

Does modernisation = mechanisation?

Mozambique imported £20 million of agricultural equipment last year in a crash attempt to increase production. But inside Mozambique, the mechanisation campaign sparked increasing criticism.

Last week, the agriculture minister was sacked

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reports from
Mozambique

President Samora Machel was one of more than 30 000 volunteers cutting rice in the Limpopo valley in June. This mobilisation was

a political response to a combination of technical and organisational failures. And it is one of several factors which has led to a rethinking of the belief that modernisation of agriculture is the same as mechanisation. This has led to a return to Frelimo's old policy that mechanisation comes last, after the most is made of human labour, better seeds, irrigation, etc.

The Limpopo valley is a good example of the agricultural changes of the three years since independence. This lush irrigated area was set aside for Portuguese settlers in the 1950s and it became the rice bowl of Lourenço Marques. At independence, the colonists fled, smashing equipment as they went. The farms were idle but Lourenço Marques, now Maputo, had to be fed. Some of the land was allotted to cooperatives, but most was formed into a massive state farm. Standing in the middle of 12 000 hectares (ha) of rice, it is easy to see why hard-pressed government officials simply imported tractors and combine harvesters without further thought. But all did not go well. This year, the rice grew too tall and fell over; the combine harvesters worked poorly. What went wrong? Too much fertiliser and planting too many seeds made the rice grow too tall, explained Daniel Sousa, director of the National Agronomy Institute. George Tembe, head of the state farm, denies this. But both agree that the strain of rice was not the most suitable and that soil preparation did not take account of mechanical harvesting—the rice was still grown in small paddies separated by low walls, rather than in larger fields suitable for large machinery. Finally, the combines could only be used in the middle of the day, because the rice was too moist early in the morning—a problem both of wrong choice of machine and inadequate operator training. In all, the 49 combines harvested only 2000 ha, less than half their target. The Portuguese colonist families did much of the picking themselves, working long hours. But they also used forced labour and, more recently, hired workers for the harvest from the surrounding areas. The state farm did not hire enough, and tried to depend on inexperienced volunteers. When I was there, six weeks after the harvest had begun, much rice was still lying in the fields in the rain. But the problems are all those of inexperience, and the farm managers seem to be learning fast. In any event, no one would have chosen to take over such a large operation on such short notice. And as Tembe comments: "All these problems are natural when you are growing; a child falls down—it is part of growing up."

There are three distinct components of Mozambican agriculture. One is the plantation sector, largely controlled by foreign capital, producing sugar, copra, tea and sisal, which did not abandon Mozambique. Next are the peasants, who cultivate most of the maize (Mozambique's largest crop), cassava, millet, beans and cashews (the country's largest export). The peasants do not, however, produce enough even to feed themselves. The third sector is the medium size—4 ha and up—colonist farms which produced food for the cities. The colonists almost all abandoned their farms.

So far, the government has concentrated on this last sector, because it seemed the quickest way to bring agriculture production back up to pre-independence levels.

State farms were set up on the bulk of colonist land, at 100 000 ha, and they control 80 per cent of the rice, vegetables, and citrus fruit. (The new cooperatives, which now account for 20-50 000 ha, are mostly on the rest of settler land.)

Three factors determined this choice. First was the commitment to keep all industries and farms running as not, for example as in Cambodia, to start again from scratch. The second was the desire to become self-sufficient as quickly as possible, both because of the foreign exchange problem and of the threat of Rhodesia and South Africa.

The third factor is political. "During the war, the peasants were the base of the revolution. This class was able to liberate our country. But for the construction of socialism, we must have a real working class to make the social and economic changes," Sousa explained. "The ideology of our country is Marxist-Leninist, so the leadership of the working class is not questioned. But our working class is not very big and has little experience of organisation. To develop our resources, we must create and develop the base of the revolution—the working class. This will be done by creating state farms with large numbers of workers. Another factor is that co-ops should be the base of the peasant economy, but people have no experience of them. "People will see the importance of organising communal work and leaving individual work by looking at the state farms."

No discussion

Colonist agriculture was partly mechanised: before independence there were 4500 tractors and a few combine harvesters in Mozambique. At the beginning of 1977, only 2500 tractors were working—the rest destroyed by departing colonists, driven over the border, or simply broken down due to lack of parts and mechanics. The decision to try to replace the lost colonist equipment, and bring the Portuguese farms back into production in the same technical way as before, was taken, by all reports, virtually without discussion. In 1977, £20 million of equipment was imported, including 1200 tractors, 50-100 combine harvesters, and pumps and irrigation equipment. About half the money was foreign aid, the rest from Mozambique's own reserves. More than 1000 tractors went to state farms. The rest were distributed to machinery stations, set up for the Portuguese to serve colonist farms, but which are now controlled by the state and are renting tractors and other equipment to nearby cooperatives.

How successful this importation was can only be a matter of perspective. Considering the total inexperience of the people ordering the equipment, they did rather well. As one expert put it: "they didn't order anything disastrous, like snowploughs."

But the utilisation of the equipment is extremely poor. There are few skilled mechanics and spare parts distribution is bad. There are few skilled operators, which leads to poor ploughing quality and under-utilisation. Mozambique is learning the hard way, by being thrown in at the deep end. Most of the equipment will survive the learning process, and the damage and inefficiency may be a small price to pay for a quick education.

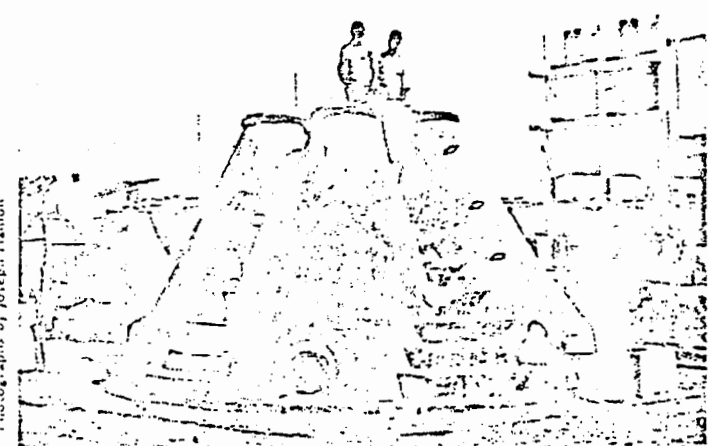
But under-use is expensive. Although some co-ops have made enough money to buy their own machinery, others have been unable to pay even the subsidised hire charges of £3/hour for the tractors. And the purchases for the state



Upper left Some of the thousands of city dwellers who volunteered to gather the rice at the Limpopo state farm

Above Tractors are more than just a means of ploughing; they are a vital means of transport of goods and people

Left Cement grain store at the TEARN appropriate technology centre of the Institute of Scientific Research. Such stores can be built inexpensively by villagers themselves



farms were justified on doubling production this year and doubling it again next year, paying for the imported equipment by savings in the £40 million annual food import bill. But this is hopelessly optimistic. Rice production on the Limpopo state farm is now only 2.5 tonnes/ha, compared with 9 tonnes/ha in China.

By early this year, it was becoming clear that foreign exchange was to be a critical factor. Throughout recent colonial history, Mozambique had a sizeable trade deficit, balanced by wages of miners going to South Africa and by the ports and railways serving South Africa and Rhodesia. Applying the UN sanctions to Rhodesia cut port and railway income 30 per cent. And mine income has dropped. For nearly a century, around 90 000 Mozambicans have worked in the coal and gold fields of South Africa. The wages were paid in gold at the official rate to Portugal, which resold the gold at the free market rate and paid the miners in Mozambican escudos. Independent Mozambique inherited this procedure. The peak year was 1975, with gold profits of £90 million from 118 000 miners in South Africa—more than the number of workers in all of Mozambique's factories. Now the agreement has been ended and the gold is paid at the free market rate; the recession in South Africa has cut mine employment to less than 40 000 Mozambicans.

Some estimates suggest that Mozambique could use up to 40 000 tractors—but the money simply isn't there. Combined with the realisation that what has already been imported was not being used all that well yet, mechanisation was cut back. State farm proposals for another substantial importation of machinery were rejected, as was a proposal to treat tractors as the basis for co-ops. Machinery imports this year are likely to be less than one-third of last year—virtually all covered by aid.

On the state farms, attention is turning to other technical inputs. The agronomy institute has just begun soil

testing for the state farms, to tell them what kind of fertiliser, and how much, to use. No effort was made during colonial times to breed seeds suitable for Mozambique, so this is beginning. The Belgian FAO expert killed on 22 June by Rhodesian troops was working on improved maize seeds, for example. The Limpopo state farm is experimenting with a shorter rice which matures quickly enough to permit two crops per year. Actually, no effort was ever made to breed seeds at all—most were imported, particularly from South Africa. So seed farms are also being set up. On the machinery front, two Swedish aid projects are now providing mechanics for the co-op machinery stations and setting up a spare parts supply system for the whole country.

Priorities shift

The almost single-minded concern for state farms and mechanisation drew increasing criticism within Mozambique—and not simply because it wasn't working as well as its proponents hoped. The peasant sector includes at least 2 million ha, vastly more than state farms and co-ops. And Frelimo's policy—successfully introduced in the liberated areas—has always been that communal villages must be the basis of peasant agriculture.

Pressure increased on the Ministry of Agriculture to pay more attention to the peasant sector, but the ministry resisted. In an effort to elevate communal villages to the same level as state farms, the government three months ago set up a special National Commission for Communal Villages which reports directly to the president.

The shift became even more clear at the third national agricultural congress in June. There was a call for better control of machinery and a warning against the "preoccupation" with using machinery as the basis for forming co-ops. And the congress urged the spreading of what it called "appropriate technologies" such as animal traction and better ploughs and storage facilities. A national campaign was announced to start next year to encourage animal ploughing.

Finally, last week, the Frelimo Central Committee sacked Agriculture Minister Joaquim de Carvalho because "he refused to implement the priority defined by the leading bodies in relation to communal villages. In essence, he does not place trust in the people; he does not consider man as the determining element of development."

Most peasants now live on scattered farms or in small villages. The commission wants to bring them together

into communal villages of up to 1000 families. This is the only way that water, roads, schools, and health services can be sensibly provided. It will permit the farming of communal plots to pay for these services. And, most important, it will permit various forms of shared production, starting simply by sharing improved implements and animals and by helping on one another's plots. Eventually it is hoped that this will lead to the formation of cooperatives. This is seen both as the only way to improve peasant production and as a basic form of political mobilisation, leading to a socialist society.

Peasant agriculture in Mozambique presents serious problems, especially because of the distortions of 100 years of colonial rule. In the south, virtually every man worked for part of his life in the mines. In other regions, many men worked on the plantations. Those who did not work in mines or plantations were often forced by the government to work on roads and other projects. In addition, the government forced the peasants to grow cotton, a labour intensive crop. The result was that there simply wasn't enough labour left to grow sufficient food to eat and to sell for money to pay taxes and to buy farm implements, house building materials, and a wife. This was further distorted by the introduction of cashews, an export crop, which were often grown in place of groundnuts, a food crop. Bad agricultural practices developed which seriously damaged the soil as peasants tried to grow the most with the least labour. Many villages are now so poor that they cannot afford to pay someone to become a village health worker.

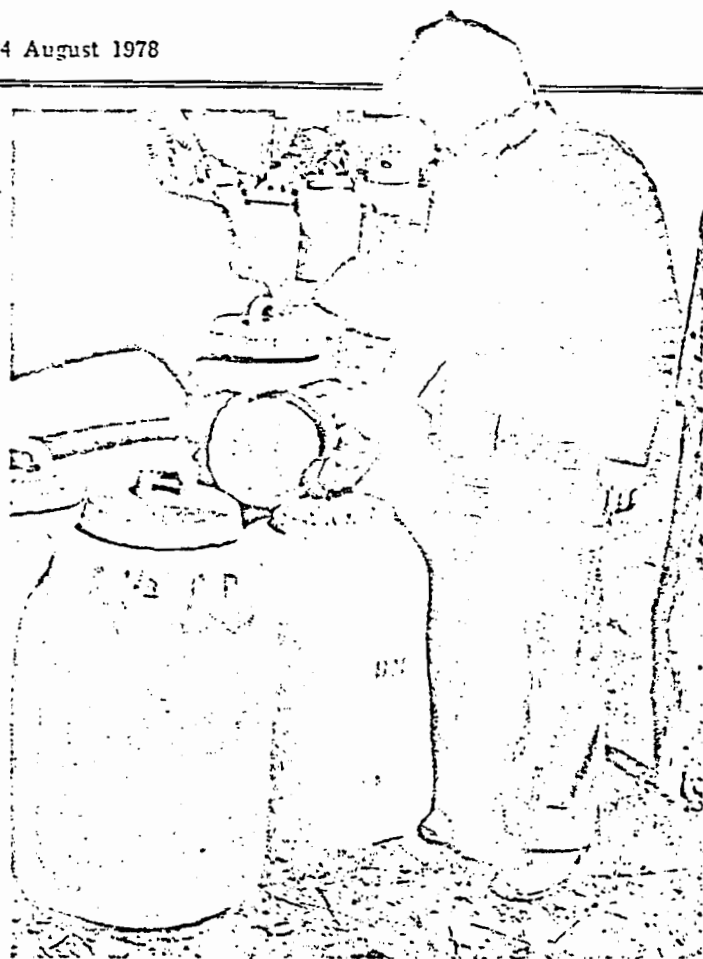
The first step will be the proper planning of the farming areas of the communal villages—ensuring that enough water and land are available and determining which crops are suitable. There must be enough land to rotate crops, to grow both food and commercial crops, and for forests for fuel.

The intention is that farming should begin first. Only when an economic base has been established, with some cooperative work, will people build housing and actually begin to live in the communal village. "Some of our most flourishing new villages do not have any people there yet," commented the assistant director of the commission, Lopes Tembe. But in the past, the reverse often happened—housing was set up first and farming later. This occurred for three different reasons. Some communal villages were set up to rehouse the more than 100 000 people displaced by the serious floods of the past two years. Some communal villages are really the "protected villages" set up by the Portuguese in an effort to keep the peasants away from Frelimo. Some villages have been set up since independence, but because the Ministry of Agriculture was concerned with state farms, production was neglected.

Planning communal villages

Thus, while Frelimo literature talks of the communal villages as the basic units of production, they have, often, merely been housing units—and sometimes poorly planned ones at that. The average distance to water, for example, is 5 km. In one village, the farms are 30 km from the living area. In another, the peasants get up at 3 am to walk for 2½ hours to the communal land, returning home for lunch. In the afternoon, they work their own land. They must walk 1½ hours each way for water. The new commission, however, is taking the planning aspect seriously, and it is unlikely that any new communal villages will be formed unless they can be self-supporting and are near water and roads.

The next step is actually improving production. This will first require study of the present level of technology and organisation—something which was never done during the colonial period. But it is clear that soil preparation requires the most labour, and thus is the biggest constraint on improved production. Although animal ploughing is



Luis Faria of TBARN with a concrete grain storage jar

used, particularly in some areas of the south, the most common way of preparing the land is with the *enzada*, a short-handled hoe. Thus, the programme to encourage animal ploughing could significantly increase the area of crops that can be planted. But animal ploughing will not be easy. The animals must be bred and trained and the peasants must learn to care for the animals. Feeding is a special problem, because the cattle are needed for ploughing just before the rains when pastures are at their worst.

Animals are also important for transport, particularly to carry water (now carried by women in large cans on their heads) and crops to market. Even where animals are already used, many simply pull loads on sledges. So there is a need for ox-carts. (Bicycles with trailers, already used in Mozambique, might also help here.) Animal dung provides a useful fertiliser which is not commonly used here.

Another problem is improved implements, both animal drawn and hand tools. In many areas, the *enzada* is the only tool. But it is particularly unsuitable for weeding because it is too heavy and cuts the roots of the crops. The peasants know this, and one co-op on its own, has developed a harrow by nailing branches together. There is a clear need to provide, probably on a communal basis, harrows and weeding hoes.

Herbicides may be the best solution during the rains, when weeds grow fastest but there is little time between storms to remove them; after the rains, manual weeding would be adequate. Simple hand- or animal-operated seed drills would also be a major advance. The sickle is the most commonly used harvesting tool, but much more efficient tools exist, so improvements are possible.

Grain storage is one of the biggest problems, with peasants in some areas simply storing grain on the ground—rat and insect losses reach half the crop. Simple, inexpensive cement grain storage jars and bins have been built by TBARN, the appropriate technology unit of the Institute for Scientific Research, and are now being tested

in villages. A store for 10 tonnes of grain would require only £20 of materials, and could pay for itself in the first year. TBARN will be working closely with the National Commission for Communal Villages to develop and implement much of the necessary AT. Loans will be made available to cooperatives for grain stores, draught animals, etc.

Improved crops are also needed. Ironically, only cotton was bred for Mozambican conditions, in an attempt to maximise the yield of the forced cultivation. New crops, such as carrots and other vegetables, may also be introduced. Tree crops might be preferable to annual crops, in that they require less work and do less damage to the soil while producing a similar yield per ha, but this will require considerable research.

Selling the surplus

Improved commercialisation will undoubtedly be the biggest prod to increased production, both individual and communal. Portuguese colonists controlled both local shops and the purchase of surplus produce, but they left at independence and have not really been replaced. In some villages maize storehouses are full with another crop ready to pick. In Inhambane, tangerines are rotting on the trees because there is no way to get them to Maputo. It is planned that every village will have a cooperative shop, the *Loja do Povo*, which will sell basic necessities. The plan is for this shop also to buy surplus produce. If transport and marketing were coordinated quickly, however, the peasant sector might contribute as much surplus food as the state sector.

Finally, the commission is considering the setting up of small-scale workshops in the communal villages. They will be absolutely necessary to make and repair some of the basic implements needed by the farmers, and could also make some basic commodities. The basis of such workshops might well be returned miners, many of whom have mechanical skills and consider themselves wage labourers

rather than farmers, so would much prefer to be paid a regular wage by the community.

Mozambique's long-term goal is industrialised agriculture. And with its large land area and small population, that goal seems possible. So does the intermediate goal—mechanised land preparation but manual weeding and harvesting. But how quickly can these goals be met? With some peasants still practising slash-and-burn agriculture, it will take many steps to bring everyone to mechanised farming. And with the present high unemployment, caused both by the drop in mine employment and the general economic decline since independence, the first priority should be labour-intensive rather than capital-intensive methods.

But the third agricultural congress did not speak for everyone when it talked of appropriate technologies. Suggestions for improved hand tools, for example, draw outright laughs from some foreign advisers and offhand dismissal from the Agronomy Institute. There is a tendency for some foreign advisors, particularly from Eastern European countries, to advocate policies followed in their own countries, pushing mechanisation particularly hard, based on their experience of huge farms and labour shortages. And on the ground, the peasants themselves realise that a tractor can prepare 3-4 ha/day, while a pair of cattle can prepare less than 1 ha/day. Vasco Cubai, the vice-president of the Mozambican Heroes Co-op, told me that although his co-op uses both tractors and animals to plough, they prefer the tractor. Not only is it easier, "but tractors do a better job, and the land produces more." But, as Daniel Sousa notes, the "comparison is not between tractors and animals to prepare the land, but between animals and nothing."

In practice, the balance between mechanisation and intermediate technologies has yet to be struck. But Mozambique has discovered quickly that modernisation need not mean simply mechanisation. □