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Linkages between Industry and Agriculture

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Introduction

1. A short paper dealing with the relations between industrial and agricultural development in the African continent must neglect many differences between individual countries and focus attention on some major features which seem to be characteristic of the countries in the region.
2. There is a danger, however, in over-stressing the similarity of basic conditions within the African region. The danger is that an autarchic attitude is taken in each country, if it is not realized that there are important differences between individual countries and that it is these which give scope for economic cooperation among the countries. Therefore, the present paper focuses attention not only on common features, but also on some important differences between African countries.
3. Since sparse population settlement is a common feature in Africa, it is natural to begin a discussion of the interplay between industrial and agricultural development with an analysis of the African labour market. The labour force needed for industrialization is not limited to the workers and employees who are employed in the new industrial establishments themselves. It also includes the much larger numbers needed for the construction of the industrial enterprises and for the creation of necessary infra-structure, such as transport facilities, power production, urban expansion, etc. In countries with a low degree of urbanization, most of this labour force needed for industrialization must be attracted from the countryside. This need to draw labour from a common pool creates a linkage between industrial and agricultural development.
4. While average population density in Africa is low, there are striking differences in the density of settlement as between individual countries. These contrasts, together with climatic differences, provide a basis for international specialization in industrial as well as in agricultural production. Therefore, the relative density of settlement is the chief criterion for the summary grouping of African countries adopted in this paper.
5. It must not be assumed that the grouping of African countries into more or less densely settled countries is identical with the grouping in coastal and landlocked countries which is often used in discussions of economic development in West Africa. The disadvantages of sparse settlement are not

identical with the disadvantages of being land-locked: many coastal countries in Africa are sparsely settled, and some land-locked countries in East Africa are relatively densely settled.

I. The Supply of Labour for Industry and for Agriculture

6. In the colonial period, most Africans preferred subsistence agriculture to wage labour. The Europeans had great difficulties in recruiting labour to plantations, mines and other non-agricultural activities and they often had recourse to recruiters or even to forced labour. Wage employment was usually temporary: the young men returned to the villages as soon as they had earned the amount of money they needed for the payment of taxes, bride prices and other purposes.
7. In recent decades, the attitude of the rural African to wage labour outside his village has changed radically. Very large numbers of African youths have left the villages in order to establish themselves permanently in urban areas. Employment in construction and services, and sometimes also in industry has been rapidly increasing in numerous African towns, but mostly the inflow of labour from the villages has been running ahead of demand for labour and a certain amount of unemployment has become a characteristic feature of the urban scene in Africa.
8. The flow of villagers into African towns is sometimes explained as a result of population pressure in the villages. Closer inspection suggests, however, that this explanation is valid only in rare cases, at least in Africa south of the Sahara. In most of Africa the agricultural system continues to be that of shifting cultivation on tribal land. This implies that all members of the new generation can find land to cultivate, even if population is growing at a fairly high rate. If all villagers, despite population growth, were to stay in the villages and take up the cultivation of land, it may sometimes be necessary to shorten the periods of fallow, which could lead to deterioration of the land in the longer run. This risk of land deterioration, however, does not deter the villagers from taking land under cultivation to obtain employment and income. As a result agricultural experts are worried about the risk of land deterioration resulting from population increase in villages subsisting by engaging in shifting cultivation of tribal land.
9. It is true that there are rural districts in various parts of Africa where land is privately owned and where a part of the

population is thus unable to start cultivation on their own account. However, these districts are mainly the centers of production of export crops and the increasing volume for export has provided increasing employment; indeed, it has sometimes been difficult to recruit sufficient labour for export production. The producers of some traditional African export crops have suffered from declining export prices, but as a rule the decline of prices has not prevented output and employment from expanding.

10. Recent trends in production of food in Africa have been in marked contrast to the high rate of increase of export production. Statistical data on trends in food production are poor and few, but it is generally agreed that there has been little change in traditional methods of production. As a broad generalization, production of food may have increased roughly in proportion to the rate of increase of the rural population. This means that, in the typical case, there has been insufficient increase in the marketable surplus of food to feed the villagers who have emigrated to the towns. Thus, the increased demand for food in the rapidly growing towns has had to be filled largely by imports. Some of this food has been imported from African countries which have had little urban growth or which have had some increase of productivity in food production, but a substantial part has come from non-African countries. Food imports into West Africa, for example, has been growing by more than ten per cent per annum in recent years.

11. The inflow of rural population to the urban areas has not only run ahead of the demand for labour and created unemployment, as already mentioned, but has also created bad housing conditions with the migrants living in congested shanty towns. It is important to note, however, that neither the risk of unemployment nor the lack of decent housing has been an effective deterrent to further migration. The attractions of the towns are obvious and the gap between the range of private and public services which are offered in urban areas and in the villages is steadily widening. Under these circumstances, rural youth is willing to take a long waiting period with unemployment and poor housing conditions in order to obtain the desired status of urban wage labourer or employee. They are able to take such a waiting period, because of the widespread solidarity between family members and co-villagers who will support them during this period. They can therefore refuse to accept employment for less than the normal wages.

12. In the savannah regions, migration to urban areas usually begins as a seasonal migration by young villagers leaving their home village for the dry season. However, when the dry season is over, many of them have little desire to return to village life. They try to stay in the towns if they can obtain employment or support from other town dwellers or from their home village.

13. The age and sex composition of the migrants from rural to urban areas in Africa also suggests that the attractions of the towns, rather than the lack of possibilities for finding subsistence in the villages, is the motivating force behind the migrations. It is much discussed, and much regretted, that the young people who leave the villages in search of urban employment are the more vigorous and promising members of rural life, including a large share of the literate in regions where literacy has begun to spread to the villages. This tendency is so pronounced that it has even been discussed whether it would be desirable, in the interest of rural development, to hold back the spread of primary education in the rural areas. The suggestion seems self-defeating from the point of view of rural development and its effect on rural-urban migrations would not necessarily be to slow them down. The desire for education may be so strong that migration would increase if that were the only way to obtain literacy for the migrant or for his children.

14. It has been a matter for debate among economists whether discussions about the possibilities and conditions of industrialization in underdeveloped countries should be based upon the assumption of an unlimited supply of labour. In the case of Africa a realistic approach to this question requires that a distinction be made between the urban and the rural sector. In the urban sector, it is pertinent to assume an unlimited supply of labour, because an increase of employment in an urban area will by itself raise the inflow of labour to that area from the rural districts. With increasing employment more former villagers will be able and willing to support still larger numbers on the 'waiting list' for urban employment. Thus, the inflow becomes larger and continues to run ahead of demand, so that the reserve of unemployed waiting for employment tends to be maintained.

15. This theory of an 'unlimited supply of labour' in urban areas implies that there is little hope that industrialization will eradicate urban unemployment in the near future. Many developing countries have experienced this steady inflow from

the countryside which has prevented a decline of unemployment in spite of rapid expansion of industrial and other urban employment. Italy continued to have mass unemployment during its period of rapid industrial growth in the fifties, because rural migrants continued to move in from the South, thus preventing a decline of urban unemployment in the Northern regions where industrial and other urban employment was growing at a remarkably high and steady rate. It is more than likely that this process will also take place in Africa.

16. If the above reasoning is accepted, it serves to stress an important point for industrialization policy in Africa: the need for industrialization in Africa does not arise from the need to reduce or eliminate unemployment, but from the need to raise incomes.

17. The existence of visible unemployment in urban regions must not be allowed to conceal the true picture of the rural labour market in most of Africa. Here, too, there is much unemployment in the dry seasons and working hours are often short. But nevertheless, agricultural production is likely to decline proportionately when a share of the villagers leave the village for the town. There is no reason to assume that the remaining villagers would work harder because some are leaving, except in some regions of high population density which are mainly in North Africa. Thus, in contradistinction to the urban scene, plans for rural development in Africa must be based upon the assumption of a limited supply of labour.

II. Supplies of Food to the Urban Sector

18. Demand for food in Africa is increasing, partly because population is increasing and partly because of the growth of urbanization and the rise of per capita incomes in urban areas. Furthermore, the growth of the urban population causes a shift in the composition of the demand for food. Many types of processed food are in rapidly increasing demand in urban areas and imports of meat, vegetables and fruits are rising to supplement local supplies in the seasons when domestic supply is insufficient in quantity or quality.

19. The rising demand for food in urban areas is a challenge to African agriculture, but in meeting it there are several hurdles to pass. The difficulty is not that the African soil cannot produce more than it does at present. There was a time when agronomists were in doubt about the ability of the African soil to bear more frequent harvests than it does under

the traditional system of long fallow. This stage has been passed; virtually all experts now seem to agree that the physical conditions for very large increases of agricultural production in Africa are excellent, given a radical change from long fallow methods to more intensive types of land utilization which use other types of fertilization, and taking account of the need to avoid erosion and other deterioration of the land.

20. There is agreement among experts up to this point, but no further. The long fallow system can be replaced by several other systems. One possibility is to change to a relatively extensive system of short fallow or annual cropping with ploughing of the land and application of manure or chemical fertilizer. Another possibility is to change to an intensive system of mixed farming, where fodder for domestic animals is introduced in the crop rotation. A third possibility is to create facilities for irrigation, thus allowing more than one crop a year in regions where the agricultural population is without work in the long dry seasons. For short reference, the three types of agriculture just mentioned may be labelled as the North American, the West European and the Far Eastern type of agriculture.

21. In the colonial period, most agricultural research and agricultural extension in Africa was concentrated on export crops. Only in some of the few and relatively small districts with dense population had an extension service been operating which devoted attention to the improvement of the methods used in food production. What was needed in these districts was to raise the total amount of food crops and other crops which a family could produce on a given, and small, area of land. It was felt to be of less importance what effects the suggested changes had on average and marginal output per work hour. Therefore, agricultural research and extension work were focussed largely on methods to raise output per unit of land, mainly or exclusively by increasing the annual input of agricultural labour per family. There is little doubt that many of the new methods thus recommended added proportionately more to the input of labour than to the net output of agriculture, thus lowering net output per man-hour.

22. The agricultural change which is needed in Africa today is of a different type. Since so much land in Africa is only rarely utilized for cultivation or grazing - or never utilized for any purpose - the aim should not be to raise the output of any particular piece of land in the continent. The aim must be

to raise the output per unit of labour in African agriculture so rapidly that the marketable surplus can become sufficient to feed an increasing urban population with African grown food, despite the fact that a share of the agricultural population will continue to leave agriculture and migrate to urban areas. In each rural district of Africa, the choice between the three agrarian systems mentioned above must be made with this goal in mind.

23. At this stage, our reasoning may be contradicted. It may be objected that since most African long fallow cultivators are working for a short part of the year only, or are working very short daily hours, the aim should be to raise the input of labour per cultivator family, and thereby total output and total family income, while underemployment in agriculture is reduced. The answer to this possible objection is that it is based upon an unrealistic assumption regarding attitudes to work. It must be remembered that in Africa - as in long fallow communities in other parts of the world - agriculturalists are prone to value leisure highly in comparison with the utility of additions to output.^{1/} Therefore, agricultural changes which offer additional employment opportunities without raising output per unit of labour significantly are not likely to be widely acceptable. All Africans want higher incomes per work hour, but most of them have little desire for additional agricultural work which does not raise and might even lower average output per work hour.

24. If, on the other hand, the agricultural changes which the extension personnel suggest to the cultivators make it possible to earn a significantly higher income from a work day of given length and strenuousness, they may be tempted to put in more workdays per year or more work hours per day than they are

^{1/} In technical parlance: the income elasticity of demand for leisure is high.

do it now, thus raising their total income and output through the double effect of higher output per work and more work hours per year. In other words, if agricultural policy is designed to raise the output per work hour, it may have the secondary effect of raising the labour input in agriculture, while on the other hand methods designed to raise labour input in agriculture without significantly raising output per work hour are unlikely to have the desired effect.

25. Our conclusion seems to be confirmed by actual experience in extension work in Africa. There are a few successful examples of improvement of food production in Africa by labour intensive methods with low output per man hour, but these refer to untypical districts where land is very scarce and little or no employment opportunities are offered outside agriculture. In such cases, the cultivator had no alternative to working harder in agriculture and giving up his accustomed periods of seasonal leisure. By contrast, where the cultivators have land enough to continue with the easy methods of long fallow or can avoid intensification by changing to non-agricultural employment, it is difficult or impossible to persuade any large number of cultivators to take to labour intensive farming with low output per man hour.

26. Intensive systems of farming are difficult to learn for a cultivator accustomed to long fallow methods only, and desperately few people are available to teach him how to do it. Agricultural technicians and extension personnel specialized in food production were always few in Africa, as has already been mentioned. Their ranks are now being depleted by the departure of expatriates and few Africans are prepared to fill the gaps.

27. This is not just a matter of too few years having elapsed since independence to train Africans to take over the jobs previously filled by Europeans. The problem is far worse, because there are so few Africans under training for agricultural jobs requiring higher education. And this is not due to a lack of training facilities, since African candidates can easily get scholarships for training abroad. The fact is that educated Africans, just like ordinary Africans, prefer any other activity to agriculture. Thus, few Africans seek scholarships for training as agricultural specialists, and the agricultural schools in Africa although they are few and far between, often find it difficult to fill their capacity except by accepting the less qualified of the educated youth.

The immediate effect of African independence on economic policy was to focus attention on the expansion of the urban sector, while the modernization of African agriculture was considered to be less important. When African countries began to draw up development plans, agricultural expansion came into the picture, as a means to reduce or to avoid food imports in the future, thus making foreign exchange available for the purchase of equipment for industrialization.

29. When this issue of expanding food production in order to facilitate industrialization came up, it was generally agreed that this would require much capital investment in agriculture; purchase of agricultural equipment was foreseen in the import plans and the cost of creating agricultural extension services and other rural development services were taken account of in the plans for the agricultural sector. This concern for agricultural development was not exclusively due to pressure from the planners; it also reflected the desire of political leaders to make rural people feel that they had benefited from independence.

30. However, it is of limited avail that planners and politicians begin to take an interest in the modernization of African agriculture and make financial means available for equipment and personnel, if the general lack of interest in agriculture persists. Unfortunately, there is little reason to expect any rapid change in this respect, and it is likely, therefore, that far too few and insufficiently qualified top specialists will be available to work out the strategy of agricultural change and adapt it to conditions in various localities. It is likely, moreover, that it will take a long time to train a sufficient number of sufficiently qualified extension personnel and technicians on lower levels, partly because there are too few to undertake the training and partly because too few qualified Africans are prepared to undergo this type of training - and to use it for the purpose it was meant to serve, once the diploma is obtained.

31. In conclusion, the likely lack of qualified extension personnel is compounded by the likelihood that they will have to teach a rural population deprived of its more active elements who have migrated to urban work. It seems relatively safe to predict, in these conditions, that there will be much underfulfillment of agricultural development plans and considerable difficulties in supplying the towns with the quantities and qualities of food that will be needed, if the development plans for the urban sector are to be fulfilled.

III. Population Density and Type of Industrialization

32. It is a matter of much concern to governments of African countries that they are highly dependent on agricultural exports to industrialized countries as a source of foreign exchange. Nearly all exports of African countries are primary products, mainly agricultural, and nearly all of these exports are sold to industrialized countries in other continents.

33. There are three ways to reduce the dependence of the economies of African countries on this type of exports. One is to promote exports to developing countries in other continents, another is to promote exports of processed goods to non-African countries, and the third is to promote intra-African trade in all types of goods, thus replacing some of the imports from other continents. There is little doubt that in the longer run, Africa will reduce its degree of dependence on primary exports to the highly industrialized countries in all of these three ways. However, in the short run, there seems to be scope primarily for progress along the third line of action, i.e. by increased specialization of the production for export to African countries accompanied by an increase of the volume of intra-African trade.

34. Individual African countries cannot carry out any systematic policy of import substitution without abandoning the hope of obtaining high levels of per capita incomes. Only three African countries - Nigeria, Egypt and Ethiopia - have more than twenty million inhabitants, and nearly half the Africans live in countries with less than ten million inhabitants, usually a few million only. Countries with a few million inhabitants - and even those with ten to twenty million - must export a large share of their domestic production in order to be able to pay for the very wide range of goods which cannot be produced economically for domestic use in countries with such small domestic markets. In all highly industrialized countries with populations in this range, exports are large in relation to national income.

35. Thus, there is no other route to high standards of living in individual African countries than to focuss development efforts on the creation of an efficient export sector. It is important to note, however, that this in no way implies that the African continent taken as a whole, does not have considerable scope for import replacement. A continent with

300 million inhabitants needs to import only a small share of the goods it is consuming or investing, if only the pattern of production within the continent is sufficiently diversified, with a high level of intra-trade between the individual countries. As the range of goods produced in Africa for exports to other African countries becomes larger, the range of goods imported from other parts of the world can be narrowed, thus leaving more room for imports of the type of goods which cannot with advantage be produced inside Africa at the present stage of development.

36. There are many obstacles to a rapid expansion of intra-African trade, but only two of them fall within the scope of this paper. One is the desire for self-sufficiency in food, shared by many African governments. The other is the widespread resentment felt by countries who take the risk of becoming exporters of agricultural products in exchange for imported manufactures, not only in trade with non-African countries but also in intra-African trade.

37. There are large differences between African countries with respect to climate, occurrence of mineral resources, population density and degree of economic development. Therefore, there is considerable scope for intra-African trade in agricultural and mineral products. Some such trade is already taking place. For instance, the savannah countries south of the Sahara deliver considerable quantities of livestock to the coastal countries of West Africa. However, the coastal countries are planning to replace these imports by introducing intensive systems of livestock and fodder production in northern regions within their own frontier.

38. The coastal countries have usually better possibilities for exports to other continents than Savannah countries in the interior of the continent and better possibilities for setting up many types of industries. It was mentioned above that the limiting factor for the expansion of food production in Africa is more likely to be the human resources than the provision of physical capital or financial allowances for agricultural extension in development plans. This is important to note in any discussion of the possibilities for intra-African trade: if it were the financial and physical limitations that mattered, these would be likely to be the least severe in the richest countries in Africa with the best conditions for economic development. These countries might then be able to overcome these limitations and become self-sufficient in food with the result that there would be little

score for intra-African trade in food. On the other hand, if human resources are the limiting factor, as here indicated, then the difficulties are likely to be most pronounced in the countries with the best possibilities for development of the urban sector. This is so, because these countries, with rapid growth of the urban sector give both the highly skilled technicians and the ordinary villager the best chance to satisfy their wish of avoiding agricultural work. If these countries encounter a food deficit for their urban sectors and thus have to allow food imports, other African countries could fill the gap, and intra-African trade in food may thus expand.

39. Thus, one obstacle to the expansion of intra-African trade is the widespread desire to be self-sufficient in food and other agricultural products. Another and probably more formidable obstacle lies in the fact that the less industrially successful African countries are likely to resent being allocated the role of importers of manufactures from the African countries which have more success with their industrialization policy. Recent developments in East Africa provide a good example of this obstacle to the expansion of intra-African trade in industrial products.

40. It is unavoidable that those African countries which have proceeded more rapidly with industrialization should take the lead in exports of industrial manufactures, while the countries which are less advanced in industrialization must begin by replacing imports of European manufactures by African ones, without themselves being able to export manufactures at this stage. Kenya is more advanced in industrialization than Tanzania, and under the free trade arrangement between these two countries and Uganda, exports from Kenya to Tanzania has increased much more rapidly than trade in the opposite direction. The resulting pattern of intra-regional trade is shown below:

Intra-regional trade in East Africa 1961 (mill. dollars)

Importing country	Kenya	Uganda	Tanzania ^{a/}	Total
Exporting country				
Kenya	-	19.7	24.9	44.6
Uganda ^{a/}	14.4	-	4.8	19.2
Tanzania	5.1	1.1	-	6.2
Total	19.5	20.8	29.7	70.0

^{a/} Excludes trade of Madagascar
 Source: Report of the ICA Industrial Coordination Mission
 to East and Central Africa, Addis Ababa, December 1963;
 p. 14/15/16/17/18/19.

41. It appears from the table that Kenya has a considerable export surplus in its trade with Tanzania. The latter country resents having to pay for African produced industrial manufactures (textiles, footwear, beer, etc.) with part of the earnings derived from exports of agricultural products to Europe, and insists that Kenya must take industrial manufactures of Tanzanian origin in exchange. In these conditions, the prospects for the free trade arrangement and for Kenya's exports are not too bright.

42. Tanzania is far from being the only African country to take a pessimistic view of its chances of industrialization under a system of free trade among African countries. Therefore, discussions about industrial coordination held under the auspices of the United Nations Economic Commission for Africa have been focused on attempts to arrive at a mutually agreed planned distribution of industries among African countries. The idea is that industries should be allocated among the countries in such a way that all countries obtain an appropriate share. It is hoped that in this way not only countries with a late start, but also countries with more permanent handicaps, due to small markets, lack of mineral resources or awkward geographic position could avoid falling behind the others in their rates of industrialization and development of per capita incomes.

43. In discussions of industrialization in Africa, it is necessary to distinguish between the obstacle to industrialization which is caused by the smallness of population in most African countries and the obstacle which is caused by the low degree of density of settlement in most of Africa. In densely peopled Europe, small countries need only make free trade arrangements or common markets in order to overcome the handicap to industrial growth from which they are suffering. But in Africa, most countries have small home markets, not because they have small territories, but because their often huge territories are very thinly populated. Countries with very low population densities are unsuitable as locations for medium and large size market oriented industry. This handicap cannot be overcome by free trade and common market arrangements, and if market oriented industries are set up in sparsely settled regions they cannot compete with similar industries in more suitable locations without being permanently subsidized in one way or another.

44. Although population density is exceedingly low in most of Africa, there are certain regions, first of all the region north of the coast of Benin and districts near Lake Victoria

where populations of twenty-five to fifty million live within a relatively small area. Such regions must unavoidably exert a strong attraction to market oriented industries. Small centers in sparsely populated regions with smaller markets will find it difficult to compete with them. The attraction of the big population in the Victoria region is already being felt in East Africa. A foreign firm which had agreed to set up its East African processing plant in Tanzania instead of in Kenya, chose to place it in northern Tanzania rather than in Dar-es-Salaam, which is less favourably situated for serving the Lake Victoria region.

45. In addition to the big densely settled regions already mentioned, there are in Africa a number of much smaller, densely settled districts which are usually separated from each other and from the larger agglomerations by vast areas of very sparsely peopled forest, savannah or desert. These smaller, densely settled districts will no doubt become centers for market oriented industries of the kind which lend themselves to economic production even at a medium-size, while they will be unable to compete for the location of large-size market oriented industries. Sparsely populated countries with still smaller markets are best suited for specialization in raw material oriented industries producing mainly for export. According to local circumstances, these may be processing either ores and other minerals or products from agriculture, pastures, forestry and fishing.

46. In advanced industrial countries it is usual, in grouping of industries according to their preferred location, to distinguish several groups, in addition to the broad and basic groups of market-oriented and raw material-oriented industries. For instance, it is usual to distinguish between labour-oriented industries and 'footloose' industries, the latter group consisting of industries which can be located almost anywhere in the territory without making much difference to the costs of production. The special conditions of Africa are such that all the industries which elsewhere in the world might be classified in the two latter groups as labour-oriented or as 'footloose' would seem to be market-oriented, since they are likely to have much lower costs of production if they are set up in major urban centers in regions of large and dense population, than if they are located in other parts of Africa.

47. Take first the labour-oriented industries. Even in densely populated and highly industrialized countries, labour-oriented industries are attracted to the big centers

of market-oriented industries which are by definition the largest agglomerations of potential industrial workers. They may, however, be attracted to other locations if these have significantly lower labour costs. In Africa, it seems most unlikely that labour costs would be lower in sparsely populated regions than in the centers of regions with a large and dense population. Wage rates may be lower far from these centers, but in view of the high incidence of labour migrations in Africa (including labour movements from one country to another), it is unlikely that the difference would be large enough to outweigh the higher efficiency of labour and other advantages of the centers. The population in the densely populated regions is more familiar with modern techniques and types of work. Literacy rates are higher and schools usually of better quality.

48. It is true that a large share of the population in the big towns is composed of recent migrants from rural areas, including some from sparsely populated regions, but it has been noted already that it is often the best elements that migrate to the centers and the less qualified who are available for employment in their home districts. The high labour costs in the less urbanized regions are partly due to the fact that workers in such regions are more likely to spoil materials and equipment by misuse and carelessness, than are workers with some urban experience and education. This factor is reinforced by the difficulty of providing spare parts and qualified repair work outside the industrial agglomerations.

49. The factors already mentioned, together with the fact that transport costs are high all over Africa, except in the most densely settled regions lead to the conclusion that there can not be 'footloose' industries under African conditions. There must necessarily be a very strong tendency for the concentration of manufacturing industry in the densely settled regions which can afford better infra-structure and can attract the best qualified workers, technicians and managers.

50. Outside these locations, the only medium- and large-size industries which can be competitive are raw material-oriented industries either of the 'heavy' type, processing ores and other minerals, or of the 'light' type processing raw materials from agriculture. Even raw material-oriented industries of both types will prefer location near the markets,

unless the raw materials (or power) they use can be produced more cheaply in sparsely settled regions away from the location of market-oriented industries.

51. It is of course possible for a country to choose a type of industrialization which runs counter to these considerations, but the result is likely to be unsatisfactory. Such a country will lose the advantage of profitable trade with neighbouring countries with different types of industrialization, and when other African countries will have outgrown the need for infant industry protection and take steps to liberalize their trade, the country with an unsuitable type of industrialization may not find it possible without painful adjustments, to take part in this movement, because it has set up industries which are in need of permanent protection and not only of protection in the first years of their existence.

IV. The Integration of Agriculture and Raw Material Oriented Industry

52. For sparsely populated regions without possibilities for the establishment of low-cost market oriented industries, the advantage of raw material-oriented industries is not in the processing costs, but in the costs of the raw materials (counting fuel and power as raw materials). Processing costs are likely to be higher than elsewhere, because labour costs are likely to be higher, as already mentioned.

53. Thus, industries are raw material-oriented only if it is more convenient or cheaper to transport the industrial product than the raw materials used in its production. Otherwise, it is likely to be cheaper to undertake the processing in the market region.

54. Take cotton for instance. Raw cotton loses weight in the process of ginning. Therefore, cotton ginning takes place in the region where the cotton is grown. Ginned cotton, on the other hand, is as easy and cheap to transport as cotton yarns and cotton textiles, and there is thus no particular advantage in setting up the textile industries in the region where the cotton is produced. If this region happens to be densely populated and thus provides a sufficiently large local market for textiles, a textile industry may be set up to serve this market, but otherwise the crude cotton is likely to be transported away from the region. It is only at a later stage, when the country has become highly industrialized that the cotton industry can

become footloose, because there are no lower significant regional differences in the efficiency of labour or in the quantity and quality of infra-structure.

55. It has been suggested, during discussions among African governments about the possibility of an agreed geographical distribution of industries in West Africa, that cotton industries producing for exports to other West African countries might be located in some land-locked countries which now export raw cotton and in which the domestic market is too small to support a cotton textile industry. There seems to be a considerable risk, however, that such industries would long remain high-cost producers, unable to pay the producers of cotton as much as these could obtain by exporting unprocessed cotton.

56. In contrast with cotton, many other agricultural products are inconvenient to transport in crude form. This is true of perishable products like fruit and vegetables, livestock products and fish. Such products are expensive to transport over long distances under tropical conditions while suitable processing can solve the transport problem. Forest products too are inconvenient to transport in crude form, because there is considerable loss of weight in the processing. Owing to the gradual exhaustion of forest resources near the sea ports, there is demand for timber from more remote regions where the timber may more conveniently be processed locally. Thus, food processing, timber and paper industries would seem more suitable for location in distant and sparsely populated regions than textile industries, provided, of course, that the crude products can be produced at costs low enough to enable the processed goods to bear the cost of transportation to the large urban centers of Africa without becoming non-competitive in relation to local products or to imported non-African products.

57. It is often recommended that small-scale food processing industries should be set up in rural areas as a means of reducing seasonal and other underemployment in agriculture and to improve the incomes of the rural population. The further suggestion is often made that such industries should be organized as cooperatives run by the farming communities, and that agricultural extension and other types of rural development services might assist the cultivators in producing the type and quality of products needed in these industries.

58. It is not possible to base the processing of agricultural products for export on this type of enterprise.

Those African countries which will most need to base their industrialization on a specialization in agricultural processing industries are among those which have hitherto been least affected by modern influences. Their agriculture is overwhelmingly a non-monetized production for consumption by the cultivator's family with the sale of only a small share of the output of food or of a small quantity of other products, which are usually of poor quality. The social system is highly traditional in such rural areas; elders and traditional chiefs dominate, and the younger members of the communities are subservient to them. Cooperative industries set up in such regions must necessarily be dominated by the least enterprising and most traditional elements of the local population, and there is thus a risk that these industries, instead of being a means for modernization and increased efficiency in traditional agriculture, will themselves be contaminated by the traditional inefficiency of primitive agricultural economies.

59. Industries producing for export markets must have management and technicians of high quality. The flow of production must be uninterrupted (apart from seasonal interruptions) and consist of products of uniform and reasonably high quality. Food processing industries catering for export markets must maintain high hygienic standards.

60. In order to meet these requirements, enterprises producing for export must be large enough to be able to pay high salaries to management and the chief technicians. (An enterprise can consist of a number of relatively small industrial plants under the same management). Moreover, the enterprises must not be dependent for their supply of raw materials on the whims of the leaders or members of traditional rural communities, unaccustomed to meeting firm time-tables and with little regard for quality and hygienic standards. Thus, the industrial enterprises must be autonomous in relation to the traditional local communities and it is desirable that they should organize and supervise the agricultural production on which they depend for their supply of raw materials.

61. In sparsely populated African countries which have possibilities for setting up this type of industry, the rural population will be found to consist either of tribes of herdsmen or of agriculturalists cultivating tribal land by very extensive labour systems of shifting cultivation.

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These types of activities may produce low yields per unit of land, but food can be produced for subsistence with a small input of labour per family, usually less than one thousand hours per year. In other words, in activities of these types, labour productivity, as measured by the output of food per hour of labour, is not particularly low. In fact, it is much higher than in regions where agriculture is more intensive but where the use of modern equipment or chemical fertilizers has not yet been adopted. The annual output per family is low, not because output per hour of work is low, but because the number of hours worked per family is low.

62. This traditional pattern of work in sparsely populated regions is an important factor to keep in mind in discussions about industrialization in Africa. A labour force accustomed to very short daily hours or to long periods of idleness between short seasons of agricultural work cannot easily be adapted to modern types of regular work in industries or in modern-type agriculture. All parts of Africa are suffering from this obstacle to economic development, but the handicap is more serious, the more sparsely populated is the region and the more labour extensive is the traditional agricultural system. It is generally agreed that the problem is most formidable where the local population is composed of nomadic herdsmen accustomed to no other work than pasturing of their flocks.

63. The youths belonging to tribes of herdsmen or to cultivating tribes applying very extensive systems of long fallow on tribal land, usually have no desire to become independent, land-owning farmers. The more enterprising among the young people desire first of all, to leave the village, dominated by the elders, and obtain well-paid employment in a distant area where they are able to freely dispose of the earnings of their labour. In order to obtain employment of this type, they are willing to accept longer working hours than the ones to which they were accustomed in their home village (although it may require intensive training and considerable time before they agree to work with consistent effort throughout the working day). Thus, it would seem advisable for several reasons, in the case of agricultural or pastoral production related to the food processing industry, to recruit wage labour from among the young people who are eager to leave their home village instead of having production organized by the villagers themselves in their traditional surroundings. It should not be

difficult to find suitable land on which to organize production of this kind in the very sparsely populated countries.

64. Many European plantations have organized agricultural production around a processing plant, relying on wage labour, but their labour policy was usually to recruit a large, rapidly shifting and poorly paid labour force, which continued to be uncommitted and inefficient, and needed steady and intensive supervision by European staff. If industrialization is to have a chance in the least developed regions of Africa, labour policy must be the exact opposite of the above. The workers must be carefully selected from among the best elements of the rural population. All of them, the industrial as well as the agricultural workers must be systematically trained in the class-room and on the job, and the wage system must be one which gives strong incentive to individual effort and to careful work and careful handling of equipment and materials.

65. The organization of local agricultural production under the auspices of a large processing industry has the further advantage of helping to mitigate the scarcity of agricultural technicians. It has already been mentioned that educated people willing to specialize in agriculture are a desperately scarce resource in Africa, and it is therefore important that such people should be utilized in the most efficient way and offered the best possible conditions of work and other facilities.

66. Agricultural technicians are more efficient, when they can give orders to a staff of wage labourers, than when they are engaged in persuading traditional cultivators to change their methods and types of crops. They can obtain more attractive living conditions and have a better chance of promotion if they work on the staff of a modern integrated processing industry than if they are dispersed in traditional villages.

67. Africans do not seem to be firmly tied to their home districts. They are inclined to leave regions where they cannot obtain as high a remuneration for their qualifications as elsewhere in Africa. If agriculture-based industries in sparsely populated countries can become efficient and able to pay high salaries and wages to qualified persons, they may become poles of attraction for people who would

otherwise have emigrated from the country. Ordinary villagers, as well as the best educated youth, may then choose employment in such industries and in ancillary activities, such as offices, workshops and technical schools attached to the industries.

68. The industrial processing of agricultural products is often regarded as a less desirable type of industrialization, because it is thought to have little or no local spread effects. It is certainly true that such processing industries, established in regions of sparse settlement are unlikely to attract market-oriented industries, but this is because of the small population in the region. A 'heavy' mineral processing plant of similar size would not have much spread effect either. Even the exceptionally large and rich mines in the African copper-belt had little spread effects, because the region where they happen to be located is very thinly populated. In such regions, it is difficult, if not impossible, to achieve the agglomeration effect where new market-oriented industries attract other market-oriented industries and succeed in attracting further population by immigration. However, agriculture-based industries can have important spread effects if they contribute to raising labour productivity in agriculture in the region where they are located.

69. A thinly populated country, specializing in industries which process agricultural or mineral products for exports, becomes dependent on markets in more densely populated African countries which buy the latter's products for consumption or for use in their own market-oriented industries. However, the dependence works both ways since the thinly populated countries which develop industries processing local raw materials can offer the more densely populated countries an outlet for their industrial products. In other words, the sparsely settled country which chooses the type of industry to which it is best suited enjoys the advantage of having an economy which is complementary and not competitive to those of its more densely populated neighbours with resulting better possibilities for economic production in market-oriented industries.

70. Trade agreements and coordination of development plans are likely to be more easily arranged between local groups of neighbouring countries which are developing complementary patterns of industrialization, than between the wider groups

of Africa... industrial... oriented
for... types of... oriented
in Africa.

21. By promoting the right type of industrialization, specially in those countries which have better possibilities for setting up a wide range of industries. Thus, instead of making vain attempts to compete with other African countries in the fields where they face at a disadvantage, they may look for the growth of market-oriented industry in other African countries by improving the markets for their own industrial and ordinary exports.

4. Use of Industrial Input in African Agriculture

22. The preceding sections of this paper deal with the contribution of the rural sector to industrial development in Africa; the transfer of labour and of food from the rural to the urban sector and the input of agricultural raw material in industry. It must now be asked, to what extent African industry can help to solve the problems of the rural sector. In other words, what is the scope for use of industrial input in African agriculture?

23. It is generally agreed that there will be a widening market in Africa for chemical fertilizers and insecticides and some African countries are setting up or planning to set up industries to produce such chemical inputs to agriculture. The future demand for equipment for agriculture is less easy to foresee, because the type of equipment needed depends upon the system of cultivation which African countries will choose to replace the low-fallow system. In a previous section, the possible alternatives were briefly referred to as the Far Eastern System, the West European System and the North American System. The first of these types of farms would require widespread use of irrigation equipment, if it were to be applied in the dry regions of Africa; the second system requires ploughs and other equipment suited for animal draught power; and the third one requires the use of mechanical traction, and ancillary equipment. Thus, the amount and kind of equipment needed varies widely according to the system of agriculture and it is therefore necessary to discuss the scope for the introduction of each of these types of agriculture in various parts of Africa.

74. There are in Africa large areas of land in arid regions which are used very extensively in low-fallow systems or not utilized at all. These unutilized or unutilized areas could be opened up for farmland by the building of access roads and by land clearing. Therefore, production for export on artificially irrigated land is unlikely to be profitable, except if the costs of irrigation are low and the distance to markets relatively short compared with the distance which separates the same markets from humid land suitable for growing the same type of crops.

75. The irrigation projects which are being set up or are being planned in dry regions of Africa are mostly large-scale schemes for the damming of rivers. Usually, such schemes are very costly: investment per hectare of irrigated land seems to range from 1000 to 2500 dollars. Crops grown on such land must be sold in the home market at prices which are likely to be far above those at which the products could be imported, or the full capital costs of the project cannot be covered.

76. Large irrigation projects are not the only possibility of bringing water to dry regions of Africa. In many parts of these regions, this can be done much more cheaply by various types of small-scale irrigation. In addition to having lower capital costs per hectare of land irrigated compared to large-scale projects, small-scale irrigation has the further advantages that the equipment can be produced more easily by African industry than can the equipment for large-scale schemes, and that small-scale irrigation allows a more flexible adaptation to the available supply of labour than does large-scale irrigation.

77. In large-scale irrigation schemes, full utilization of the capacity can be obtained only if the input of labour in agriculture in the district where the project is located can be increased rapidly either by the immigration of labour or by a sufficiently radical change in the work habits of the local population. Some large irrigation projects in Africa, created with a view to providing additional employment for the local population, have in fact been unable to recruit sufficient labour to produce more than one crop annually and have therefore been forced to use highly mechanized methods of production. This would appear to be a striking example of misconceptions about the true supply elasticity of agricultural labour in Africa.

78. Small-scale irrigation projects are not dependent on whether a large or small share of the local population desires to obtain additional employment. Enterprising villagers who desire to grow some irrigated crops in the dry season - for local use or for exports - can do so, while the less enterprising villagers may continue with their traditional system of work until the improved living standards of the former become a sufficiently strong motivation for emulation. In this way, small-scale irrigation may spread slowly in step with the change of attitude of the villagers.

79. The choice between animal and mechanical draught power to replace the traditional hoeing of land is a much discussed dilemma. A priori, there seems to be several arguments in favour of the introduction of mechanical power in African agriculture: the increasing needs of the urban sector for agricultural products combined with the steady migration of part of the rural population to the urban sector makes it desirable that output per agricultural family should increase rapidly. The attitudes of the rural population make it unlikely that this can happen through a rapid and radical increase in labour input per family in agriculture but the introduction of mechanized equipment might help to provide a break with old attitudes. The low man-land ratio in most of the continent makes it physically possible to expand very rapidly the area that is tilled and harvested in any given year, since the long-fallow periods can be shortened or eliminated when chemical fertilizer is applied to the land.

80. The chief advantage of using animal draught power and animal manure instead of power-driven equipment and chemical fertilizer is that less money expenditure is required. But although money expenditure per unit of output may be lower if the first alternative is chosen, the cultivator family must provide a much larger input of labour per unit of output. This is the chief reason for using this type of labour-intensive agriculture in preference to agriculture with more industrial input in those parts of the world where the agricultural population is dense in relation to available land, and it may also be suitable, for the same reason, in districts of Africa, where the man-land ratio is higher than usual, where land is privately owned, and where there is fragmentation of land. By contrast, it seems less

suitable in those parts of Africa where a more rapid expansion of cultivated area could be obtained with the use of mechanized equipment than with the use of animal draught power.

81. If we look at the actual experience with the use of mechanized equipment in African agriculture, we see a rather mixed picture. In some regions of white settlement, mechanized traction has been spreading very rapidly, but in areas farmed by Africans it has usually proved uneconomic. There seems to be several reasons for this difference. The Africans usually had no experience in handling mechanical equipment; it was misused and deteriorated rapidly. Sometimes the land was also damaged by incorrect use of the equipment or by the use of unsuitable types of equipment. In most cases, insufficient or no preparation was made before the introduction of the equipment. Finally, in some cases the cultivators seem to have used the equipment not to increase output, but to add to their hours of leisure.

82. Many agricultural experts have concluded from these experiences that the introduction of mechanized equipment in African agriculture should be deferred until the cultivators have learnt, from experience with simple animal-drawn equipment, how to handle equipment without spoiling it and have learnt, from experience with more intensive systems of irrigated and mixed farming, to value additional income more than additional leisure.

83. The transformation of African agriculture will necessarily be slow, if it is to take place in step with a change of attitude in favour of additional manual work. There is considerable risk that the less enterprising villagers will avoid the adoption of methods of labour-intensive farming, or will adopt them so half-heartedly that the results may fall short of expectations, as has already been discussed. The more enterprising villagers are more likely to seek an outlet for their energy in the more attractive, and more mechanized, non-agricultural occupations.

84. It has also been proposed that mixed farming with animal draught power and produced fodder be introduced as an intermediate stage preceding the introduction of mechanized power. This seems seriously to underestimate the difficulty of teaching African cultivators to operate such a complicated and wholly new system. The cultivators must learn not only to operate the equipment and to use and feed the animals, but also to use more complicated systems of rotation which require that all the

different crops are sown at the right time and all operations throughout the year are timed in such a way that the crops benefit from the growing season most suitable for each of them. As mentioned before, there are very few technicians available who can teach the cultivators and supervise their activities to ensure that they follow instructions correctly.

85. It would be less difficult to teach some of the more alert young villagers how to handle a specialized equipment and to introduce simple systems of specialized cropping with the use of chemical fertilizers and insecticides instead of having to teach all the villagers how to operate systems of mixed farming. In fact, rural youth is operating lorries and busses in all regions of Africa where a modern road system is available. It is true that the motor vehicles deteriorate rapidly and thus are very costly to operate in rural districts of Africa, and that the same could be the case with tractors. But this may have to be accepted as an inevitable weakness of an infant industry, which could be overcome only by systematic training and long experience.

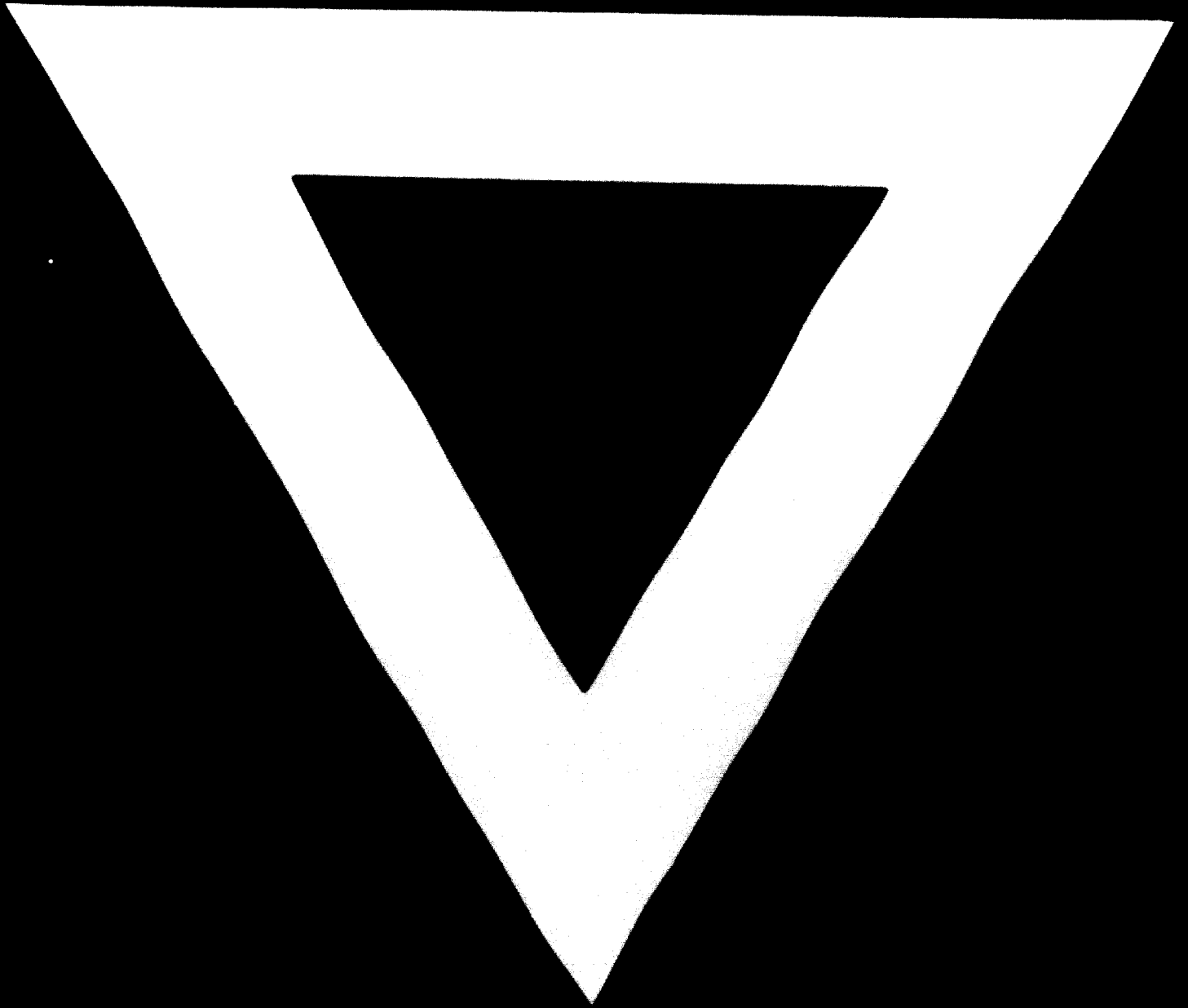
86. It was suggested above that in sparsely populated regions of Africa, where very extensive systems of long fallow cultivation are practised and where there is a traditional social structure, it might be preferable for processing industries to undertake the production of their own agricultural raw materials. Such a type of agricultural organization would be well suited to the mechanization of agricultural operations, if that were desired, since the industrial enterprise could train the necessary mechanics and drivers and control the use of the equipment. A hire service with mechanized equipment for use in neighbouring villages might be attached to such an enterprise and this could be the first experimental step towards partial mechanization of more traditional systems of farming. If the villagers had to pay for the hire service without any subsidization, there is little risk that they would use the services to lower their input of labour instead of using it to raise total output. This risk arises only when the cultivators obtain the equipment too cheaply.

87. In many regions of Africa, the change-over from long fallow systems to other types of cultivation requires heavy investment in the levelling of land, removal of roots, etc. If heavy tractors were used for this type of work it would increase the willingness of the cultivators to change their system of agriculture. Subsequent use of tractors for cultivation raises some intricate problems of land tenure in communities used to applying shifting cultivation on tribal

land. This is because cultivators who can afford to pay for tractor services can occupy a disproportionate share of tribal land. The need for tenure reform would also emerge, however, in such communities where the change is to ploughing with animals instead of hoeing the land, since this change also enables the better-off cultivators to encroach upon the land rights of other villagers. The need for tenure reform does in fact arise as soon as the system of low fallow is replaced by any other type of agriculture.

88. The remarks made above make no claim to have solved the dilemma of the type of agriculture to be applied in sparsely populated regions of Africa; they only attempt to show that it is a dilemma. It is difficult to accept the idea that Africa could completely reverse the traditional sequence of development, with mechanization of agriculture occurring after the urban sector has reached a high stage of mechanization. The idea of introducing mechanized or partly mechanized farming in villages which are still dominated by traditional leaders belonging to the old, non-literate generation seems far-fetched and unrealistic. But it may seem equally unrealistic to advocate a change to those types of farming which are used in densely populated regions with a shortage of land, since the chief advantage of the sparsely populated regions of Africa lies in the abundance of land which can be taken under cultivation or become available for improved grazing if modern mechanical equipment is introduced. Therefore, the inevitable conclusion is that much more thought and research must be applied to the problem of the future farming systems in Africa, before the question of the role of African industry in solving the problems of African agriculture can be conclusively answered.





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