Agricultural and economic development

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Practically all tropical and sub-tropical regions are technically under-developed. Their inhabitants are poor and have always been so. A small proportion of the inhabitants still depend on hunting, fishing and food gathering as a means of subsistence (e.g. many Papuas), produce no surpluses at all and hence no reserves or capital, and consequently always live at the minimum subsistence level. Some of them, for instance the Zulus, depend on cattle raising for exchange with, and usually combined with the suppression of, agricultural peoples, and these groups are also poor.

But the great bulk of the tropical and sub-tropical population consists of farmers likewise with a very low per capita production and hence also small surpluses either of food or other products and no reserve or capital.

There is abundant evidence that these conditions have always prevailed. Where the conditions governing subsistence were comparatively unfavourable, for example owing to scanty, irregular or excessive rainfall, there was either a very slow expansion of the population or none at all and the population density continued to be low and the bulk of the inhabitants poor. Where conditions were more favourable owing to the better climate and good soils there was a great increase in population, but the per capita production was still fairly low and even fell until the minimum area per capita and the maximum population density had been reached, when all available land had been brought into cultivation.

The many difficulties in all these regions, expressed in opposition and antipathy to the West, necessitate the most objective possible analysis of their situation so as to give a greater stimulus to possibilities of developing them.

The question arises as to whether these regions have been unable to develop because of Western influences, or whether any other causes can be adduced for their backward situation. A further question is whether as a result of or despite Western influences they have been able to develop to some extent but that the benefits have largely accrued to the West. The latter argument has been repeatedly and primarily put forward by Western critics and these exploitation theories have been adopted by the peoples concerned. Hence it is very widely assumed that the West has grown rich by exploiting the underdeveloped areas. The question is, therefore, are these accusations just, and to what extent?

It will be found that intrinsic factors are responsible for the backward situation of these areas, these factors being partly unalterable and due to their natural conditions, and partly capable of modification and based on their cultural pattern, the result being retarded development owing to both factors. In addition the cultural, political and economic influence of the west may also have played an active part.

One example of the latter is the introduction of Western hygienic methods and medical care without a simultaneous increase in the per capita production. In the West also improvements in hygiene and medical care preceded an increase in agricultural productivity, but the simultaneous progress made in science and technology

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enabled the per capita agricultural production to be increased and thus cope with the great increase in population.

But in the under-developed areas of the tropics and sub-tropics the only direct result of improved hygiene and medical care was a great acceleration in the population increase (India, Java), agricultural production lagging behind owing to the lack of suitable land and the lack of technical development in agriculture. True, attempts were subsequently made to develop agriculture intensively in these areas as well, but Western agricultural techniques often proved unsuited to the tropics and sub-tropics. A correct assessment of the development possibilities of tropical and sub-tropical agriculture is a problem in itself, and one which is still unsolved. Consequently although a large part of the world does not live in perpetual hunger, it has a diet of which the quality (proteins, vitamins) is inadequate. Together with the incidence of many tropical diseases, due to tropical conditions and also to poverty (inadequate technical development, sanitary provisions, drinking water, medicaments, protection against insects, etc.) it has led to a cycle of inertia and low output.

Throughout the world agriculture was the primary production factor. This resulted in the first reserves made for the further differentiation of society so that industry, mining, transport, commerce, science and technology were able to develop.

In very broad outlines, agriculture has developed along the lines indicated below and in so doing it has largely determined the present situation.

In most *tropical areas* human labour is the only kind employed in agriculture. Agriculture is a primitive cultivation with the hoe, or else it is practised with a digging stick or dibble on permanent or alternate fields, the latter form (shifting cultivation) being the predominant one. This results in a family farm [1] of not more than half a hectare to two hectares. Added to this, the fabulous wealth of tropical agriculture is usually non-existent. On the contrary, the labour needed per hectare for opening up, preparation of the land and tending the crop is considerable and the yields per hectare are low. The reasons are as follows:

1. the very rapid weed growth under conditions of high temperature and humidity and the impossibility of timely weed control when there is constant rainfall, so that the area which can be tended per capita remains on the low side,
2. the poor fertility of the soil which is leached by the constant rains, apart from recent volcanic and a number of recent alluvial soils, and
3. the short day-length in equatorial regions.

The latter two factors depress the yields per hectare. On the other hand it is true that with a little technical development it is often possible to obtain two crops a year of annual crops when the soil is suitable for permanent land use.

The disadvantages of the tropics are particularly reflected in the yields of the food crops, but to a much lesser extent in those of tree, grassland and forest crops [2] which are able to grow and produce throughout the year, whereas in food agriculture practically only one crop a year is obtained over a short period. Moreover tree crops and grassland require much less tillage and weed control.

Consequently the inhabitants are scarcely able to produce the necessary food crops, and it is obvious that in this situation no one is capable of producing much more food than he needs for himself.

1 Mutatis mutandis the same is true of other types of farms.
2 Moreover, prices of food crops are comparatively low.

Draught cattle are occasionally employed in tropical agriculture (e.g. in India and Java) and this makes somewhat larger farms possible.

An autonomous differentiation of society in which a substantial part of the population would be engaged outside agriculture is excluded by the very fact that there is not enough food available for producers outside agriculture. The accretion of capital for developing industry and commerce, technology and science, which could develop agriculture in turn, is practically impossible.

There is still a considerable difference between areas in which shifting cultivation is practised and a different field is cleared and planted every year, and areas with permanent agriculture on good soils (recent volcanic soils such as in Java and Salvador, or recent delta alluvia as in Tonkin) with a favourable climate, where there can be a great increase in the density of the population and there is in any case a large and concentrated surplus of labour at certain seasons for public works (e.g. in the ancient kingdoms of Java, Champa, Cambodia and Burma). But even at an early period cattle was used in these kingdoms in agriculture which was based on wet paddy. The great American empires were based on agriculture without cattle, but they were formed on rather fertile, mostly volcanic soils in the cooler climates of the mountains (Aztec, Incas) or in the subtropical lowlands (Maya).

In many *sub-tropical areas* the situation indeed is more favourable. In general the soils are richer here, in many cases there is a wet and a dry season in various combinations with warmer periods of long days and colder periods with short days. However, drought is often a drawback, involving many hazards. But if irrigation water is available more crops per annum are possible.

In many parts of the ancient world (e.g. India and Mesopotamia) mixed farming with draught cattle was the traditional practice; here and there this form (often without milk production) also penetrated into the tropics (India, Burma, Indo-China, Java, parts of Africa and more recently in South America as well). As a result the family farms, helped by easier weed control in cooler and drier seasons, may be as large as 5 to 10 hectares. But the primitive irrigation requires so much labour in turn that the irrigated family-size farm is rarely larger than 4 hectares. On the one hand the usually less reliable rainfall in these regions has often led to catastrophic famine, but on the other some surplus production was possible so that a start could be made in accumulating capital and differentiating society. But this development was such a slow one that the rapid increase in population necessitated the occupation of all available land and the splitting up of family farms into the marginal size for subsistence. As time went on the formation of surpluses and capital in this agricultural society became an increasingly difficult task, and ultimately the fellah societies of Spengler arose (e.g. in Egypt, India and Mesopotamia).

This form of agriculture gradually spread over the *temperate zones of Europe* where although the soils differed in fertility the reliable rainfall made irrigation unnecessary and adequate and timely weed control proved possible, so that family farms of from 10 to 15 hectares gradually arose. These farms produced sufficient food and other basic materials to supply producers outside agriculture as well, thereby making possible further capital formation in commerce and industry and the development of science and technology. Here also the increase in population eventually led to a gradual limitation of the farm size, but at this stage industry, commerce and services were able to draw off a part of the population from agriculture and the farmers were originally able to produce enough food for all. Here the increasing pressure of population on the long run led to migration, especially to North America.

The colonisation of the *temperate zones of North America* which had an abundance of fertile soils afforded full opportunity for establishing family farms of maximum size with large surpluses. Here, owing to the increasing export of cheap produce to Europe, it was possible to build up large capital reserves which stimulated industrial development, as did also the purchasing power. This in turn led to the manufacture of machines, including agricultural machinery. Here cattle was replaced by machines, resulting in family farms of increasing size (100 hectares and over). The same basic factors as in Europe and the United States, but in different ratios, are also found in Canada, Argentina, and neighbouring regions, South Africa, part of Australia, New Zealand, and possibly in large parts of Siberia.

Each of the four patterns described above originally has its own living level which increases by bounds from the tropics to the sub-tropics and from there to the temperate zones, reaching its peak in the United States. Being determined in the first instance by the agricultural possibilities, the increasing wealth has found its great development in the evolution of a highly differentiated society in which production outside agriculture has become predominant. Consequently the percentage of farmers in the highly developed countries is small, whereas in the under-developed countries it is very high. [1] The combination of greater surface area planted per farmer and a higher yield per hectare has resulted in such a great increase in the productivity per capita in the highly developed countries that the total production per head of the agricultural population still provides an ample surplus and sufficient purchasing power for buying what is needed. When the farmer's purchasing power lags behind, e.g. by low prices, it is subsidised from national income obtained in other ways. It would carry us too far to discuss the reasons for this (cost prices and protection).

In a number of temperate regions great progress had already been made in agriculture without the use of cattle and most of the land suitable for agriculture was already occupied before the introduction of cattle enabled the farm-size to be increased. This was the case in China where milk, for example, is still not produced because dairy cattle have always been unknown in the Chinese agricultural pattern. In China this led to continuous expansion towards the south where the milder climate made possible two crops a year. In Japan this led to regulation of population, followed by a practically feudal form of industrialisation based on low living standards and then by increasing mechanisation of agriculture up to the present date.

The backward situation of the tropics is therefore partly due to natural causes working in agriculture, and to a lesser extent this is also true of the sub-tropics. The backward situation may also be blamed on the different cultural pattern in which no use is made of cattle. The situation is also partly due to the later development. In industry, mining, fishing, etc. there appears no intrinsic reason for any backward situation and apparently no natural causes exist here.

What, in broad outline, has been the part played by the West in the further development of this situation? Originally it was limited to purchase and acquisition (as was also done by China, for example) of rare commodities with a very high value per unit of weight, e.g. such spices as pepper, cloves, nutmeg and cinnamon, and resins, precious woods, gold and precious stones. Later on there was a demand for less

[1] In the U.S. the percentage is 8, in Holland 12, in Egypt and Java 70 to 80, and in New Guinea probably nearly 100.

highly valuable products, viz. the monopoly products [1] of the tropics, such as indigo, coffee, tea, cocoa, rubber, quinine, copra, palm oil, cane sugar, fibres, bananas, ginger, pineapple, cola and timber which were finally produced on private estates, independent of the local cultural pattern, with Western management, scientific methods, technology and capital. The same happened in industry, mining and the like, but on a more limited scale.

The work was chiefly done to export agricultural produce, a daily wage being paid either for seasonal or regular labour which was at about the same level as earnings in native agriculture but had additional advantages (hospital clinics, etc.). The number of labourers to the hectare was about the same or slightly higher than in native agriculture, but the gross yields per hectare were considerably higher. In native agriculture these averaged about a hundred guilders (U.S. $ 40) a hectare before world war II, whereas on the estates the figure was about five hundred guilders (U.S. $ 200) in the case of rubber, tea and cocoa, and over a thousand guilders (U.S. $ 400) in the case of quinine and sugar. At the same time cultivation of these agricultural export products by the farmers, e.g. coffee, rubber, and also cotton, groundnuts, etc., was greatly encouraged, but in this case the gross yields were usually much lower on account of the smaller yield and inferior quality.

As the cultivated area and the total money income increased there were more opportunities of employment, and the independent farmer also obtained a larger money income, albeit this did not exceed his limited labour capacity (lack of cattle, no mechanisation). Moreover, a considerable part of the gross revenue of estate agriculture remained in the producing country, either in the form of investments for land development and new concerns, or in the form of taxes used for developing the entire country, or else for supplies and services. Owing to lack of exact information it is not known what proportion of the gross revenue ultimately left the country and could not be regarded as national income. In a UNO publication [2] it is calculated that the profits taken out of these countries, averaged over a long period of years, cannot be considered unreasonable. In 1947—49, for example, it was only in four countries out of forty-six that the percentage of the national income taken out as a return on investments exceeded 5 %, and this included the two oil-producing countries of Venezuela and Iran. In the case of Deli it was calculated that two thirds of the gross income remained in the country.

In one respect, however, the development described was eminently unsatisfactory. The estate companies chiefly worked for export and the native farmers also mainly cultivated export produce in addition to their food. But this produce was mostly processed in the West where an industrial basis had already been established and the entire infra structure was adapted to cheap large-scale production. Hence the social differentiation belonging to the processing of the agricultural surpluses took place in the West, despite the fact that a part of this production was again sold to the tropics and sub-tropics.

The result was that the differentiation of society was a very slow process in the tropics and sub-tropics and the bulk of the population continued to be farmers. Nor

1 As a result of the continued opening up of the tropics and the manufacture of synthetic substitutes this monopoly character is being increasingly lost (e.g. in the case of indigo, quinine, rubber and coffee).

2 United Nations: National income and its distribution in underdeveloped countries (New York, 1951). For Deli see: *R. van de Waal,* Richtlijnen voor een ontwikkeling van de Oostkust van Sumatra. Diss. Wageningen (1959).

did there grow up any market of their own for agricultural produce which would have had a stimulating effect on the production of foodstuffs. Moreover they were still unable to find an effective and sufficiently rewarding farm system for agriculture. On poor soils it was found that the farmers were scarcely able to supply their own need of food and the principal money income had to come from such export products as coffee, rubber and the like. For these soils no effective permanent use of agricultural land was developed of which the yield was many times greater than the family food requirements.

Although on the better soils a somewhat larger family farm was possible with higher total yields and the production per hectare could be increased, — though still not comparable with production under temperate conditions — the pressure of the population still made this larger farm an unattainable goal; this was due both to the increase in population and the impossibility of transferring surplus farmers to industry, mining, commerce, services and the like.

Although in the past agriculture has been the primary factor in building up capital assets for the further development of society, it should not be forgotten that there have always been other means of capital accretion, which could stimulate social and economic diversification. Such were, for example, the manufacture of bronze and iron in ancient times, e.g. in Mesopotamia and the surrounding area, as well as the trade in these commodities, succeeded by trade in and transport of foodstuffs and rare articles. Such are, in modern times, mining, transport and commerce, and sometimes fisheries. But in this case it can often be seen that although the national income grows substantially, most of agriculture remains outside this growth, and being linked to the unchanging cultural pattern it lags behind (this is the case in Venezuela [1], for example).

In most countries, however, both capital and knowledge is lacking which would enable agriculture to be raised to a more productive level, i.e. to increase the per capita production. To do this these countries will have to aim at a more differentiated society in which great attention is paid not only to the development of the export trade but also to the marketing of agricultural produce within the country itself and to the encouragement of its own market by means of industrialisation. This development will have to proceed in harmony, enabling a constant interchange of agricultural and industrial produce. At the same time densely populated areas should be enabled to enlarge their farms by transferring surplus labour from agriculture to industry and the like. Capital is required if both agriculture and industry, commerce etc., are to be encouraged in these under-developed countries, and this capital will not yield a very great return in the first instance, the reason being that it will be required not only for the development of agriculture and industry, etc. but also the entire infra structure. This means that in order to develop these countries capital will have to be made available at little or no interest.

What is true of capital is equally true of knowledge. The experts required for furthering development are not usually cheap to come by. The countries receiving them will be unable to pay them. Nor should it be expected that these experts will adapt themselves to local living standards out of sheer idealism. After all, it is only common sense to realise that such experts will only be available in large numbers provided they receive a reasonable reward.

[1] In this country about 40 % of the working population are engaged in agriculture which only contributes 7 % of the national income.

Thus these charges will also have to be largely borne by the developed countries. Ultimately it will only be possible to assist all these countries by increasing their productivity, i.e. their per capita production. All measures working to this end, either directly or indirectly, deserve our support. Any measures that do not have this effect, however well intentioned and necessary they may be, e.g. during a period of famine, will only have a permanent influence provided increased production is also ensured at the same time.

LITERATURE

BENEDICT, RUTH 1949 Patterns of culture, Mentor Books.

BROEK, J. O. M. 1941 Climate and settlement. *U.S.D.A. Yearbook 1941:* Climate and Man.

DUMONT, R. 1959 Types of rural economy, Paris.

GOUROU, PIERRE 1948 Les pays tropicaux, Paris.

LEE, D. H. K. (Ed.) 1957 Climate and economic development in the tropics, New York.

SMITS, M. B. 1938 Economic aspects for white farmers etc. in: "Comptes rendus du Congrès International Géographique Amsterdam, II S. 3, Leiden.

TERRA, G. J. A. 1950 Het welvaartspeil in de tropen. *Landbouw. 22.* 275—302.

——— 1952/53 Some sociological aspects of agriculture in S.E. Asia, *Indonesië. 6,* 439—463.

——— 1956 Tropische landbouw en welvaart. *Economie. 20,* 404—439.

——— 1958 Farm systems in South East Asia. *Neth. J. agric. Sci. 6,* 157—182.

——— 1959 Agriculture in economically underdeveloped regions, especially in equatorial and subtropical regions. *Neth. J. agric. Sci. 7,* 216—231.

United Nations 1951 National income and its distribution in underdeveloped countries, New York.

WAAL, R. VAN DE 1959 Richtlijnen voor een ontwikkeling van de Oostkust van Sumatra. Diss. Wageningen.