Food Security and Economic Development in Tanzania: Past Problems and Proposals for a New Strategy

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Introduction

Tanzania is well–endowed with agricultural and human resources, and should therefore have no problem with food security, or in developing food resources to promote economic development. The principal constraint is organisation of production and distribution. Organisation is all the more important in underdeveloped countries in order that the most efficient use is made of scarce resources, especially finance and transport. The bulk of this paper, therefore, will be concerned with organisational aspects of agricultural production, food marketing, and distribution which is central to the task of working out the best strategy for food storage, and the most appropriate technologies for food preservation and processing to perform different functions, as well as making the best use of existing food industries.

1.1 Food Security

Food security is more than simply ensuring adequate staple supply and distribution. Staples such as cereals, cassava and bananas can usually supply sufficient energy for adults. Some cereals can also supply some of the essential amino acids, vitamins, minerals, and dietary fibre; but for a healthy diet other foods are needed such as vegetable oils, legumes, fruits, and leafy vegetables. Animal products such as meat, dairy produce, eggs and fish are also important supplements. For children and growing adolescents, the latter are almost essential. The stomachs of young children especially are not large enough to accommodate the amount of food required to provide all the essential nutrients if staples and a few vegetables were the only foods consumed. Very young children need special weaning foods.

Furthermore, if food is to perform its biological function effectively, it must have an enjoyment element. One cannot expect people to eat properly if the food is bland, or otherwise disagreeable to the palate. It must also be safe – free of pathogenic organisms. In short, food security requires the supply and consumption of a wide variety of foods and means to keep the foods in good condition.

Due to variations in climate, soil conditions, and water availability, not all areas of Tanzania are capable of producing the wide varieties of foods needed for a healthy, wholesome diet; and to fulfil other functions. An efficient food supply system requires particular areas to specialise in the production of the types of food most suited to the area, and to produce surpluses to be exchanged for food products produced in other areas, as well as for other commodities, including farm inputs, industrial consumer goods, and services such as water supply, transport, health care and education. This requires an efficient marketing system, and an adequately organised infrastructure. It also requires adequate incomes, either in the form of adequate prices for food produces or adequate wages for workers in the manufacturing and service sectors.

1.2 Food Security and Economic Development

Food production, processing, and distribution have major roles to play in economic development. First, by providing a balanced diet necessary for proper physical and mental development of children and adults, this reduces morbidity, enabling people to participate fully in economic development. Second, preserving and processing food helps to smooth out seasonal variations in supply and ensures a market all year round. They enable use to be made of seasonal gluts which would otherwise go to waste, minimize losses due to microbiological attack and pests, and generally add value to food products.

Third, food can make a major contribution to foreign exchange earnings, both through exports and through tourism. Exotic foods are in much demand in the industrial countries, and Tanzania is well–endowed to exploit that market. Similarly, Tanzania has more to offer tourists, perhaps, than any other African country. The supply of foods to hotels is highly profitable requiriging minimal costs once the hotel is established. If hotels can offer a high standard of catering, coupled with well–organised tours, it could attract many more tourists.

2. Organisational Aspects of Agricutural Production, Food Marketing and Distribution

Food security depends first and foremost on producing enough food of different types from domestic agricultural resources. This requires investment in agriculture to increase productivity, and diversify agricultural production so that the wide range of foodstuffs required for a healthy diet are produced. The investment does not necessarily have to come from government budgets. Much can be raised locally, first by making more efficient use of local labour power, and second by orientating food production away from subsistence towards rural and urban markets, thus increasing local money income. It requires reducing the number of people directly involved in agriculture (on a day–to–day basis) so that more are available to perform the whole range fo other activities contributing to social and economic development, including the production of farm inputs such as implements and fertilizer.

Ujamaa Vijijini policy was the first attempt to reorganize agricultural production so that it could generate local investment resources. It was unsuccessful and has now been abandoned. The reasons for its failure is the subject of sections 2.1 and 2.2.

On the other hand, one policy of 'development villages' has brought people closer together, thus facilitating communal activities which could promote the generation of investment resources at local level. However, to date, the mode of production has hardly changed from the 'traditional' pattern. Could 'development villages' form a new basis for *ujamaa* in the future? That question is discussed in Section 2.3.

What alternative approaches could be adopted? In order to investigate that, it is necessary to take into account developments in other policy areas. First, is the role of marketing co-operatives. These were abolished in 1975, but have now been reintroduced. Could they be organised around a wider range of activities that could generate local investment resources? Second, in 1972 government administration was decentralised to allow villages to play a more active role in planning. This does not seem to have happened in practice[1]. Decentralisation has only reached down to the district level. One survey[2] has shown that differentiation is quite marked within villages, and suggested that decentralisation to the village level could increase inequalities by extending power of the local elite at the expense of the poor.

Third, the government has re–established the Community Development Department. This could play a key role, first in educating politicians on the important development potential of investing local decisions in local people, especially making use of their local expertise; second, in generating more self–reliant approach to solving local problems, thus saving government expenditure which can then be used on other projects; third, by coordinating action of other government departments so that they do not undermine self–reliant activities; and fourth, by developing local

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technical skills, building on what is known already (which may not be used at present because of other constraints or because it has been undermined by 'imported' technical skills which could have been used to greater effect in other ways).

2.1 Ujamaa vijijini

Immediately after independence, Tanzania's agricultural policy was greatly influenced by advisors from the World Bank and others – in the so–called 'modernisation' approach. Since it was impossible to modernise agriculture all at once, a few village settlements were selected (70 eventually) as 'models' for modernisation. They took 13.5 percent of the total development budget in 1964.[3] After two years these schemes had to be abandoned as a total economic disaster. They were overcapitalized in the extreme,[4] and in no way could pay for the capital costs, not even in local currency, let alone in foreign exchange which would ultimately be necessary since all the technological inputs were imported. A new approach had to be found. Other areas of policy were also in crisis at this time, all of which led to a major re–think, culminating in The Arusha Declaration of 1967. Other policy papers followed, including Ujamaa Vijijini concerned with rural development. The stated aim was to promote communal (or co–operative[5]) forms of agricultural production.

The theoretical advantages of co–operation in agricultural production are well–known. By working together in large groups, people can carry out projects which as individuals they cannot. Efficiency in agricultural production depends on much more than the actual cultivation of the land. For instance, erosion and flood control on individual plots are ineffective unless the whole area is protected. An irrigation channel or a road serving the whole community can only be conceived if each individual adds his labour to others. Economies of scale can be achieved are communal grain store, water supply, pump, tractor, workshop, latrine, experimental plot, breeding animals, etc, can serve the whole community. Financial resources (savings) can be concentrated to purchase a piece of equipment that can be shared. Thus, the act of co-operating itself is a financial resource. An irrigation channel built by the community is a resource created virtually out of nothing – or more precisely people doing extra work in an organised way[6]. That is the origin of all finance. Co-operation between co-operatives extends the advantage further.

However, the political problems of putting co–operative forms of production into practice appear to be less well–known. Tanzania has never had a coherent implementation strategy. A major problem was that most settlements were too small and scattered to realize the full potential of co–operation. Small communities needed to be resettled into larger ones. Thus, the first step envisaged in *Ujamaa Vijijini* was to move into villages.[7] The second was to establish a small communal plot or other activity to get people used to working together, with the idea that gradually this would expand until virtually all production was carried out communally – the third step.[8]

From the start, *ujamaa* development was piecemeal and isolated. There were some successes and many failures. Among the most successful were a group of *ujamaa* villagers forming the Ruvuma Development Association – an embryonic form of co-operation between co-operatives. The failure has much been blamed on the individualism of peasant farmers holding back co-operative development. However, there is no evidence that this is so. There is plenty of evidence from Tanzania and elsewhere that peasant farmers are prepared to co-operate[9] – and of course they always have done so to a greater or lesser extent since time immemorial. No peasantry could have been subject to cut-throat competition and individualism than that of China, yet full co-operation and a network of co-operatives was established in less than a decade.[10]

By 1975, the policy of *Ujamaa* villages in Tanzania had largely been abandoned as a failure. In fact, the transition from *Ujamaa* villages to the policy of 'development' villages occurred almost imperceptably. It was hardly admitted that the policy of *Ujamaa* villages had been abandoned, let alone explained why it had been. Indeed, so confused was the situation that even the then Prime Minister was stating that 10 million Tanzanians now live in *Ujamaa* villages when in fact 'development' villages.[11] The nearest explanation was from Hilary Ng'weno:[12]

> 'We decided to quicken the programme (of moving into villages) because this is our base – whether socialist or not – this living in villages is a base for rural development. *It has nothing to do with ujamaa.*' (emphasis added).

In fact, had the original document: *Ujamaa Vijijini* been consulted, it would have been noted that the first step to *ujamaa* was in fact moving into villages. The villagisation programme could therefore have been explained in those terms.

2.2 Why did Ujamaa Villages fail?

One reason why the ujamaa villages policy failed was that the nettle of resettlement was not grasped. Most *Ujamaa* villages began on too small scale. When the resettlement issue was finally addressed, *ujamaa* villages policy was already abandoned. Moreover, when resettlement was put into effect, it caused a high level of alienation due to the coercive tactics employed in many areas. People were aware of the advantages of living in larger communities. They were not helped to plan the resettlement themselves, nor even consulted, in spite of the fact that they would be the true experts of their locality – its ecology and social structure. This type of coercion did not begin with villagisation, however. It began in the earliest days of *ujamaa*[13] in spite of warnings against the use of force by President Nyerere:[14]

In Ruvuma Region, where *ujamaa* appears to have been successful (presumably because it was introduced and supported as it should have been), people had gone as far as forming mutual aid association between villages as already mentioned. This was rudely crushed and banned by the Party in 1969.[15] Thus, a second reason why *ujamaa* villages failed was because:

> ...the ruling parrty that had called for communalisation did not support poor and middle peasants against kulaks, did not support democratic structures of the villages against authoritarian bureaucracy and did not force technical staff to serve villages loyally and intelligently.[16]

Thirdy, ujamaa villages failed because the approach proposed to promote it starting off with a small communal plot – undermined it. Since the bulk of production would be carried out individally as before, this would conflict with the communal activity. People would naturally give priority to their own plots, and the communal plots would always be planted late, weeded late, not given enough fertilizer, and so on. That accounts for the very low productivity reported for communal production, thus giving co-operative production a bad reputation, and undermining its whole basis.

The Chinese began in a different way. They began with 'mutual aid associations'.[17] People would help each other on their individual plots. They began to realize the advantages through practice (and given the necessary political support). The *quid pro quo* arrangement established the basis of keeping account of who did what work. This was the first small step to pool resources and form a co–operative, and establish an accounting system based on work points so that at the end of the season it would be 'to each according to his work'. Not all farmers joined the co–operatives initially. When they saw their progress, which was supported by the government, they eventually threw in their lot with them. Once the co–operatives were established, it was not difficult to arrange co–operation between the co–operatives, first through mutual aid, then through forming higher co–operatives based on the administration already

established for the lower co–operaties. Similarly, at a later stage, mutual aid between the higher co–operatives led to the formation of very large co–operative units known as people's communes.[18] Each step was a relatively small one, and a logical development of what was established before.

The experience of China was already known and reported for more than a decade before *Ujamaa Vijijini*, but was never studied, let alone used. The strategy proposed by ujamaa vijijini was wrong – it generated contradictions rather than resolving them as is required for co–operation. Moreover, no proper accounting system was proposed – indeed one of the major problems of most *ujamaa* villages established was the complete absence of any reliable system of financial control.[16]

Finally, economic support for *ujamaa* villages and peasant farming generally was undermined by the erosion of the real value of producer prices. During the late 1960s, the government embarked on a costly 'import substitution' industrialisation programme requiring large amounts of foreign exchange and profits from the marketing of export crops. The accumulation of financial resources at state level necessitated depressing prices paid to producers. The investments went on industries and services that barely affected rural areas. Much was wasted on expanding the non–productive bureaucracy rather than investing in productive activities that would enhance foreign exchange earnings; or those which would save foreign exchange by developing local resources and promote economic activity within the domestic economy. Escalating foreign debts (as a result of the 'import substitution' programme) necessitated further squeezing of the peasants, and the country itself was sqeezed by the erosion of most international commodity prices. Furthermore, in order to make investment in urban areas more attractive, wages had to be kept down. This meant that food had to be cheap. Consequently, food was subsidized, and in order to minimize subsidies, producer prices of food crops had to be kept low.

The cumulative effect was that the peasantry either in, or outside *ujamaa* villages had neither the means nor the incentive to invest their time and effort into increasing production. Thus, foreign exchange earnings declined, the newly established industries — highly dependent on imported inputs and spares operated unprofitably at very low capacity utilization, consumer goods became in short supply, and there was little for the farmers to buy even if they had the money.[19]

2.3 Could 'Development Villages Form the Basis for Ujamaa in the Future?

Though ujamaa village is not part of the formal government policy at present, it is worth considering whether a basis exists for re–introducing co–operative farms of production, especially since the factors causing *ujamaa* to fail before would also hinder alternative policies.

The first point is that since people now live in villages the first step towards *ujamaa* has now been achieved. The question is, would the poor and middle peasants get more political support against vested interests than before? On the basis of the way villagisation was carried out, this does not seem hopeful. However, according to some reports, the various recriminations of that period are now all past history. Because of the deep economic crisis Tanzania has been through, all are united in finding ways of pulling the country up again. Is there a new spirit of co–operation?

A fundamental question here is, are the political leaders going to place greater trust in the judgments of peasant farmers taking decisions collectively? Most villages seem to operate under an appointed manager 'who helps to draw up an annual plan which includes details such as when people will work on their own plots, when to work on communal plots, and when to work on some other project'.[20] Does this manager merely 'help' or in fact tell people what to do? If the manager consults, whom does he or she consults? Are the more wealthy being consulted disproportionalety? One survey[21] noted that a high degree of differentiation continues to exist within the

villages surveyed (though little between villages) but concluded that the better–off did not not have a disproportionate share of formal political power. However, the questionnaire did not investigate the extent to which economic power of the better–off influenced decisions taken at village level, for example by the village level, for example by the village manager. Given past experience, one cannot be too confident that the people are sufficiently involved in management so that eventually they could take over the function themselves, something necessary if a shift towards *ujamaa* were to take place.

Thirdly, does the present organisation of production provide the basis for moving towards, and thus realizing the full advantages of, full–scale co–operative production? According to the survey already cited most, but not all, villages had a communal plot and/or some other type of communal activity. These communal activities are meant to raise finance for village development projects. As before, the productivity of the communal *shambas* was found to be very low. Among the villages surveyed, although on average they absorbed 20% of village labour and 8% of village land, they produced less than 2% of the agricultural output. This was in broad conformity with a government survey of communal production in over 4000 villages.[22] The communal *shambas* are clearly no more a success now than during *ujamaa vijijini*; and presumably for the same reasons – a fundamental conflict of interests between individual and household production.

Furthermore, it was found that the work on the *shambas* was disproportionately carried out by the poorer half of the community – thus equivalent to regressive taxation (since the communal work represents raising revenue for overall village development)[22]. Moreover the people working on communal *shambas*, with a few exceptions, did not receive any returns (either in cash or in kind) in proportion to their labour contribution. In most, since proper records were seldom kept, it would be impossible anyway.[23]

If the intention were to move towards full–scale co–operative production, this is not the correct strategy and should be abandoned in favour of promoting mutual aid associations between households, and use these as a basis for developing communal production. No information seems available on whether mutual aid is taking place between hauseholds presumably because nobody thinks it is important to investigate. It is difficult to imagine that it is not, since it has always been a feature of peasant production everywhere. If that is so, it would not be too difficult to extend it through a concerted campaign and by giving it material and political support. These could later lead to the formation of producer co–operatives — with or without the better off farmers (they could join later once the co–operatives proved themselves.

On the other hand, if full–scale co–operative production is not the intention, the communal *shambas* should be abandoned since they are clearly very inefficient. Collier *et al* believe they are probably causing a net reduction of public revenue. A better system for collecting revenue for local development projects and investment would be to establish an effective and progressive system of taxation as will be shown later.

The final factor undermining *ujamaa vijijini* was the erosion of producer prices which reduced incentives to produce surpluses for sale – at least through official channels.[24] By the mid–1970s, Tanzania, along with many other African countries, had reached the classic impasse described by Griffin. The need to increase incentives to, and investment in agriculture was sharpened by the two successive harvest failures in 1973/74 and 1974/75 crop seasons.[25] Prices of domestic crops were generally doubled, and in some cases tripled. Drought resistant crops such as sorghum, millet, and cassava were brought into the official marketing system for the first time at prices markedly higher than those at which they traded before. The result was a

dramatic increase in food crops marketed through official channels, especially the drought crops and pulses. Market output for maize, rice and wheat increased from 166,097 tonnes in 1973/74 to 234,547 tonnes in 1979/80. For sorghum and millet it went up from 4089 tonnes to 37,575 tonnes during the same period! For pulses it went up from 7144 tonnes in 1977/78 to 33,305 tonnes in 1979/80. It was a graphic illustration of the extent to which peasant farmers can respond to price incenties.[26]

On the other hand, although money prices for export crops were increased at the same time, in real terms it was a decrease and continued the decline that had taken place throughout the decade, and, correspondingly, production stagnated further fueling the country's foreign exchange difficulties.[27] Since 1980, real prices of export crops have been increased substantially – fivefold in the case of cashenuts.[28]

It is clear, therefore, that the government is now giving high priority to agricultural production. The 1985–90 Five Year Plan announced that 25% of the budget will go into agriculture, and further increases of producer prices have been made, including a 9% increase in September 1986.[29] If this change in priority filters down to the level of individual producers successfuly, it should provide a sounder basis for agricultural production, whatever its organisational form. However, it would also depend on the extent to which farmers have something to buy with their extra income. In some areas, people have the cash, but industries are so run down they cannot provide the consumer goods people want. Thus, the rehabilitation of industries is an important priority to support higher producer prices.

2.4 Marketing Problems and the Re-establishment of Marketing Co-operatives

A factor mitigating against the positive changes in producer pricing policy was the extreme inefficiency of the official marketing system. At the time of independence, well–established marketing co–operatives handled export crops in the richer parts of the country. In 1963 the National Agricultural Products Board was established to handle food crops for domestic consumption, and co–operatives were made the sole buying agents at village level. In 1975 all co–operatives, together with the district and regional co–operative unions, were abolished, and under the village and Ujamaa Village Act, each village was made into a single co–operative responsible for both the administrative functions of local government and the commercial functions hitherto carried out by the marketing co–operatives. Consequently, the villages were supposed to sell direct to the statuary Crop Authorities, one for each crop, with the National Milling Corporation responsible for all food crops. The reasons given for abolishing the marketing co–operatives was, first, that growth 'had out–stripped the ability of the members to control their leaders,' and widespread dissatisfaction and petty (sometimes not so petty) curruption existed. Second, it was argued that since the crops ended up with the Crop Authorities anyway, it was inefficient to channel them through the co–operative structure involving an additional tier of marketing administration and presumably extra costs.

In the event, the Crop Authorities and the National Milling Corporation performed very badly.[30] For instance, during the 1970s, the producer share of the price for export crops fell from 70% to 35%, a major part of which was attributed to the escalating costs of marketing under the new system. (The National Milling Corporation during this period ran up to a debt of Shs. 12½ billion which has had to be written off).

The reasons for the inefficiency are not hard to see in retrospect. First, because each crop authority now had to collect from each village, it had to have an administrative and collection system down to the village level, whereas before, it would have collected in bulk from district or regional co–operative godowns. Most of the people employed by the marketing co–operatives were taken on by the crop authorities, so the costs of labour were not reduced. Secondly, each crop authority had its own fleet

of lorries and personnel so as to visit each village. Such a fleet of lorries was only functional for a short period each year during the marketing season for that particular crop. Thirdly, each crop authority was responsible for distributing inputs for its particular crop, which frequently did not arrive on time.

Consequently, in 1982, in response to popular pressure, a new Co–operative Societies Act was passed to bring back the old co–operative structure, and authorize the creation of district and regional co–operative unions.[31] To what extent could this development form a basis around which agricultural production and food supply, and other development activities of villages, could be organised?

2.5 Decentralisation

Another major factor having a bearing on rural development, and which could form the basis of a new strategy,is the decision taken in 1972 to decentalise government administration. Before decentralisation each ministry had its own functional officer at regional or district levels. As noted by Nyerere,[32] this made it difficult for different functional officers based in a district to get together to coordinate action since each would have to apply to his separate Ministry for funds or permission to act. If one Ministry refused, perhaps because it was not fully conversant with the facts on the ground, the whole action would be jeopardized. With decentralisation, the various functional officers at district and regional level reported directly to District Development Directors (DDD) and Regional Commissioners (RC) all with ministerial powers. The process of planning was supposed to be initiated at ward or village level, then move to the district level, then to the regional level where the plans for several districts would be coordinated before going to the national level.

In practice, the main effect of decentralisation was to increase the size of the bureaucracy, and hence the costs of administration. It was probably beneficial to services such as health and education since each region and district had more power to argue for its fair share of resources. However, it did not particularly benefit production, from where the money for increased costs of administration would have to come. Moreover, most development plans were formulated by functional officers and there was not much consultation, still less decentralisation of power and decision – making, to the village level.[33]

2.6 Community Development: The Concept of 'Integrated Community Development and its Application

A government decision was made to re–established the Community Development Department, some 15 years after its abolition within a newly created Ministry of Community Development, Sports, Youth and Culture. At the time of writing, no reports were available as to its function. The fact that Community Development was lumped together with Sports, Youth and Culture, as has happened at different times in other countries, does not indicate that its intended function is to play the key coordinating role that it could, because of several reasons.

First, it could provide a new ideological basis for decentralised, self–reliant development. It is true that in many countries, including Tanzania in the past, community development was as bureaucratically patronizing as other government departments concerned with 'teaching people what is wrong with their ways,'[34] or else getting people to give their labour free on projects designed by others who did not necessarily consult the people at the receiving end. However, that is a bureaucratic distortion of community development. True community development involves developing the organisational basis for the people to plan ways of fulfilling their needs through working together, either on infrastructural projects on productive activities that would generate income to finance raw material inputs for such projects, or on productive activities that would supply products such as fertilizer, implements, carts and consumer goods the community needs which otherwise would not

be fulfiled. That can only work if all the people are intimately involved in the decision–making processes, including all the discussions leading up to those decisions. The role of the community development agent is to help people examine the pros and cons of various projects so that when they take the final decision, they are fully aware of probable technical or organisational difficulties. Any material support from the government for community development activities can also be channelled through, or negotiated by, the agent on behalf of the villagers.

Second, it is natural that before embarking on any project themselves, villagers be aware that there would be no hope of the government doing it for them. The task of the Community Development Department at district and regional levels, in association with village committees, would be to determine the projects the villagers could carry out by themselves, which they could if the raw materials support, and which they definitely could not carry out (or could only do so with extreme difficulty). The more villagers can be encouraged to do things for themselves, the more government resources can be devoted to other key development activities. If the benefits of community development are to be realised, therefore, it is necessary that the Community Development Department play the key coordinating role in rural development to which all other agencies and ministries are subordinate. Whether the presently constituted Community Development Department has that kind of authority is not clear.

To be successful, community development needs government support at the highest level to overcome the well–established technocratic approaches of other ministries.[35] Community development implies utilizing both indigenous technical knowledge i.e. the wealth of knowledge and experience the people themselves have accumulated over many generations and modern scientific knowledge in a two-way process of communication, and thus conflicts with the traditional top-down approach to development practised by most governments and development agencies. The latter, in believing that they know better then the people, and thus have to find solutions, to their problems ignores the last that more appropriate solutions could emerge from indigenous technical knowledge, perhaps with a little help from outside. Already an institution exists in Tanzania can process the two types of technical knowledge so that the one can learn from the other – namely the Folk Development College.[36] These could play a major role in skills development and specialisation at village and district level, and participatory research and development.

Third, the Community Development Department could perform an additional function of coordinating not only between ministries and other agencies, but also between villages, districts and regions. For instance, a particular activity or project in one village (or district) might not be viable, but would be if it catered for the needs of several villages in the area. Several potential projects could be of that nature, in which case it could be arranged that each village specialise in one activity of another on behalf of the other villages in the area. That basically was what the Ruvuma Development Association was set up to do. Furthermore, the Department could coordinate labour requirements operating on a rota basis for district (or even regional) projects, for example constructing a water main or a road, working on forestry projects, erosion control, organic fertilizer and biogas production, extensions for a district hospital or health centre, or building – and eventually operating – small industries providing various consumer goods for all the villages in the area. A district (and ultimately a regional and national) food storage network could be created in that way.

The development of such self–reliance in practice would give community development a whole new meaning, and a momentum that would produce many new ways of fulfilling people's needs, producing more appropriate products based on the

resources of the country rather than on imported inputs and technology. By doing without imported technology in as many areas as possible, foreign exchange can be devoted to key imports that would begin to transform the economy from one of external dependence to internally orientated development, and to develop the vast untapped natural resources to fulfil the expanding needs of the people and the country.

3. Choice of Technology in the Processing, Storage and Preservations of *Food*

Food security depends on having enough food of all types needed for a healthy diet throughout the year. Since food supply is highly seasonal whereas food demand is constant, much depends on preserving the food when it is in seasonal surplus. Furthermore, food preservation also means that food producers can greatly extend the marketability of their crops thus generating income out of food that would otherwise be wasted or not be produced.

A huge range of technologies are avaible to preserve and process food. In Tanzania, it makes sence to choose technologies which economize on scarce capital resources and transport facilities, and make use of the abundant labour power spread throughout the country. An important factor here is the organisation of production. If that can be imporoved as discussed previously, not only would better use be made of existing food industries, but also the basis for developing a network of small processing facilities to improve domestic food supply in the Regions and in the nation as a whole would be created.

The principal areas of food processing, storage and preservation to be reviewed include grain storage and grain milling; preservation of leafy vegetables, roots and legumes; oil seed extraction; fruit storage and processing; dairy production; sugar manufacture; and meat and fish preservation. Before we do that, however, a review of the country's food technology policy since 1967 would give us a background for better perspective.

3.1 Review of Food Technology Policy Since 1987

Many of the decisions on food technology in Tanznia since 1967 have not taken into account the balance of resources available in the country. The choice of technology has frequently been made as if Tanzania were an industrial country with a highly developed infrastructure. Major investments have been made in high capacity, centralised units at considerable capital and foreign exchange costs. These can only be justified if (a) supplies of foodstuffs are guaranteed for most of the year so that the units can maximize the use of capital invested in them; and (b) if production is primarily geared to export to regenerate the foreign exchange invested in the plant, and generate new foreign exchange for investment in other areas of production.

None of the units have fulfilled those criteria. Because of the problems of transport, many have run at far below capacity, or have even had to be closed down altogether, because of insufficient supplies of produce. Furthermore, the demand for produce by these large scale units has often encroached on the local market so that less is available to fulfil local nutritional needs.[37] Finally, the nature of the technology of such units has often meant considerable dependence on imported inputs. A few examples will illustrate how inappropriate these have been. The dairy processing plant in Dar es Salaam is not only almost entirely dependent on imported milk powder, but is spending even more foreign exchange on materials and equipment for the packaging then on the milk itself.[38] This example also shows the extent to which the choice of technology related to the choice of product. Pasteurized milk is not the only product that can be produced from milk. The decision was largely determined by the choice of technology. The alternative of using glass bottles could have been considered. especially as Dar es Salaam already had a factory producing bottles for beer

and soft drinks, even though this would have required additional expenditure on cleansing equipment.

A further more costly example was the decision taken by the National Milling Corporation to establish a large scale bakery.[39] Not only did this involve enormous capital costs – made all the greater by the fact that expensive Canadian technology (more appropriate to the Canadian climate and labour market than of Tanzania's) – but also it involved producing a product from a foodstuff (wheat) that cannot be grown in sufficient quantities in Tanzania. Rather than stimulating domestic agriculture and food self–sufficiency it did the opposite. Furthermore, there was no evidence that existing small scale backeries could not have expanded production out of their own resources to meet rising demand. In any case, a policy for promoting increased food security based on domestic agriculture would not include bread to any great extent since the production of other cereal crops can be achieved more easily under the country's climatic conditions.

Another inappropriate and costly investment decision made by the National Milling Corporation was the silo project, which went ahead in spite of detailed criticisms of various economic advisors and intense opposition from the National Agricultural Products Board responsible for the marketing and distribution of domestically produced cereal.[40] The project involved the construction of three (it was four in the original proposal) modern silos at a total cost of Shs. 40 million, financed by a loan from the Swedish International Development Agency. The same storage capacity could have been created at a little over one quarter of the cost, involving no foreign finance, by the construction of 120 godowns spread throughout the country. This would have also given improved food security in the regions, provided employment during their construction, and stimulated the use of local resources. A centralised national grain reserve is not suitable for a country where transport is underdeveloped and costly. It means transporting the grain to the centres when in surplus, and transporting it back again to the Regions at times of local shortages surely a waste and always unrealistic when roads may be impassable.

The decision to build the silos was partly related to the already established high capacity grain mills. For these to function at full capacity, a constant supply of grain is required. One way to guarantee that is to have large capacity silos nearby. However, a well–organised supply system from regionally–based godowns could have equally been effective, and at no extra cost – in effect organisation substitutes for capital. Whether such large capacity grain mills are a good investment is another matter explored in Section 3.3.

Canning is another area where investments have been made in centralised plants involving high foreign exchange costs. Apart from the initial cost of machinery, foreign exchangehas tobe spentcontinuously on the importation of tinplate for manufacturing the can ends and lids. Since the Canning industries are geared for export, foreign exchange expenditure can to some extent be justified if it leads to more foreign exchange earnings. The main problem however, has been the supply of foodstuffs to these centralised plants their 'catchment' areas extend up to several hundred miles from the plant. In addition, the supply of the food being canned – mainly fruit and meat – are characterized by marked seasonal fluctuations. The supply problems have meant that all four large–scale canning plant have been operating at far below capacity, and one has closed down altogether. This represents a gross misuse of investment funds.

The viability of the plants is further worsened by distortions in the international market, overwhelmingly dominated by a few huge multinational firms. The meat canning industry in Tanzania was originally part-owned by the giant Brook Bond Liebig Company. The industry had barely made a profit since its establishment in 1950 because its whole output was sold to the parent company at a deflated price. When the industry was nationalised in 1974, the multinational successfully mounted an international boycott on spurious hygienic grounds. Furthermore, the local company never made efficient use of the by-products upon which the profitability of meat processing depends.

The fruit canning industry faces similar problems. The international market is overwhelmingly dominated by the huge De Monte Corporation which has canning plants all over the world linked to highly exploitative contract forming arrangements located in areas where labour costs are ulta low. This makes it extremely diffi cult to offer competitive prices unless special terms can be negotiated with recipient countries.

In short, the emphasis during the period immediately after The Arusha Declaration to the mid–1970s was on establishing centralised, large–scale capital intensive food processing and preservation. The major economic crisis since then has prevented any further investment. All have had economic difficulties related to underutilisation of capacity, and have been a drain on economic development rather than the reverse. The development of small or intermediate scale systems has been almost totally neglected.

3.2 Grain Storage Network

Because of its nutritional importance ease of storage, grain forms the backbone of any system of food security. Because grain production in Tanzania is rain dependent, its production fluctuates greatly from one year to the next, especially for maize, the preferred grain. It is necessary, therefore, to ensure that sufficient surpluses in good seasons are stored to offset shortfall at other times, taking into account that drought can continue over two or three seasons. Furthermore, since drought do not normally occur uniformly over the whole country, provision for transfer from productive area to those having a shortfall must be made. Financial arrangements for doing that could be facilitated by a system of insurance managed by the state, taking into account the expected probabilities of shortfalls in different regions.

A grain storage network consists of well–managed grain stores at every level – village, district, region and nation. Stores at village level should have a capacity approximating the village's annual consumption. In district, regional, and national storage facilities should perhaps hold somewhat less but sufficient to contain supplies for a subsequent drought. Grain surplus from village storage facilities would be sent to the district. Surplus from the district stores would be sent first to other district in the region, and then to the regional stores. Surplus from the region would be sent first to neighbouring regional stores, and then to the national storage centres. The grain would flow in the opposite direction in the event of seasonal shortfalls.

There are several technical requirements for grain storage. The first prerequisite is to dry the grain sufficiently prior to storage. This prevents mould and bacterial growth, and minimizes insect damage. Stores should be clean and fitted with rodent traps. The most effective way of minimizing insect damage in large stores is to fumigate after the grain is in, preferably contained in bags. Insecticides should be used sparingly except in an emergency. If used preventively, they induce insect resistance after which they are useless. If ingested, however, they can give rise to poisoning, tending to accumulate in the fatty tissues of the body. They are also expensive. Local methods are known to minimize insect damage such as blending with ash or mixing large grains with small grains such as millet which can be separated out later as required. Local technical knowledge can also produce appropriate designs for village stores and should be used as far as possible so that villages can construct them out of their own resources.[41] Some may be adaptable for district level stores based in villages or small towns.

3.3 Grain Milling

The discussion is confined to maize milling, but is adaptable to other grain crops. If grain storage is to be decentralised as outlined above, it is essential to establish a corresponding grain milling network to reduce the tedious and time consuming hand pounding by women which would be better spent if used in other ways. This would imply that each village (or ward) would invest in a small hammermill of capacity say 0.5 – 2 tonnes per day.[42] Larger hammer or roller mills of capacity say 10–30 tonnes per day would be suitable at district and regional levels. A study in Kenya showed that hammermills, even working at quite low capacity utilization, were always more profitable than roller mills.[43] Furthermore, the capital costs of setting up a single roller mill is nearly ten times that of a network of hammermills of equivalent capacity. Moreover, with minimal modification they can be used to mill other grains and oilseeds. The other advantage of hammermills is that they can be manufactured in the country.

Hammermills produce a coarser flour, but since unlike the flour from roller mills it is 100% extraction, it contains more nutrients.[44] A finer quality flour can be produced by hammermills by incorporating a pre–milling pounding stage. Since the country already has several large capacity roller mills, these would have to be incorporated in the grain milling network. These need not be under national control, and could be better utilized if managed by the regions, complementing the grain storage network.

3.4 Preservation of Leafy Vegetables, Roots and Legumes

Leafy vegetables play a crucial role in the diet both by providing valuable nutrients and as garnishes to an otherwise bland meal. Leafy vegetables are mainly preserved by drying, most traditional techniques relying on direct drying in the sun. Indirect solar drying produces a more palatable (and more saleable) product, with less colour loss, and the nutrients are preserved better.[45] Various low cost designs are available and they can be made at village level. The materials required could be afforded if vegetables are dried co–operatively. Income can be generated by offering the dired vegetables for sale in local markets. Further value can be added by mixing them into prepared garnishes, blending with spices and tomato paste.

Cassava is the most important root crop in Tanzania. It is very low in protein, and thus does not properly substitute for grain, but it is a valuable source of energy in the diet. It has a major role to play in food security since it can effectively be stored in the ground while growing, being harvested as needed. Once harvested, cassava is highly perishable and should generally be consumed immediately. However, it has been reported that cassava can be stored in simple earth clamps for up to three months,[46] but probably only at higher altitudes where ambient temperatures are lower. Dipping in parafin has been used in Colombia to preserve cassava for up to one month.

Cassava contains the poison cyanide in various proportions which must be washed out before it can be safely eaten. Traditional methods of processing have solved this problem in a number of ways, turning the cassava into such products as boiled cassava flour, gari, and fermented doughs. The processing of cassava without mechanization is extremely laborious, involving several stages including, in the case of gari, peeling, grating, formeting, dewatering, sifting, frying, and milling or sieving. Mechanical (abrasive) peeling has the disadvantage of high losses. Grating can be carried out with a hammermill. A major time constraint is frying. In Nigeria, a semi–mechanized fryer has been devised to overcome this bottleneck.[47] If the various processing bottlenecks could be overcome at village level through co–operation, this would save considerable labour time and produce a product for sale to other villages or local towns.

Legumes can be dried and stored in the same way as grain. If cleaned, dried and inspected (to check for insects and broken grain which are more vulnerable to insect damage) and blended with ash, they can be stored in air tight containers for two or three years (though they take longer to cook as time goes on). Legumes provide a valuable suource of protein with an amino acid spectrum complementary to that of grains. Thus, a meal of grain and legumes can provide all the protein needs for the human diet.

3.5 Oil–seed Extraction

Oils and fats are an essential part of a diet. Facilitating the absorption of certain vitamins, and providing essential fatty acids and supply energy in a more concentrated form.

The production and consumption of oils and fats would be greatly stimulated by setting up an oil seed extraction network, parallel to that of grain milling. Cotton seeds account for between one–half and three–quarters of the marketed production of oil–seeds. Cotton seeds are unsuitable for very small expellers since the oil needs to be refined. Larger units at district or regional level are therefore required. Other oil–seeds such as sesame, sunflower and groundnuts can be processed using small hand–operated expellers, suitable for village level production. Surplus seeds could then be supplied to larger units at district or regional levels. Solvent extraction plants, available at scales ranging from 5 to 30 tonnes per day, could extract further amounts of oil from oil seed cake as well as the seeds, though the oil seed cake might be more profitably fed to animals.

3.6 Fruit Storage and Processing

The production and consumption of fruit needs to be greatly expanded including producing enough for the canneries geared to export. Mangoes, bananas, papaya, melons, pineapples, passion fruits, citrus and avocados are the most suitable for this purpose. Fruit not only greatly enriches the diet but also are a source of the essential vitamin C. Fruit is highly perishable and is best eaten when fresh. The principal causes of fruit deterioration are enzymatic reactions which continue after the fruit has been picked, and microbial action enhanced by damage to the protective outer layer, and the continued respiration of the fruit which after picking does not have the facility to get rid of its waste products or receive nutrients via its connection with the mother plant. Cooling to 10–12 degrees (centigrade) inhibits both processes. Cooling below those temperatures causes chilling damage to most tropical fruits which makes them more vulnerable to the above actions.

A simple fan blowing air into a store through a box containing straw with water dripping through is an effective cooling device which also has the effect of maintaining the humidity required to prevent the fruit from drying out. Normal refregeration is too expensive, but solar powered refrigeration units suitable for the tropics have been developed and are quite effective. Even these would require considerable investment, mainly in locally produced materials such as metal pipes and tanks, and would have to wait until a sizeable fresh fruit market had developed.

Once the seasonal fresh fruit market is satisfied, the next priority is to process the fruit so as to make it available out of season. For domestic purposes, this can be achieved by simple means at village level through bottling or jam–making (i.e., boiled with 50% sugar which is an effective preservative), some kept for local consumption, the rest for sale in local markets. The principal constraints here are containers and fuel. Tanzania has a large–scale glass manufacturer producing jars. Since they can be recycled, the initial bottleneck would be building up stocks. Larger scale units at district or regional level producing products for export would need a constant supply.

As argued previously, the problem with the existing large scale canneries is that they are too large which makes the supply system too extended and unreliable. However, since they exist, they must be made to work and the supplies of fruit better organised, though the first thing is to expand fruit production so that the canneries do not encroach on domestic need for fruit. For export purposes, some research needs to be carried out to determine the most suitable varieties for canning. Not all varieties give an acceptable product for the fickle export market, and there is some variation in flavour when the same variety is grown in different soils. This particularly applies to pineaples.

Mangoes are probably the most versatile fruits which can be canned, sliced, converted into pulp and juice, and used in the manufacture of excellent jams, pickles and chutneys (for which Tanzania has won international prizes). There is a huge untapped market for mango products in the industrial countries partly owing to the fact that fresh mangoes do not travel well since they are susceptible to fungal damage. Citrus fruits have less export potential. The European market is already well supplied from the Mediterranean countries (except for limes, but these have a more limited market). Moreover, the quality of Tanzanian citrus fruit is generally too poor for the fresh fruit market. For export purposes they would be most suitable if processed into juice. However, even this market is highly competitive.

The local production of juice at village level or district level for the domestic market is a viable proposition. All that is required to extend shelf life is pasteurization to destroy the enzymes and micro–organisms that cause spoilage. Again, the principal constraints are fuel and containers (which may be glass bottles).The simplest method of pasteurization is heating in an open pan. The disadvantage is that not all the product might reach the pasteurization temperature, and some of it may be overheated, thus impairing colour and flavour. It is also inefficient in the use of fuel. An intermediate scale continuous pasteurizer has been developed which would be suitable for a village or district level unit.[48] It viability would depend on the successful development of the organisational network for supplies and marketing.

3.7 Sugar Manufacture

Sugar is not an essential food, but enhances the palatability of many different food preparations, and is an essential ingredient for jam–making. It is a dietary source of energy, though no better than starch, but has the disadvantage that it causes tooth decay if eaten in excessive amounts (especially in the form of candies). From a food security point of view, therefore, it should not receive high priority.

Sugarcane has to be processed within 24 hours of harvest. The economic of sugar manufacture has been a matter of some controversy.[49] It seems that the large scale vacuum pan technique does not have the economies of scale that was supposed, and the smaller scale open pan sulphite process in its modern form is far more cost effective in the developing country situation. Thus, the capital costs for a single vacuum unit of 20,000 tonnes capacity is ten times that of a network of 12 to 15 open pan sulphite production units of the same capacity.[50]

Tanzania already has five vacuum pan units with a total capacity of 300,000 tonnes per annum. There is no need for more. Sugar is not a suitable export commodity since the international market is highly oversupplied, and the price is at its lowest ever in real terms, and this is unlikely to change much in the foreseeable future (especially since the competing bulk sweetner is glucose or fructose syrup produced from fermenting maize suitable for the huge soft drink market is being produced in ever increasing quantities). Any expansion of the domestic market can be handled by the intermediate open sulphite process at district or regional levels, or by small scale jaggery units at village or ward level.[51]

3.8 Dairy Producton

Tanzania has major potential for increasing the production and consumption of dairy products. One of the major problems is to improve the productivity of dairy herds which mostly have exceedingly few milk yields per animal. Selective breeding is one approach, but to be effective, this needs a well–developed infrastructure to facilitate controlled mating or artificial insemination (which is the more cost effective method once a satisfactory cold chain is established for the frozen semen). Before investing in breeding however, the priority must be to ensure satisfactory feed and water supplies, as well as veterinary services which are the main constraint at the moment.

The incorporation of milk products in the diet, even in quite modest amounts, greatly reduces the bulk required to obtain all the necessary nutrients, and is an essential component of weaning foods and the diets of young children.

The main problem with milk is its extreme perishability and its bulk which is mostly water. If it is to be marketed as whole milk, pasteurization is essential to kill off pathogenic organisms, and if it is to last more than a day it needs to be refrigerated. Sterilization is another technique which can be carried out after sealing the milk in a container (e.g. a crown capped bottle). This eliminates its perishability so that refrigeration is not required, but the process alters the flavour. A technique developed in Tanzania recently on an experimental basis was to sterilize the milk in 20 litre stainless steel containers which were sterilised by rotating the drum containing the milk over a flame of biogas.[52] The container was then to be taken to the market and the milk sold direct from it into vessels brought by the consumer. The product was tested on the Arusha market. It sold well, many consumers saying it tested better than the normal pasteurized milk in tea and coffee. The containers would have to be imported, but unlike the materials imported for pasteurized milk packaging are reusable over and again.

The production of dried milk and evaporated milk can be produced on various scales, and a wide range of fermented products such as 'sour milks', yoghurt, and many types of cheeses can be produced from milk. Many traditional techniques are in operation at village level, which, with better organisation of rural production could be expanded, up–graded or diversified. An intermediate scale dairy suitable for rural areas in developing countries has been developed in Afghanistan.[53] Its design eliminates the need for external supplies of energy, making use of gravity to run intermediate products from one vat to another, and flat plate solar collectors for heating the water. It would be suitable for village and district level production in Tanzania. The story of the Anand co–operative in India shows the extent to which a sophisticated rural dairy industry can be built up from small beginnings: apart from supplying pasteurized milk to urban centres, it now manufactures cheese, butter ghee, yoghurt, baby foods, dried milk powder, and confectionary products, and provides insemination and veterinary services to members. It began in 1946 with two village co–operative societies that produced only 250 litres of milk per day, and it now has 831 village societies whose 255,000 members produce more than 450,000 litres of milk daily.[54]

3.9 Meat and Fish

Meat and fish are rich in high quality protein, essential minerals, vitamins and fats, as well as important ingredients for garnishes. The principal means of preserving meat and fish without refrigeration are drying, salting, smoking and canning. This is mainly for the purposes of extending the market beyond the immediate locality, and for producing certain speciality products. Canning is an expensive process, involving the import of canning materials and should be restricted to the export market. The present large scale canning plants should not be expanded beyond existing capacity

since there have been difficulties in keeping them running at full capacity, and the export market is limited and highly competitive. The emphasis should be the supply of fresh product to local urban centres on a daily basis, transporting the animals to slaughter houses.

The preservation techniques other than canning are well–known at village level, but there is considerable scope for developing improved methods, either to increase the scale of production or produce more palatable products. One approach is to combine techniques – e.g. part dried, part salted – to give a product with less moisture removed and less salt added which in combination reduces water activity sufficiently to inhibit microbial degradation.

3.10 Energy Resources for Food Processing

Energy resources in most villages are chronically short even for domestic needs, let alone for small scale food preservation and processing. The principal fuels are wood and charcoal, the latter more economical if transport costs are high (since it has a high calorific value per unit weight). The main problem is that trees have been cut down and not replaced. All villages, districts, and regions must give urgent priority to rectifying that situation through major, on–going afforestation and tree–planting projects.

The next most important source of energy is the sun. Flat plate solar collectors can heat water sufficiently for most cleansing operations – hot water is essential to maintain hygienic conditions of all food processing operations, whatever the scale.

Finally, biogas from cattle dung combined with plant wastes is another valuable source of energy. Biogas plants exist in virtually every small community in China, supplying fuel for cooking and small–scale processing.[55] China has the advantage that centuries ago it overcome the cultural inhibitions of combining human waste with other waste products, originally for use as fertilizer, and now for both energy and fertilizer, for the by–product of biogas is large amounts of organic fertilizer,[56] odourless and completely free of pathogenic organisms. Biogas plants are most economic for groups of neighbouring households for domestic supplies (cooking), and are ideally suited for small scale food processing units which tend to generate large amounts of organic waste suitable for composting. The biogas plants are built of locally produced bricks shaped into a dome for accommodating the methane gas.[57] In India, the other country which has developed biogas production for households, the designs require the purchase of a mild steel floating chamber to hold the gas (manufactured in India). A number of biogas plants are operating in Tanzania based on the Indian design.

4. Concluding Discussion

4.1 Summary of Current Organisational Situation

The need is to diversify and increase agricultural productivity in rural areas to fulfil local needs, develop local resources including making more efficient use of labour power, especially outside the seasonal peaks of agricultural production, and to earn additional income which can be used to purchase agricultural inputs to enhance productivity and consumer goods produced in Tanzania. Since financial resources are severely limited, local communities – villages or villages co-operating with one another – need to create their own financial resources by working together. The government needs to find ways of assisting them to do this, through better incentives and better organisation.

Apart from the fact that people now live in villages which make some types of co–operation or community development activitities more practical than they once were, the approach to production remains virtualy unchanged.

An organisational basis for diversifying production has not been created. Household production, as before, is based on cultivating food for the family and export crops. What communal production there is, is largely the same, and its intention to create financial resources for village development is extremely inefficient. They are not a means by which full–scale multipurpose co–operative activities can evolve — and only in a small way — and in a minority of villages are communal activities outside agriculture, and are therefore far from being a basis for diversifying the productive base of villages.

Marketing co–operatives have been re–established to replace the extremely inefficient marketing system operating since the old co–operatives were disbanded, but it is not clear whether they will take on a multifunctional role as suggested above, which could assist in the diversification of production, or be mainly confined to a single role as in the old marketing co–operatives.

A major factor, whatever the form rural policy takes, is the incentives given for increasing agricultural production and other areas of production in rural areas. Producer prices are important, and the failure of these to keep up with inflation was one of the factors undermining rural development potential. First, the necessary task of reorientating agricultural production away from subsistence to the market was made more difficult. Second, in effect, it appropriated investment resources from rural to urban areas which were mostly not invested in activities that would create new investment resources, but much was wasted expanding an inefficient service sector (especially government administration). This deprived rural areas of investment resources which could have been used to improve agricultural productivity and thus reduce the costs of agricultural production. Third, low producer prices reduced incentives to supply food commodities needed for the established food processing industries in towns, so that all operated at far below capacity – as low as 20% in some cases – thus undermining their role in generating profits for new investment.

The current emphasis in improving agricultural prices is highly positive for rural development. However, prices alone are not enough. Other concurrent changes are needed, such as improved credit arrangement to finance technical inputs to improve agricultural productivity, and measures to increase the efficiency – i.e., reduce costs – of marketing and distribution. Furthermore, there is a limit as to how high prices can be. First, high prices adversely affects food security in urban areas. If food is more expensive, it pushes up costs for industrial products for wages are raised to compensate price rises (which might reduce employment); or if wages are not raised, it means people especially the poor, would be less likely to meet their food needs. Second, for export crops, the govenment cannot allow domestic prices to be higher than those prevailing on the world market – and at present most primary commodity prices are very low. In both cases, the costs of production must be reduced by improving efficiency in all parts of the food and agricultural system.

4.2 Policy Options and Proposals for a new Strategy

Ujamaa, especially if extended through a district network or association of village–based producer co–operatives as in China, has the greatest potential for diversifying production as it has maximum flexibility in the utilization of labour power. People would work in whatever activity needed at the time – perhaps all working on agriculture at peak labour, demand, but specializing in other areas at other times. It would depend on developing a rigorous accounting system so that people would be remunerated according to their labour productivity. As long as labour is of equivalent skill, the system of work points is the most flexible. For especially arduous, unpopular or skillful work, members of the co–operative would probably agree that bonuses should be paid. Private fields need not be excluded (they never were in China), but should not be dominant otherwise they would begin to undermine communal work (the Vietnamese called them '5% plots' – i.e. they were 5% of the total land area per household).

People's involvement in mutual aid associations, on the other hand, paves the way for co–operation, and is more likely to work. Local government could encourage this through political support and small incentives, such as freer access to credit. The main problem is to ensure that local vested interests do not undermine such developments. If there is a clear strategy, refined by discussions with the people, the better–off people could be won around the argument that co–operation is in their best interests too. Marketing boards, or the marketing co–operatives, could offer better prices buying mutual aid groups (on the grounds that it is more efficient to collect from groups). Such premium prices could be extended as mutual aid to associations grouped to form larger co–operative units, and if associations of these types were formed, e.g., based on the district, the number of buying points would be reduced further thus achieving greater economies of scale. In effect, the administration would increasingly become the responsibility of the internal workings of the co–operative.

As in other forms of production, government price policy would be crucial. The mutual aid associations or co–operatives must be left with sufficient investment resources to begin financing their own growth. On the other hand, it is necesary to appropriate some of the profits centrally in order to finance large–scale projects that will begin to transform the economy as a whole. A balance has to be struck between the desire to raise investment resources at national level by making a profit out of marketing transactions, and allowing sufficient investment resources to remain at local levels to stimulate local efforts to raise productivity.

One approach is to operate a two–tier price system, offering a lower price for a fixed quota and a higher price (or bonus) for sales above quota. This incorporates an incentive to produce enough to begin selling at the higher price. The lower quota price in effect incorporates a taxation element. For that to operate effectively, the quota would have to be properly negotiated rather than imposed, taking into account normal production and special problem of soil fertility or other adverse technical factors. The negotiation of a quota would be equivalent to the marketing board or crop authority establishing a contract with the mutual aid association or co–operative, the higher prices being equivalent to a bonus for exceeding the contract. As in other types of contract, to put it on a proper business basis would imply having penalties for not fulfilling the contract. Similar contract/quota arrangements could operate for individuals outside the mutual aid/co–operative structure (but at less favourbale terms for reasons already implied). Once the quota is negotiated, it should not be raised as producitivity goes up – that way the incentive actually increases.[58] Marketing boards and crop authorities benefit from a contract system by having a reasonably guaranteed delivery on which it can base planning.

Such a system need not, indeed should not, preclude a parallel free market system. As long as the quota is fulfilled, mutual aid associations and co–operatives should be permitted to choose between selling on the free market and selling to the marketing board. This has the advantage that by monitoring free market prices, it allows the government to set above–quota prices at level roughly corresponding to the supply and demand situation. Government monopolies tend to lose touch with the laws of supply and demand, which ultimately gives rise either to unwanted surpluses, or to uncontrolled black markets. Furthermore, not all crops (or other products from the co–operative) need come under the quota system – it would depend on their strategic importance. The major grains such as maize, wheat and rice would be obvious candidates, as would be the established export crops, plus others such as fruits and meat needed by the canneries geared for export.

The Chinese marketing boards have recently abandoned buying from the large scale co–operatives (people's communes) and are instead buying directly from households on a contract basis similar to that which operated previously (and similar

to that described above).[59] Some have interpreted this as a failure of the old system. However, a more accurate assessment is that the success of the multi–tiered co–operative system gave rise to new constraints at a higher level. That the co–operative system was successful cannot be in doubt. They totally transformed the food security situation of China (supported by other policies), raised productivity of farming quite dramatically, and diversified production into a multitude of other areas, including a network of rural industries fulfilling people's needs which otherwise would not have been met. Meanwhile, they raised revenue for the central government to invest in large scale industries. However, a point was reached, evidently, whereby the growth of productivity of the co–operatives slowed down to the point of stagnation. One reason identified was that individual households which had the means, and were prepared to invest more of their income and/or time to increase production, did not have the incentive to do so. Any returns from their investment would be diluted by the failure of others to do the same. The government took the step, therefore, to contract everything to households in what is called the 'production responsibility system'. This was not the only possible option, and there are some negative consequences. Nevertheless, for the moment it does seem to have led to significant increases in production and some further diversification, assisted by the encouragement of private trading. Within this system, many households have formed loose associations for the purposes of mutual aid. The rural small industries created by the communes are running as independent co–operatives.

A possibility for Tanzania to consider is to 'miss out' the co–operative step and 'go straight to' direct contracts with households. One problem is that the administration of the contracts would be very complex to start with. It is quite important to note that the Chinese could introduce household contracts relatively easily because they were derived from the previous co–operative contracts, and the various technical factors such as soil productivity were already built in.

It is possible that if the Tanzanian government considered that the development of producer co–operatives (ujamaa) was politically too difficult, such a household contract system could be devised and managed by the newly created marketing co–operatives if their functions were broadened. A major disadvantage is that people would not benefit from the flexibility of the producer co–operative system, and it is less likely that production would be diversified out of agriculture to any great extent, though the marketing co–operatives could foster that development too and set up, for instance, workshops, small industries or projects to improve local infrastructure, paying wages to people who did that kind of work. A further disadvantage is that it might greatly increase social differentiation so that the wealthy might increasingly work themselves into more powerful economic positions and exploit the poor. This is precisely what seems to be happening in China now. (At present, for better or worse, this development is being hailed by the government as progress.)

The decentralised administrative structure could be another way of establishing this type of household contract system, and be responsible for the negotiations leading up to it, but it would probably be less effective in that unlike the marketing co–operatives, it is not primarily commercially orientated. On the other hand, it is possible that personnel presently in local government would be of more use if they were more involved in commercial activities. A case could be made for seconding local government administrators to help establish the administration of, for instance, marketing co–operatives or producer co–operatives, especially to set up a properly accredited accounting system; or in the case of technical personnel, helping to solve particular technical problems of a particular enterprise. The co–operatives would benefit, and so would the government administrators (especially if their salary for that period depended on the success of the enterprise the same as for the others!).

The 'integrated community development' concept could be applied to co–operative production systems or those based on individual household. It would undoubtedly work better in the former because the co–operative element in community development would already be there. It is that much more difficult to get households involved in community development because the same conflicts earlier described arise as between the communal plot and the household farm. It is the art of community development in such a situation to identify projects in which everyone would benefit reasonably equally and to which everyone would be prepared to contribute. In the past this has tended to operate on a voluntary/moral obligation basis, and this can cause immense friction if not all members of the community are equally committed. And, of course, it is even worse if projects are imposed as has so often been the case. In a producer co–operative structure, these problems are less likely to arise because first, the fact that the co–operative is functioning implies that an effective management/consultation process already exists. Secondly, people would get their work points whether working on the project or on the communal farm (or whatever) – i.e., in effect people would get paid (by the co–operative) for working on community development–type projects. That in essence was why community development in China was more successful than it has been anywhere else in the world.

The other role of community development is its capacity, through the ideology of self–reliance, to promote the most economical use of resources (finance, skills, natural resources, manufactured materials). If people sit around waiting for their problems to be solved for them (as patronizing bureaucrats encourage), that is hardly development at all. That is why agencies geared to solving problems technocratically – which they cannot do all at once resulting in some people being favouved over others – should not be allowed in until Community Development has done its work. That is why community development has to play the central role if the aim is all–round development.

To summarize, ujamaa (producer co–operatives), and broadening the function of the new marketing co–operatives, form the organisational basis for long–term food security (and social security). Greater emphasis on one or another could vary in different regions according to the situation – there does not necessarily have to be a uniform policy throughout the country, but probably it should be consistent within a particular region. If any one of those elements is missing it would limit what can be achieved.

4.3 Food Processing and Organisation of Production and Distribution of Food Supplies.

The priority should be on establishing a network of decentralised, small or intermediate scale food processing industries at village, district and regional levels. This could only take place if a major advance were made in the organisation of production and distribution along the lines already outlined. Very small scale village operations could concentrate on supply of village needs and of the local market, whilst larger scale regional plants can be geared to the needs of major urban centres and export–based on supplies through the district network. Regional planning would have to ensure that needs of different sectors – village, district, regional and centralised production – do not conflict. For example it would ensure enough foodstuffs are produced to keep all those sectors working, and also that wasteful competition is minimized by ensuring that not all villages in the region engage in the same line of production, some specializing in one activity and buying supplies from other villages. Small–scale units with minimal capital investments do not need to run all year round, nor even beyond the peak of the season. Larger–scale plants at regional or national level, on the other hand, need to keep production going for most of the year, and to work double shifts at peak periods to maximise use of the capital invested.

Some of the large–scale investments already existing could be made to work profitably if the supply problems were solved. This depends greatly on the efficiency of the organisation and distribution of the raw food supplies. Some would be better closed down altogether – e.g., the large bakery and the large–scale dairy in Dar es Salaam – since they are a constant drain on foreign exchange.

Notes

1. C.G. Kahama, T.L. Maliyamkono and S. Wells, *The challenge for Tanzania's Economy*, (James Currey, 1986).
2. P. Collier, S. Radwan, S. Wangwe with A Wagner, *Labour and Poverty in Rural Tanzania: Ujamaa and Rural Development in the United Republic of Tanzania*, Oxford: (Clarendon Press, 1986).
3. L. Cliffe and G.L. Cunningham, 'Ideology, Organisation, and the Settlement Experience in Tanzania' in L. Cliffe and J.S. Saul (eds), *Socialism in Tanzania* Vol. 2, (Nairobi: East African Publishing House, 1973).
4. The invetory for one such scheme in 1965 read as follows: four bulldozers, two tractors, a field car, seven lorries, a workshop and two stump pluckers to clear site, seven tractors with implements, a maize mill, water pump, landrover and an electric generator as permanent equipment. On the management side, it had a manager, assistant manager, clerical officer, survey assistant, chief mechanical supervisor, 'jack–of–all–trades' voluteer, three drivers, two junior clerks, a mechanic, storeman, plumber–fitter and three survey assistants. In addition, the scheme, which involved more than 300 settlers, was at one time also employing 150 labourers and twelve artisans. (Cliffe and Cunningham, *op. cit.)*
5. Two distinct types of co–operatives are discussed in this paper– namely producer co–operatives and marketing co–operatives. The context denotes which type is being referred to. Producer co–operatives, co–operative forms of production, communal production and *ujamaa* are used more or less synonimously.
6. The tremendous financial potential of self–help community development schemes carried out by people organised under a system of producer co–operatives is well illustrated by a multitude of well–documented projects in the people's Republic of China. The classic example perhaps is the construction of the Red Flag Canal in Linhsien County.The whole project, including 1500 km of large and small channels 134 tunnels and 150 aquaducts took ten years to build. Only 2 percent of the resources came from the government (except the main canal where the corresponding figure was 21 percent), the remainder coming from the organised labour of 30,000 men and women (out of a total population of 240,000 able–bodied people in the county) working on a rota basis. Apart from bringing water to a hitherto arid area which revolutionised agricultural production, the project included 'a host of small hydro–electric stations' which supplied power to small industries and a fisheries network. *(Peking Review* Nos 48 and 49, December 1972; see also *China: Science Walks on Two Legs,* New York: Discus Books, 1974).
7. J.K. Nyerere, 'Socialims and Rural Development' *(Ujamaa Vijijini),* in J.K. Nyerere, *Freedom and Socialims,* (Oxford, 1968). The need to move into villages was stated as early as 1962 in the Presidential Inaugural Address (J.K. Nyerere, *Freedom and Unity,* (Oxford, 1966): 'Before we can bring any benefits of modern development to the farmers of Tanganyika the very first step is to make it possible for them to start living in villages.' One problem Tanzania did not have was individual ownership of land. If the colonial authorities had had their way, that might have happened. Nyerere, on behalf of the Party, resisted that move in the following famous statement: 'If we allow land to be sold like a robe, within a short period there would be a few Africans possessing land in Tanganyika and all others would be tenants ... we would be faced with a problem which has created antagonism among people and led to bloodshed in many countries of the world.' *Freedom and Unity, op. cit.)*
8. 'Socialism and Rural Development', *op. cit.*
9. M. von Freyhold, *Ujamaa Villages in Tanzania: Analysis of a Social Experiment,* (Heinemann Educational Books, 1979), J. Myrdal, *Report from a Chinese Village,* (Heinemann, 1963, and Picador, 1975).
10. A.L. Strong, *The Rise of the People's Communes,* Peking: New World Press 1959

11. *Daily News* 28 November, 1975
12. Ibid. 2 March 1976.
13. For example: in Rugazi Ujamaa Village, Karagwe, 'It seems... that command and not persuasion was the predominant means used... People say that some of the leaders never bothered to explain what was involved in "going *ujamaa*...Instead they were simply told that new settlements were to be established and that they were expected to join them. The example set by some leaders was certainly not such as to encourage others to move voluntarily...for their actions gave little evidence of their own identification with or commitment to goals of the scheme. Instead of practising co-operative farming themselves, they were consolidating and expanding their own private landholdings and operating them individually along capitalist lines. People began complaining about this and argued that if the projects which the leaders were urging them to undertake were good, why were the leaders themselves practising the opposite....Out of 42 settlers I interviewed, 36 said they had been forced to the village and eight...had been intimidated. Two of them went further and said they had been put in the lock-up by a Divisional Executive Officer.' (I.K.S. Musoke, 'Building Socialism in Bukoba: The Establishment of Rugazi Ujamaa Village' in J.H. Proctor (ed), *Building Ujamaa Villages in Tanzania,* (Tanzania Publishing House, 1971). See also others in Ibid.,and in von Freyhold, *op. cit.*
14. J.K. Nyerere, 'Freedom and Development' paper presented to the TANU Executive Committee, October, 1968.
15. A.Ellman, 'Development of Ujamaa Policy in Tanzania," in L. Cliffe, P. Lawrence, W. Luttrell, S. Migot-Adholla and J.S. Saul (eds), *Rural Co-operation in Tanzania,* (Tanzania Publishing House, 1975).
16. von Freyhold, *op. cit.*
17. Myrdal, *op. cit.*; A Piazza, *Food Consumption and Nutritional Status in the People's Republic of China,* Westview Press, 1986).
18. Strong, *op. cit.*
19. 'As long as the agricultural sector is very large and industry insignificant, it is possible to obtain impressive rates of growth of manufacturing output by squeezing the peasantry and transferring resources out of rural areas. If such a policy continues for very long, however, per capita agricultural output will begin to fall and eventually this will result in a decline in the industrial growth rate as well. When this point is reached, further growth in both sectors will necessitate an increase in per capita agricultural production. In other words, there comes a time when the economy must walk on two legs or it will not walk at all.' (K. Griffin, *Political Economy of Agrarian Change,* 2nd Edn, Macmillan, 1979). In fact, in most African countries the problem was far worse because the investment resources extracted from agriculture were not used, except in a small way, to establish industries supporting agriculture or supporting the development of local natural resources to meet local needs, and much was wasted in expanding an inefficient administrative apparatus. Thus, in the late 1970s, most developing countries that had adopted that strategy had reached the point whereby they had to increase incentives to, and investment in, agriculture.
20. Personal communication.
21. Collier *et al, op. cit.*
22. Cited in *ibid.*
23. Interestingly, the three villages in the survey which did operate a system of distributing communal output linked to household contributions had a communal output above average, being six times that of the remaining villages surveyed. (Collier *et al, op. cit.)*
24. F. Ellis, "Agricultural Price Policy in Tanzania," *World Development 10* No. 4 (1968).
25. In 1973–74, southern Tanzania was largely unaffected by drought but the surplus grain produced in the area remained undistributed because of the underdevelopment of the transport and distribution system. And because of inadequate storage facilities, much of it rotted before transport could be arranged.
26. In the event, the response did cause some problems. The National Milling Corporation responsible for buying food crops had a huge surplus of the drought crops (and pulses) on its hands for which there was no market – people prefer maize. Evidently, the price increases were apportioned incorrectly. If the prices of the drought crops had been lower, and that of maize higher, it is possible what more maize would have been sold and more sorghum consumed on farm.
27. Ellis, *op. cit.*
28. K. Malima, Discussion Meeting, Overseas Development Institute, London 1 October, 1984.
29. *Financial Times* 3 September, 1986. At the same time retail prices for maize, rice and wheat flour had increases ranging from 31 percent for rice to 121 percent for maize.
30. F. Ellis, Discussion Meeting, Overseas Development Institute, London 14 April, 1981.
31. P. Yeo, "Current Debates on Co-operatives in Tanzania," *Bulletin of Tanzanian Affairs* No. 23, January 1986.
32. J.K. Nyerere, *Freedom and Development,* (Oxford University Press, 1973).
33. Kahama *et al, op. cit.*
34. B.L. Hall, *Adult Education and the Development of Socialism in Tanzania,* Nairobi: East African Literature Bureau, 1975).
35. For a discussion of how the Ministry of Community Development in India was gradually overwhelmed by the Ministry of Agriculture and Food, see J.V.S. Jones and I. Wiggle, "The Concept and Politics of Integrated Community Development: Can Community Development be Resurrected as a Leading Force for Social and Economic Change in the Third World?" in *Community Development Journal* (1987). See also G.E. Sussman, *The Challenge of Integrated Rural Development in India: A Policy and Management Perspective,* (Westview Press, 1982).
36. A.K. Rugeiyamu, "The Folk Development Colleges of Tanzania," Special Study, Queen Elizabeth College, University of London, 1979; J. Marwa, "Technical and Vocational Skills at Village Level with Special Reference to North West Tanzania," Special Study, Queen Elizabeth College, University of London, 1979.
37. S.M. Wangwe, "The Problem of Underutilization of Capacity in Industry: A Case Study of Mara Dairy Industry," Research Paper 75.4, Economic Research Bureau, University of Dar es Salaam, 1975.
38. J.V.S. Jones, *Resources and Industry in Tanzania: Use, Misuse and Abuse,* Tanzania Publishing House, 1983.
39. A. Coulson, "The Automated Bread Factory" in A. Coulson (Ed), *African Socialism in Practice: The Tanzanian Experience,* Spokesman Books, 1979)
40. A. Coulson, "The Silo Project" in Coulson, *op. cit.*
41. L. Sangana, 'Food Grain Storage at Village Level in Tanzania', Special Study, Queen Elizabeth College, University of London, 1981.
42. D. Phillips, "Industrialisation in Tanzania, Small Scale Production, Decentralisation and a Multi-Technology Programme for Industrial Development, Small Industries Development Organisation, Dar es Salaam, May 1975.
43. C.G. Baron (Ed), *Technology, Employment and Basic Needs in Food Processing In Developing Countries,* (Pergamon Press, 1980).
44. R. Kaplinsky, "Inappropriate Products and Techniques: Breakfast Cereals in Kenya,' *Review of African Political Economy* No. 14 (1979).
45. M. Sichinga, "The Preservation of Leafy Vegetables and Beans in Malawi," Special Study, King's College, University of London, 1986.
46. *Nature 267* 16 June 1977; cited in Baron, *op.cit.*
47. P.O. Ngoddy, 'Gari Mechanisation in Nigeria: The Competition Between Intermediate and Modern Technology," in N. Jequier (Ed), *Appropriate Technology: Problems and Promises,* Organisation for Economic Co-operation and Development, Paris, 1976.
48. P. Fellows, C. Neville and B. Axtell, "A Tubular Pasteurizer for the Small Scale Preservation of Fruit Juice," *Appropriate Technology 12* No. 1 June 1985.
49. Baron, *op. cit.;* R. Kaplinsky, *Sugar Processing: The Development of a Third World Technology,* Intermediate Technology Publications, 1984; M.K. Garg, "The Scaling Down of Modern Technology: Crystal Sugar Manufactruing India," in Jeguier, *op. cit.*
50. The development of the latter technique stagnated until the 1960s because all the R and D had gone into vacuum pan mills operated by the multinational firms. The recent developments in open pan sulphite process owes much to the work of Garg in India. See ref 49

51. Jaggery is the brown solid left after evaporating the water from sugar cane juice, consisting of sugar crystals coagulated with the molasses. This is suitable for the production of local alcoholic drinks among other things.
52. R.L. Kurwijila, "Flame Sterilization and Marketing of Milk in 20 Litre Containers," Ph.D. Thesis, Swiss Federal Institute of Technology, Zurich, 1986.
53. M.R. Bachmann, "Technology Appropriate to Food Preservation in Developing Countries," in S.N. Thorne (Ed), *Developments in Food Preservation* Vol 1, (Applied Science Publishers, 1981).
54. M. Franda, *Small is Politics: Organisational Alternatives in India's Rural Development,* (Wiley Eastern Limited, 1980).
55. Personal Communications.
56. But there have been a number of problems. See R. Bisney, 'The Economics of "Gobar Gas" versus Fertilizer: A Critique of Intermediate Technology' *Development and Change,* January, 1977; M.K. Garg, "The Upgrading of Traditional Technologies in India: Whiteware Manufacturing and the Development of Home Living Technologies" in *Jeqier, op. cit.*
57. M.G. McGarry and J. Stainforth, *Compost, Fertilizer and Biogas Production from Human and Farm Wastes in the People's Republic of China,* International Development Research Centre, Ottawa, 1978.
58. This is a direct adaptation of the Chinese system. See Gek–boo Ng, Incentive Policy in Chinese Collective Agriculture', *Food Policy* May 1979.
59. A Watson, "Agriculture Looks for Shoes that Fit:" The Production Responsibility System and Its Implications," *World Development II No. 8 (1983).* The Vietnamese which has similar co-operative structures to China has effected a similar change of policy.