4.14 ASSESSMENT OF VEHICLE CHOICE

Problem: **Many countries suffer from poor vehicle choice that impacts on the availability of transport services and on competition for those services.**

Solution: **Availability of information to make informed decisions on appropriate vehicle types.**

BACKGROUND

For an efficient transport system a diversity of modes is required. Conventional motor vehicles are most viable when they are carrying a large amount of goods or passengers over long distances but less viable over short distances with small loads where intermediate means of transport (IMT) are likely to be more viable. In rural areas conventional vehicles and IMT's complement each other and one cannot operate effectively without the other.

Research shows that vehicle diversity in much of Sub-Saharan Africa is lower than in many Asian countries. Choice is restricted to headloading and infrequent vehicle services. Bicycles are gradually becoming more prevalent but the use of animal carts, motorcycle technology and simple tractor based technology is still uncommon. Many reasons have been forwarded to explain this lack of diversity including cultural factors, an unwillingness to promote vehicles that are regarded as a backward step, low incomes and a low density of demand.

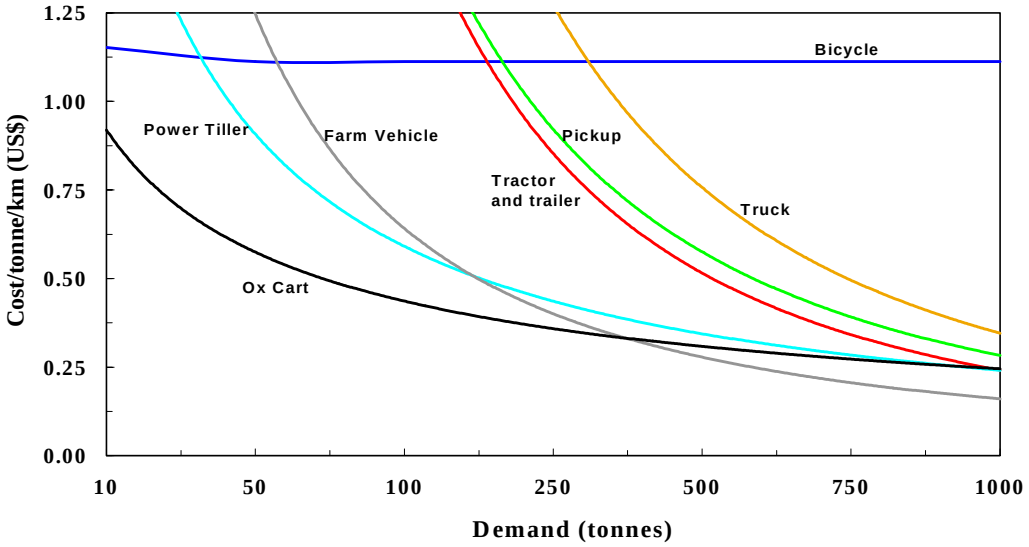
FACTORS AFFECTING VEHICLE CHOICE

Deciding on the vehicle that is most likely to minimise total operating costs requires an understanding of the environment in which the vehicle will be expected to operate. Rural transport characteristics include:

- Transport is seasonal i.e. the bulk of transport is required during the harvest season
- Other transport movements are most likely to be undertaken on a weekly basis
- The vehicle must be suitable for carrying passengers and goods
- Distances to markets and other facilities are long, typically between 10 and 50 kms
- The skills and repair facilities available in rural areas are basic
- The infrastructure is very often in poor condition and so speed will be low
- Consider potential cultural and gender barriers to take-up of new technologies

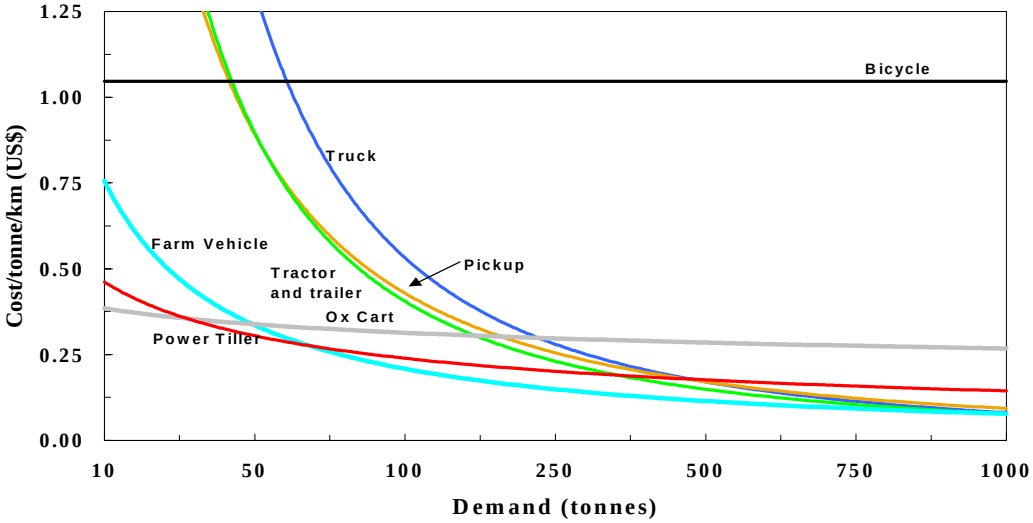
Some of the vehicles shown in the figures are already used, to a greater or lesser extent, in parts of Sub-Saharan Africa such as the bicycle, ox cart, tractor, pickup and truck. Vehicles such as the farm vehicle and power tiller are not widely used but it will be shown that these vehicles have the potential for substantially lowering transport costs in certain scenarios. While the list of vehicles described here is not exhaustive of the very wide range of motorised and non-motorised vehicles that may be suitable for use in Sub-Saharan Africa it does provide an indication as to the relative merits of different vehicle classes.

Figure 1: Vehicle operating costs assuming a 10km distance and varying levels of demand



It should also be noted that VOC's are very sensitive to levels of utilisation. This is particularly the case for motorised vehicles where capital costs are high. For example a tractors operating costs per tonne km are 8 times higher for a 50 tonne demand than for a 750 tonne demand over a 50 km distance. Similarly an ox cart is 50% more expensive for a 50 tonne demand than for a 250 tonne demand over a 10 km distance.

Figure 2: Vehicle operating costs assuming a 50km distance and varying levels of demand



In determining vehicle choice every effort should be made to assess likely demand. Many of the vehicles suitable for use in rural areas are multi-purpose in that they can be used for goods and passenger transport and agricultural preparation. In order to determine the total demand in tonnes certain assumptions can be made on the productivity of the non-goods transport related activities:

- One passenger = 70 kg
- One acre ploughed in equivalent tonnes =

(Hours to plough one acre * Av. speed of vehicle * Load capacity) / Av. trip distance

OPTIONS FOR PROMOTING DIFFERENT RURAL TRANSPORT TECHNOLOGIES

Patterns of adoptions and use of transport vehicles vary widely, in part reflecting social, economic and environmental factors and in part idiosyncratic features. Some means of transport spread slowly, others more quickly, and some may never be adopted. The conditions that favour adoption should be

understood where possible so that a conducive environment can be created. Success usually comes as a result of small-scale private initiatives rather than formal government campaigns and where it builds on technologies that are already accepted within an area or country. **Table 1** provides some options for the promotion of means of transport.

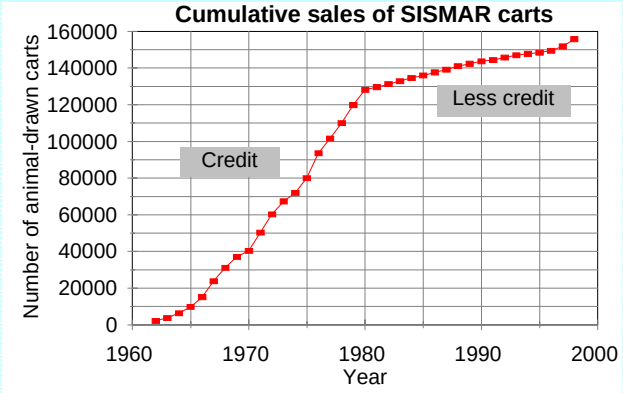
It is also important that a ***critical mass*** of means of transport is developed. It is difficult to make the promotion of alternative technologies sustainable if there is not sufficient numbers to justify the provision of supporting services. Once critical mass has been achieved manufacturers, mechanics, vehicle and spare part suppliers and operators can all be confident to invest in support of the industry.

Table 1: Options for promoting means of transport

Option	Implementation arrangements
Sensitisation process	A programme of sensitisation to show politicians, planners and local communities the benefits from use of a variety of technologies and to improve their image.
Access to credit	Poor people need credit facilities to afford IMT's. These could be "piggy backed" on to existing schemes or started from new.
Local manufacture	In some cases local manufacture can utilise local resources and skills. This can reduce costs and help with after sales servicing.
International sourcing of vehicles	In some cases other countries will have a comparative advantage in the manufacture of vehicles. Where this is the case the vehicles will be cheaper and better quality.
Improved infrastructure	At the village level improved paths, tracks and the necessary bridges and other structures can improve usability.
Transport use of agricultural power	Ministry of agriculture and NGO's to promote transport uses of animal traction, power tillers and tractors.

Box 1: Large-scale cart production in Senegal affected by credit policies

The spread of animal-drawn carts in Senegal is associated with the wide availability of good axles and components and the availability of credit. In 1960 Siscoma built a factory to manufacture carts and agricultural implements in Senegal. Sales were high in the 1960s and 1970s, boosted by agricultural credit schemes. The sudden termination of credit in 1980 caused sales to fall dramatically, making Siscoma bankrupt. But with government support, the Sismar Company was formed in 1981 to take over and diversify the factory.



Since 1960 Sismar (Siscoma) has sold more than 150,000 carts. It has also supplied separate axles and components. Sismar carts are strong but relatively light and easy to pull, and their design has been copied by many other manufacturers in the region. Sismar carts and their clones have a critical mass of users, making it easy for traders to stock spare parts and for artisans to provide repair services. In other countries the adoption of carts has been constrained by a lack of credit and a shortage of appropriate axles.

Source: Starkey et al (2002)

KEY REFERENCES

Crossley P and S Ellis (1996). A Handbook of rural transport vehicles in developing countries. Silsoe College, Cranfield University, UK.

IT Transport (1996). Promoting intermediate means of transport: Approach paper. SSATP working paper 20. World Bank, Washington DC.

Starkey, P. (2001). Promoting the use of intermediate means of transport. The Rural Transport Knowledge Base. *Crowthorne: TRL Limited.* www.transport-links.org/knowledgebase.htm

Means of transport with indicative characteristics and important requirements*

Transport type	*Indicative characteristics*					*Some important requirements*			
	*Indicative cost price * ($ relative)*	*Indicative load * (kg)*	*Indicative speed * (km/hr)*	*Indicative range * (km)*	*Indicative cost/tonne/km* ($ relative)*	*Foreign exchange*	*Animals and vet services*	*Mech-anics*	*Good roads or tracks*
Carrying/head load	0	20	5	10	1.50	Low	None	Low	Low
Sledge	10	100	4	3	0.80	Low	High	Low	Low
Wheelbarrow	30	100	4	1	0.40	Low	None	Low	Low
Hand cart	60	150	4	5	0.35	Low	None	Low	Medium
Pack donkey	60	80	7	20	0.70	Low	High	Low	Low
Bicycle	100	60	10	20	0.60	Medium	None	Medium	Medium
Cycle rickshaw	170	150	8	15	0.45	Medium	None	Medium	High
Donkey cart	300	400	6	15	0.60	Medium	High	Medium	Medium
Horse cart	500	1000	7	15	0.60	Medium	High	Medium	Medium
Ox cart	500	1000	5	10	0.20	Medium	High	Medium	Medium
Motorcycle	900	100	50	50	1.30	High	None	High	Medium
Power tiller trailer	5000	1000	10	15	0.70	High	None	High	Medium
Pickup	12000	1200	80	200	0.70	High	None	High	High
Truck	60000	12000	80	200	0.50	High	None	High	High

* *Notes: This is from Starkey et al (2002), which provides order-of-magnitude indicative figures only. The costs, prices, loads, speeds and distances vary greatly with the country, the people, the environment, the infrastructure and the vehicles or animals. It is not uncommon for the transport systems mentioned to carry much greater loads and to travel much longer distances. The figures are simply indications of what is commonly achieved. The costs per tonne-kilometre are very approximate, and highly sensitive to assumptions on costs, loads and distances: they are mainly based on the model of Crossley and Ellis (1999) for 5 km journeys.*