

The supply of animal-drawn implements in Tanzania

by

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Abstract

Availability, affordability, and awareness are the major impediments to the widespread use of animal-drawn technology in Tanzania. While erratic availability and late deliveries cause frustration, availability of plows only instead of the whole animal-drawn technology package hinders adoption of animal power by precluding economic profitability.

Crop pricing that directly affects farmers' purchasing power is the most important factor for enhancing affordability of animal-drawn technology supplies by farmers. The current status of trade liberalisation and price de-confinement should be maintained. There should be no direct subsidies on animal-drawn equipment. However, indirect subsidies on particular equipment, for example weeders, for a specified amount of time, would be beneficial.

Efforts to inform and persuade farmers of the potential benefits of animal-drawn technology stand out as the most effective methods of increasing use of animal-drawn technology. Once a 'critical mass' of users is reached animal power becomes self-sustaining and spreads rapidly. To achieve this, donor support of private enterprises and provision of credit in key 'action zones' is necessary. The authors postulate that if effective promotion is adopted the number of animal power users in Tanzania could double within 5 years.

Introduction

Agriculture is the dominant sector in the economy of Tanzania, engaging 80–90% of the population. Smallholder cultivation accounts for 85% of the total area under cultivation. The hand hoe is the dominant tool and the estimated 3.6 million farm families cultivate only about 6 million hectares out of the 40 million hectares of potentially cultivatable land.

The objective of improving agricultural production in Tanzania by adopting animal draft power has not been smooth. To date only 20% of the land is cultivated by oxen despite a population of 12 million cattle. The 1 million draft oxen are

mainly used for plowing, with a limited amount of transportation.

Efforts to promote the use of animal traction in Tanzania started about seventy years ago, with the missionaries and settlers playing a leading role during the colonial days. The initial spread of animal traction was more-or-less spontaneous, mainly through farmer-to-farmer contact and may have been associated with commercial production of cotton, rice, coffee, tea, maize and wheat.

Some of the major constraints which have been identified as limiting the widespread use of animal traction in the country are:

- low farm incomes which make the technology unaffordable to the majority
- unavailability of implements
- poor infrastructure and support services
- an ineffective extension system
- and social, cultural and gender issues.

Moreover, it should be noted that successful dissemination of any innovation requires that the price must be right, potential users must be knowledgeable in the use of the innovation and the necessary inputs must be available. Although farmers are a rational people, they are not aware of all the possibilities of animal power.

This paper reviews the supply of animal-drawn implements in Tanzania and its consequences for animal traction use. The supply of implements is observed as a function of availability, affordability, profitability and technological awareness.

Availability of animal-drawn implements in this context is defined as the timely physical presence at the farmer's place of residence of animal-drawn implements, harnesses, spares, repair services and technical know-how. Animal-drawn implements which are physically present in an area could still be perceived to be unavailable if farmers are not aware of their existence - a problem of education and promotion. Affordability can be referred to as the ability of farmers to procure animal-drawn

implements, parts and services using income originating from farm produce where animal-drawn technology played a role.

Availability of animal-drawn implements

That availability of animal-drawn implements, spares and services has a fundamental influence on whether a farmer adopts animal power technology is obvious, in that it is impossible for farmers who cannot get implements to oxenise. In a survey carried out in Mbeya region, half of the farmers who responded indicated that they did not have the implements they needed because they were not available (Harder and Klassen-Harder 1988).

Parastatal monopoly of production

In Tanzania, unlike in many African countries, there has been a heavy involvement of the public sector in the supply of animal-drawn implements with little participation of the private sector. The main source of animal-drawn implements (up to 1994) has been Ubungo Farm Implements (UFI). UFI, a public parastatal factory, opened in 1970 with an annual installed capacity of 20,000 plows. It also produces hand tools, such as hoes, machetes, spades, forks, axes, etc and imports other animal-drawn implements such as weeders, harrows, ridgers and planters (Table 1).

Distribution points far from villages

The distribution of animal-drawn implements by UFI has been carried out through a network of three depots (Mwanza, Makambako and Kigoma), regional wholesalers like Regional Trading Companies (RTC), Cooperative Unions, the Agricultural and Industrial Supply Company (AISCO), the Tanganyika Farmers' Association (TFA) and a few private traders after the trade liberalisation in 1988.

The confinement policies in the 1980s severely restricted UFI's market, and the sale of farm implements to Regional Trading Companies on credit caused UFI severe financial problems. The wholesalers, being government controlled, were pushed through directives to sell animal-drawn implements in line with the government policy with disregard to profitability. The result of this antagonism was the accumulation of animal-drawn implements in town warehouses where nobody needed them while an acute shortage prevailed in the villages. The poor transport infrastructure further restricted accessibility of the implements to farmers. Over the years, animal-drawn implement needs (the market pull) were suffocated by bureaucratic central control over what was to be manufactured/imported, in what quantities and from where. Thus animal-drawn implement marketing became for the most part not consumer-driven, and the monopolistic tendency of UFI made it unresponsive to farmer requirements and wishes, such as an improved mouldboard curvature and angle of the frog piece so as to increase soil inversion. For example, farmers in Rukwa region find it necessary to send a newly-purchased UFI plow to a local blacksmith to work the mouldboard and frog piece to adjust the curvature and angle to increase soil inversion.

For many years UFI has concentrated only on ox plows. Other implements, such as weeders, have received little attention despite their importance in weed control which has been singled out as one of the major constraints to increased crop production (Croon, Deutsch and Temu, 1984; Rain, 1984). The use of the ox plow in tillage only shifts the labour bottleneck to weeding. This might be a disincentive to adoption where labour is scarce.

Table 1: Sales of farm implements by the parastatal Ubungo Farm Implements (UFI) in Tanzania 1978–1987

	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
Plows	7,464	7,254	15,098	5,676	16,000	30,829	80,435	2,027	24,846	22,023
Ridgers	131	111	20	0	289	1,226	1,168	195	42	81
Cultivators	38	172	60	15	40	1,236	116	1	9	60
Harrows	48	50	0	0	240	152	82	7	0	41

Source: UFI annual reports 1978–1987

Similarly in areas where minimum/zero primary tillage is practised, for example in the semi-arid regions of Central Tanzania, labour is mainly critical in weeding, thus the introduction of the ox plow on its own would not address the farmers' needs and as such they might be reluctant to adopt the technology.

Affordability

Cash crops

Animal draft technology requires a relatively heavy investment which might not be possible for farmers with low farm incomes. To ensure sustainability, farms, like any other business venture, should be commercially viable and this can be achieved only when outputs have an excess (profit) over the inputs. Thus in most cases animal traction has been associated with cash income. It is therefore not surprising to note that the main area of animal traction use in the country is the cotton belt of Arusha, Mara, Mwanza, Shinyanga, Tabora and Singida which together account for 75% of Tanzania's work oxen (Starkey and Mutagubya, 1992).

Liberalisation of prices has brought in private companies like Cargil Tanzania Ltd, Chawe Transport and Co, Arusha Coffee, Douran Co Ltd, Telae Winch Co.Ltd and many others, resulting to prompt cash payment and even better prices for farmers and thus enhancing animal traction use. For instance, in 1994 cotton prices nearly doubled from US\$0.20 per kg to US\$0.34. However, where there is no potential for cash crops farmers have benefited little from trade liberalisation due to the persistent government policy of cheap food. This has made it difficult for such farmers to afford the initial investment in animal traction.

Credit

The unaffordability of animal-drawn supplies by subsistence farmers requires 'unconventional' interventions to facilitate its introduction and/or adoption. While credit for farmers is classified as an 'unconventional' intervention in the Tanzanian context, most North American households and businesses cannot function without credit. Government-controlled banks, aid agencies and, more recently, private banks are all very wary of credit schemes because of the failure of earlier interventions. However, in most cases, loan default

has been due to organisational problems and not a 'boycott' by farmers.

Experiences from elsewhere in Africa including Mali, Togo, Benin, Cameroon and Côte d' Ivoire have shown that the provision of credit by crop marketing organisations and financial institutions has led to widespread adoption of animal traction (Starkey and Faye, 1990). Unfortunately, there are few examples of this kind of intervention in Tanzania. A small number of donor-assisted projects and NGOs have extended credit to farmers successfully, but their overall impact has been low as they have worked in only a few areas.

In an effort to liquidate some slow-moving stock (*Cossul* cultivators and nylatron bushed axles), SEAZ, a small private company based in Mbeya, Tanzania managed to sell on credit in one season 77 *Cossul* cultivators and 20 complete carts at the full market price of Tsh 39,500 (US\$ 79) and Tsh 150,000 (US\$ 300), respectively, while their annual sales of the two implements on a cash basis averaged 11 and 3 units, respectively. The credit was repayable in one year at no interest. The loan repayment was 100%, presumably from the close contacts and follow-ups which were maintained. As a result of this credit arrangement, loan requests in 1995 stood at 160 cultivators, outstripping SEAZ's loan ability even with price increases of 20% for cultivators and 10% for carts to cover for devaluation. Only 40 farmers benefited from this arrangement before stocks of cultivators were depleted. This example suggests that the rate of adoption of animal traction technology can be increased significantly by the provision of credit and the loan repayment can be very high provided that the schemes are well organised with consistent and well-defined goals right from the beginning. Also, it shows that relatively inferior but workable technologies can still be accepted when credit is available as SEAZ's sales indicated farmer preference for other cultivator designs such as the *Agro Alfa* and *Mkombozi* over the *Cossul* and SEAZ *Nibebe* pneumatic roller bearings carts to the nylatron bushed axle carts. In the light of this, it is sad to note that US\$ 295,000 set aside for credit by the International Fund for Agricultural Development's 'SHERFS' project in Mbeya Region has not been available to farmers for the last three years because of administrative wrangling.

Price controls and subsidies

It has been observed that the economic potential of any innovation, including animal-drawn technology could be raised through effective research, extension and marketing to attract more farmers to use it or through price controls and subsidies. The former is more difficult to implement and hence generally unpopular, so many governments opt for the latter approach. In Tanzania, in spite of the stringent price controls on farmers' produce, the government also subsidised animal-drawn implement prices until 1994. Mkomwa, Shetto and Mkoga (1994) report an indirect 53% price subsidy on the UFI plow compared to SADC region prices (Table 2). However, when the markets were liberalised the decrease in crop prices was much larger than the subsidies for implements.

The very large number of smallholder farmers who constitute 85% of the total employed population command little political power and are often seen as the group to be directly and indirectly taxed through price controls of their produce to subsidise food prices for the urban population and to support other, generally urban-based, state activities.

Massive state subsidy, much of it to support technological advancement, is in contrast to the approach used by developed countries for their

minority of farmers. A comparison of the relationship between intervention through price controls/subsidies and technological advancement reveals exploited small-scale farmers producing well below potential, while rich large-scale farmers in developed countries produce an enormous food surplus which can only be sold at further subsidised prices.

Profitability of animal-drawn technology supply businesses

The authors believe that a businesslike approach to animal-drawn technology marketing is a prerequisite to serving the intended consumers and suppliers effectively. Animal-drawn technology supply must be profitable to justify involvement of suppliers, in this case manufacturers, importers, wholesalers and traders. Profit is also essential to ensure sustainable provision of quality implements and services.

It is sometimes argued that the price controls on implements were needed to enhance affordability by farmers whose crop prices were equally controlled. On the contrary, both farmers and the technology have suffered due to the following reasons:

inadequate profit margins restricted the financial ability to effect sufficient availability of quality implements, spares and services. The inability by UFI to respond to feedback

Table 2: Prices of implements from UFI and other manufacturers in Africa in October 1992

Supplier	Country	Implements and price in US\$				
		VS10 plow	S51 cultivator	Ridger	Zig-zag harrow	Planter
Zimplot	Zimbabwe	64	106	137	201	285
Bulawayo steel products	Zimbabwe	64	105	136	200	284
AgroAlfa	Mozambique	80	120	104	222	
Safim	South Africa	65	70			183
Cossul	India	86	55	114	75	
UFI	Tanzania	38	9 (from Cossul)	35 (from Cossul)	12	91 (from Zimplot)

Prices are ex-works in US\$ in the host cities. UFI's prices include delivery.

Source: Mkomwa, Shetto and Mkoga, 1994

for improvement of their plow designs and erratic supplies are but a few examples. What is worse for UFI is that the government did not even reimburse the company for the subsidy between the market and controlled prices.

Thus the recent liberalisation of markets has not fully benefited UFI because of their poor financial position and the inability to secure bank loans as a result of the poor financial performance of animal-drawn technology businesses over a number of years

controlled pricing discourages individuals from investing in the sector. When competition is suffocated because of low profit margins, implement availability and repair services deteriorate as many intended suppliers are pushed out of business.

Economies of scale

Economies of scale demand a minimum number of units to be manufactured or traded to justify the capital invested. The implication is that manufacturing should be undertaken by large factories. But even these are vulnerable, as sales depend mainly on farmers' income and weather, and the underdeveloped infrastructure of the country limits the market to a few easily accessible areas. Ox carts are an exception, as their bulkiness and high capital tie-up render their production by small- to medium-sized workshops more economical.

Seasonality of animal-drawn technology business

Manufacture of and trading in animal-drawn implements and spares are not attractive as sales are highly seasonal, thus creating cash flow problems for most of the year, especially for smaller companies and traders. Mkomwa, Shetto and Mkoga (1994) reported that 62% of SEAZ's annual implement sales were realised in the four peak farming months of September to December in the Southern Highlands (Table 3). To ensure timely deliveries at the start of the farming season, suppliers have to build up their stocks off season when their sales are at the lowest level. This is difficult, especially where credit is not easily accessible. Seasonality of sales means that capital is tied up in stocks when it could give higher returns if invested elsewhere eg in consumer goods with more regular sales. In the 1994/95 season

SEAZ incurred a loss of US\$ 7500 because late deliveries meant that they could not sell their implements in time and had to hold the stocks for 8 months. Due to the depreciation of the Tanzanian shilling during this period and the fact that it is unrealistic to pass on the cost of devaluation to resource-poor farmers who expect constant prices, this resulted in a loss to SEAZ.

Marketing and promotion

Marketing and promotion in this context is defined as communication between a manufacturer/trader and prospective farmers aimed to inform, persuade and influence the farmers to get them to buy animal-drawn implements, spares or repair services.

With the exception of donor-assisted projects like the Mbeya Oxenization Project, the Tanga Draft Animal Project, the Maswa Rural Development Programme, the Lake Zone Farming Systems Research Project and MIFIPRO, no significant animal power promotional activities have been made by either the parastatals or the few emerging private companies after the trade liberalisation.

The government-controlled extension systems have been ineffective and have little, if anything, to offer animal traction technology mainly due to the limited animal-power knowledge of the extensionists. Many farmers are not aware of the appropriate use and maintenance of other implements apart from the plow. For example, in one SEAZ marketing trip to Kahama District farmers were not aware of ox-powered weeding despite having used animals for plowing for over seven decades. Thus the advantages and profitability of animal traction have not yet been demonstrated fully under peasant farm conditions even in potential areas of widespread use and a conducive environment for adoption. A vigorous, well-coordinated extension programme has been credited for the accelerated rate of adoption in some parts of Gambia, Mali and Burkina Faso (Jaeger, 1984; Starkey and Faye 1990).

Strategies to alleviate animal-drawn technology supply constraints.

Marketing and promotion

Promotional efforts to inform, persuade and influence farmers about the availability,

Table 3: The seasonality of number of animal-drawn units sold illustrated by the sales of SEAZ Agricultural Equipment Ltd

<i>Financial year</i>	<i>Implements</i>	<i>July–Sept</i>	<i>Oct–Dec</i>	<i>Jan–March</i>	<i>April–June</i>	<i>Total</i>
1991–92	Plows	1	116	9	8	134
	Weeders	3	40	26	5	74
	Ox carts	59	43	11	16	129
	% of total	19	59	13	9	337
1992–93	Plows	68	222	59	40	389
	Weeders	11	103	52	42	208
	Ox carts	23	47	2	23	95
	% of total	15	54	16	15	692
1993–94	Plows	47	136	98	17	298
	Weeders	65	188	29	17	299
	Ox carts	35	12	10	32	89
	% of total	21	49	20	10	686

Source: SEAZ Quarterly Sales Reports

affordability and potential benefits stand out as the intervention with the best potential returns to the widespread use of animal draft power.

Conventional extension approaches as part of promotion are ineffective. Non-Governmental Organisations (NGOs), private companies and traders also need to be supported by donors to promote animal-drawn technology and stimulate demand.

Subsidies

No direct subsidies should be provided to parastatals or others to allow free market prices to determine the profitability and adoption of animal-drawn technology.

However, indirect subsidy on selected equipment such as weeders within a stipulated time-frame is justified and essential to promote sales and realisation of the potential of the technology. Rebate coupons for reimbursement to farmers by the Ministry of Finance are one option. In areas of animal-drawn technology introduction, or where farmers are poor with no access to cattle, provision of targeted subsidies is a prerequisite.

Credit

The provision of credit is desirable to enable the uptake of animal-drawn products with high investment costs such as weeders and ox carts. Increased production and trade and revenue from hire income would enable repayment of the loans. However, loan administration has to be controlled closely with special low lending rates, taking into consideration the low profitability of animal power and the long return period for the investment. The involvement of private companies and NGOs might be beneficial as they usually have closer contacts with the recipient farmers. The special lending rates could have a stipulated time-frame after which commercial or market interest rates could be imposed.

Action zones

It has been established that animal traction can spread rapidly and spontaneously once a 'critical mass' of people has adopted the technology (Starkey and Mutagubya, 1992). Hence particular geographical action zones should be established with the aim of meeting the critical mass.

The resulting economies of scale would also allow profitable provision of implements, spares and repair services. This is especially important because implements are heavy and bulky so transport is expensive even in areas with better-developed transport systems.

Conclusion

There is ample scope for expansion of animal power in Tanzania. With effective promotion, as outlined above, the authors postulate that the number of animal power users in Tanzania could double within 5 years.

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