DEMAND APPRAISAL FOR IMT AND TRANSPORT SERVICES

A Technical Brief from I.T. Transport Ltd. August, 2003

INTRODUCTION

The availability and usage of Means of Transport (MoT) and Transport Services (TS) in Sub-Saharan Africa (SSA) is patchy. Sometimes the reasons are evident, such as unsuitable terrain or infrastructure, but often they are not fully clear. Several attempts to introduce and disseminate Intermediate Means of Transport (IMT) have had limited impact and often improvements in infrastructure do not achieve the results anticipated in terms of increased levels of traffic. There are obviously other barriers. Often there is a "Catch 22" situation in that incomes are constrained by poor access whilst improvements in access through increased use of MoT and transport services are constrained by low incomes. There is a need to identify the inputs required to break out of this cycle.

The aim of the project was therefore to develop a rapid appraisal method that provides an effective assessment of the demand for IMT and transport services and the inputs needed to promote demand.

METHODOLOGY

The methodology has been to carry out a series of case studies of situations where either - (i) there is a significant usage of IMT or transport services, or (ii) there have been attempts to introduce IMT or transport services – to identify the main factors affecting demand and usage. The studies have been selected to cover a range of typical situations in SSA and to avoid situations where terrain or infrastructure are clearly significant deterrents.

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DFID

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The following studies were carried out:

- *Malawi* – in the Lobi area where there has been a Pilot Integrated Rural Transport Project that has introduced IMT such as oxcarts, bicycle trailers and wheelbarrows. It is a densely populated area with a network of markets and well-used transport services on a number of roads. Two components of the project were carried out in this area, one dealing with IMT and the other Transport Services

- *Tanzania* – in Masasi, a district in the Southern part of the country. This is a fairly isolated area with low use of IMT. A VTTP (Village Travel and Transport Project) has been recently carried out in the area to improve some rural roads and promote increased use of IMT

- *Ghana* – in Nanumba district in Northern Ghana. This is an area in which there is a high ownership and use of bicycles. A programme to improve feeder roads is at present being carried out in the district

- *Zambia* – in Mpongwe district in the Copperbelt region. It is considered a deprived area that has considerable agricultural potential. A component of the World Bank RTTP (Rural Travel and Transport Project) is in progress in the area. This has generated considerable background data

- *Senegal* – two areas of the country where there is high use of donkey carts and/or horse carts

The studies were carried out by local consultants using questionnaires which were revised after each study to develop an effective appraisal method. In each area 3 to 4 villages were selected to cover a range of distances to the nearest market/resource centre. Data was collected at various levels:

- Background data for the district
- Average data for the village on agricultural production and marketing, travel and transport characteristics and needs, ownership of IMT and village priority needs
- Household data on similar issues collected from spot interviews on the main access road from the village to the market centre in conjunction with traffic counts. These were carried out on two days for each village, a market day and normal day. At least 15 users and 15 non-users of IMT were interviewed on each day with a representative mixture of men and women
- Data for households using transport services on the road was collected in a similar manner
- Data was collected from a number of suppliers of IMT and also operators of transport services.

Data was coded and entered into EXCEL spreadsheets for evaluation.

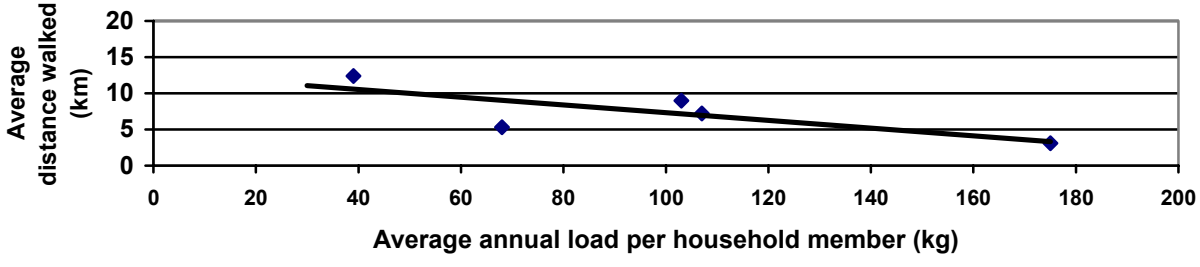
FINDINGS ON DEMAND FOR IMT

1 Need and demand

The findings suggest that the primary factor governing demand for IMT is the "need" to reduce time and effort to transport produce to market. Inadequate transport capacity limits the amount that can be transported. Two indicators were identified:

1.1 There is good agreement over the 5 case-studies on an upper limit of the transport load (amount and distance) that people are able or prepared to transport by walking (Figure.1). The upper quartile threshold was found to be 1.2 tonne.km /hh member/year (assuming that 50% of hh members participate in carrying). Above this limit there will be a need and demand for a MoT (IMT or TS).

Figure 1: Load vs Distance for Headloading for Studies in 5 Countries



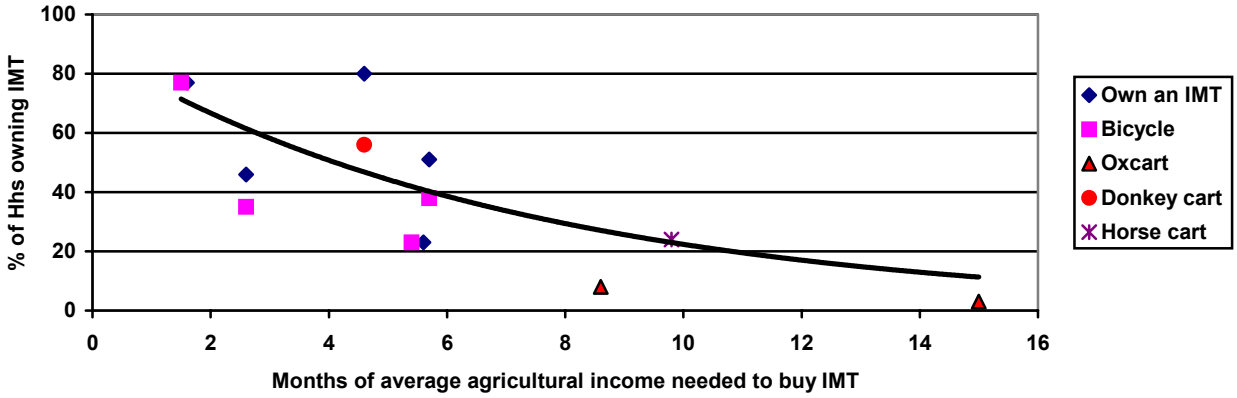
1.2 The initial MoT generally acquired by a household was a bicycle where conditions were conducive to its use. The findings also showed an upper limit on the transport load carried by bicycle. The upper quartile transport load carried on bicycles was found to be about 10 tonne.km. Above this there was an increasing demand for MoT with greater load-carrying capacity such as Animal-drawn Vehicles (ADVs). Many bicycle owners in Malawi and Zambia in fact hired oxcarts for carrying larger loads.

1.3 These limit lines provide a means of appraising the demand for particular types of IMT based on the tonne.km transported to market by households (hhs) per season.

2 Affordability and demand

2.1 The results from the 5 case-studies showed a clear trend on the affordability of IMT in terms of the months of income needed to purchase the IMT and percentage ownership (Figure 2). The trend shows a boundary line above which there is generally no ownership and below which there tends to be ownership. The boundary line is drawn for the affordability of bicycles which are the initial choice for an IMT in many countries. More expensive IMT such as ADVs tend to lie further below the boundary line. These findings are for IMT purchased mainly from agricultural income. If credit is available then possibly the boundary line might be higher showing improved affordability.

Figure 2: Ownership vs Months of Income Needed to Buy an IMT



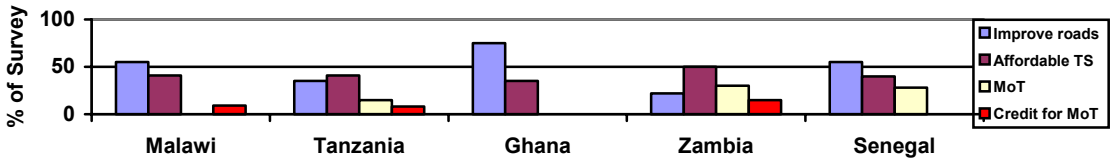
2.2 A further indication of affordability and demand is provided by the relationship between farm size and ownership of IMT. Although this data was only collected in 3 case-studies it shows a similar pattern of ownership. On average, non-owners of IMT had a farm size of around 2ha, owners of bicycles between 2 and 3 ha and owners of ADVs 4 to 6 ha.

2.3 The findings show that in general the investment in an IMT is economically worthwhile compared to headloading in that the extra agricultural income earned is greater than the operating cost, including depreciation, of the IMT. The economic benefit of extra investment in an ADV compared to a bicycle is, however, more marginal but can be made quite profitable by obtaining additional income from hiring it out. ADVs offer considerable advantages in saving time and effort in transporting crops both from the fields and to market. Since most hhs cannot afford an ADV there is likely to be good demand to hire them as shown in the case studies. This provides good benefits to both owners and non-owners.

3 Transport needs

Comparing the demand for IMT with other transport needs (Figure3) it was found in all the case-studies that the main needs reported were for improved roads and affordable transport services and that these were significantly higher than the reported need for IMT. It appears that people tend to prefer higher speed transport that does not require human effort and in situations where TS can be provided close to a village then there will be a higher demand for TS than for IMT.

Figure 3: Summary of Reported Transport Needs



4 Impact of transport on agricultural development

The findings showed that although efficient transport is needed to facilitate agricultural development it is unlikely to be enough by itself and other important constraints may need to be addressed, including:

a. Improving agricultural methods, particularly for cultivation, since these often constrain production
b. Increasing availability and affordability of agricultural inputs to improve yields
c. Development of an effective market network and good storage facilities to provide a more reliable and uniform demand and prices for produce over the year. This is likely to require effective links to external markets.

5 Supply of and support for IMT

In the case-studies the supply of IMT was not reported as a significant constraint on ownership although the lack of availability of work animals in the case-study areas of Ghana and Tanzania constrained the use of ADVs there. There were limited reports of problems of servicing bicycles and some problems reported of the high cost of spare parts and the distance to supply centres for spare parts, but it is not considered that these constrained demand for IMT.

Other factors affecting demand

This project has concentrated on collecting evidence on the "hard" or concrete issues that affect the demand for IMT. It is considered that the need for transporting produce to market and the ability to afford an IMT are the primary factors affecting demand. However, there are other less concrete issues that are also important. These issues have been reviewed by Starkey (2001)[1]. An important criteria is considered to be "critical mass", which refers to a minimum level of IMT that is needed to encourage back-up support and confidence to invest in them. Achieving a "critical mass" has been one of the main problems of IMT projects. However, if a real need exists as indicated by the criteria identified in this project then it is considered that there will be a considerably greater chance of achieving the "critical mass".

Implications of Findings

The relationship between the 3 demand indicators for the case study areas is shown in Table 1.

Table 1: Relationship between Demand Indicators

COUNTRY	% Of survey hhs above 1.2 tonne.km/active hh member A	% Ownership of IMT indicated by trend of Figure 2 B	Actual % ownership of an IMT C	% of Survey hhs above limit of 10 tonne.km (or 6 tonne.km) D	Actual % ownership/hire of higher capacity IMT	
					% Own F	% Hire G
Malawi	34	40	52	12.5 (21)	9	13
Tanzania	29	42	22	8	0	-
Ghana	62	72	76	52	0	-
Zambia	52	60	45	23 (34)	10	30
Senegal	39	47	80	28	80	-

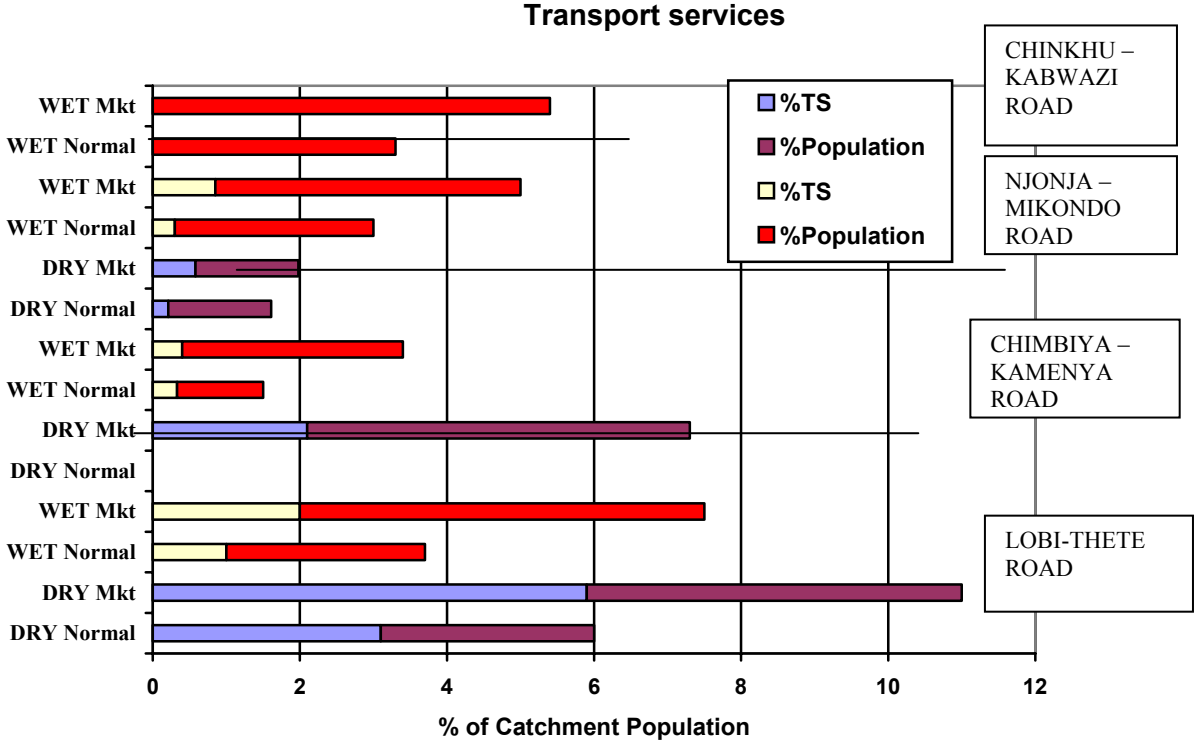
[1] Starkey, Paul: *Local Transport Solutions – People, Paradoxes and Progress*; Sub-Saharan Africa Transport Policy Programme Working Paper No 56; World Bank, Washington DC, May 2001.

A comparison of the indicators can indicate issues affecting the demand for IMT (see *Guidelines*). For instance **C** less than **A** and **B** may indicate supply of IMT is a constraint or costs are too high.

DEMAND FOR TRANSPORT SERVICES

The number of persons travelling and using transport services on the 3 study roads as a percentage of the estimated populations served by the roads is shown in Figure 4. The Chinkhu-Kabwazi road did not have TS and was included for comparison.

Figure 4: % of Catchment Population Travelling on Road and % Using Transport services



The Lobi-Thete road had a high traffic level ranging from 935 to 3,112 persons per day (average in ONE direction) and a high TS capacity, ranging from 334 to 1682 persons per day one way.

The other two roads with TS had more average traffic levels ranging from 270 to 1,520 persons per day one way and a TS capacity of 149 to 620 persons per day one way.

Based on these results two methods for estimating the demand for TS are shown in the following table:

1) Based on a proportion of the estimated catchment population served by the road
2) Based on a proportion of the traffic level measured on the road

It is considered that the estimate based on measurements of the traffic level on the road is more reliable.

Table 2: Guide for Estimating the Demand for Transport Services

1 Based on % of Catchment Population	**Average Traffic**				**High Traffic**			
	Dry season		Wet season		Dry season		Wet season	
	Normal	M'ket	Normal	M'ket	Normal	M'ket	Normal	M'ket
% Using road	3 to 5	5.5 to 8	1.5 to 3	3 to 5	6	11	3.5	5
%Using TS	1	2	0.5	1	3	6	1	2
2 Based on % of Road Users using TS	20 to 30	25 to 35	17 to 30	20 to 30	50	55	30	27

Conditions relating to demand in study area:

1 Road condition: all roads were earth-gravel in poor condition due to lack of maintenance over many years. Access was possible for all vehicles in the dry season but at restricted speeds of 30 to 50km/hr. Access was possible for 4-WD vehicles in the wet season but other vehicles were liable to get bogged down in muddy sections.

2 Trip destination and length: all routes provided access to rural market and resource centres. The Lobi-Thete route also provided access to main long-distance routes. The average trip length on the Lobi-Thete route was 26.5km, on the other routes it was 12 to 15 km. 90% of users of TS lived within 5km of the roads.

3 Incomes of users: the average agricultural income of users varied from around $140 to $300 per year. The average amount spent on TS was about 10 to 15%.

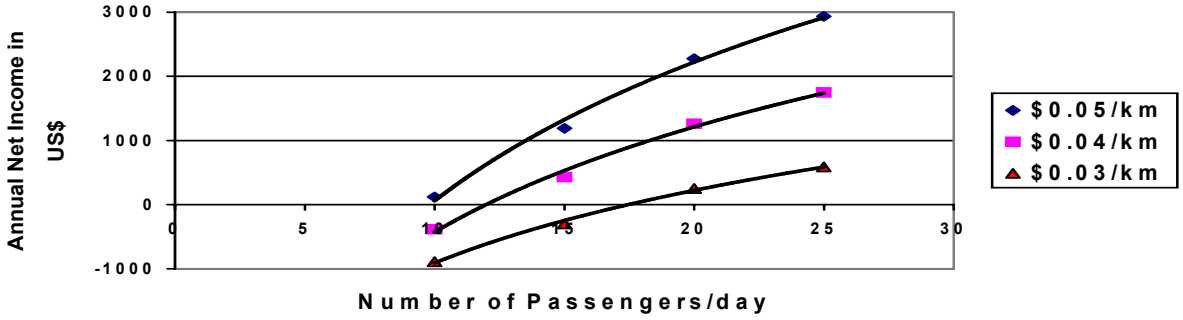
Supply of TS:

In all cases the operators of TS lived close to the road on which they operated. On the road where there were no TS, a main reason given was the lack of potential operators along the road. The main reasons given by operators for starting up on their routes were observation of demand for TS and lack of competition. Almost 80% of operators reported that they purchased their first vehicle from agricultural related income.

In this study average fares ranged from 5 cents/km/passenger for trips under 10km, down to about 3 cents/km/passenger for trips of 20 to 30km. At this level and a vehicle capacity of 18 passengers, a load factor of 60 to 70% was found necessary to break even on operating costs (fuel, repairs and maintenance, operator and overheads) and to provide for eventual replacement of the vehicle.

Based on the findings, Figure 5 shows the estimated relationship between normal daily dry season demand and annual net income for a range of fare levels (see Guidelines). Table 2 suggests that the number of road users will need to be 4 to 5 times this number of passengers.

Figure 5: Evaluation of Transport Service



SUMMARY OF DEMAND APPRAISAL FOR IMT AND TRANSPORT SERVICES

1. ***IMT -*** The findings show a consistent trend relating demand for IMT to the *transport load (tonne.km) carried to market* and *the number of months of agricultural income needed to purchase an IMT*. These indicators provide a basis for appraising the demand for IMT and factors that affect demand. The appraisal procedure requires collection of data for a representative sample of the community on: (i) Amounts of various crops transported to available market outlets and the distances to these outlets; (ii) average market prices for crops at these outlets; (iii) availability and cost of appropriate IMT.

2. ***Transport services*** – The indicator for appraising demand for transport services is based on the proportion of road users using TS. However, it applies to only one location and further studies are needed to assess if it is more general.

Further details can be obtained from two reports, the *Technical Report* and *Guidelines on the Methodology*. These are available from IT Transport and also on www.ittransport.co.uk.