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The Provision of Rural Transport services

Approach Paper

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The Sub-Saharan Africa Transport Policy Program (SSATP) is a joint initiative of the World Bank and the United Nations Commission for Africa (UNECA) to improve transport sector performance by promoting policy reforms and institutional changes.

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FOREWORD

Lack of transport services for the movement of goods and people is frequently identified as an important constraint to agricultural and rural development. The provision of transport services is particularly low and infrequent in the rural areas of Sub-Saharan Africa, and transport costs are higher than anywhere else in the world. Over many years, transport planners have focused on improving the road infrastructure as the principal remedy to low mobility, on the assumption that private initiative would respond to the resultant demand for transport services. Solid evidence has shown, however, that good quality roads do not necessarily result in good transport services. There are significant underlying policy and regulatory constraints that hinder the development of the private sector response and, therefore, the supply and quality of transport services remains constrained.

This paper looks at the key issues of transport service provision in rural areas in Africa. It draws on several studies, and puts forward options and good practice recommendations taking an integrated approach to the rural transport system including transport planning, and provision and promotion of motorized and non-motorized transport services including the use of appropriate technologies. The report is one of a series of studies on rural transport carried out under the Rural Travel and Transport Program (RTTP). The other studies are *Expanding Labor-Based Methods in Road Programs in Africa, Promoting Intermediate Means of Transport, Rural Transport Planning, Transport and the Village, and Options for Managing and Financing Rural Transport Infrastructure.*

The RTTP is a component of the Sub-Saharan Africa Transport Policy Program (SSATP), a collaborative framework designed to help improving transport policies and strengthen transport management. RTTP is working with bilateral and multilateral donors, African central and local governments, road users and local constituents to improve rural accessibility. The RTTP is financed by the governments of Denmark, Norway, Sweden, and Switzerland, and by the World Bank.

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EXECUTIVE SUMMARY

Much of the investment and research into rural transport problems over the last few decades has been focused on the building of infrastructure and on increasing the efficiency by which this infrastructure can be built, maintained, planned, managed and funded. To a large extent this has happened because the provision of rural infrastructure has been thought of as a public good and therefore a responsibility of the state. In contrast, the day to day provision of the vehicle services has been regarded as a private sector concern and as such has been largely ignored by transport planners. The purpose of this paper is to redress that balance by concentrating on the provision of Rural Transport Services (RTS). The focus of the paper is on motorised transport but much is of relevance to Intermediate Modes of Transport (IMT's) and it should be understood from the outset that the effective provision of RTS cannot be achieved without both.

The rationale behind rural road building and improvements has been that better quality infrastructure will induce higher traffic flows, improved access and incentives to increase agricultural production through lower vehicle operating costs. Unfortunately the evidence suggests that despite large investments in rural road building the subsequent increases in traffic and economic activity have not always materialised. The argument presented in this paper is that the relationships between improved infrastructure and the provision of vehicle services have not been fully understood resulting in over emphasis on infrastructure and under emphasis on the vehicle services themselves.

The evidence from cross country comparisons points to particular problems in the rural areas of Sub-Saharan Africa (SSA). Rural populations in SSA suffer from very high transport costs when compared with both national transport costs and rural transport costs in other countries. They also suffer from low service frequency and unreliable services particularly in the wet season. Rural people make very little use of conventional motorised vehicles and also have poor access to IMT's, their principal mode of transport is walking. While the paper concludes that low density of demand is the over-riding problem in much of SSA, there are measures which it is considered will reduce transport costs and increase service frequency.

The policy of leaving the provision of RTS, including IMT's, to the private sector has generally been unsuccessful because the market for these services does not operate effectively. There are a number of reasons for this which include a low density of demand and the subsequent problems in matching demand and supply; poor information flows between transport operators and users; un-competitive practises and market distortions caused by the institutional framework; and a lack of emphasis by government on the promotion and strengthening of the private sector. As such RTS is provided by vehicles which are old, unsafe, under utilised, poorly maintained and owned and operated in an unprofessional manner by poorly trained personnel. Many countries suffer from the perverse situation where vehicles are queuing for days or weeks to find a load on profitable urban and inter-urban routes while rural people are waiting for days at a time

for transport services because of vehicle shortages. Similarly countries have found it cheaper to import produce over international boundaries rather than transport their own produce from rural areas.

To help understand the complex nature of the inter-relationships involved in the provision of RTS a framework has been developed which has two main components: Firstly the operating environment which includes factors such as infrastructure, demand, income levels and institutional factors; Secondly the fixed and variable costs of vehicle operation which together constitute total vehicle operating costs. These principal elements affect and influence the level of competition, diversity of vehicle types, vehicle utilisation and ultimately service frequency and cost of travel.

The recommendations which emerge from the report are addressed under five main categories:

- Low density of demand for transport - whilst the single largest obstacle to the improved provision of RTS in SSA is the low density of demand it is considered that more can be done to maximise effective demand. This can be achieved through increased provision of rural markets; ensuring that rural road networks have a minimum degree of inter-connectivity to reduce dead end routes; make greater use of transport brokers to match vehicles and loads; and use of modern communication devices such as radios and telephones to link isolated areas to centres with vehicle services.

- Poor quality infrastructure - road condition is often cited as the most important/only reason for vehicle operators not servicing rural communities. Whilst this report has emphasised that infrastructure is not always the obstacle sometimes perceived it is undoubtedly true that poor quality roads do provide a disincentive to potential operators. It is recommended that providing basic year-round vehicle access is a minimum requirement and that the best way of achieving this is through spot improvements. It is also highlighted that many rural roads are constructed to unnecessarily high standards, particularly in terms of road width. This imposes high construction costs and subsequently high maintenance costs. In the majority of cases, and certainly for all roads with traffic flows under 20 vehicles per day, a maximum running width of 3.5 metres is all that is required.

- Poor diversity of vehicle types - the diversity of vehicle types in SSA is lower than many Asian countries. Diversity is important for meeting all transport needs and ensuring a competitive environment. There are five vehicle categories which require consideration in rural areas and these are bicycles, animal transport, tractor technology, pickups and trucks and buses. All have specific roles within an efficient rural transport system. It is considered that there are a number of ways in which the use of these vehicles can be encouraged in rural areas. Close co-operation is required between transport planners, agricultural extension agencies and roads authorities to ensure that maximum utilisation is derived from available vehicles; credit is required for vehicles owned within rural areas; and price incentives in the form of relief on

import duties to encourage the ownership of rural vehicles such as tractors, power tillers and IMT's. Price incentives are also required to encourage the operation of conventional vehicles such as pick-up trucks and buses in rural areas. These incentives should be on their variable costs of operation, for example, through rebates on fuel taxes.

- Un-competitive transport markets - although RTS has predominantly been supplied by the private sector in much of SSA and government control in transport services overall has been reduced, the institutional structure within which RTS is delivered leads to un-competitive practice. Transport unions, associations and informal cartels have often taken the place of government in setting fares, licensing routes and effectively imposing quantity controls. In many countries strong unions significantly distort transport markets keeping prices high and utilisation low. Promoting a more competitive market for RTS in SSA would involve two elements. Firstly a reduction in the power of the transport unions through an inclusive policy of dialogue and explanation of the issues, consequences and potential benefits from reduced control. This dialogue should include user groups as well as operators to ensure that there is countervailing power to union activities. Secondly to prepare operators for survival in a more competitive market through training programmes in vehicle maintenance and operations as well as in business management skills. It is recommended that these training programmes are organised and promoted through the unions to keep them fully involved in all developments.

- Lack of understanding from government, donors and other agencies - the potential benefits to developing economies from increasing the efficiency with which transport services are provided are potentially enormous. The transport cost differences between Asia and Africa, between some African countries, and between inter-urban and rural transport are many times different. Therefore the opportunities for reducing transport costs in SSA by 20% or more through some of the interventions mentioned above must be very real. The implications of this in terms of increased demand for travel, lower food and commodity prices, and increased incentives for agricultural and industrial production could be substantial. There are a number of causes of action which can be taken which at a comparatively small cost could make a large difference. All rural road maintenance and rehabilitation projects should have target traffic levels and transport charges along with a strategy as to how these targets will be met. If it is considered that the improved road will be sufficient in itself to meet these targets, a justification for this assertion must be given. In order to measure the achievements of targets, baseline data is required on classified traffic counts (which include IMT's and pedestrians) and typical passenger and goods fares. The strategy should include elements such as those outlined above and the scale of funding for the implementation of the strategy should be as a percentage of the road improvement project.

It is concluded in the report that there is considerable potential for increasing service frequency and reducing the cost of transport services in rural SSA. While the low density of demand in many countries is a limiting factor in the success of RTS much more

attention needs to be given to improving the efficiency with which the existing fleet of vehicles is operated. In this context it is concluded that in the majority of cases there are sufficient conventional vehicles but attention should be given to increasing the numbers of IMT's and vehicles based on tractor technology.

ABSTRACT

The argument presented in this report is that the relationships between improved rural road infrastructure and the provision of complementary vehicle services have not been fully understood resulting in over emphasis on infrastructure and under emphasis on the vehicle services themselves. The paper draws on evidence from cross country comparisons to conclude that there are particular problems in the rural areas of Sub-Saharan Africa (SSA). Rural populations in SSA suffer from very high transport costs when compared with both national transport costs and rural transport costs in other countries. They also suffer from low service frequency and unreliable services particularly in the wet season.

The policy of leaving the provision of Rural Transport Services (RTS), including Intermediate Means of Transport (IMT's), to the private sector has generally been unsuccessful because the market for these services does not operate effectively. There are a number of reasons for this which include a low density of demand and the subsequent problems in matching demand and supply; poor information flows between transport operators and users; un-competitive practices and market distortions caused by the institutional framework; and a lack of emphasis by government on the promotion and strengthening of the private sector.

The paper recommends ways in which effective demand can be maximised; appropriate infrastructure standards employed; better vehicle selection and promotion achieved; an enabling environment created which promotes competition; and a better understanding of the issues by all governments and agencies involved in the provision of road infrastructure.

1. INTRODUCTION

In Africa the rural poor suffer, even when they have road access, from high transport costs and poor service availability with the subsequent impact that this has on all features of economic and social well-being. To date interventions have predominantly been to provide improved physical infrastructure, little or no effort being given to improving the supply and cost of vehicle services. It has been assumed that market mechanisms will ensure the provision of Rural Transport Services (RTS) because improved infrastructure will reduce vehicle operating costs and hence increase the demand for transport. In reality this has not happened and the rural poor have been left isolated with little access to motorised and intermediate means of transport.

Research has shown large differences in the cost and availability of transport services between Africa and Asia, though there is little difference between their levels of vehicle ownership. It seems that low vehicle utilisation, un-competitive markets, inappropriate vehicle types and the poor distribution of vehicles between urban and rural areas are more likely to be contributing factors.

Although rural transport is the focus of this report, it cannot be taken in isolation from national transport systems. The structure of urban and inter-urban bus services, as well as long distance freight movements, all impact on the structure of rural transport services. Rural transport covers the multiplicity of transport forms that connect and interact with rural areas, and urban centres are often the main origins and destinations of rural trips. In addition, the vehicles which primarily undertake the rural phase of transport journeys are predominantly owned by urban based businessmen, and the institutions which govern their operations are also urban based.

Relatively little work has been done in the area of rural transport services and so the main purpose of this report is to highlight the major issues governing service cost and availability. The main focus of this report is on transport which takes place outside the village and as such concentrates on motorised transport. However, as Intermediate Means of Transport (IMT's) play such an integral role in rural transport systems, these vehicles are also covered and indeed the content of this report applies as much to IMT's as conventional motorised vehicles. It should be noted from the outset that although there are many similarities in transport operations between Sub-Saharan African countries there are inevitably differences which would make it impossible to give hard and fast solutions in all situations for all countries. The report also explores alternative solutions to identified problems and provides a menu of choices for transport planners to use according to the situation.

The material for this report is drawn from a number of sources which include three case studies commissioned as part of the World Bank's Rural Travel and Transport Programme (RTTP) to Malawi, Mali and Zambia; surveys undertaken in Thailand, Sri Lanka, Pakistan, Ghana and Zimbabwe as part of a programme of work on RTS carried

out at Cranfield University; and work carried out at the Transport Research Laboratory on freight and urban transport, and an on-going Department for International Development (DFID) study on the availability of RTS. These main sources have been supplemented by other references to rural, freight and urban transport in SSA.

The report is structured in the following way. In Section 2 the reasons for an over emphasis on rural infrastructure at the expense of RTS are examined. Evidence is presented on the impact that high transport costs, poor availability of vehicle services, and lack of affordability of these services has on agricultural, economic and social development. An assessment is made on likely changes in effective demand given interventions to improve the provision of RTS. Section 3 covers the state of RTS as it stands at the moment and including trip patterns, vehicles types and ownership and the legal framework within which they are operated. Section 4 provides a framework to help explain the complex interactions between the many different variables involved in the provision of RTS. These variables include the operating environment, vehicle operating costs (VOC's), competition and vehicle diversity. Sections 5 and 6 take each of these variables in turn to explain the major issues and how they impact on the cost and availability of RTS. In the final section recommendations are made on actions to be taken which culminates in a recommended structure for country specific strategy documents to tackle high cost and poor availability of RTS.

2. RURAL TRANSPORT SERVICES, ROADS AND RURAL DEVELOPMENT

Chambers (1983) lists isolation as one of the five factors (isolation, powerlessness, vulnerability, poverty and physical weakness) which contribute to the deprivation trap. Isolation will increase marketing and production costs, slow down the diffusion of new technologies and techniques, and limit access to education and health facilities. Improved transport, as part of a multi-disciplinary approach to poverty reduction, plays an important role in improving access to vital social and economic facilities through more reliable and lower cost access. However, the research from SSA points to high transport costs, unreliable and infrequent vehicle services with the inevitable implications that this has on rural development and poverty eradication. It is asserted in this section that this is in part due to an over emphasis on physical infrastructure and under emphasis on the vehicle services themselves. This problem has also been highlighted in the past by such authors as Dawson and Barwell (1993) and Carapetis et al (1984).

2.1 Transport services and rural development

The evidence for new road investment to act as a stimulant for rural development and poverty alleviation is mixed, as borne out by the large number of ex-post road impact studies which show a very wide range of response (Howe, 1981). One important reason for this is that the rural environment is much more complex than it might at first appear. The ability of a rural community to respond to better accessibility and reduced transport costs in a given area is dependant on a wide range of social as well as economic factors. In a similar way the supply and costs of vehicle services is also dependant on a wide range of inter-related factors and not just on the quality of infrastructure on which it operates.

Despite the mixed success from rural infrastructure most authors would agree that good communications are necessary for agricultural development but that on their own they are not a sufficient basis for success. Beenhakker (1987) has stressed the need for complementary inputs such as agricultural extension advice, fertilizers and credit. Howe (1997) has highlighted the need for use of local resources, the efficient allocation of funds and an enabling environment for transport services.

In the planning of infrastructure the quality, frequency and cost of vehicle services has been often overlooked. Attention has often been wrongly focused on a theoretical model rather than on the magnitude of transport cost changes or the sensitivity of response. For most of African smallholder agriculture reduced transport costs will make little difference to the supply of agricultural inputs. The major input is labour which walks a few kilometres between home and farm. Only small quantities of fertiliser, insecticides or improved seeds and planting material are used which travel any substantial distance. The major impact of better transport is likely to come from the reduced costs of transporting produce to market.

There is also growing evidence that transport planners have been over predicting the benefits from improved rural infrastructure, in terms of reduced VOC's, and hence the price signals sent to rural communities may not be as strong as previously thought. In the last few years it has become widely recognised that road investment models, such as HDM and RTIM, have tended to over-predict the VOC benefits from improvements in infrastructure (Cundill et al, 1997). The most important component of these models in the prediction of benefits from road investments is the relationship between road roughness and vehicle maintenance costs. Most VOC data used to derive the model relationships has been collected from established operators who keep good records that are inevitably located in the major cities and who use the main network of primary and secondary roads. Far less is known about the true operating costs of operators travelling on the minor rural road network. Not only do these operators have little or no records, but the roads and tracks on which they travel have far less definition in engineering terms. The road roughness and geometry on which they operate is often beyond the scale of the data used to derive the original relationships.

It is not automatically true that VOC's are inevitably much higher than on the primary and secondary road network because as roughness and road geometry become worse operators will respond by cutting speeds. On the primary and secondary network, at low and moderate roughness levels, roughness does not substantially affect vehicle speeds. As a result vehicle speed is not a component of maintenance costs relationships. However, speed is an important factor in vehicle damage from the shocks associated with poor quality rural roads. Some evidence on operating costs can be gained from transport charges, however, as is pointed out in the rest of this report charges are as much influenced by monopolistic practices and density of demand as by road roughness.

2.2 Transport costs in SSA

By overlooking the provision of rural transport services, rural SSA has suffered from higher rural transport charges than anywhere else in the developing world. The impact that this has on their economic and social development must be considerable. A comparative study of rural transport carried out in Ghana, Zimbabwe, Thailand, Pakistan and Sri Lanka in 1994-5 has shown that Ghana and Zimbabwe have transport charges that are two to two and half times more expensive than for Asian countries for comparable journeys of up to 30 kms. In this case data was collected from a variety of different types of vehicles including tractors, power tillers pickups and trucks (Ellis, 1996) .

In surveys conducted for this report (Ellis, 1997a,b) it was found that one way passenger fares over a distance of 25 kms were 70% higher in Zambia than in Ghana and 60% higher in Zambia than in Mali. In Zambia there were also large differences in passenger fares depending on distance and road quality. For example, the route from Lusaka to Chipata on a paved road is 580 kms and cost Kwacha 20.7 per passenger kilometre; the route from Chipata to Mpetamai is 24 km on good quality gravel road and cost Kwacha 62.5 per passenger kilometre; and the route from Chipata to Mwanga is 74 km (on poor quality earth road) cost Kwacha 135 per passenger kilometre.

In surveys in Tanzania designed to measure the impact of poor road condition it was found that over a 50km distance that an increase in roughness of 50% would increase truck charges by 16% and increase pickup charges by just under double. It was also found that there were large changes in wet and dry season charges on poor quality roads. For example, on one road passenger fares increased by 60% in the wet season and freight charges increased by 65% (Ellis, 1997c). Similar figures were also found in Madagascar where on poor quality roads wet season passenger fares on "Taxis-brousses" were 70% higher than dry season fares (Ninnin, 1997).

A similar picture emerges for long distance transport where the evidence suggests that freight transport costs and charges in much of Africa are also consistently higher than comparable costs in Asia. In the period 1986 to 1988 long distance freight transport tariffs in Francophone Africa were over five times higher than tariffs found in Pakistan. Similar levels of freight rates were found for long distance traffic in Zambia, Zimbabwe and neighbouring countries in 1989. Similar low rates to those found in Pakistan were found for long distance traffic in Vietnam and in other Asian countries including India (Rizet and Hine, 1993). More recently it was found that long distance freight rates in Tanzania were on average three times higher than for Indonesia (Hine et al. 1997).

However transport charges and costs (per tonne km) by conventional vehicles are not uniform. Not only are there large differences in costs between different countries for the same type of transport (particularly between Africa and Asia), there are large differences between rural short haul transport (usually carried out by pickups or small rigid trucks) and long distance interurban transport that is more often carried out by heavy tractor and semi-trailer. Research carried out in Cameroon, Mali and Côte d'Ivoire has shown that costs of short distance local transport (i.e. up to 10 kms) are on average six times those of long distance transport (i.e. 50 kms) (LET, ENSTP and INRETS, 1989). Similarly in Madagascar freight charges on national routes were some three times higher than on non-national routes (Ninnin, 1997).

2.3 Trip frequency and vehicle numbers

The frequency with which RTS operate is dependant on the density of demand, road quality and ability of the rural population to pay for the service. For all of these reasons the frequency of service tends to be quite low. On major routes, between district centres for example, a regular daily service will generally be available. On village routes the frequency of service can decline dramatically. For example, in Mali 50% of communities are within 5 kms of weekly transport but only 21% are within 5 kms of daily transport. Evidence from Zimbabwe suggests that the number of motorised trips per person per week in rural areas is only between 0.2 and 0.5 compared with 3.5 in urban areas (SWECO, 1985).

In some of the remotest rural areas of SSA where subsistence agriculture accounts for virtually 100% of total household food consumption, the road and motor vehicle are of no relevance in day to day transport tasks. In surveys in Zambia, villages with access to

motorable roads may only see commercial vehicles three times in a year with other vehicles being used for agricultural extension, delivery of health services and community development visiting the village once a month on average. In these cases rural people routinely have to walk in excess of 20-30 kms and trips of 120 kms by bicycle are reported.

Availability of motorised vehicles is also very low. A study in the Makete district of Tanzania in 1987 found only one four wheeled vehicle and three motorcycles for 13,700 people (Dawson and Barwell, 1993). Gaviria (1991) found that in the northern and southern regions of Malawi there was only one bus per 30,000 people and this falls in the central region to one bus per 45,000 people. Cross country comparisons between Africa and Asia show that representative villages in Asia have far greater access to vehicles than those in Africa. For example, surveys found that villages in Zimbabwe would have on average one motorised vehicle per 300 people which is a fifth of the level in Sri Lanka. The conundrum here is that it appears that vehicle ownership in low income countries in SSA is virtually the same as in low income countries in Asia i.e. one vehicle for per 135 people in SSA and one per 138 people in Asia (AAMA, 1996). Although it is recognised that vehicle registration statistics are very inaccurate in SSA this does suggest that vehicle ownership in SSA is very urban biased.

2.4 The impact of transport costs on agricultural development

The proportion of transport charges to final market price will vary with a range of factors such as commodity type, the efficiency of the transport and marketing sectors and travel distance. Studies carried out in Ghana demonstrate this variation. As a proportion of final market price wholesale transport to Kumasi were found to be between 3.5 and 5 % for maize, yam and plantain with mean distances of the different crops of between 120 km to 200 km (Hine, Riverson and Kwakye, 1983). In another study an average of 7 to 8 % were found for Koforidua (Gore, 1978). A more recent study carried out by the Ministry of Transport found that for Accra the proportion was 11 % for maize (420 km) and 25% for tomatoes (360 km).

However the impact of total transport costs on agriculture will be higher than these figures indicate because the critical factor is the relationship between transport costs and what the farmer receives for his produce at the farm gate. Both marketing margins and transport costs (including the high cost of head loading produce to the village or roadside) need to be subtracted from the final market price. When this is done a very different picture emerges, as highlighted by the research conducted by Ahmed and Rustagi (1987). In their study they found that African farmers received only between 30-50% of final market prices compared to 70-85% received by Asian farmers with most of the difference going on transport costs.

The effect of reduced transport marketing costs on agricultural productivity can be estimated using agricultural supply price elasticities. These have been shown to lie in the range 0 to 1.5. If it is assumed that transport costs of moving goods to a major urban

market are equivalent to say 30% of farm gate prices and that agricultural prices are set at the urban market then, a reduction of total transport costs by 20%, which is totally passed onto the farmer, will induce a rise in farm gate prices by six per cent. If it is also assumed that the total agricultural supply elasticity is +1 then one may estimate that total agricultural output would rise by about six per cent.

The above analysis has largely assumed that changes in transport costs will be passed to farmers and not go to transporters, food wholesalers and retailers or the final urban consumers. Competitive transport and food marketing is required to ensure that the benefits from reductions in transport costs are passed on to farmers and to final consumers. Unfortunately in many parts of Africa this is far from the case.

Where food prices are not government controlled it is common to find a wide variation of food prices between different regional markets in Africa which cannot be easily explained by transport costs. For example, it was found in the Ashanti Region of Ghana that the prices of cocoyam, plantain and tomatoes varied by more than two to one in different district markets at the same time. In one month the price of cassava was reported to be six times the price in another! Within Ashanti Region to transport produce from the lowest price market to the highest price market would have accounted for around 5 % of the price difference for maize and plantain and around 15% for yam (Hine, Riverson and Kwakye, 1983). Similarly in Zaire it can be calculated that transport charges account for about 15 to 20 % of the total difference in price of cassava for Kinshasa and village markets 260 to 600 km away (Rizet and Tshimanga, 1988).

Besides transport costs, other factors that can account for a wide range of prices, these include small volumes, poor price information, commodity perishability, differences in storage and retailing costs and a monopolistic marketing system. For example at the village level travelling wholesalers will travel together to a village and agree prices before they arrive. Individual farmers will often have little choice as to whom they will trade with. More often than not it will be with one travelling wholesaler with whom the farmer has a long standing relationship, this is often strengthened by a credit agreement. For many farmers, indebtedness will force them to sell at peak harvest time when prices are low.

The price of transport is not the only disincentive to increased agricultural production. There is evidence from all over SSA that crops remain un-harvested, or are spoiled once they have been harvested, because of an inadequate supply of vehicles at harvest time. For example, Gaviria (1991) presents evidence from Tanzania that in some regions after the 1987/88 harvest that up to 89% of harvest remained stranded with typical figures in the region of 10-40%.

2.5 The impact of transport costs on economic and social development

While conventional appraisal and evaluation of transport projects tends to concentrate on agricultural benefits, there are considerable non-quantifiable benefits to communities and

economies from improved access to economic and social facilities. These facilities may include schools and health centres, markets, administrative centres, external employment opportunities as well as friends and relatives, and social functions such as weddings and funerals. For most rural communities travel for direct economic reasons such as the sale or marketing of their produce is only a small proportion of their total transport requirements. In this context the cost and availability of RTS is an important factor in their ability to reach these facilities.

High transport costs directly impact on rural peoples access to health and education facilities. In the Meru district of Kenya access to hospitals was almost entirely dependant on vehicle transport. Therefore, for hospitals offering a free service, transport charges represented the most important component of treatment costs to patients (Airey, 1991). As might be expected the distance from medical facilities also has a great bearing on attendance. Howe (1983) cites evidence from Lusaka that for distances of less than five kms 50% of patients attend hospital, this figure falls to 2% for distances between 33 and 40 kms.

Rural people's most valuable asset is their physical labour without which they are unable to make a living. Both ill health and low literacy levels prevent rural people exploiting their limited resources to the full. Stewart (1988), for example, found a strong correlation between levels of education and indicators such as life expectancy.

In addition to transport for health and education, there are many other reasons for travel for both economic and social reasons as stated above. In addition to the obvious reasons for these trips, they all serve the purpose of allowing people to interact. This is not only good because people are sociable animals and need interaction for their personnel welfare, but also because it provides a flow of information. This information may only be about what friends and relatives are doing but is as likely to cover issues such as produce prices in other markets, current agricultural techniques and technology, government policy changes impacting on incentives to produce various crops and opportunities for employment outside of the agricultural sector. All of these factors may influence people to change their behaviour as a response to the current economic climate either in the local or national area.

2.6 Affordability of RTS

A major constraint to the increased availability of rural transport services is rural poverty. Low incomes severely reduce the effective demand for services because passenger and goods transport fares are considerably in excess of what most rural people can afford.

Table 1 shows rural household expenditure by poverty group for Zambia but the levels of expenditure are typical for most rural areas in Sub-Saharan Africa. Food accounts for the majority of expenditure, being in excess of 65% for all income groups, and higher as poverty increases. Transport has the fourth largest expenditure, the proportion of total expenditure falling as poverty increases. The poorest households spend just under half as

much on transport as less-poor households. In monetary terms the majority of rural households spend between approximately K635 and K1,000 per month on transport. With a typical passenger fare of K1,500 for 24 kms in the Chipata District, it clearly shows how low incomes provide a considerable constraint to greater use of transport services.

In this situation it is doubtful whether households would be able to use transport services more than twice a year. In deed, many households would not use transport services, motorised or non-motorised, at all. The predominant users of rural transport are those from richer households or those engaged in external employment.

Table 1: Expenditure shares (%) in rural Zambia by poverty group

	Moderate poverty cut-off		*Severe poverty cut-off*		
Item	***Non-poor***	***Poor***	***Non-poor***	***Poor***	***All rural***
Food	65.0	69.9	67.1	69.9	69.1
Housing	10.6	14.9	10.0	15.7	14.2
Education	1.0	1.7	0.9	1.9	1.6
Medical	0.8	0.8	0.8	0.7	0.8
Clothing	11.7	7.7	11.5	7.2	8.3
Transport	6.3	3.6	6.0	3.3	4.1
Remittances	4.6	1.4	3.7	1.3	1.9

2.7 Effective demand for RTS

The evidence so far has demonstrated that the effective demand for RTS in rural SSA is severely reduced by the high cost of service and low incomes. Clearly remotely located small scale agricultural communities can be at a considerable disadvantage resulting from the high costs of local and regional transport, thus reducing the scope for developing both national and international markets for locally grown produce.

Given the high costs of RTS and low incomes the question that is of interest to planners is the likely impact that interventions to reduce the costs of RTS will have on effective demand. By reducing transport costs demand for travel should increase, which will encourage new transport operators into the market and stimulate economic development. The evidence for this is encouraging.

A study in the Meru district of Kenya found elasticities of demand for passenger travel in the range of -0.38 and -0.78 with an average of -0.57. This suggests a 1% reduction in fares would lead to a 0.57% increase in journeys (Airey and Cundill, 1998). Evidence from other evaluation studies carried out in developing countries give elasticities of demand in the range of -0.6 to -2.0 with an average of -1.0 (Hine, 1982).

In a survey of price elasticities of demand for transport, evidence from predominantly developed countries was that reductions in transport costs are likely to be followed by proportionately smaller increases in demand for travel i.e. as transport is a derived

demand, it will tend to be inelastic. In examining the applicability of the results for developing countries it is suggested that price elasticities were likely to be more elastic where there was greater competition between modes. In addition, they stated that where modal choice was available that lower income groups may be more price sensitive to transport costs (Oum et al, 1990). However, interventions to reduce transport costs may not benefit all members of the community equally because the share of budget spent on travel rises from poorer to richer households (Gannon and Liu, 1997).

Care needs to be taken when elasticities are used to predict traffic response. It is quite common for the same data set to yield a range of elasticities depending on the exact model formulation. Secondly there are time delays in any likely response. In the short term elasticities may be low because people have little chance to modify their behaviour. In the longer term elasticities are higher as people can adjust where they live, work and what transport they use to accommodate price changes. However, the evidence does suggest that there is likely to be a positive response in rural areas from interventions designed to lower transport costs. The evidence points to the responses which are roughly equivalent to the percentage price change. Therefore if transport costs can be reduced by 20% it is likely that demand will rise by 20%. The remainder of this report will examine the major issues governing high prices and recommend ways in which the provision of RTS can be improved.

3. PROVISION OF RURAL TRANSPORT SERVICES

3.1 The nature of rural transport

The literature on rural transport has emphasised the importance, particularly in SSA, of very short distance village level trips. Village level travel, that is internal to the local area of the village, includes the collection of water and firewood, trips to the field for crop husbandry and marketing inside the village. These transport tasks are predominantly carried out on an informal network of paths and tracks by headloading and IMT's.

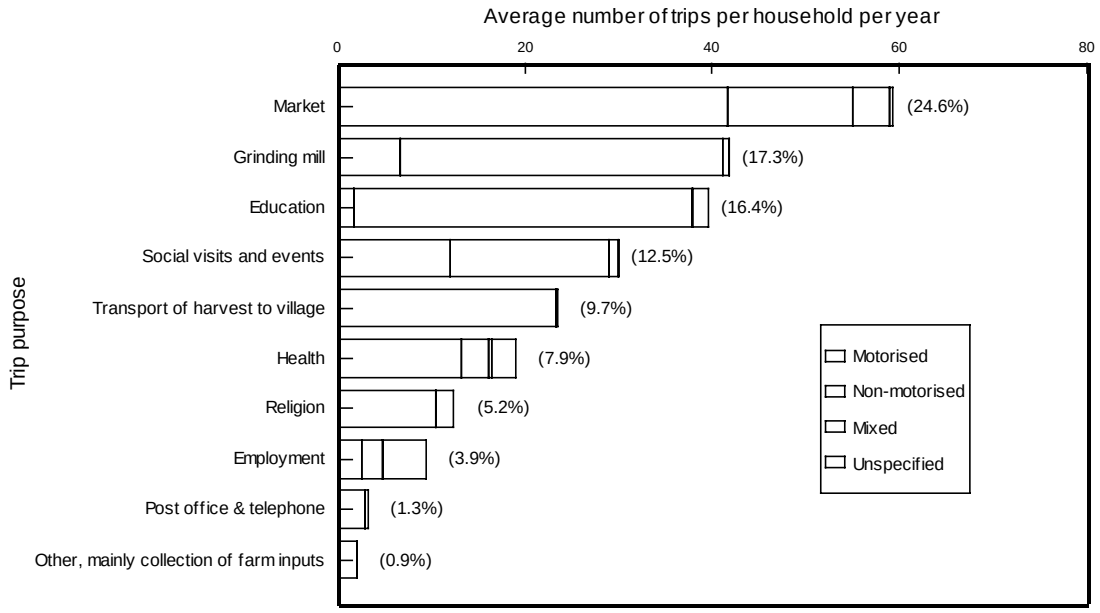
Research from Ghana and Tanzania suggests that up to 80% of the total village based transport burden, in terms of tonne kilometres, is composed of very short distance trips that are confined to the local village area (Dawson and Barwell, 1993). Similar finding have been found from Uganda, Burkino Faso and Zambia (Barwell, 1996).

External travel, which is the main subject of this report, is travel outside the village and includes marketing, journeys to schools and health facilities, grinding mills, travel to friends and relatives, and access to alternative employment opportunities. This form of transport involves longer distance transport movements than internal travel and, as such, benefits from the use of motorised vehicles. However, it is clear from observation that many long distance movements are conducted by walking or use of IMT's.

It is difficult to generalise about journey purpose, trip frequency and mode of transport for external travel, because there are large differences from country to country and even district to district within the same country. Figure 1 shows household trip purpose, frequency and mode of transport for external travel from four districts in Ghana. It shows that travel to markets is the most common trip purpose with most of these trips being conducted by motorised vehicles. There is also considerable use of motorised vehicles for social visits and events and travel to health facilities. The villages that were used for the surveys were predominantly engaged in subsistence agriculture but did derive some income from the sale of their crops and from other employment opportunities. Surveys made in the less affluent Northern areas of Ghana show a similar picture in terms of trip purpose but very much less use is made of motorised transport i.e. principally for transport of harvest and one-off visits to health facilities and friends and relatives (DFID, 1998).

Data from a relatively affluent area of Kenya shows that travel for work was the most important trip purpose. As in Ghana, travel for shopping (markets), social and health were also very important (Airey and Cundill, 1998). In poorer, more remote areas of SSA, trip frequency outside the village is much lower and virtually no use made of motorised modes of transport as is the case in Northern Ghana.

Figure 1: Household trip purpose, frequency and mode of transport for external travel from four districts in Ghana



3.2 The organisation of rural transport services

3.2.1 Vehicle type, ownership and control

In most African countries short distance rural transport services are provided by small scale enterprises run by local entrepreneurs who are usually based in district or regional centres. Quite often they regard their vehicle as a sideline to their main business but useful as another source of income. The types of vehicles used may be saloon cars, pickups, 4 wheel drive vehicles such as Land Rovers, minibuses, or conventional buses and trucks. The vehicle is normally driven by a hired driver who may have the help of a conductor to collect fares and supervise vehicle loading. It is common that vehicles are used for both passenger and goods movement.

Traditionally in West Africa wooden bodied “mammy wagons”, often based on a small Bedford truck chassis, have provided a flexible means of transport whereby passengers and goods could be carried together in the interior of the vehicle. However some countries now have regulations preventing passengers from being carried in wooden bodied vehicles and with the growing use of minibuses and more conventional buses and trucks the use of the mammy wagon is becoming less common. In East and Southern Africa more conventional bus services have been provided whereby people sat inside and the loads were stored on top.

In some areas goods transport is often provided by privately owned marketing companies or government run “parastatals” that own relatively large fleets of vehicles. These

vehicles will pick up directly from the farm or village but the service will only be available on a seasonal basis i.e. during harvest time. Many of the farmers will be tied to selling to a particular company as they have taken a loan from that company to buy seed and fertiliser.

Conventional bus passenger services tend to be confined to the more major routes and are not common in most rural areas in SSA. However, where they do exist they are either provided by a local entrepreneur or by a government run parastatal.

The other motorised vehicle type which also plays an important role in rural transport is the agricultural tractor and trailer. Tractors are used intensively for transport during the harvest season but are also used for delivering farm inputs, building materials and in some cases for passenger transport. They are commonly owned by individual farmers and co-operative societies who provide transport services to other people in the community. Of all the motorised vehicles mentioned in this section, it is the tractor which is most likely to be owned at the village level.

At the village level it is the bicycle which is most commonly owned and operated by individual households. In some areas there is quite high ownership of animal carts but this is by no means widespread throughout SSA.

3.2.2 Legal framework for RTS

Passenger transport in rural areas has traditionally been subject to a range of legal controls. The most widely enforced are that the vehicle must be taxed, have a certificate of vehicle fitness, and that the driver is licensed for a public service vehicle. In many countries the transport operator will also need to be officially registered. In reality, there is very little enforcement of these requirements in rural areas and there are few other legal requirements which restrict vehicle operators ability to provide RTS.

Government control of rural transport varies between countries. In Southern and Eastern Africa individual bus companies have been granted licences to operate specific routes by government bodies such as the Road Traffic Commissioners' office. In other countries in SSA there is a deregulated operating environment and government no longer controls route licenses and fares.

However, in many countries officially sanctioned bodies such as transport unions and associations, as well as informal cartels, have taken control of RTS. These organisations influence RTS to a different extent from country to country. In some cases their control can be almost total and in others they just provide guidance to their members on appropriate fare levels. These organisations can cause significant distortions to transport markets, their impact will be dealt with in more detail in Section 6.4.1.

Throughout Africa is has been very common for passenger fares to be fixed by government or by officially sanctioned bodies such as transport unions. Freight tariffs have been controlled in the past but this is now much less common, although for some

countries there are still controls in place for the small loads accompanying passengers. In most instances officially approved tariff lists act as a maximum. For larger loads individual fare negotiations still take place between the customer and the transporter.

4. FRAMEWORK FOR IDENTIFYING CONSTRAINTS TO LOW COST RTS

In the preceding sections the high cost and poor availability of RTS in rural SSA has been highlighted. The evidence suggests that rural transport costs are higher than national transport costs and that charges in SSA are higher than elsewhere in the developing world. As a result, poor rural communities cannot afford the services which has a knock on effect to their availability. As already discussed the provision of RTS varies from country to country and even from district to district within the same country. As such there is no universal panacea for the poor availability and high cost of transport services in SSA. Single interventions are unlikely to significantly improve the situation, it is more likely that a combination of factors is required.

In order to understand why the cost of rural transport is high in much of SSA a simple framework has been developed to identify the components which constitute a transport charge. The framework attempts to demonstrate the interactions between these components and to show their impact on the price and service frequency of RTS. The purpose of the framework is to give planners a tool for identifying areas which may be contributing to high costs and creating obstacles to the more efficient provision of transport services.

4.1 The framework

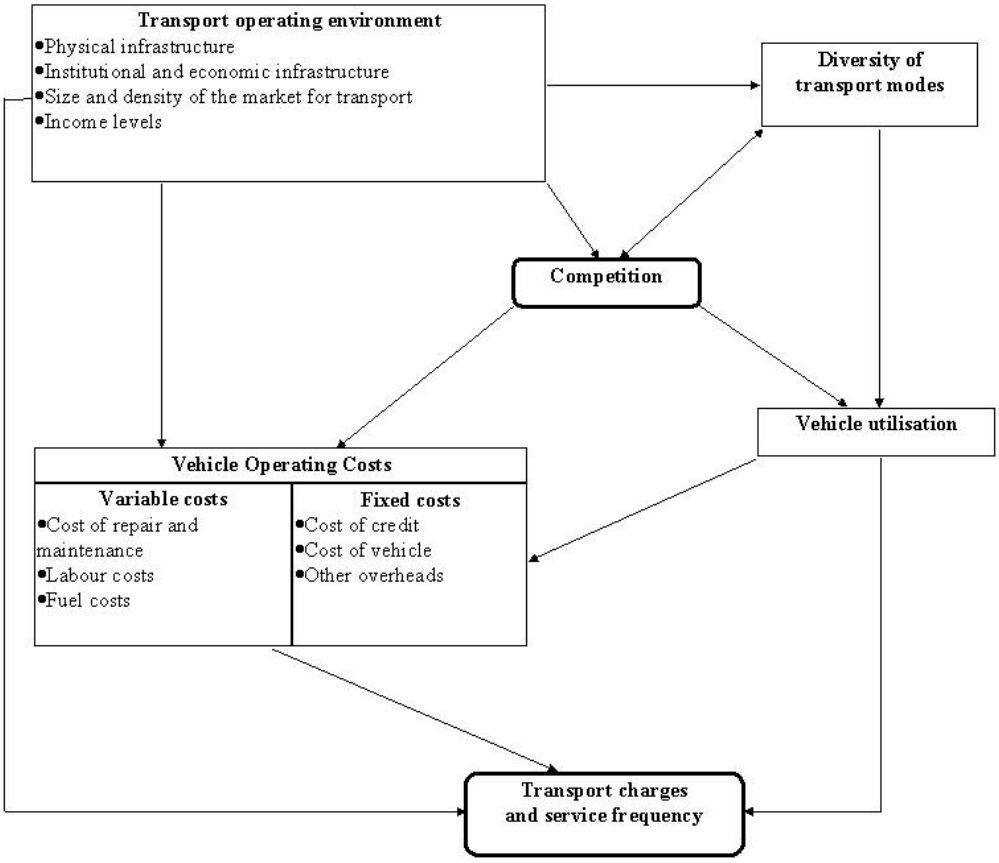
It is commonly accepted that the state of the road network affects variable vehicle operating costs (VOC's). What is less commonly understood is that there are a whole series of other factors which also affect VOC's and the fares and tariffs to the customer. Figure 2 shows that the transport charge and service frequency is influenced by a number of inter-related factors. For example, the size and competitiveness of the transport market will affect VOC's through the supply of inputs, choice of vehicle and utilisation of the vehicle fleet.

The basis behind the framework shown in Figure 2 is that there are two main ways by which transport charges can be reduced and service frequency increased. Firstly, the input prices to VOC's can be reduced which will have the affect of lowering transport charges and increasing demand for transport. Secondly, by increasing competition and improving vehicle choice this will encourage vehicle operators to increase their efficiency and hence the utilisation of their vehicles. This will also place downward pressure on fares and tariffs and make more frequent service provision more viable.

These relationships will be explored further in the following sections. Section 5 looks predominantly at the inter-relationships between the transport operating environment, competition and the input prices to VOC's. Section 6 deals with inter-relationships between the transport operating environment and its impact on vehicle diversity,

competition and vehicle utilisation. The following sub-sections summarise the principal relationships that are covered in the Sections 5 and 6.

Figure 2: Framework to show the main factors that determine transport charges and service frequency



4.1.1 Input prices to vehicle operating costs

The vehicle's operating costs are the sum of the fixed and variable costs of operation. Variable costs include repair and maintenance, fuel and labour costs. Fixed costs include the capital costs of the vehicle, interest repayments and other overheads such as insurance. Table 2 shows the various cost items which constitute the vehicle operating cost along with the factors which may influence the size of these cost items. Section 5 gives more detail on each of these factors and provides evidence on their impact on total VOC's.

Table 2: Factors influencing vehicle operating costs

Cost item	*Influencing factors*
Fixed costs:	
i) Interest repayments	Interest rates.
ii) Capital cost of vehicle	Taxes and import duties, dealer margins, vehicle type, imported vs locally manufactured vehicles.
iii) Other overheads	Insurance, vehicle licensing and taxes, certificate of fitness, police bribes.
Variable costs:	
i) Repair and maintenance	Operator and mechanic skills, quality of infrastructure, imported vs locally manufactured spare parts, taxes and import duties.
ii) Labour	Wage rates, numbers of crew.
iii) Fuel	Efficiency of vehicle, taxes and import duties, local transport costs.

4.1.2 Competition, vehicle diversity and vehicle utilisation

The relationships and components which affect competition, vehicle diversity and vehicle utilisation and hence the efficiency of vehicle operations are shown in Table 3. The size and density of the transport market, institutional and physical infrastructure, income levels, diversity of transport modes and vehicle utilisation are all inter-related and all affect the level of competition in the transport market. Section 6 provides more detail on these factors together with evidence on their impact on transport charges and service frequency.

Table 3: Factors influencing competition, vehicle diversity and vehicle utilisation

Transport market characteristic	*Influencing factors*
Competition	Regulation governing operation, size and density of market, income levels, vehicle diversity, access to agricultural markets.
Vehicle diversity	Government policy on promotion, size and density of market, income levels, competition, infrastructure type, access to agricultural markets.
Vehicle utilisation	Operator and mechanic knowledge, competition, regulation governing operation, size and density of market, infrastructure quality, access to agricultural markets.

5. VEHICLE OPERATING COSTS FOR RTS

Ellis (1996) surveyed vehicles used in rural areas in a number of countries in Asia and Africa. Table 4 shows the vehicles for which it was possible to make cross country comparisons. The results clearly demonstrate the differences in VOC's between the Asian countries studied and the African countries. For example, the pickup truck in Ghana has operating costs some 4.5 times the levels in Thailand and 2.8 times those in Pakistan. Similarly the costs of truck operations are up to 10 times higher in Ghana and Zimbabwe than in Pakistan. The same is the case for agricultural vehicles. The costs of tractor operation in Ghana and Zimbabwe is 4.6 times and 2.7 times more expensive respectively than in Pakistan. The cost of power tiller operation in Ghana is around 2.8 times more expensive than in Thailand and Sri Lanka.

Table 4: A comparison of vehicle operating costs (1994 US cents)

	Thailand	Sri Lanka	Pakistan	Ghana	Zimbabwe
Transport Vehicles [cents/t/km]					
Pickup Truck	8.7		13.7	39.0	21.4
Truck [8-11 tonne]			2.1	20.6	
Agricultural Vehicles [cents/hour]	123	320	270	1240	740
Tractor		127		357	
Power Tiller					

Whilst some of the differences here may be due to the quality of the infrastructure it is unlikely that this is a major factor. In Zimbabwe for example, the rural infrastructure is as good, in terms of road roughness, as in Sri Lanka and Pakistan. It is also apparent that VOC's for agricultural vehicles show the same large differences between the African countries and the Asian countries studied. Because of their robust build agricultural vehicles are unlikely to be as affected by road roughness as conventional vehicles. Therefore it is probable that the key to the differences lies in the components that make up a vehicle's total operating costs.

A detailed examination of costing and vehicle performance for freight vehicles also found that Africa was at a substantial disadvantage both because of the higher input costs (of vehicles and fuel) and because of the poorer utilisation of its vehicle fleet compared with Asia and other regions of the World. For example, similar two and three-axle Japanese trucks were found to be three times the price, before tax, in Africa compared with Pakistan and Indonesia. Likewise fuel and tyres were found to be about double the price in Africa compared with Asia. The productivity of vehicles was found to be much higher in Asia. For example, two-axle trucks in Pakistan achieved over three times the tonne kilometres of two-axle vehicles in Tanzania while articulated trucks could achieve about 2.8 times the productivity of similar vehicles in Francophone African countries (Mali, Cote D'Ivoire and Cameroun). In this case higher utilisation was achieved through much

higher annual travel and a much lower degree of empty running. The mean load was less in Pakistan than in the three African countries (Hine et al, 1997). Table 5 shows the difference between the operating cost components of a two-axle truck in Tanzania, Indonesia and Pakistan.

Table 5: Estimated composition of operating costs for two axle trucks (1995 US cents per km)

	Tanzania	Indonesia	Pakistan
Capital costs	10.6	2.7	1.8
Fuel	15.4	5.8	9.3
Crew	2.7	3.2	3.2
Oil	1.0	0.7	1.0
Maintenance	6.1	4.3	2.2
Tyres	7.8	1.2	1.1
Overheads	6.5	1.8	2.4
Total	**50.1**	**19.7**	**21.0**

The rest of this section will examine the background to higher fixed and variable costs in VOC's to gain some insight for the reasons for the large differences between countries.

5.1 Fixed Costs

The three main items which affect fixed costs are the cost of credit, the cost of the vehicle and the level of utilisation. The capital costs of a vehicle and any interest repayments which may result from the purchase of that vehicle must be paid irrespective of whether the vehicle is used or not. The burden of the vehicles annual capital and interest costs, in terms of cost per kilometre for example, will be dependant on the number of kilometres travelled in any given year.

5.1.1 Cost of credit

The cost and/or availability of credit is a major constraint to greater vehicle ownership in rural areas. Interest charges typically account for between 5 and 20 per cent of total annual operating costs. In rural SSA, access to credit facilities for transport purposes is virtually non-existent from the formal, or even informal, banking sector. Where credit is available it is usually associated with targeted donor supported programmes. In these cases the credit is often subsidised, lent to co-operative groups and for a specific purpose such as the purchase of a tractor. The success of these programmes is limited because there is lack of individual responsibility and no penalty for default on the loan.

With regard to rural transport, this is a problem which is particularly relevant for the introduction of IMT's and tractor based technology. While there are many agricultural credit programmes in rural areas, many do not lend for transport vehicles. Closer co-operation between agricultural and transport agencies in this regard could allow resources

from the transport sector to be "piggy backed" onto existing agricultural credit programmes. This would have a number of advantages including a better understanding of potential demand for particular vehicle types, greater access to funds and the reduced targeting of funds. A good model is the Bank of Agriculture and Co-operatives in Thailand which lends for a variety of agricultural/transport machinery, see Box 1. This concept could be expanded to include bicycles and animal carts.

Box 1: The Bank of Agriculture and Co-operatives in Thailand

In the rural areas of Thailand the most important credit organisation is the Bank of Agriculture and Co-operatives (BAAC) which provides loans for agricultural inputs, farm machinery, farm vehicles and longer term agricultural projects such as plantations. Farmers wishing to qualify for a loan must receive their equipment directly from the BAAC who have a department buying machinery in bulk from manufacturers. This has two main advantages. Firstly it means that farmers can buy their machinery cheaper than from conventional retail outlets and have a guarantee that the quality is good. Secondly the BAAC can ensure that the loan is being used for its intended purpose.

The BAAC provide loans at an annual rate of interest of 12 % repayable over 2-10 years. Commercial banks, finance companies and retail outlets charge an annual rate of interest in the range of 20-30 %. The traders charge in the region of 5 % per month. An official from the BAAC will come around every month to collect repayments whereas traders will only collect their money after the harvest.

The BAAC has a novel way of getting around the problem of security for loans. Farmers who do not have deeds to land or other collateral to secure their loan can form groups with other farmers in their village and they all take responsibility for the loan. In this way if the farmer who has applied for the loan defaults on repayments the whole group becomes liable for his debts. This effectively places the borrower under peer pressure to repay and also gives a considerable incentive to the others to make sure he does, even to the point where ultimately they will repay the loan themselves in order that they do not jeopardise their chances of receiving a loan in the future. In this way the loan goes to an individual but the security is provided by the group. The more formal institutions require conventional security for loans and the traders rely on detailed knowledge of the trustworthiness of their clients.

Whether poor access to credit facilities is such a constraint to the greater availability of more conventional vehicles seems more doubtful as there is evidence of over supply of these vehicles in other parts of the transport system. The challenge in this context is persuading the owners of these vehicles to operate in rural areas. Urban based businessmen do not have the same financial constraints to the purchase of vehicles as their rural neighbours and if they can see a good business opportunity they will probably get access to funds.

5.1.2 Cost of vehicle

As already stated vehicle prices in Africa have been found to be higher than in Asia but the precise reasons are not known. Many examples have been found where comparable

new vehicles are two to three times the untaxed price in Africa, compared with Asia. The small market size (i.e. low density of demand) coupled with exclusive dealerships will obviously play a part in keeping import prices high. Tied aid deals, corruption or the influence of government owned companies and parastatals may also be important. A lack of competition in transport markets may also encourage a lax attitude by those who are responsible for buying new vehicles so that they do not demand better terms or seek out new suppliers. High prices are not the exclusive preserve for the transport sector in Africa. It has been noticed that small African markets also pay higher prices for iron and steel imports than larger countries do (Yeats, 1989).

On the primary network in Africa it is relatively common to find expensive and sophisticated vehicles which have, for example, a large number of gears, air conditioning and turbo chargers etc. In contrast, all over Asia the emphasis has been to purchase the most basic vehicle and to modify and strengthen it to meet local needs. On the lowest trafficked roads in Africa many old and often imported second-hand vehicles are used. Inevitably these vehicles will be unreliable and expensive to maintain.

There are a number of ways in which vehicle prices can be kept low and therefore more affordable for rural people. The evidence is that low vehicle prices do feed through into higher demand for the vehicle.

Lower import duties and taxes will make final prices to the consumer much more attractive although has a cost to the state in reduced tax income. Care has to be taken in adopting this type of policy because it can lead to over supply of vehicles or distortions to transport markets as is the case in Pakistan where tractors are used for transport tasks which should be undertaken by trucks. Some examples are given in Box 2.

Box 2: The impact of tax relief on demand for vehicles

Buses in Zambia
Prior to the liberalisation of the Zambian bus industry in 1991 there was an extreme shortage of buses and in some cases passengers would have to queue for days. In 1994 it was decided to suspend duties on imported commercial buses. As a consequence there has been an estimated 75% increase in the commercial bus fleet since 1994. Very quickly a situation of under supply has turned to over supply and now it is the buses which have to wait for days at a time.

Tractors in Pakistan
The People's Tractor Scheme started in October 1994 to enable more farmers to be able to buy tractors. Tractor manufacturers were invited to forward their tractors for testing on the basis that they could supply them for Rs 150,000 and were in the 50hp bracket. Of the tractors forwarded 2 were accepted - the Belarus MTZ50 and Ursus 2812.

The tractors were offered for sale at Rs 150,000, and the government waived all duties which accounted for Rs 80-90,000 per tractor. Credit was offered through commercial banks and the Agricultural Development Bank of Pakistan. The deposit is Rs 20,000 and the rest will be paid at 30.5% over 10 years. Demand far outstripped supply.

While independent commentators have suggested that the scheme was implemented for political reasons as there was no evidence of a shortage in the supply of tractor services, this type of scheme may be beneficial to SSA.

This type of policy is also relevant for IMT's, for example, in Malawi restrictions on import licenses for bicycles led to a cartel of suppliers who increased bicycle prices. The subsequent decline in sales was only stopped when the Transport Planning Unit brought about a policy shift which increased the number of licenses issued (IT Transport, 1996).

Box 3: Local manufacture of power tillers and farm vehicles

There are some 80 factories producing power tillers and farm vehicles in Thailand at the moment and despite fluctuating demand due to variations in producer prices, the success of this industry is set to continue. In both cases the vehicle chassis' are manufactured in the factory, while the rest of the vehicles is made up of second-hand conventional vehicle parts, new conventional vehicle parts and parts that are assembled in the factory. For example, it is now common for the transmission mechanism in the power tiller to be assembled using gears that have been imported from China. The result is a vehicle that is cheap to buy, easy to maintain and easy to find and replace spare parts.

Power tiller specifications

	Thai Manufactured Chassis	*Japanese Manufactured Chassis*
Gear Box	Welded case of mild steel - heavy but easy to repair.	Cast iron case.
Transmission	Sprocket and Chain - cheap and easy to maintain.	A compact gear system.
Clutch	Four teeth at right angles to each other - the wear is greater but they are cheap to make.	Multi-teeth dog clutch.
Brakes	No. Must disengage the transmission to stop.	Yes. Drum brakes.
Power Take Off	No.	Yes.
Gears	1 - 3 gears.	4 gears.
Dimensions WxLxH (mm)	1,080 x 3,250 x 810	1,080 x 3,250 x 810
Engine	8 - 11.5 hp	8 - 11.5 hp
Price - Chassis Engine	B11,000 - B15,000 B23,000 - B29,500	B25,500 B23,000 - B29,500

In addition, the factories provide after sales support so that the farmers have a guarantee for reliability. For example, a power tiller factory in the Sukhothai province provided a 3 year warranty for faulty parts and labour costs. They also had a service vehicle that travelled around the villages providing doorstep service. Their production had increased from 1000 to 2000 units in a year.

Farm vehicle specification

Chassis	Manufactured at the factory from general steel
Rear Axle	From Toyota pickup, brakes are replaced but nothing else is done.
Suspension	New suspension from Izuzu pickup for the rear (very hard) and new suspension from Toyota for the front (softer).
Transmission	From an old Toyota pickup, it is checked over and has new transmission oil.
Electric's	Built up in the factory.
Tyres	Goodyear 6.00 - 14 Nylon 6 ply rating.
Dimensions WxLxH (mm)	1,560 x 2,700-3,500 x 2,160
Engine	8.5-16hp supplied with or without engine
Cost - Chassis Engine	With cab - B66,500 No cab - B40,000 With cab - B86,500 No cab - B60,000

Exchange rate 1993: US$1 = 24.5 Baht

Vehicle prices can also be kept low through local manufacture of vehicles or through the importation of completely knocked down (CKD) vehicles instead of already assembled vehicles. It is through local manufacture that considerable cost savings can be made. Box 3 describes the manufacture of the farm vehicle and power tiller by factories and local workshops in Thailand.

5.1.3 Vehicle utilisation

Levels of vehicle utilisation are extremely important in determining the burden of the vehicles capital costs and interest repayments. Table 6 shows the levels of vehicle utilisation for various modes between countries. There is a significant difference between utilisation in Africa and Asia. For example, surveys found that pickups in Thailand were travelling on average 61,000 kilometres per year compared to 29,000 kilometres in Ghana. The same was the case for tractors. In Zimbabwe and Ghana utilisation levels were around 800 hours per year compared to 1400 hours in Sri Lanka and 1900 hours in Pakistan. There are also similar differences in animal based transport. The ox cart operates for over 4 times the number of hours in Pakistan than in Zimbabwe.

Table 6: Levels of utilisation for various vehicles between countries

	Thailand	Sri Lanka	Pakistan	Zimbabwe	Ghana
Pickup (kms/year)	61,000	–	44,000	–	29,000
Tractor (hours/year)	–	1,440	1,900	750	800
Power Tiller (hours/year)	500	740	–	–	400
Ox Cart (hours/year)	–	875	2,000	400	–
Donkey cart (kms/year)	–	–	4,600	1,600	–

Similar findings have been found from freight studies. For example, the average annual utilisation of two and three-axle trucks in Tanzania was found to be 60,000 kms compared to 80,000 kms for Indonesia (Hine et al, 1997). Annual utilisation for tractor and semi trailers in Pakistan was found to be 123,000 kms compared to 50,000 kms in Francophone Africa. Additionally it was found that the vehicles in Francophone Africa had 34% empty travel compared to only 12% in Pakistan (Rizet and Hine, 1993).

In this context, national networks of transport brokers who can match loads with vehicles can reduce empty running and increase vehicle utilisation. For example, an extensive network of transport brokers in Pakistan has given it one of the most efficient road freight industries in the developing world.

5.2 Variable costs

5.2.1 Maintenance and tyre costs

Ellis (1996) analysed repair and maintenance costs for three different classes of vehicles; pickup, truck and power tiller. The results showed that repair and maintenance costs were

between 5 and 16 times higher in the African countries than for the lowest values found in Asia. These differences point to serious deficiencies in vehicle backup services and routine maintenance.

Routine maintenance is vital for the efficient operation of a vehicle and includes the day to day activities which must be undertaken on a vehicle to arrest the premature wearing of moving parts or failure of components. The activities include checking or changing the engine oil; cleaning or replacing oil, air or fuel filters; maintaining bearings, shock absorbers and springs; tightening up of nuts and bolts; and the general day to day care of a vehicle.

The care with which operators look after their vehicles is obviously going to have a large impact on the total repair bill. This is supported by the data; in general routine maintenance accounts for a much smaller proportion of the total repair and maintenance bill in the African countries studied than in the Asian countries. For example, in Ghana routine maintenance only accounted for 8.6% of total repair and maintenance costs for a power tiller compared with 50% in Thailand.

These results reinforce the impression gained during the surveys that, generally speaking, the Asian operators had far better knowledge of their vehicles and of the importance of routine maintenance in keeping down total repair bills.

Although the analysis did not include the break down of repairs into different types, the surveys did produce anecdotal information to support the idea that the lack of routine maintenance has a large impact on repair costs. For example, it was found that engine overhauls in Ghana were being conducted after only 2-3 years compared with after 5-10 years in Pakistan where routine maintenance is conducted more frequently, and perhaps a little too over-zealously.

Although there may be cultural reasons for poor routine maintenance in Africa, it can also be attributed to an un-competitive operating environment. Competition encourages low cost practices in a range of ways. Because of competition, drivers become aware of all aspects of their vehicle's performance and operating costs. In Pakistan nearly all goods transport drivers are given responsibility to find loads and maintain their vehicles. Most keep detailed accounts of their operating costs. Vehicles travel slowly (average spot running speed is 54 km /h) in order to save fuel and reduce maintenance costs. The engine oil is changed frequently for the same reason. Because of the careful way that vehicles are treated maintenance costs in Pakistan are particularly low. In fact it has been calculated that for most of Pakistan's road network vehicle maintenance costs are less than one fifth of that which would have been predicted by the Highway Design and Maintenance Standards Model, HDMIII. (Hine and Chilver, 1994).

In Pakistan there is also a large network of skilled mechanical workshops that help provide repairs when necessary. Often parts will be made on the spot if they are not readily available. Locally made parts can be used successfully because the vehicles are not stressed by high speeds or unpredictable potholes. By contrast the availability of

skilled mechanics who can repair and make minor alterations to vehicles in Africa is far less which means repair costs are higher and down times longer. Box 4 gives an example of the Kumasi Magazine in Ghana which provides repair facilities for much of Ghana as well as neighbouring countries.

Box 4: The role of GRATIS in Ghanaian transport

GRATIS (Ghana Regional Appropriate Technology Industrial Services) was established to disseminate information and provide training for vehicle mechanics around the country. The scheme started in the Kumasi Magazine where 60,000 artisans have grouped together to provide vehicle backup services. Each artisan specialises in anything from the manufacture of nuts and bolts to full engine rebuilds. The Kumasi Magazine is not just the centre for vehicle services in Ghana but also for neighbouring countries such as Togo and Cote D'Ivoire.

Kumasi University set up an Intermediate Technology Transfer Unit (ITTU) at the magazine in order to exploit and develop the skills already available there. Second-hand machine tools were provided to the most entrepreneurial artisans and training courses conducted on their use and in vehicle servicing in general. GRATIS was formed to take the concept of ITTU's to all regional centres in Ghana and eventually into rural areas as well. The ITTU at Kumasi now provides training and advice to the other centres.

This sort of scheme is essential in order to provide the skills and basic manufacturing capability that will keep Ghana's vehicle fleet on the road and running smoothly.

In Africa it has been found that drivers are far less aware of their operating costs or the maintenance requirements of their vehicles. Where the driver is employed by a large company, or urban based businessman, he will in general be given very little responsibility for finding loads or maintaining the vehicle. If a breakdown occurs his main job will be to telephone base and wait for a repair truck. Vehicle speeds are much higher in Africa, (typical speeds in East Africa are around 70 to 80 km/h), even on very rough roads where the potential damage will be correspondingly greater.

Tyres can also represent a significant component in total operating costs of a vehicle, up to 15-20% in the case of tractors and trucks. However, it is unlikely that operating practice has a significant impact on tyre costs. Of greater importance is taxation and whether they can be manufactured locally.

5.2.2 Labour costs

Labour costs in SSA, in terms of crew wages and labour required for loading, constitute a small proportion of total VOC’s when conventional motorised vehicles are being considered. For this reason there is little point in paying too much attention to interventions which may reduce the labour burden. However, it is worth noting that the issue of labour costs is critically important in determining the viability of alternative modes of transport.

Where labour costs are low, as is the case in much of rural SSA, there may be a case for substituting labour for mechanised equipment. Where this is considered it is assumed that a labour intensive transport device which is slow and has a small payload, will be cheaper, because labour costs are low, than a mechanised transport device which is fast and has a large payload. This "substitution effect" can be considered when comparing vehicles such as tractors and animal drawn carts in their transport and agricultural activities.

5.2.3 Cost of fuel and lubricants

The cost of fuel represents a significant component in total VOC's, between 10 and 40% for conventional motorised vehicles. It is also the cost which vehicle operators are most sensitive to because they have to fill-up on a daily basis. As such, a rise in fuel prices is often the trigger for a rise in transport charges. When fuel levies and taxes are set, it is important to consider that any subsequent change in the final price of fuel will have an immediate effect on the cost of transport to the consumer, particularly in remote rural areas.

The price of fuel, net of tax, is not uniform around the world. The evidence suggests that African countries pay very much more for fuel than comparable Asian countries. Clearly the costs of distributing fuel are higher when volumes are small, there is often a lack of competition in the provision of fuel because government parastatals are the sole distributors. The large oil companies often act only as retailers.

Although some countries try to adopt uniform pricing across the country, it has been found in some countries that there can be large differences in fuel prices between urban and rural areas. For example in Zambia fuel prices in rural districts can be up to 20% higher than in Lusaka.

6. TRANSPORT OPERATING ENVIRONMENT FOR RTS

The previous section dealt with the issues surrounding the component costs of VOC's. These issues are quantifiable in that reductions in the price of vehicles or spare parts, whether through reduced taxes or local manufacture for example, will show in a corresponding fall in VOC's. What is less certain, but potentially more important, is the impact that the operating environment in which RTS are undertaken has on transport costs. Factors such as competition, regulation, infrastructure, vehicle choice, markets and the density of demand have already been discussed but in this section the inter-relationships between these factors will be dealt with as well as their influence on transport charges and service frequency.

6.1 Density of demand

The factor that underpins all the aspects in this section is the size and density of the market for transport. The greater the size and density of demand, the greater range of loads, distances, route patterns and types of vehicle service. In this variable environment there is a greater possibility to sustain a competitive transport system that will encourage a wide range of vehicle types.

Asian transport is very competitive, low cost, has a high service frequency and, for short distance rural movements is diversified. In contrast African transport, is un-competitive, high cost and rural transport appears to be undiversified. The one critical difference between the Asian and African countries is density of demand. Undoubtedly a high density of demand in Asia has helped to provide a competitive operating environment, high utilisation, high service frequency and, for rural transport a diverse range of vehicle types.

The major reason for a low density of demand in the African context is a low population density. For example, Sri Lanka has a population density of 263 per sq. km, Pakistan is 150 per sq. km compared to only 66 per sq. km in Ghana, 27 per sq. km in Zimbabwe and 12 per sq. km in Zambia. Therefore in any given area in SSA there are less people requiring vehicles to transport themselves, agricultural produce, building materials and household goods.

The problem for RTS of low population densities in Africa is compounded by the nature of farming systems in Africa which tend to be low input, low output. This is because there are not the land pressures in Africa to force an intensive farming system. With an intensive farming system there is the need to provide more fertiliser, insecticide and other inputs for land preparation, irrigation and animal husbandry. The harvest yield is greater as are any by-products. Again, the greater number of inputs and outputs to the farming system the wider is the scope for specialisation and market agriculture and hence the greater is the demand for transport.

6.2 Provision of physical infrastructure

Despite disappointing results from the provision of rural infrastructure, the quality and planning of roads, tracks and paths play an important role in determining the costs and frequency of vehicle operation. The following sub-sections put a vehicle operator's slant on the need for infrastructure.

6.2.1 Interconnectivity of routes - redundancy is not redundant

Where more than the minimum number of links and length of road are present on a road network, the network is said to exhibit redundancy. In providing accessibility to remote rural communities road engineers and planners often attempt to minimise their costs by avoiding redundancy. One result of this is that many rural feeder road networks are characterised by dead-end routes. The end of the route may occur at a town or village or at a natural obstacle such as a river or mountain. Sometimes these dead-end routes may exceed 100 kms. From the transport operator's point of view a major problem with these routes is they pose a higher risk in terms of load factors and revenues and may also involve more costs should a breakdown occur. Another disadvantage is that should the road become impassable, the rural community will become isolated from vehicle traffic.

Where there is an inter-connectivity of routes potential demand for transport services can be maximised. There is less chance of poor load factors and rural communities can respond to a wider range of market opportunities. With through routes traffic volumes will increase both because of greater demand and because operators can travel a route "on spec" with a reduced risk of an empty return journey. With a greater number of transport operators using a route there is then a chance of competition to become established in the provision of transport services.

6.2.2 The need for basic access

In the past much emphasis has been put upon building feeder roads as a way of helping the rural poor and of encouraging agricultural production. However upgrading relatively short sections of track to gravel surface standard are unlikely to induce significant reductions in the total costs of bringing produce to a major market. Most transport to such markets takes place on major and secondary roads. For example, in Ghana it was estimated that upgrading 5 km of earth roads to gravel standard would (if all the savings were transferred to the farmer) increase farm gate prices by about 0.1%. In contrast bringing motorised transport 5 km nearer to a village (where the alternative was head loading) would have an effect of raising farm gate prices by about 11 %.

The reason for this difference is that the likely reduction in VOC's from improving an earth track is in the region of 25 per cent whereas the costs of head loading was (in the case of Ghana) about 30 times more expensive than transport by a 3 tonne lorry. Hence the effect of upgrading a footpath to a motorised track is over a hundred times greater than that of upgrading the same length of earth track to a gravel standard road.

Because of the wide difference in carrying capacity and productivity between different modes of transport an infrastructure improvement which induces a change of mode (e.g. from head loading, pack animals or bullock carts to transport by truck) is likely to have a much larger impact on transport costs than any impact of reducing VOC's from improving road surfaces.

The results of this analysis indicate the importance of basic (motorised) vehicle access, the quality of that access, in terms of road roughness is very much a secondary consideration.

6.2.3 Seasonal traffickability

The nature of seasonal impassability on rural infrastructure has also been misunderstood. Although in some areas of SSA long periods of impassability do occur in areas such as on the flood plains of major rivers. More usually roads are closed for short periods, a few days or a few hours at a time, followed by longer periods of reduced traffickability. Research into seasonal impassability in Tanzania found that complete road closure was rare but that on poor quality roads seasonal traffickability (defined as wet season traffic as a percentage of dry season traffic) dropped to 35%. In addition, it was found that the movement of pedestrians and other non-motorised means of transport actually increased during the wet season presumably because of the poor availability of conventional motorised vehicles (Ellis, 1997c).

The major issue appears to be the accumulation of road sections where the going gets difficult, but not impossible. Here some operators are reluctant to take the risk of getting bogged down or encountering very long delays and there is an imperfect market mechanism to compensate the operator for this extra risk. However, in many areas higher fares are charged during the wet season as outlined in Section 2.2.

6.2.4 Appropriate standards

On most rural roads (outside of the primary and secondary network) traffic volumes are below 50 motorised vehicles per day and on many are below 10 vehicles per day. With such low traffic volumes, the need is for maintaining vehicle access and traffickability through the year. Initially the width and geometric design of the road should be appropriate to the volumes of traffic. In some countries large sums of money have been wasted in building roads to high geometric standards with excessive carriageway widths for these low volumes of traffic. It is sometimes argued that roads need to be wide to allow vehicles passing room and to avoid accidents. A road with a daily traffic volume of 10 will have 0.05 conflicts per day per km assuming a speed of 40 km/h and this will increase to 1.3 conflicts per day per km if the daily traffic volume is 50. It is clear from these simple calculations that, particularly for the very low volume roads, a single lane road is all that is required i.e. with a running width of 3.5 metres, with some provision for passing.

It is becoming increasingly expensive to maintain, and periodically replace, a gravel running surface for two reasons. Firstly, many good sources of gravel have already been used and secondly there is increasing resistance from farmers to allow their land to be used for gravel extraction. In most cases, it is unnecessary to provide a full gravel road to maintain basic access and good traffickability. Where access is threatened a programme of spot improvements are, by far, the most cost effective solution. In most situations problems occur over relatively short road lengths of between 10 and 250 metres in places where drainage becomes a critical factor, in total these road sections do not normally exceed about 10% of the road length. Road failure is most likely to occur on steep hills, sags in the road and in low lying flat areas. Solutions may include spot drainage works such as simple culverts, drifts, and other structures, side drains and road camber. The running surface may also be improved by the addition of stones, boulders or gravel. Spot improvements should be properly engineered to provide a cost effective solution which can last many years. It may be possible to use locally available timber to provide drainage structures such as culverts and bridges.

It is vitally important that even low trafficked roads are properly maintained. For example, a low cost labour intensive maintenance regime such as the lengthman system can help maintain the traffickability. This may be supplemented by tractor-based technologies and a capacity for spot improvements such as in the new Kenyan “Roads 2000” approach which represents a very cost effective solution.

It is also important to consider that, in terms of distance, most rural transport journeys are made on the primary and secondary road network and that efforts to rural roads should not ignore the importance of maintaining this network to a reasonable standard. There is evidence that a number of donor sponsored programmes designed to help the rural poor have resulted in very high standard feeder roads leading onto important secondary and primary roads that are in complete state of disrepair. Hence it may be argued that the donor programmes have contributed to a misallocation of resources.

In addition, it is always important to assess alternative solutions to access problems. In this context access may best be provided by ensuring basic access in conjunction with modern communications devices to maintain regular contact with the outside world.

6.3 Agricultural markets and marketing

In Section 2.4 the importance of an efficient and competitive marketing system was stressed as a complement to RTS and infrastructure in promoting development. However, the presence of markets in themselves also constitute a means by which the effective demand for transport can be increased. A market acts as a point where goods and people are amalgamated together and thereby concentrating the demand for transport. Where populations are dispersed markets are also likely to be dispersed with long average distances to market and people less likely to make the trip. This is an important consideration for the demand for IMT’s where, if distances become too large, an IMT can become unviable.

In addition, one of the most effective ways that farmers have of getting the best price for their produce is for them to sell it themselves directly to final consumers at rural or urban markets, and thus bypass the normal marketing system. Although farmers do not have the economies of scale of travelling wholesalers it is often recognised by urban dwellers that the keenest prices are often provided by the farmers. Farmers bringing their own produce to market represent a very important way of limiting the power of the marketing cartels. However there is usually little support by the authorities for this type of 'unofficial' trading and farmers are frequently harassed as they attempt to sell. As far as possible facilities should be provided at urban markets, at minimum cost, so that farmers can sell their own produce without being disadvantaged or harassed in the process.

Whether farmers rely on travelling wholesalers, traders, parastatals or large private marketing companies they all reduce the farmers bargaining power, and critically, it reduces demand for transport services and the supply of vehicles available for rural people. Box 5 gives some different examples of marketing structures in SSA and Honduras. It can be seen that the system in Mali lends itself to RTS whereas in Zambia and Malawi the demand for transport is very much more seasonal.

Box 5: Rural markets

Mali

A good example of where rural markets work well is in Mali. Rural transport in Mali is centred around weekly markets. In a given area there will be a village or town which has a market on every day of the week. Each market serves a group of villages who visit this market on the given day of the week. Rural communities are generally within 30 kms of their nearest market and they transport themselves and their goods by IMT's and headloading (rural Mali has many IMT's including donkey carts, ox carts and bicycles). Where motorised vehicle services exist villagers use these depending on the distance, quantity of goods they have and the quality of the roads. Therefore most rural communities only see motorised services on one day per week; on this one day there may be more than one vehicle that visits the village depending on demand.

The traders use the motorised services to travel between the different markets on different days of the week buying the produce. The daily markets maybe upto 50 kms apart. In this way the rural transport system works quite effectively. The abundance of markets means that goods can be easily amalgamated for transport by motorised services. The relative proximity of the markets makes IMT's a viable proposition for transport from village to market.

Malawi

The marketing of agricultural products in Malawi has been dominated by the state owned Agricultural Development Marketing Corporation (ADMARC). They buy agricultural produce from farmers at the rates they publish at the beginning of the season, and then transport, store and eventually sell it to both rural and urban buyers. ADMARC is still the largest company in this business but since liberalisation there are new private sector actors competing. ADMARC has the biggest national network of centers, depots and markets, and between April and November they operate 1300 small seasonal markets. ADMARC has no vehicles on its own but contract most of their activities to local transporting companies (Ternell, 1998).

Zambia

The marketing of agricultural produce in Zambia has historically been dominated by the parastatal marketing boards which organised the collection of agricultural produce and paid the farmers a government agreed rate. In the liberalised economy post 1991, the market was left to take over and as a result many agricultural marketing companies have formed which have taken over many of the roles of the parastatals. These companies have formed collection points for produce. In some instances the farmers bring their produce to these collection points and in others the companies send large trucks to pick up directly from the farm. However, these collection points are little more than storage areas. Formal rural markets are scarce, distant and usually concentrated at district centres. For example in the high poverty districts of Eastern and Northern Provinces the average distance to markets is nearly 40 kms.

Honduras

In the Guinope Municipality of Honduras the nearest market was Tegucigalpa the capital city 60 kms from the district. Although there was widespread use of animal transport in the area, the capital was out of reach to most rural people. As a result they were reliant on the traders or "Coyotes" for the sale of their produce and for hire of vehicle services. The communities felt they were being exploited and set up mobile markets which met periodically and were advertised on the radio. In this way markets were set up within reach of IMT's and allowed direct contact between the farmers and buyers.

6.4 Institutional issues in the provision of RTS

The major institutional issues that are dealt with in this section are with regard to regulation and control of RTS and the organisations which promote RTS at a national and district level. The institutions involved in the regulation of RTS include government organisations, private sector transport associations and informal groupings. The institutions involved in the promotion of RTS are less easily defined but may include the ministries of transport and other planning ministries, district councils, community groups, NGO's, agricultural extension offices, highway authorities, roads boards and donors.

6.4.1 Regulation and the provision of RTS

Although state ownership of urban and inter-urban bus services has been common, in the more remote parts of rural Africa passenger transport has been very largely provided by private operators. In recent years the trend has been to continue to reduce the level government ownership of all forms of road based public transport. However, as already stated in Section 3.2.2 , much of the control for RTS has been taken over by transport associations, unions and informal cartels. Operators are required to stick to published fares and operate on certain routes. As the examples in Box 6 show these practises tend to keep prices high and vehicle utilisation low.

As already stated the interaction between the provision of rural transport services and inter-urban and urban services are fundamentally connected. Rural services are often provided by urban based traders, bus companies, government parastatals or transport associations. In addition, the final destination for the majority of rural journeys, which are undertaken outside the village, are urban centres. In this context the activity in the urban and inter-urban bus sector has a significant impact on the provision of rural bus services. Therefore any interventions to increase the competitiveness of RTS must start with urban based organisations. There are also lessons to be learnt from attempts to liberalise the market for urban bus services which may be of use in a rural context, see Box 7 for a few examples.

Within the urban public transport sector the trend towards liberalisation has been to reduce constraints for potential entrants into the sector and make the sector 'more responsive' to the market. Liberalisation does not necessarily entail the total abolition of regulations and controls but can help to harness competitive forces to provide effective and extensive market orientated services within a measure of "quantity" and "quality" controls.

"Quantity controls" entail limiting the number of vehicles and operators allowed to operate on routes and throughout the network so as to avoid excess passenger capacity. Without such constraints, operators tend to compete only on the most lucrative and heavily trafficked routes. On these routes this can lead to the wasteful duplication of services, congestion and excessive fuel consumption to the detriment of the national economy.

Box 6: Examples of control by transport associations/unions over RTS in SSA

Ghana

In Ghana a more informal control of transport services has been provided by the Ghana Private Road Transport Union (GPRTU). Vehicles are registered by the GPRTU for a particular route, the fee is dependent on the perceived route profitability. The GPRTU controls 80 % of the lorry parks, passenger and goods fares are fixed and the vehicle must wait its turn in the line. Reports of vehicles waiting for one to two weeks are not uncommon. The GPRTU collects 5 to 10% of the fare and a park entrance fee; it also collects 3% income tax on behalf of the Internal Revenue Service. It is reported that loads acquired outside of the lorry parks are also obliged to pay the GPRTU commission and income tax (Delaquis, 1993).

Zambia

Although the market for transport services is liberalised as far as the government is concerned, in reality the market for passenger transport is regulated by the United Transport and Taxi Association (UTTA). The UTTA sets fares, ratified by government, which all their members must abide by. Members also have to register for routes and are forced to wait their turn to load. The result is that buses will wait many days, sometimes in excess of a week, to load their vehicle. When they do load they overload to ensure that they maximise their revenues.

UTTA members operate on urban, inter-urban and the more major rural routes. An organisation called the Transport and Public Association of Zambia (TPAZ) was set up to represent the interests of small scale rural operators. Where TPAZ members operated on the same routes as UTTA members they charged the same as the UTTA fares list. Where TPAZ were the only operators the association would publish separate fare levels to which their members would have to adhere. In addition there are also private or “pirate” operators who decide on fares among themselves. However, in all cases a policy of queuing for loads is adhered to.

Mali

Since 1992 there has been a liberal transport market in Mali and therefore no government regulation over routes and fares. Immediately after liberalisation there was a significant reduction in transport costs in the country. An example from the petroleum industry was that the price per tonne kilometre dropped from FCFA 32-35 before liberalisation to FCFA 16 after liberalisation. However, it was felt that transport services were being “dumped”, i.e. freight rates were below long run operating costs, which was leading to the demise of a number of vehicle operators in the country.

To stop this perceived demise the transport unions stepped in to publish voluntary minimum and maximum prices for all road sector transport. These prices were based on the previously used government figures and the practice continues today. There are four main unions (or Syndicates) which appear to represent the interests of virtually all inter-urban and rural transport operators.

The union system requires that operators use truck parks where they must wait for loads on a first come, first served basis. This can mean that operators will wait for many days to secure a load. This problem is particularly acute in Bamako but can also be seen in many rural markets around the country. To become a member of a union requires a joining fee (FCFA 10,000 every 3 years), an annual membership fee (FCFA 2,000 every year) a small daily fee to use the lorry park (~FCFA 500 per day) and a fee for each trip made (~FCFA 500-1000 depending on trip and size of vehicle).

Box 7: Examples Of Urban Public Transport in Africa

Accra, Ghana

In Accra members of the Ghana Private Road Transport Union (GPRTU) provide up to 90% of bus services and has wide powers of control over bus terminals. Because buses do not operate according to service frequencies or schedules, passengers have to wait for the bus to fill up before leaving the terminal, and passengers waiting at intermediate route points are rarely provided for. Hence many would be passengers forsake the bus and travel at greater expense by shared taxi.

Nairobi, Kenya.

In Nairobi public transport is provided by the private sector comprising conventional buses operated by a franchised bus company, Stagecoach Kenya Bus, a Government owned service (Nyayo Bus) and a large paratransit fleet of small buses and converted pickups, called matatus. Under its franchise Stagecoach determines routes, fares and schedules without reference to any regulatory authority. It provides a higher level of comfort than offered by the matatu and is profitable without any level of subsidy being provided. It has around 45% of the market compared with the matatu's 55%. However, the latter is provided by approximately 2500 vehicles as opposed to 315 Stagecoach buses. Matatus provide a basic and inexpensive form of transport but have been the object of persistent public criticism and are viewed as unruly and hazardous. Despite subsidies the Government bus service has largely disappeared from operating in Nairobi.

Harare, Zimbabwe

Prior to liberalisation there was insufficient investment in vehicles to keep pace with growing demand and so long passenger queues and waiting times became increasingly evident. In August 1993 the sector was liberalised with the private sector allowed to provide stage bus services using vehicles (known locally as commuter omnibuses) with a capacity of more than 7 passengers. Operators had to obtain a licence to provide services on routes but there was no control on the numbers allowed on any route and the number of commuter omnibuses increased dramatically so that by 1996 they accounted for 56% of the passenger market. Overall, the introduction of liberalisation in the sector has ensured high frequency services for passengers with reductions in waiting times and queues during peak travel times. However fare levels were not reduced with liberalisation and, on occasion, they were increased when operator route cutting occurred (Maunder and Mbara, 1995).

Dar es Salaam, Tanzania

In Dar es Salaam public transport services are presently provided by a parastatal (UDA) and privately owned and operated buses called Dala Dalas. UDA was unable to cope with passenger demand during the 1980's and so contracted out routes to Dala Dala operators who paid UDA a monthly permit fee to operate the route. UDA managed the system and agreed the number of Dala Dala's allowed to operate so that an adequate service was provided to a scheduled timetable. UDA operated at least one bus on each route to ensure a basic level of service was provided especially during early mornings and late at night when Dala Dala's were less evident. In time UDA lost the management control and Dala Dala's were licensed without any regulation or control over the numbers licensed to operate or on which routes. Gradually Dala Dala's provided the majority of services and at the present time there are approximately 3500 licensed to operate compared to only 70 UDA buses . As a consequence UDA now serves less than 10% of the public transport market and operates very few routes.

Many countries recognise that "quality licensing" is also required even in a liberalised environment so that passengers are afforded a measure of safety protection. This is to prevent overloaded unroadworthy vehicles, often in a poor mechanical state, from

transporting passengers. In addition licensing is a way to ensure that operators have adequate passenger insurance protection.

In contrast to the urban situation the main issue for rural public transport is how to increase service frequency. In most cases it seems unlikely that "quantity controls" would do much to alleviate this problem. The imposition of more stringent "quality licensing" may have an effect of improving vehicle safety however this could well be purchased at the expense of service frequency or higher fares. Union control over RTS does to some extent impose quantity controls because their activities restrict routes that vehicles can travel and artificially restrict supply on all routes by enforcing a policy of queuing for passengers/loads. The consequence of this policy is an infrequent but overloaded service which often prevents vehicles stopping along the way to pick up passengers.

Similar evidence is found in the market for freight transport. Guira (1989) made international comparisons of the trucking industry using data from Argentina, Brazil, Thailand, Chile, Kenya, Paraguay, Korea, Bolivia, Peru, Uruguay, Turkey and Portugal. Overall it was found that countries where freight transport were highly regulated with substantial entry controls, route licensing and price controls the average annual distance driven was low (e.g. Korea, 33,000 km, Bolivia 45,000 km and Portugal 31,000 km). In contrast where freight transport services are not so regulated the average figures were much higher (e.g. Argentina, 91,000 km, Thailand, 53,000 km, Chile, 60,000 km, Paraguay, 70,000 km). However in Brazil (not regulated) the average was only 48,000 km.

6.4.2 Institutional responsibility for RTS

It is sometimes difficult to determine the organisation which takes responsibility for the provision of RTS. Typically it should be the Ministry of Transport through the Road Traffic commissioner who tries to ensure that services are provided efficiently, regularly and at a price the rural communities can afford. To some extent this may have been the case in the past with extensive control over public transport services which determined fare levels, routes and service frequency. At present there is a growing push towards deregulation and allowing the market to respond to rural demand.

The problem is that the market in rural areas does not always work well. The previous section demonstrated some of the distortions in service provision that have developed since the transport associations and transport unions have assumed the roles previously undertaken by government. However, there are other institutional reasons why market failure occurs in rural areas. In areas of low demand there is insufficient market information flowing between operators and transport users about price and demand. Because rural communities are small and dispersed they are also not effective in applying pressure to operators or transport organisations where they feel service is inadequate or too expensive. In addition rural people have insufficient information to make effective choices on vehicles that can be effectively operated in the rural environment.

These problems also apply to the provision of rural transport infrastructure, Malmberg-Calvo (1997) stresses the need for the participation of a wide range of stakeholders. These include rural people, community groups, farmers' associations, transport associations, local and central government as well as NGO's and donors. An integrated approach to rural transport development can be obtained by encouraging these stakeholders to consider RTS in conjunction with infrastructure considerations.

While little work has been done on this area of RTS it is clear that local level institutions need to represent the interests of rural dwellers and to provide information on vehicle technologies that may be available to them. Surveys carried out in Asia suggest that the role of agricultural extension agencies is instrumental in providing knowledge and training in new technologies to rural communities and communicating back to urban based policy makers, manufacturers and vehicle importers the needs of rural people. While agricultural extension agencies are primarily set up to promote agriculture, many of the technologies which they use are multi-purpose in that they are just as useful for transport. Examples include the use of animals and carts, tractors and trailers and power tillers and trailers.

In SSA, as in Asia, the network of agricultural extension offices has responsibility which extends down to the village level. Very often extension officials visit individual villages on a regular basis and have detailed knowledge of the problems faced. However, these extension officials are very often under resourced and under utilised. As transport and agricultural matters are so inter-related it is possible that extension officials could also take responsibility for transport issues. In so doing the extension service could provide the voice of the rural people both at the national and local level as well as providing advice on appropriate vehicles for transport as well as agricultural purposes.

Governments and donors must also take responsibility for RTS when investing in rural roads programmes. This can primarily be done by being aware that new construction or rehabilitation works do not necessarily go hand in hand with an increase in service provision. Targets need to be set on the frequency and cost of service following investments in the roads sector. The targets should be quantified and a strategy developed to ensure that these targets are met. In Zambia, for example, one of the objectives of the Roads Sector Investment Programme (ROADSIP) is to provide "an enabling environment for improved road transport services and increasing the truck and bus fleet by at least 20% in rural areas". Unfortunately, the underlying assumption was that the target would be achieved by improving the quality of the infrastructure. No strategy was developed for improving the efficiency, frequency and cost of service of the existing fleet of vehicles.

As already stated transport unions and association can introduce un-competitive practices to RTS, however, there is a role for these organisations in promoting the interests of rural transport operators and travellers. An example is the Transport and Public Association of Zambia (TPAZ) which was formed to serve the needs of rural travellers in Zambia. TPAZ drew its members from private operators of 1-10 tonne trucks who predominantly operated from provisional and district centres to rural areas. TPAZ encouraged its members to put seats and canopies at the back of the truck to increase passenger comfort

and safety. They also tried to import 1300 pickup trucks, duty free, from South Africa. They managed to have the duty on the vehicles waived by government and they charged their members a fee as a down payment for each vehicle. The remainder would be paid on a loan repayment basis through the importing garage.

Unfortunately, only about 12 vehicles entered the country, many members lost their money and people have been left feeling that they have been duped. Now operators have lost confidence in TPAZ although many are still following the rates set by TPAZ. Despite this the concept behind TPAZ deserves further consideration perhaps with some refinements.

6.5 Vehicle Choice

The main objective of this report is to examine transport services to meet the needs of longer distance travel which are external to the village. By its very nature this type of travel will predominantly be undertaken by motor vehicle, although there is plenty of evidence to suggest that headloading and IMT's are also used over long distances. However, 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.

Research to date shows that vehicle diversity in much of SSA 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.

Deciding on the vehicle which is most likely to minimise total operating costs requires an understanding of the environment in which the vehicle will be expected to operate. There are certain characteristics of rural transport in SSA:

- 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 always be low

Figure 3 and 4 show VOC data for a range of vehicle types from a bicycle to a truck. The VOC data used is from Thailand and Sri Lanka, in 1994 prices, no account is taken for road roughness and a 50% utilisation level is assumed. Some of the vehicles shown in the

figures are already used, to a greater or lesser extent, in parts of SSA 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 SSA it does provide an indication as to the relative merits of different vehicle classes.

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.

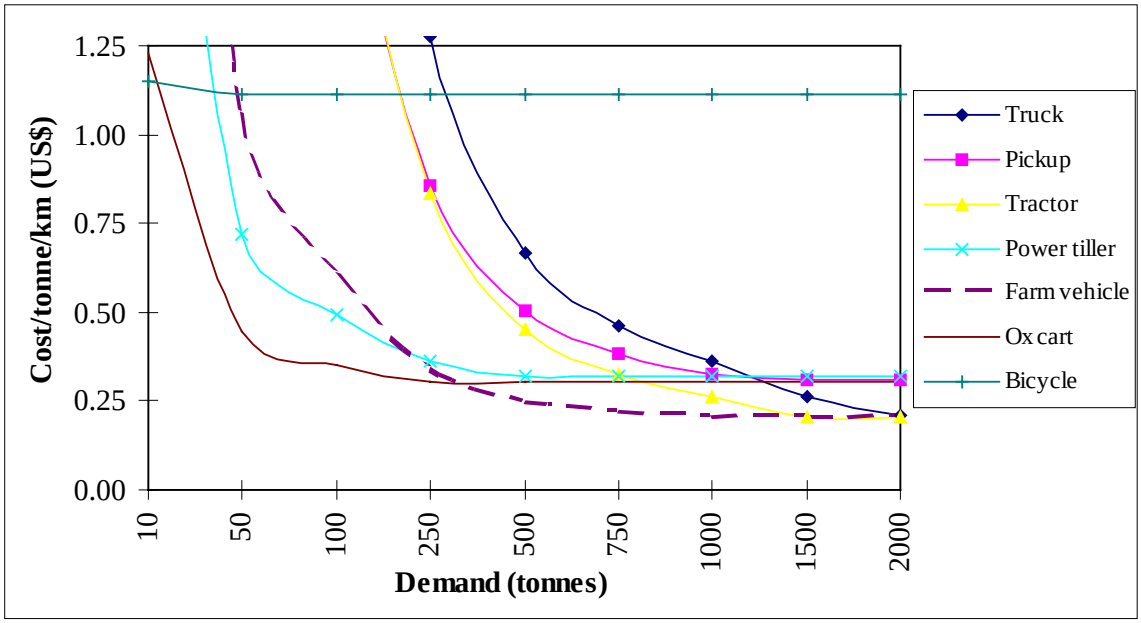
In determining vehicle choice every effort should be made to assess likely demand. Many of the vehicles suitable for use in rural areas are multi-purpose in that they can be used for goods and passenger transport and agricultural preparation. In order to determine the total demand in tonnes certain crude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

6.5.1 Bicycle and motorcycle technology

Figure 3 shows that the bicycle has the lowest operating costs only at short distances and where demand is low. However, the transport of small loads over short distances is the principal characteristic of rural transport movements. In addition, much rural transport takes place away from the formal road network on informal paths and tracks. These factors go a long way in explaining the rapid increase in bicycle ownership across Africa, together with the fact that it is the most affordable means of transport for most rural households.

Figure 3: Vehicle operating costs assuming a 10 km distance and varying levels of demand



The load capacity of a bicycle can be increased by attaching a trailer or where it is used as a rickshaw. For similar loads motorcycle technology can also be considered either when a trailer or sidecar is attached or when the vehicle is designed to have a payload area on the front or back. These types of technologies are very rarely seen in SSA although they are in widespread use in parts of Asia.

6.5.2 Animal transport

Figure 3 shows that the ox cart remains the lowest cost option over a 10 km distance until the demand reaches about 250 tonnes per year. In Figure 4 it remains the lowest cost option until about 50 tonnes per year. The ox cart has the advantage that it can also be used for agricultural preparation and can therefore maintain relatively high utilisation levels. Although the ox cart is slow it can use most types of infrastructure, maintenance costs are low and the cart is simple to repair. Disadvantages include a limited range and the need to find food for the animal having reached the final destination.

While the ox cart is one of the more common modes of animal transport there are many other animals which can be considered. These include donkeys, mules, horses, camels and even elephants. These animals can be used in conjunction with a cart or as pack animals. Horses maybe considered where speed is important, pack donkeys for poor quality mountain paths and a camel and cart for high load capacity, road transport.

6.5.3 The farm vehicle

The manufacture of the farm vehicle is described in Box 3 as a cost effective alternative to the pickup. The vehicle is roughly a third to a quarter of the cost of a conventional

pickup, a similar load capacity, is very simple to repair and maintain and suitable for local manufacture. As such the vehicles operating costs are lower than other conventional vehicles over a wide range of distances and loads. While it is very difficult to find successful examples of “made to measure” vehicles or “indigenously manufactured” vehicles being transferred from either a research environment or host country to another country, the performance of the farm vehicle and its apparent suitability for use in SSA does make it worthy of serious consideration.

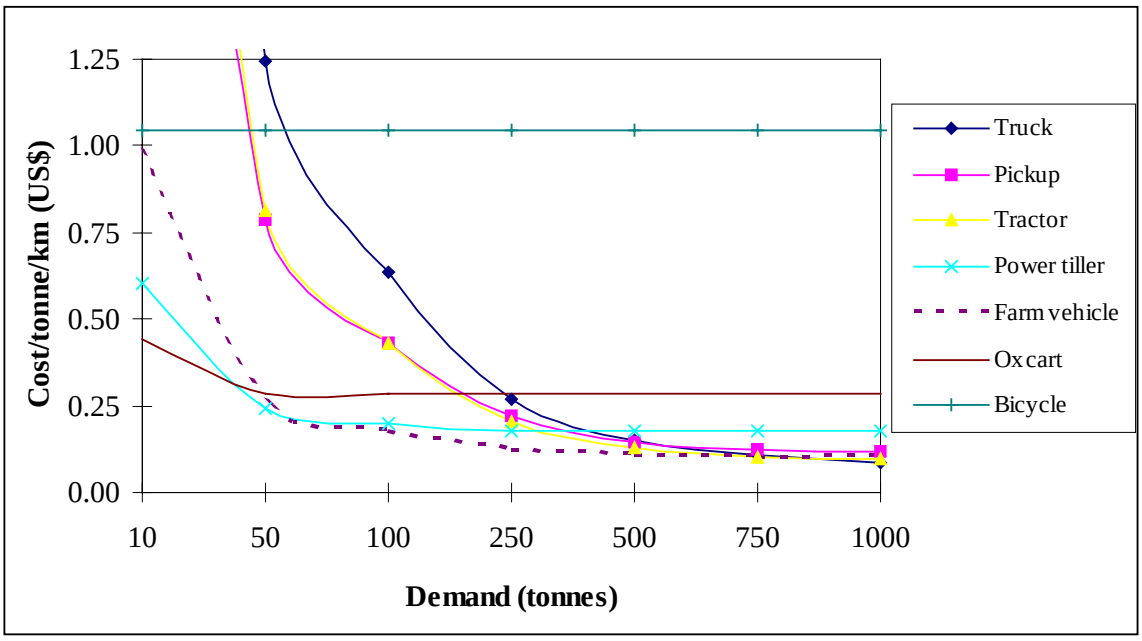
6.5.4 Tractor based technologies

Tractor based technology is often forgotten as a means of rural transport, associated instead for its role in agricultural preparation or as a vehicle for haulage in labour intensive road works. However, the evidence from many countries is that the tractor is used for rural transport tasks, sometimes upto 100%, and that these tasks are often the most profitable for the operators. One of the major constraints to conventional vehicles in SSA is the inability of the operators to maintain high utilisation throughout the year because of the seasonal nature of demand. This is where the tractor has a big advantage because there are a number of activities in which they can engage including agricultural preparation, transport tasks and haulage as part of road construction and maintenance works.

The quality of infrastructure is not a constraint to tractor operations, the technology is relatively simple and the load capacity is high. A study in Malawi found that a tractor and two trailers could be operated more cheaply than a conventional truck over distances of upto 40 kms (Cheesman, 1990). On poor quality roads speed is not an issue and the provision of a second trailer means that the second trailer can be loaded as the first is being transported.

Another vehicle which performs well over both 10 and 50 kms is the power tiller and trailer. This vehicle has often been discounted for use in SSA because of its poor performance with ploughing in hard soils. However, in irrigated areas or in areas of high rainfall it is possible to maintain high levels of utilisation with these vehicles. The power tiller is truly multi-purpose, it can be used for ploughing, transport, pumping water, threshing and electricity generation. At lower levels of demand the power tiller is much cheaper than the tractor because of its lower capital costs. It provides the ideal step between draught animal power and conventional tractors.

Figure 4: Vehicle operating costs assuming a 50 km distance and varying levels of demand



6.5.5 The pickup truck and similar utility vehicles

The pickup truck with load capacity of one tonne and ability to carry a dozen passengers in comfort and many more if necessary is an extremely versatile vehicle for rural transport. Its versatility allows high utilisation through the year on a variety of infrastructure. The size and speed of the pickup makes it an ideal vehicle for servicing the transport needs of small and dispersed communities. In Pakistan which has very high vehicle diversity, the pickup is the predominant means of transport in less densely populated areas. As shown in Figure 4 the pickup truck quickly becomes cheaper than non-motorised means of transport as distances increase. The pickup truck can easily be converted for passenger carrying work by installing benches in the load carrying bay and by attaching a canopy. If a roof rack is also attached this allows the easy carrying of goods and passengers.

As well as pickup trucks there are other similar vehicles such as Jeeps, Land Rovers and small trucks which all perform similar tasks and have similar advantages. The mini-bus in particular is a vehicle which is being increasingly used for rural transport where roads are in fairly good condition.

6.5.6 Large trucks and buses

Large trucks and buses are generally not as viable for rural transport as smaller vehicles. This is because demand is dispersed making it difficult to attain a reasonable load factor. Trucks in particular have very seasonal demand in rural areas i.e. mainly at harvest time and during the application of seeds, fertiliser and insecticides. Buses can be viable on

more densely populated rural routes but in general are not suitable for the bulk of dispersed rural communities. However, it is clear from Figure 3 and 4 that as demand increases to high levels that these vehicles become the cheapest options. They are most likely to be suitable in cash crop growing areas.

7. RECOMMENDATIONS AND CONCLUSIONS

There are a number of key points which have emerged from the report as obstacles to the greater availability and reduced cost of RTS. The major obstacles can be summarised as the following:

- Low density of demand for transport
- Poor quality infrastructure
- Poor diversity of vehicle types
- Un-competitive transport markets and a lack of professionalism from transport operators and vehicle mechanics
- Weak institutional structure for promoting RTS and a lack of understanding from governments, donors and other agencies as to the potential benefits from addressing the provision of RTS

In the following sub-sections recommendations will be made on possible solutions to these problems.

7.1 Maximising effective demand for rural transport services

The single largest obstacle to providing reliable, frequent and cost effective transport services to much of rural Sub-Saharan Africa is the combination of low cash incomes and often low population density. The viability of transport services is reduced by the need to service poor, small and dispersed populations. However, there are a number of ways in which effective demand can be maximised. These include the improved provision of rural markets; encouraging the use of transport brokers; consideration in the planning of the route network to ensure interconnectivity; and improving the flow of information.

7.1.1 Provision of rural markets

Where distance to rural markets is large, the creation of more rural markets has the potential for making transport services more viable in that markets enable the amalgamation of demand, both goods and passenger. A regular market for agricultural produce and household goods may also increase incentives for farmers to buy IMT's to travel the relatively short distances to rural markets. It would also encourage transport operators and traders from the towns to visit the markets because they can guarantee sufficient demand to warrant the trip.

If it is considered that rural communities are too dispersed to justify weekly rural markets, it maybe that introducing mobile markets which shift from place to place on a more informal basis are the answer. In this context a market is just a collection of people selling and buying goods and may only take place once a month.

For this type of initiative to be successful there needs to be close co-operation with other agencies who may also see the benefits from a wider marketing structure. These may include the ministries of agriculture, local government and planning, farmers' associations, agricultural marketing companies, district councils and of course the communities themselves.

7.1.2 Interconnectivity of rural infrastructure

Transport demand on any one route can be increased by ensuring that the road network has few dead end routes and a reasonable degree of inter-connectivity. On a circular route an operator can service more villages than on a dead end route. Ensuring that the right roads are made passable, and constructing new roads where necessary, will help in this aspect.

7.1.3 Transport brokers

The introduction of transport brokers, and increasing the role of existing brokers, will improve the matching of goods with available vehicles and hence reducing the need for empty running. For a brokerage service to be most effective then it is helpful if there is a nation-wide network of brokers who are continually in contact with transporters and clients. A good telephone, or other communication, system is essential for the effective operation of these services.

Although a transport broker's main role has traditionally been to service the needs of larger vehicles operating on longer distance routes, it is conceivable that they could also have a role for rural transport. For example, rural communities who have infrequent vehicle services could contact brokers as and when they required transport.

7.1.4 Improved information flows

A major problem for most rural communities is that they have no telephone or radio communications with the outside world. Better communications could improve both the response in a medical emergency and transport services. Efficient transport systems rely on good communications in order that vehicles and loads can be matched. This is particularly true in low demand areas where it is not viable for operators to travel on the off chance that they pick up a load. In the future the cost of mobile communications devices such as radios and even satellite telephones will be falling quickly. These devices as substitutes for expensive road improvement schemes or running unprofitable transport services may prove to be very good value for money.

7.2 Infrastructure

Infrastructure is commonly cited as the major constraint to the greater availability of rural transport services. This in part is true because operators will undoubtedly incur higher operating costs and have reduced utilisation from poor quality infrastructure. However,

the key is to provide basic access on as much of the network as possible through spot improvement strategies and appropriate standards.

7.2.1 Spot improvement strategies

Spot improvement strategies are designed to improve the traffickability of the road in terms of vehicles ability to pass during the wet season. In so doing they address problem areas which may constitute a small proportion of the network, typically about 10% of the road length. Spot improvement strategies which ensure year round passability are particularly beneficial to rural communities who are at their most vulnerable during the wet season. Spot improvement strategies should concentrate on areas where drainage or water crossings are a problem. Solutions include improved road shape, side and cut-off drains, and appropriate drainage structures such as culverts, drifts and bridges. By accepting that the road may be cut for a few days a year at the height of the rains, further cost reductions can be found.

7.2.2 Appropriate standards

The volume of traffic on rural roads is very low and standards should reflect these volumes. It is very common is SSA to see wide roads which carry very little traffic. Not only are these roads expensive to construct but they also consume large proportions of the available maintenance funds which could be used on other parts of the network. On most low volume roads a single lane with a running width of 3.5-4.0 metres is all that is required with some provision for passing. Costs can also be reduced by spot gravelling policies and using local resources such as timber and masonry for bridges, culverts and drifts.

7.3 Increasing the diversity of vehicles

Diversity of vehicle types is important in keeping transport costs to the minimum and ensuring that all transport needs are met. There is a particular problem with access to vehicles which are suitable for transporting smaller loads over relatively short distances. The importance of these types of vehicles cannot be overstated because without them the majority of rural communities transport needs will not be met.

7.3.1 Appropriate vehicle types

The most appropriate vehicle for a given rural area will vary according to a variety of factors which need to be assessed for each situation. The most appropriate vehicles will depend on incomes, demand, distance, usage, terrain, infrastructure, culture, managerial and technical skills, and availability of servicing. However, in making a decision initial consideration should be given to the least cost vehicle given the demand and distances involved using VOC's such as those presented in Figure 3 and 4. In deciding on an appropriate vehicle the decision should be weighted in favour of vehicle types that already have a successful track record in the rural areas of SSA. These vehicles include:

- Bicycles
- Animal transport - either used as pack animals or with carts
- Tractor technology - this includes conventional 4 wheel tractors and power tillers
- Pickup trucks and similar vehicles - the farm vehicle (see Box 3) could be considered as a lower cost, simpler technology alternative to conventional vehicles.
- Trucks and buses

7.3.2 Delivery mechanisms

Having identified vehicles that may be appropriate for use in rural areas the overwhelming problem becomes their introduction on a sustainable basis because the seasonal nature of demand leads to low levels of utilisation. This is particularly the case for vehicles which are likely to be owned at the village level such as tractors, animal transport and bicycles. In this regard it becomes essential that a multi-disciplinary approach is taken to the promotion of vehicles so that the different agencies involved in rural development can co-ordinate their efforts. This particularly refers to agricultural extension officials, roads authorities and transport planners.

As mentioned in the previous section many appropriate transport vehicles can be used for other purposes, and in most cases are actually bought for their agricultural potential not transport potential. Therefore in assessing total demand for a particular vehicle considerations needs to be given to the other sectors. Tractors and animal carts are good examples of where the full potential of vehicles are not realised because of poor dialogue between different agencies. For example, labour intensive roads projects often use tractors for haulage of gravel and water. These tractors are imported as part of the project, very rarely are they hired from the private sector in the area. Similarly agricultural projects seeking to introduce draught animal power or tractor technology usually only think in terms of performance in terms of agricultural tasks such as ploughing and threshing.

Where ever possible vehicles should be owned and operated by private operators. Recommendations in Section 7.4 deal with how the private sector can be strengthened. The ownership and operation of vehicles within a co-operative type set up has had very patchy success.

7.3.3 Credit schemes

Credit is often seen as a major obstacle to the affordability of rural transport vehicles. However, the evidence suggests that in many SSA countries there may actually be a surplus of conventional vehicles such as trucks, buses and pickups but they are concentrated in the wrong places and are under utilised. Much of this report addresses how utilisation of the existing fleet of vehicles may be increased. Therefore, in the majority of cases credit schemes aimed at providing these types of vehicles are unnecessary. The situation is very different for the vehicles which are likely to be owned

at the rural community level such as bicycles, animal transport and tractors. It is recommended that in these cases that transport funds are "piggy backed" onto existing agricultural credit schemes. The Bank of Agriculture and Co-operatives (BAAC) provides a good model, see Box 1.

7.3.4 Price incentives

The costs of operating vehicles in rural areas is clearly much higher than in other areas. The quality of infrastructure is poor, distances are large, demand dispersed and incomes low. To encourage operation in rural areas there is a good case for providing incentives to make this undertaking more cost effective. Recommendations in this area fall into two categories. Firstly, price incentives to reduce the variable costs of operation of conventional vehicles on rural routes. Secondly, incentives to reduce both the fixed and variable costs of operation for primarily rural vehicles.

- Reducing the capital costs of conventional vehicles by reducing taxes and duties may dramatically increase vehicle numbers but may not have much affect on the availability of these vehicles in rural areas. The vehicles may just be bought for operation on urban and inter-urban routes. However, by providing incentives to operate in rural areas through lower variable costs of operation may persuade some operators that rural operations are worth undertaking. A major component in these variable costs is the price of fuel. While subsidising rural fuel through reductions in taxes and duty would send clear signals to potential operators the mechanisms by which this could be achieved would need addressing on a case by case basis. The other major component to variable costs is that of tyres, spare parts and servicing. While relief from taxes and duty would again provide incentives to rural operators it is unclear how the benefits could be targeted at rural operators.

- The case for price incentives on primarily rural vehicles is easier to make because they can more easily be targeted at rural areas. Reductions in duty and taxes on tractors and power tillers would increase demand for vehicles that can only really be used in rural areas. Countries such as Pakistan and Sri Lanka have adopted these types of policies which have led to large increases in the fleet size of these vehicles. It is also easier to target tax relief on spare parts. These types of policies can also apply to bicycles and other non-motorised means of transport. For example, a major component of an animal cart is the axle, wheels and tyres. Imported second-hand components such as these could also be exempt from import duties and taxes. The local manufacture of vehicles in this category could also substantially reduce the capital costs. Vehicles that may be appropriate for local manufacture or assembly include bicycles, tractors and farm vehicles.

7.4 Increasing competition in the market for RTS

The main thrust of the recommendations in this section are towards increasing the utilisation and efficiency with which the existing fleet of vehicles is operated through a

more competitive transport market. While governments in SSA have liberalised the market for transport services it has not meant that operators have been free to determine routes and set fare levels because transport associations, unions and informal cartels have taken over that role.

There is no easy solution for removing monopolistic powers from transport associations.

The high price of transport poses a considerable disincentive to people's willingness to travel. As the poorest people usually live in rural areas the impact is greatest here. The price and availability of vehicle services can be improved by introducing competition both between operators and between modes. For competition to be effective, particularly in rural transport, there must be a diversity of modes of transport.

7.4.1 Deregulation of the unions/associations/cartels

Although the market for transport services is liberalised as far as the government is concerned in most SSA countries, in reality the market for transport services is regulated by unions, transport associations or other informal cartels. They regulate fares, routes, commission charges and queuing for loads. The system often leads to under utilised vehicles and inefficient operating practises. While this system may not optimise the use of the existing fleet of vehicles there is nothing wrong in groups of people with common interests setting up associations and recommending operating practises. The challenge is how the management and membership of the unions and association can be persuaded that their industry would be better served by adopting different operating practices. This may be done in a number of ways:

- Fully involve the unions/associations and their members with discussions on how to increase the efficiency of transport services. Explain how these efficiency savings will benefit both the operators and their customers.
- Explain how operating costs can be reduced by increasing vehicle utilisation and improved vehicle maintenance.
- Provide training programmes for existing and potential operators. These programmes should include vehicle maintenance and simple business management techniques. Funds for these training programmes could be channelled through the transport associations to encourage ownership.
- Passenger groups and other transport users should also be educated as to the potential benefits from a more deregulated market. They could provide considerable political weight.
- Emphasis needs to be placed on more professionally operated vehicle services.

Although it is considered here that transport unions/associations are the cause of considerable distortions in the market for transport there are reasons to think that associations representing the rural transport operators may have an important role to play. An organisation such as this may do the following:

- Represent the interests of rural transport operators and their passengers.
- Promote more comfortable and safer rural transport.
- Provide training to rural operators in maintenance and with the business of running a vehicle.
- Lobby government for price incentives to those operators wanting to run on rural roads e.g. tax rebates on fuel.
- Allow members to set prices according their known operating costs and not dictate fares. The association could ensure that exploitation was not occurring.

7.4.2 Creating countervailing power to monopolistic transport providers

One of the reasons identified for market failure in the provision of RTS is that transport users are usually dispersed and use RTS infrequently and seasonally. As a result there are no clear signals being sent to operators on potential demand and prices which will be paid. Rural communities provide a captive market for operators because they have no choice over service provider and without the service they can remain totally isolated from the outside world. As a single entity the rural community can exert no pressure over the operators to change their practises or lower their prices. Therefore, in these situations countervailing power is required from user groups who can enter into dialogue with operators. These user groups could also act as a lobbying force to government. These user groups might include local government, local chiefs, farmers groups, co-operatives and marketing people. In order for this type of user group to be effective they would also have to be educated as to what they can realistically expect from RTS.

7.4.3 Increasing the professionalism in the provision of RTS

To get the most out of any interventions to improve the frequency and cost of RTS it is necessary to have an educated work force who understand the business of operating a vehicle. There are two basic areas in which operators and vehicle owners require training:

- Vehicle maintenance and operations - educating drivers and owners to the benefits from routine maintenance and slow running.
- Business management - increasing awareness of total vehicle operating costs, the importance of long term planning and increasing the responsibility of drivers for keeping records and finding business.

For operators to have confidence in their ability to provide a service it is necessary for them to have backup vehicle servicing. Rural areas need small scale enterprises to repair and maintain their vehicles as well as larger enterprises who manufacture spare parts and make vehicle modifications. These entrepreneurs also need support and training with technical and business management skills.

7.5 Lack of understanding by governments, donors and other agencies

As this report has highlighted, the potential benefits to developing economies from increasing the efficiency with which transport services are provided is potentially enormous. The transport cost differences between Asia and Africa, between some African countries, and between inter-urban and rural transport are many times different. Therefore the opportunities for reducing transport costs in SSA by 20% or more must be very real. The implications of this in terms of increased demand for travel, lower food and commodity prices, and increased incentives for agricultural and industrial production could be substantial.

As has been stated through this report there has been an assumption by the various players involved in the provision of rural transport that vehicles will follow roads. This has not happened because of market failure, therefore this failure has to be understood and addressed. There has to be a greater awareness by all the agencies involved of the problems faced in the provision of conventional transport services, as well as IMT's, to rural communities. In this regard the mechanisms for doing this are already in place through the work of the International Forum for Rural Transport and Development (IFRTD) and that organisations National Forum Groups, the World Banks Rural Travel and Transport Programme (RTTP) and the International Labour Organisations (ILO) ASIST programme. There are also a number of consultants and research organisations who are active in the rural transport field.

7.5.1 Setting targets

Having educated the relevant agencies, and there is still a considerable way to go in this process, there is the need to develop a strategy on which these agencies can act. It is considered that the best way to proceed is to ensure that all road construction, rehabilitation and maintenance projects should have target traffic levels and transport charges to aim for. While exact targets will change from situation to situation the following is the form in which it is suggested that they are presented:

- Traffic levels, including goods and passenger vehicles and IMT's, on rural roads to increase by x% by the year xxxx.
- Goods charges and passenger fares, for conventional and IMT's, to fall by x% by the year xxxx.

In order to measure the achievements of targets baseline data is required prior to road, track or path rehabilitation on traffic counts (including modal split down to IMT's and pedestrians) and typical passenger and goods fares for all vehicle types. These can then be compared with the levels that have been achieved at the target date.

7.5.2 Basic needs targets

It has to be recognised that there are certain rural communities in SSA who, because of their poverty and remoteness, will always suffer from unacceptably poor access to

motorised transport services. This leaves these communities particularly vulnerable to ill health, exploitation from traders and a feeling of isolation. For these communities it is felt that targets are needed to ensure certain minimum access criteria to motorised transport. It is recommended that these basic needs targets should look as follows:

- That all rural communities are within 3 kms of motorable access where the infrastructure is passable to motorised vehicles for a least 95% of the year.
- That all rural communities that are further than 30 kms from their nearest service centre, and are serviced less than once a week by a motorised vehicles, have access to a communications device which allows them to request transport services at any time.

7.5.3 Developing a strategy document

It is recommended that the targets are backed by a strategy document which details how it is intended that these targets will be met. While improved infrastructure may contribute to the achievement of the targets it is considered that this on its own is not a sufficient justification. Table 7 provides a structure and checklist of factors which need to be considered in drawing up a strategy document. The table poses the main issues which need to be addressed, and the section where the relevant recommendations are made.

7.5.4 Funding initiatives

Most of the recommendations made in this report are centred around increasing the competitiveness and efficiency of the private sector. Many benefits will come from restructuring and adapting existing institutions to ensure that an enabling environment is created which encourages the private sector to do its job. However, as has already been stated there are market failures which need to be addressed and fundamental obstacles to the efficient provision of RTS because of the low density of demand. For these reasons there are requirements for support to the sector and these fall into the following categories:

- Funding for awareness campaigns and training programmes
- Price incentives to encourage the ownership and operation of vehicles in rural areas
- Data collection for the development of strategy documents and baseline data
- Promotional activities for alternative vehicle types and the possible support of agricultural extension agencies
- To cover loan guarantees
- Development of more effective marketing structures
- Professional input from transport planners to advise and oversee the restructuring of the rural transport sector

It is proposed that these activities should take place, and be funded, as part of road improvement programmes and that a certain percentage of the contract should be reserved for interventions which actively seek to increase the availability and reduce the cost of

RTS. While it is impossible to give an exact percentage, and it will inevitably differ from country to country and place to place, it should reflect the size of the problems faced by rural people in their access to vehicle services and the size of the potential benefits to the economy from improved RTS. This approach has already been adopted by advocates of road safety where they have pressed for a 3-5% road safety component on main road rehabilitation projects which might fall to 2-3% on rural roads projects.

It is important that wherever possible, funding is linked to road improvement programmes because it highlights the integrated nature of rural transport planning. It also may provide some focus on the quantity and type of traffic that the road is being built for which could manifest itself in more appropriate standards.

Table 7: Checklist of factors to be considered in the preparation of an RTS strategy document

Issues to be addressed in strategy document	*Recommendations (Section)*
Maximising effective demand:	
Do rural communities have easy access to weekly markets?	7.1.1
In the planning of road construction and maintenance is time taken to ensure a minimum degree of inter-connectivity?	7.1.2
Is their scope for promoting networks of transport brokers?	7.1.3
In low demand areas is it more cost effective to provide modern communication devices than transport interventions?	7.1.4
Appropriate infrastructure standards:	
Are proposed standards realistic for likely volumes and types of traffic?	7.2
Have spot improvement strategies been considered?	7.2.1
Can money be saved on road width, gravelling and by using local materials in structures?	7.2.2
Improved vehicle numbers and selection:	
Are the types and numbers of vehicles available in rural areas adequate for meeting demand?	7.3
What is the realistic demand for vehicles including passenger and goods transport, agricultural activities and road works?	7.3.1
Are agricultural extension agencies aware of the transport potential of agricultural vehicles? Can they play a greater role in the promotion and sustainable integration of new vehicle types?	7.3.2
Are road works using vehicles, particularly tractors and animal carts, from the local economy as much as possible?	7.3.2
Do rural communities have access to credit for transport vehicle?	7.3.3
Is there a need for providing price incentives to operators to encourage them to operate in rural areas?	7.3.4
Increasing the competitiveness of RTS:	

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