

A note on issues to be addressed in the transfer of animal traction technology in Tanzania

by

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Abstract

The problems that are being experienced in the exercise of technology transfer lie in farmers' attitudes and their reluctance to change agricultural practices which are dictated by social, economic and technical factors. For new technologies to be widely accepted they have to offer solutions to existing problems within traditional farming practices.

Technology transfer involves both imported and locally developed implements and equipment. Both may need modification to suit local conditions, and some examples are discussed briefly.

Introduction

The role of technology transfer in developing countries cannot be underestimated. A great deal of effort has been made by design engineers and manufacturing companies to make available various types of farm implements that will help farmers to improve labour productivity on their farm. However, there are various problems with introducing new technologies to small-scale farmers.

Choice of technology

The popularity of hand tools in agriculture is a result of long-term experience, highly influenced by social, economic and technical factors. Thus farmers who use traditional methods of seedbed preparation, planting, weeding and even harvesting, threshing and winnowing, need to be convinced that alternative methods are cheaper, more effective and easier to operate, and/or that they lead to a higher work output.

Animal traction, based on the use of simple animal-drawn implements, offers solutions to many agricultural problems. However, the change from hand tool farming to draft animal power technologies in a single step is not always appropriate—not only because of economic limitations but also because of low levels of technical know-how. Consequently the identification and selection of appropriate technology greatly depends on social, economic and technical factors.

Social factors

The technology transfer process must take account of the fact that rural women are major contributors to agricultural development. Thus a technology is not appropriate if rural women will not benefit from it. The labour distribution of members of a family must be identified as part of the process of selecting recipients of new technology.

Technology transfer depends on the willingness of farmers to accept new technologies. It is difficult to design implements or equipment to suit local farming practices, but farmers are also reluctant to change their ways of farming to suit new technologies.

Economic aspects

Most farmers in the developing world are poor. Thus any new machinery or equipment to be introduced into rural areas must be as simple and cheap as possible if it is to be widely adopted. High initial investment costs for a package of implements and farm equipment mean that only a few farmers will benefit from the new technology.

Technical aspects

A new technology will not be acceptable to the target group if it is not compatible with existing farming principles and cultivation practices. Thus farmers traditionally practising shifting slash-and-burn cultivation will find it difficult to use an ox plow unless they are first offered easier means of removing the bush and stumps. Similarly, farmers who traditionally practise flat cultivation may not readily accept the introduction of the ridger.

On the other hand, a new implement or technology may be readily acceptable if it is seen to solve a problem within the established farming practice. An important part of the technology transfer process, therefore, is identifying problems in the existing farming system for which new technologies or implements may offer solutions.

Most smallholder farmers have had only very limited education. It is therefore important that any

new technology to be introduced is simple enough to be understood by the farmers.

The transfer of technology

Many developing countries continue to depend on imported technology, implements and machinery. Even when implements are manufactured locally, their design features may still reflect those of implements imported from developed countries where farming practices and conditions are often very different to those in developing countries. Thus even the best imported implements, or local products based on these implements, may not be entirely suitable to local conditions and modification of imported farm machinery and equipment designs is an important part of the technology transfer process. Some examples are given below.

Plows

The standard 25 cm plow demands high energy expenditure and two pairs of local African cattle are often needed to pull it. A smaller plow could reduce the initial investment costs in terms the number of oxen required to operate it.

Cultivators

The adjustable five-tine cultivator imported from Europe and Asia is used for weeding when fitted with three reversible teeth and a pair of hillers, and as a cultivator or harrow when fitted with reversible teeth on all five tines. The implement can also be used for two-stage weeding: on the first pass three 20 cm sweeps fitted on the hind tines cut the weeds just below ground level; and for the second pass the implement is fitted with the reversible teeth on all five tines to break up the soil and expose the roots for desiccation. On models currently available in Tanzania the swivel joints easily snap off, and improvements in the design are called for. With further modification, the cultivator could also be used as a furrow-opener for hand seeding.

Ridgers

The ridgers available in Tanzania are large and have poor penetration qualities. They must therefore be used in conjunction with ox plows in order to construct 90 cm ridges. For covering seeds and fertiliser at planting and/or for weeding purposes, a smaller ridger body would be better.

Seeders and planters

Most of the imported planters have plate type seed metering mechanisms which work well only with

carefully graded seed. Consequently farmers who do not get graded seed would not use ox-drawn planters. Modifications to incorporate other types of metering mechanisms on planters would be highly desirable.

Simple toolbars

Promising designs for toolbars (already tested) are the *Unibar* and *Houe Sine*. With the help of a bracket on its beam, the plow manufactured in Tanzania by Ubungo Farm Implements (UFI) can be used for weeding when fitted with a sweep or hiller. It can also be used as a ripper tine when fitted with a reversible point.

Irrigation equipment

Very few designs of implements for ox-powered irrigation farming are available locally in Africa. Various designs can, however, be imported from Asia. These include the buck scraper, the levelling float, the dam scoop, the bund former and the single row ditchers. These implements can easily be made locally, modified as necessary to suit local conditions.

Farm carts

Although efforts are being made to manufacture some ox/donkey carts locally, there are still many problems with wheel bearings, wheels, the height of the drawbar and the types of harnesses and yokes used. Many of the ox cart designs impose excessive loads on the animals' necks, even when the cart is not loaded.

Ripper-tines

The ripper-tine is essentially a simple implement used to break the soil in rows ready for planting. The implement is most suitable for use in semi-arid areas just before the rains. Seed are planted along the loosened soil in the rows and herbicides are used to control weeds.

Sweeps

Sweeps are essentially weeder blades which cut the weeds just below ground level, leaving them to dry in the sun. When used together with herbicides, this implement can simulate zero tillage in which mulch is used to conserve soil and water in the field. However, if herbicide is not available, it would be better to use a ripper-tine together with the sweeps to replace hand-tool-dominated farming practices.