

Ox carts in Kaoma, Zambia

by

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Abstract

Eighty-three ox-cart owners were surveyed in Kaoma District, Zambia in 1994, to investigate the economic and technical aspects of ox-cart transport. About 13% of ox owners, or 1% of all households owned ox carts. Prices for new good-quality carts were US\$600–750 and locally-made carts cost US\$400–600. Cart owners had bigger households and cultivated more land than farmers without carts. Nearly half of all carts had been acquired in the last two years. About 60% of cart owners hired out their carts commercially. Carts could compete economically with trucks for distances of less than 20 km, especially for more remote areas with few roads and when it was difficult to arrange a sufficiently large load for a truck. There was a high incidence of breakdowns, especially for cheaper carts, but the rate was less severe than is often reported in the literature. Rural workshops become established and provide repair services without any support from government or donor programmes. Sales of carts made locally but using axles imported by the Western Province Animal Draught Power Programme were poor. Farmers preferred more expensive but durable ox carts from Lusaka.

Introduction

Kaoma District in the Western Province of Zambia is situated 400 km west of Lusaka on the road to Mongu, the provincial capital. Kaoma District is the most fertile area of the province, receiving 800–1000 mm of rain per year. During the average 113 days within the rainy season, there are usually two dry spells of more than 10 days (ARPT, 1993). The population of Kaoma District was 113,000 people in 1990 of which the majority live along streams and roads at densities between 10 and 100 people/km².

Agriculture in Kaoma is a mixed farming system with a higher proportion of market-orientated crop growers than in other districts of the province. Until 1994 about 4000 farmers participated in registered maize marketing and use of seasonal credit, fertiliser and hybrids. Kaoma

District produces about 90% of the marketable surplus production of maize and groundnuts of the Western Province.

The official production and yields are shown in Table 1, while Table 2 gives an overview of the production structure.

Animal draft power in Kaoma

Table 3 shows that only 10% of the rural households own oxen, while about 7% own a plow. However, it should be noted that the possession itself is less stable than the term 'ownership' suggests. Many owners sell, lose or slaughter their oxen in adverse times. The fact that relatives and neighbours can borrow and hire oxen for plowing their own fields implies that about 45% of all rural households have access to draft animal power (Kakwaba and van Leeuwen, 1999). Three percent (60) of the ox owners weeded with

Table 1: Crop production and yields in Kaoma

<i>Crop</i>	<i>Area cultivated (ha)</i>	<i>Average yield (kg/ha)</i>
Maize	9350	1530
Cassava	4800	810
Millet	1340	900
Groundnuts	890	450
Sorghum	590	630
Rice	370	1080
Mixed beans	200	360
Cotton	130	300
Soya bean	60	450
Sunflowers	30	600

Source: WP-ADPP, 1993

Table 2: Farms in Kaoma District

<i>Area (ha)¹</i>	<i>Number</i>	<i>% Female-headed</i>
>20	25	8
>5–20	341	12
½–5	10,050	20

Notes:

1) The total number of agricultural households was estimated at 19,300 in 1990 by the Central Statistics Office. About 9000 rural households do not appear in the crop forecasting of the Department of Agriculture, since they cultivate less than 0.5 ha.

Source: WP-ADPP, 1993

oxen and ridgers in 1994/95 (WP-ADPP, 1995), while only about one out of every 12 ox owners possesses an oxcart.

Ox cart owners

A survey of 84 cart owners was carried out during 1994 in Kaoma District (van Leeuwen and Siyambango, 1995). All cart owners were interviewed in four distinct and different areas of the district.

Cart owners in Kaoma usually have bigger households than non-cart owners (average 10 members per household) and have an average age of 53. Almost all carts are owned by men, although one woman had two ox carts. Most cart owners have more than two oxen, while only 38% have two oxen or less. Figure 1 shows that almost half of all the carts (43%) have been acquired during the past 2 years. This fact, combined with the impression of local manufacturers and the substantial sales of new ox carts (about 20/year) during the past three years leads to the conclusion that investment in ox carts has increased during the past years.

Cart owners cultivate considerably more land (average 3.6 ha) than the average farmer (1.1 ha). Practically all cart owners used fertiliser and only 11% did not depend on seasonal loans from lending agencies. The average cart owner sold nine tonnes after the 1991/92 harvest and seven tonnes after the 1992/93 season. Cart owners received an average income of ZK 500,000 from surplus

Table 3: Quantities and distribution of draft animal implements in Kaoma District in 1993

Number of farm households	19,300
Total number of oxen	5,700
Cropped area (ha)	19,300
Households owning oxen	1,900

<i>Item</i>	<i>Number of households owning</i>	<i>% of ox owners who own</i>
Plow	1,314	69
Ox cart	243	13
Sledge	642	34
Harrow	40	2
Cultivator	17	1
Ridger	28	2
Planter	11	1

Source: Dibbits and Mwenya, 1993

agricultural production in 1994 (US\$1 ZK650 in 1994). The average income from transport services that year, estimated by the owners, amounted to ZK 137,000. Figure 2 shows the distribution of income from transport charges.

Typology of ox cart utilisation

Figure 2 reveals that a considerable portion (38%) of owners did not hire out their carts and consequently underutilised their transport resource. The reasons given by owners is 'that they want to save their cart or oxen'. Analysis of this group shows that it consists of all kind of cart owners. Amongst the 22% of owners who earn more with their cart than with their crop production, which one could label '**rural transporter**', only very few (2%) did not hire out their cart. Among cart owners who sell over 4.5 t of maize/year, labelled as '**farmers**', only 62% hired out their cart. The majority of cart owners with less agricultural production and low transport earnings do not hire their cart. Geographical analysis showed that cart owners in more isolated areas with lower population densities hire their ox cart less (and at lower prices), unless the cart is used for a

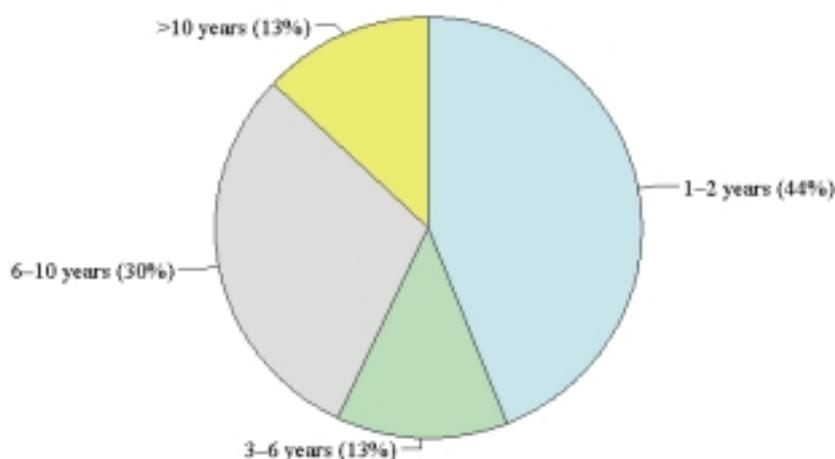


Figure 1: Duration of ownership of ox carts (n=83)

year-round business such as ferrying logs and planks to the main roads. Table 4 shows the main differences and findings concerning frequency of utilisation of carts.

Loads, distances and prices

Ox carts in Kaoma District transport a variety of products. Most products have a typical rural character such as maize, fertiliser, seed, firewood, planks, cassava and sweet potatoes. Table 5 provides an overview of different products that are

carried, and the average distance and transport price in relation to the value of the load. The table shows that planks and fertiliser are the best items in terms of price per load. However, when time and distance are considered, bricks, shelled maize and fertiliser are more profitable to transport. Table 6 shows the *maximum* income from transport per day around town, as well as the produce and transport charge as a percentage of the value of the load (after being transported).

Figure 2: Income from transport in thousands of Zambian Kwacha (n=83); US\$1~ZK650 in 1994

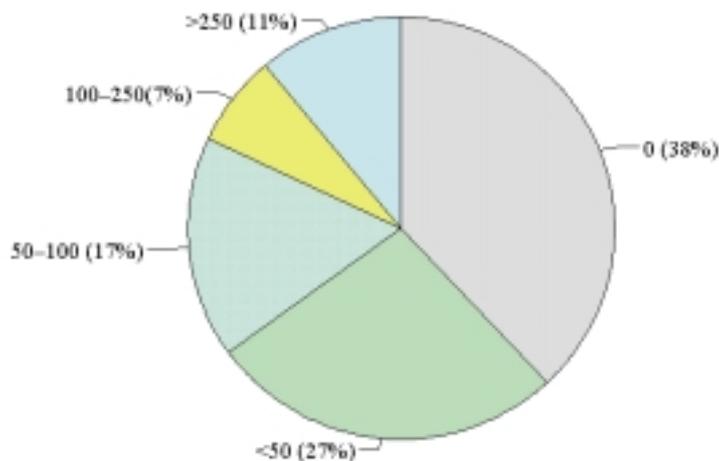


Table 4: Typology of owners of ox carts in Kaoma District

<i>Area</i>	<i>Soil fertility</i>	<i>Population (people/km²)</i>	<i>Maize yields</i>	<i>Transport location</i>	<i>Cart utilisation</i>	<i>Cart owners</i>
Town	–	High (>50)	Medium	Central	High	Transporter
West/South	Low	Low (<10)	Low	Central	High	Transporter
	High–medium	High–medium	High–medium	Central	High	Farmer
North/East				Isolated	Low	Farmer/ Transporter

Table 5: Products, carried by ox cart transport in Kaoma District, 1994

<i>Produce</i>	<i>Load (kg)</i>	<i>1-way distance (km)</i>	<i>Price/load (ZK)</i>	<i>Price/load/km (ZK)</i>	<i>Price/t/km (ZK)</i>
Maize (unshelled) n=46	490	1.8	2150	1190	2460
Maize (90 kg/bag) n=51	780	2.7	3320	1230	1570
Fertiliser (50 kg/bag) n=50	780	3.3	5690	1720	2230
Firewood n=8	870	3.4	3980	1170	1340
Planks (10 kg each) n=15	580	27.5	9120	330	1140
Charcoal (65 kg/bag) n=11	840	7.9	4640	590	700
Bricks (10 kg/brick) n=4	500	2.6	3950	1520	3000
Grass (23 bundles) n=10	350	8.4	4520	540	1540
Cassava/sweet potatoes (90 kg/bag) n=7	820	4.9	2550	520	640

Competitive transport

Ox carts in Kaoma face competition from trucks and sledges. Trucks ferry loads more cheaply for distances above 20 km, **if** there is a sufficient load (organised!), and **if** stumps, streams and loose sand do not block the truck. Ten-ton trucks on tarmac roads charged 50 ZK/t/km for grain and fertiliser transport during the period of the survey.

In isolated areas with loose sand, sledges often carry the same load (360–400 kg) as ox carts do in such areas, for the same price although more oxen are used and more time for transport is needed. In such inaccessible areas, sledges and ox carts may ferry loads over 50–70 km, charging 15–20% of

the value of the grain which is transported. Cart owners in these areas are able to earn ZK 9000 per day during peak periods .

Apart from these exceptional inaccessible areas, the survey showed that, in general, transport prices of ox carts in Kaoma District are not high in comparison with prices cited in the literature (Mack, 1984; Starkey, 1991; Helsloot, Sichembe and Chelemu, 1991; Starkey, Dibbitts and Mwenya, 1991).

Prices of ox carts

The survey did not confirm the idea cited by some authors (Mack, 1984; Helsloot, Sichembe and Chelemu, 1991) that the cost of ox carts can

Table 6: Maximum possible income per day from transporting various products by ox cart in Kaoma District

<i>Product</i>	<i>Maximum income/day (ZK)</i>	<i>% of value of load</i>
Maize (unshelled) 5.5 bags	11,000	8
Maize (shelled) (10 x 90kg bags)	10,000	7–13
Fertiliser (20 x 50kg bags)	20,000	6–11
Firewood (1 load)	4,000	50
Charcoal (20 x 65kg bags)	7,000	23
Grass (25 bundles)	10,000	50
Bricks (50 bricks)	10,000	17
Cassava (10 x 90kg bags)	9,000	5
Planks (40 planks)	7,000	28

Notes: ZK650≈US\$1 in 1994

easily be repaid from transport charges. In Kaoma District it takes the average ox cart owner who earns ZK 137,000 per year, almost 4 years to earn the value of a good ox cart of around ZK 500,000. This price is equivalent to US\$ 750, which is high compared with cart prices in West Africa (Wanders, 1992).

Locally-manufactured ox carts using Landrover, Datsun and Toyota axles cost around ZK 300,000, with the cart body (50%), wheels (30%), second-hand axle, hubs and bearings (20%) as the main costs. In the barter economy of Kaoma District such ox carts cost about 3,500 kg of maize or 3–4 young oxen. However, these cheaper ox carts do have some problems. In particular, the bearing-hub assembly and the rim-hub construction often develop problems within a short time.

Breakdowns and repair

According to cart owners the main problems with ox carts are bearings, inner-tubes and tyres, bolts/nuts, tube-valves and locknuts. A quarter of the 83 respondents bought spares like bearings, inner-tubes and tyres mostly from the capital, Lusaka.

In view of the attention in the animal power literature for breakdowns and absence of repair facilities (Malipaard, 1988; Starkey, 1989;

Starkey, 1991), the survey examined the frequency of cart breakdowns. Table 7 summarises the observations; they confirm the high incidence of breakdowns. However, it appeared that the period for which ox carts are out of order is relatively short. Moreover, it was found that the technical problems of ox carts which are broken-down for more than one year, did not differ from those which were repaired more quickly. Broken bearings, axles and hubs appeared to be the main causes of breakdowns for both categories.

Workshops in Kaoma District

There are at least seven workshops in the district where ox carts are assembled and repaired of which four are in Kaoma town. The repair services and manufacturing of carts are in all cases a minor part of the business run by these ‘workshop’ managers. The number of carts under repair or being constructed at each workshop ranged from 1–10 for 1994 (total 25), whilst in 1993 the number of carts produced and sold ranged from 0–5 (total 14). One of the most important qualifications for repair and assembling services seems to be the ability to scout around to find hubs, wheels etc at the most advantageous price. Although each manufacturer aims for at least 12–15% (ZK 50,000) profit (including labour) and costs for ox-cart bodies vary little, prices of ox

Table 7: The incidence of breakdowns according to period of ownership and type of purchase

Length of ownership	Carts bought new (n=38)			Carts bought second hand (n=45)		
	Running	Out of order	% down	Running	Out of order	% down
1–4 years	21	4	16	30	6	17
5–12 years	6	4	40	3	2	40
>12years	2	1	33	3	1	25
Total	29	9	24	36	9	20

carts differ considerably. Interviews with the workshop managers made it clear that other factors are of great influence on the price and quality of the ox cart. For instance, the degree to which the manufacturer is 'hard up with cash', the manufacturer's confidence in clients' ability to pay in installments and the extent to which the client is able to check the work critically.

The survey did not confirm the idea that extra workshop support such as training or supply of toolkits (Malipaard, 1988; Starkey, 1989; Helsloot, Sichembe and Chelemu, 1991), is necessary to increase the quality of manufacturing and repair work.

WP-ADPP services

The Western Province Animal Draught Power Programme, WP-ADPP II, concentrated on the demand for high quality ox carts in the district, by importing and selling new ox carts on a cash basis.

Over 2.5 years WP-ADPP has sold about 50 ox carts of a type that was previously sold during 1987–1991 by the former district cooperative. The same type was sold to contribute to standardisation and to stimulate hardware shops within the district to stock the correct spares.

Moreover, WP-ADPP imported new axles and tried for six months to involve four local workshops in cart assembly, by giving new hubs on consignment. A few carts were produced by the workshops, while WP-ADPP added a quality control logo and extension leaflets about local repair options and prices. However, sales of these carts were slow and the workshops were paid only after a lot of trouble. The workshops commented

favourably on WP-ADPP's activities but explained the higher sales of the imported carts as a result of farmers' desire 'to buy products which come far from Lusaka'. WP-ADPP also concluded that Kaoma has a market for more expensive but durable ox carts. It appeared that workshops were not interested in the programme of buying and stocking second-hand hubs, bearings and wheels.

Finally, WP-ADPP decided to buy old rims and tyres locally, and assembled about 30 carts, which have been sold on a rent-purchase basis to 15 regional farmers who organised the barter of fertiliser against maize in 1995. This activity did not involve the established workshops, but young people with a welding machine. This programme is part of a plow rehabilitation project, whereby traders of WP-ADPP barter broken-down plows against fertiliser and seed, while a newly settled workshop reconditions the plow, modifying the hitch and wheel attachment.

Conclusions

Investment in high quality ox carts has increased during the past few years.

Prices of new durable carts are around US\$600–750, while local ox carts are built for US\$400–600.

Only a slight majority of cart owners (61%) provide transport on a commercial basis, earning an average income of US\$200 per year from transport.

Transport charges for produce like maize and fertiliser amount to less than 10% of the value of the load at distances of 1–4 km. Ox carts

ferrying the same produce over 10 km or more earn less money per ton and per km, but still charge more than trucks or pickups.

The incidence of breakdowns is less severe than suggested in the general literature. Only 10% of the carts are grounded for more than a year. This does not reflect scarcity in repair service but reduced interest/ability of the owner to organise and finance maintenance of his/her transport resource.

Rural workshops become established and provide repair services without any support from government or donor programmes. Questionable repair work seems to be a result of price negotiations with the client, whereby the cart owners with a low budget and know how receive low quality repairs.

Credit for ox carts cannot be justified with an argument that ox carts are too expensive. Farmers with surplus production or lumberjacks can considerably lower transport costs and increase their farm/forest gate price of their produce, if they invest in ox carts.

It appears that ox-drawn transport is much more diverse than suggested in the literature. Agricultural research and extension should break away from conventional technical and financial focuses and utilise critical inquisitiveness into the commercial utilisation of transport in the rapidly developing sector of semi-subsistence agriculture.

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