MECHANISATION: SOME POINTS TO CONSIDER

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INTRODUCTION

Many extension officers and farmers believe that mechanisation (using machines) is a necessary part of development in an agricultural project. However, this may not always be true. The machines that farmers use, such as coffee pulpers, hand sprayers, rotary cultivators, irrigation equipment or tractors all require money to buy them. A farmer should think very carefully before spending money.

MECHANISATION - WHAT IS INVOLVED?

From our work with subsistence, semi-commercial and commercial farmers in Papua New Guinea we have found that most people do not realise how equipment and machinery can affect their businesses, especially from the financial point of view. We have also found that extension officers do not always think of all the factors involved in mechanisation, especially for the small scale farmer. Mechanisation such as using a coffee pulper may be a great help, but expensive machinery such as a tractor may not always be a good thing.

It is very important to have a clear idea of what machinery is needed, and how much money the farmer can afford before money is invested (spent) in mechanisation. It should be shown that mechanisation will help the farmer make more money. At the least, mechanisation should be useful socially, e.g. by reducing the amount of work done by the farmer's family.

SOME REASONS FOR MECHANISATION

When extension officers or farmers consider mechanisation they often think:

(1) that mechanisation will increase production

(2) that mechanisation will mean less work for the farmer and reduce his labour requirements

(3) that mechanisation will bring the farmer more money.

These are some reasons why farmers decide to buy machinery. Another, often hidden, reason for mechanisation is prestige of ownership. This is one of the sales points that commercial companies use when selling machines and equipment.

QUESTIONS TO BE ANSWERED BEFORE MECHANISATION

We must consider all the reasons for mechanisation carefully when advising a farmer or money lending institution (e.g. Development Bank) about suitable equipment or machines for a project. We need to ask the following questions:

1. <u>How much, if at all, will mechanisation increase production?</u>

If there is unused land available then mechanisation may increase production, as the farmer will be able to prepare more ground for crops. Mechanisation alone will probably not increase yields per unit area. This is usually achieved by the use of improved management skills, new planting methods, improved seeds, fertilizers, more labour and use of protective spray chemicals or integrated pest and disease control.

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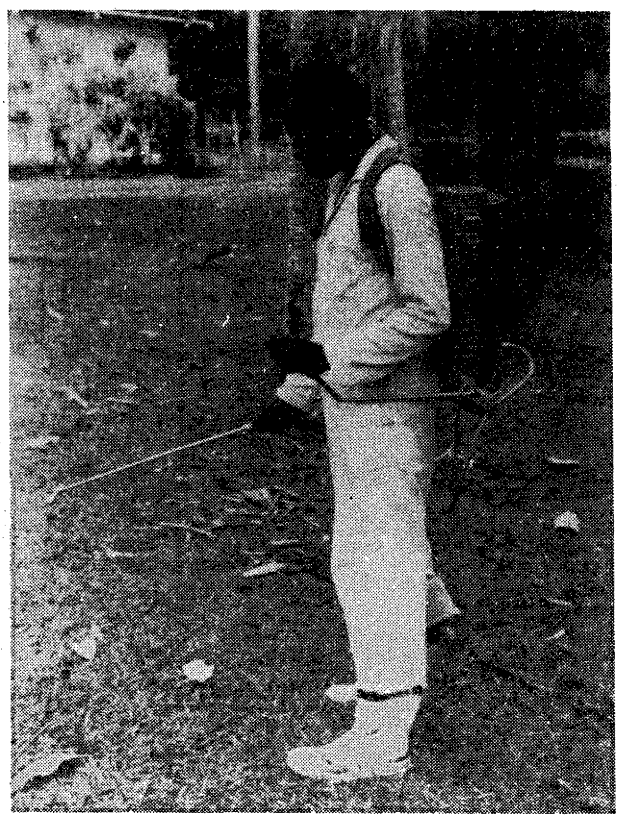
A digging stick

A spade

A pick

Hand tools like those in the pictures above are the simplest kind of mechanisation.



Using pesticides can prevent crops from being damaged or destroyed by pests and diseases - but you must use the proper equipment to apply them. This means spending money on machines such as a hand sprayer (left) or a power sprayer (right)

2. Is it really cheaper to use a machine to do the work rather than employ full or part time labour?

Many people in Papua New Guinea would welcome the opportunity to work, even part time. More work in agriculture may help to stop people from going to live in the big towns.

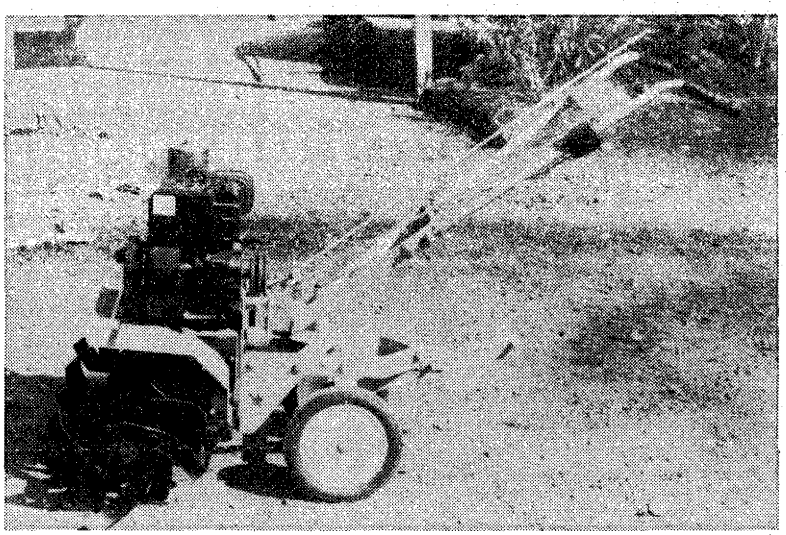
Part time or casual labour can be very useful to help out at times of land preparation, planting, weeding and harvesting. Labour costs money only while it is hired. A machine costs money whether it is working or not.

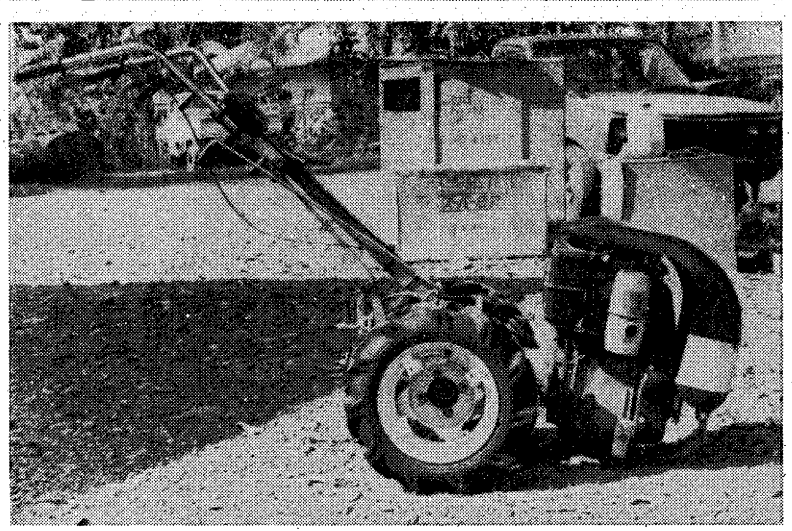
People will often do a job much more thoroughly than a machine. Also, people can do many different jobs. However simple machines such as coffee pulpers, simple honey extractors, or even a rotating coconut scraper or a good spade may be very useful to help out with very time-consuming jobs, especially for women.

3. Are markets available for selling the extra production or has the farmers' family increased enough to need an increase in the amount of food produced?

In Papua New Guinea the supply and demand for fruit and vegetables is very variable and so prices vary quite a lot. Generally, the greater the quantity of produce sold, the lower the unit price (price/kg). For example, a person selling sweet potato in a market may get K1 for three tubers weighing 2 kg. The unit price is then 50t/kg. However if this person sells 100 kg of sweet potato to a wholesaler then the unit price may only be 20t/kg.

There is usually demand for traditional staples such as sweet potato or taro, but the market for introduced vegetables and fruit is limited. The market can easily be flooded with too much produce which cannot be sold.





The top picture shows a small rotary cultivator; the bottom picture shows a large rotary cultivator.

Smaller machines like these can help farmers by reducing labour requirements. But before buying one, ask yourself questions like:

- *How long will it take for the saving in wages to pay for the machine?*
- *Can someone operate it properly?*
- *Can it be repaired locally?*

..... and so on!

4. How much capital has the farmer and will he be able to pay back a loan?

If the farmer has enough money of his own to buy equipment and machinery, perhaps this money could be spent on another project which would make him more money, or even invested in the Bank where he will be guaranteed a return on investment.

If the farmer wishes to borrow capital to buy machinery can he reasonably expect to pay off the loan in the agreed time? What form of security can the farmer offer the loan institution? 'Security' means a guarantee (promise) from the farmer that he will pay back the loan, or hand over some of his other property.

5. We need to think about what effects will the equipment or machinery have on:

. The rate of production and size of area under production?

. The methods of production? Will new skills and methods have to be learnt to cope with the effects of mechanisation? Will extra machinery or equipment be required to make sure that the increase in production is not wasted? This will involve extra capital costs.

. The soil fertility and structure? What effects will it have on the spread of weeds, pests and diseases, and on erosion and water supplies?

. The lifestyle of the farmer and his family? Will it make life easier or allow people more time for other tasks or jobs.

6. When buying machinery or equipment we must also consider these questions:

. Are there skilled operators to use the machines safely, efficiently and effectively?

. Can the machinery be easily, quickly and cheaply repaired locally?

. Are spare parts available locally or can replacement parts be manufactured?

. Is the machinery the right size for the job? If it is too big then it will not be used to the full potential. If it is too small it will operate under stress, which will shorten its life and make it more likely to break down.

. Is the machine flexible, i.e. can it be used for more than one job?

. How much of the time each day, week, year will the machine be used?

. How long can the equipment or machinery be expected to last before it becomes too expensive to run and breaks down too often?

. Does the machine suit the type of production? Intensive production, such as growing vegetables on small areas of land, will require different machinery and equipment from extensive production - e.g. large scale corn crops; sugar crops like Ramu sugar.

7. How much will the machine or equipment cost, both to buy and to run?

The following costs are involved in buying and running machinery:

(a) Fixed costs, which occur whether the machinery is used or not.

. Repayment of loan

. Depreciation costs (up to 33% per year for tractors). Depreciation is the name for the loss in value of machinery as it gets old.

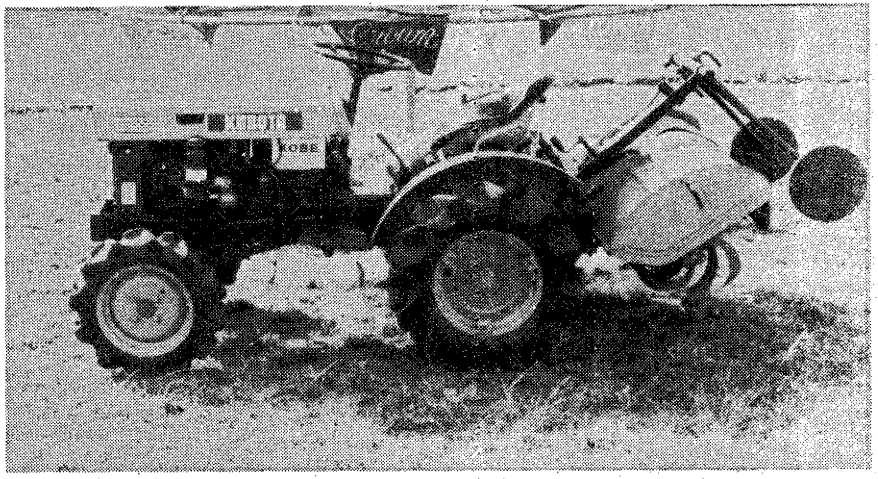
. Insurance, registration, etc.

. Storage (cost of shed or similar protection).

(b) Variable costs are costs which depend on the amount of time the machinery or equipment is used.

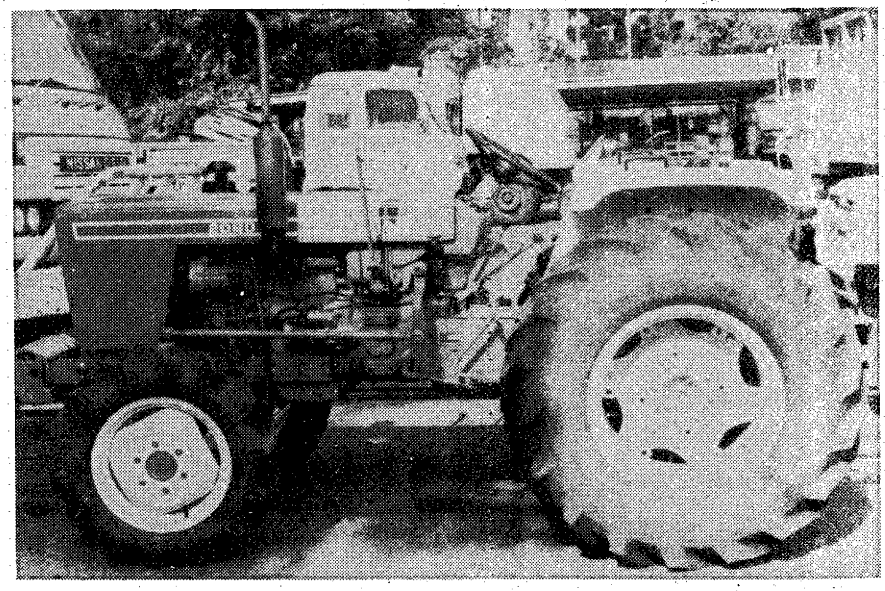
. Services

. Fuel and oil



A mini tractor with power tiller

A small tractor and set of discs



A standard size tractor

Larger tractor for plantation work

You can see from these pictures that tractors come in many different sizes. Choose the size carefully to suit the job the tractor will be doing.

- Spare parts
- Tyres

It is very important for the farmer to realize how much the machinery costs per unit of production (toea/kg for each crop). As production increases the fixed costs decrease per unit of production. Fixed costs especially of new equipment are often the most expensive part of mechanisation. Therefore it is best to use a tractor every day for land preparation and other tasks such as hauling produce, rather than joy-riding. For a machine such as a coffee pulper the costs per unit of production are small, but for a tractor they will be much more.

The variable costs change with the amount of use machinery or equipment is put to. It is possible to reduce the variable costs per unit of production only by more efficient use of machinery or by making the machine do more than one job at once. For example, with a tractor, rotary cultivating and ridging could be done in one pass. The variable costs of a simple machine like a coffee pulper would be very low. The more it is used, the faster the drum wears out.

Once we are satisfied that mechanisation is the best thing for developing a project, and all other choices, including the use of draft animals have been considered, the next thing to think about is paying for it.

This cost could be met directly by using the money saved because the farmer pays less wages for labour when he has the machinery. This may be possible with small, inexpensive machinery, but is not likely with large, expensive machines and equipment. Another way is that the effects of mechanisation should increase the farm income at least enough to cover all its cost, and hopefully, raise the farmers income.

Donations of machinery or money for mechanisation is another way in which a project can afford machines for further development. The project must still find funds to cover the variable costs however.

CONCLUSION

The object of this article is to make people more aware of what is involved in mechanisation, especially for the small holder farmer. It is best to let the mechanisation process take place in small stages, hand in hand with the development of the project and gradual increase in the management skills of the farmer.