 years and bearing 3 per cent interest, but the bond terms are now changed to 40 years at 1.5 per cent interest.

To the beneficiaries the Government extended a 100 per cent loan, repayable within 30 years, for the purchase of land; the annual instalments were kept well below the usual rent rate. Under a new credit policy intended for implementing the programme, the beneficiaries who organized themselves into cooperatives could obtain production and marketing loans from the existing Agricultural and Co-operative Credit Bank. Recently, land purchase loans extended to the beneficiaries were reduced by 25% and the period of amortization was extended to 40 years. One of the most important elements ensuring its success was the technical guidance,

supervision and extension that accompanied the liberal credit given the new owners.

Small scale projects have been undertaken recently in East African countries to improve tenure conditions. For example, individual rights in land are registered in Kenya, Uganda and Southern Rhodesia and land enclosure is enforced in Kenya, Uganda and Tanzania. Although no restriction is placed on size of enclosure in Kenya and Uganda, the Tanzania Government does not recognize areas in excess of what is necessary for subsistence agriculture.

Settlement and consolidation projects have been introduced in Kenya, Uganda and Malawi. The settlers of new areas in Uganda are issued licences by the Government. In Kenya, consolidation is achieved by legal process through which consolidated land is redistributed, on an acreage basis, to the owners after the necessary portion has been set aside for public use. Under the Native Land Husbandry Act which is in effect in Southern Rhodesia, the cultivator receives a consolidated unit in exchange for his previously fragmented holding. Consolidation is accomplished in Malawi through voluntary negotiations between local chiefs and representatives of the Department of Agriculture.

There was hardly any need for long-term loans for land purchase or compensation to landlords in all of these East and Central African schemes. The first object was to create economic land units, but the problem of extending production and marketing credit to the cultivator for farm improvement which will enable him to increase his income, remains largely unsolved.

Obstacles to effective credit development in Africa

As indicated elsewhere in this paper, there are many economic and social obstacles to the development of agricultural credit in Africa. Since only a few of the countries have effective agricultural credit institutions, and because their credit policies are not designed to improve tenure conditions, the majority of the producers are unable to obtain the credit essential for increasing their productivity and living standards. It will suffice here to summarize a few of the main obstacles to agricultural credit development.

1. Subsistence agriculture: It has been estimated that 80 per cent of African agriculture is still at the subsistence level. Under such a purely subsistence system, production is geared to personal use and not to the market. The capital used for such systems of cultivation is largely "human capital". The extension or development of credit under these conditions is not only unnecessary but also wasteful. A prerequisite for credit, therefore is the transition to a market agriculture.

2. Communal tenure: Under the system of communal tenures, land cannot be offered as a security for various agricultural loans, and other means of security are not available. The income-producing capacity of the borrower may, in the absence of free title to land, prove to be one of the basic securities for loans in the future.

3. Low land value: In most African countries land values are very low. The credit needed for farm improvement and expansion exceeds the current value of land itself. Therefore if loans are to be adapted to agricultural development purposes, other forms of security besides land mortgages must

be approved.

4. Low agricultural productivity and income: Where subsistence activities are prevalent, agricultural productivity is usually very low, and cash income is very limited because production is not geared mainly to the market. Credit needs under these conditions are scarcely felt. As indicated above, in lieu of land mortgage, the potential production capacity of the farmer is likely to be used as security for loans. The establishment of an effective credit system is hampered by lack of the cash income needed to repay loans.

Guide lines for future agricultural credit policy in Africa

Before outlining the basis for future agricultural credit policy in Africa, it should be emphasized again that a uniform policy is not feasible in view of the heterogeneous economic and social conditions existing in Africa. However, a credit policy for agriculture should be formulated in relation to national agricultural policy, particularly with respect to national land policy. Thus future land policies in Africa will have a substantial influence on the prospective nature and content of credit programmes, since the present economic state of African agriculture is not conducive to the development of a sound credit system. Land reform programmes as defined earlier constitute, of course, a major component of a land policy.

Basic factors that should enter into the formulation of a credit policy include the following:

1. Freehold vs leasehold: Because titles to most land are yet to be established in Africa, land policies may be aimed at granting perpetual leases to cultivators, or at the promotion of individual ownership. Credit policy in the former case would be directed mainly toward financing the production and marketing of farm produce. In the latter case it would be necessary to devote substantial financial resources to land purchase.

Africa is faced with a decision similar to that which confronted the developing countries almost a century ago. The US, for instance, adopted a liberal land settlement policy aimed at promoting private ownership of land at very low value, and millions of acres were leased in New Zealand to cultivators on a long-term basis.

2. Alternative types of tenure: The governments of African countries may decide on other types of tenure, such as co-operative, communal, partnership, plantation, or a combination of all these types. Credit institutions and policies should be so designed as to promote the development of these tenure systems.

3. Subsistence vs commercial agriculture: As shown above, the development of credit cannot be achieved under conditions of subsistence agriculture. Economic development plans aimed mainly at the acceleration of agricultural development or industrialization would also affect the formulation of agricultural credit policy. If emphasis is on the commercialization of agriculture, then funds should be directed towards agricultural investment and the establishment of a suitable credit system has high priority.

The role of governments in fostering agricultural credit

The role of agricultural credit in initiating and implementing land reform projects cannot be overestimated. African countries should devote greater attention to effective systems of institutional credit and financial policy aimed at improving tenure conditions, and farming techniques and higher standards of living for the rural population.

The African governments should take the lead, if not full responsibility, in such a programme, because (1) supply of public funds is usually required, (2) the amount of funds needed is substantially higher than what private institutions could provide, (3) credit programmes involve regulations which only government can enforce, (4) the scale of operation is likely to be so large that the government may be the only organization that can do the job, and (5) the government is in a better position than private investors to experiment with new schemes.

Government's initiative is also necessary to co-ordinate various supporting measures needed for the success of land reform programmes. It is not sufficient to provide adequate credit facilities because the new farmers have to adopt modern production techniques, face complicated managerial decisions and get used to the market mechanism. The extension of agricultural credit, therefore, must be amalgamated with supplementary measures in such fields as extension, marketing and co-operatives if the goals of land reform programmes are to be achieved.