

MATCHING DEMAND WITH SUPPLY IN RURAL TRANSPORT

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Objectives of the paper

Abstract

The paper describes the importance of the density of demand to the efficient operation of rural transport systems and how this effects vehicle choice. 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.

However, it is common in the rural areas of most countries in the world that population is low, distances are large and the resulting demand for transport sparse. In this environment it makes it very difficult to operate viable transport services, motorised or non-motorised, and to build infrastructure which is economically viable. The scale of the problem varies between country to country and between different areas within the same country.

The purpose of this paper to examine the possibilities for maximising the demand which is available in rural areas.

Key issues

- In areas of low density of demand it is possible to undertake certain interventions to maximise the effective demand for transport services
- To maximise demand it is necessary to look at the wider environment in which transport operates, particularly agricultural marketing
- Existing and new communications technologies may have a role in improving the efficiency of rural transport systems and in some cases taking away the need.

Key topic areas

- Provision of rural markets and storage facilities
- Interconnectivity of rural infrastructure
- Transport brokers
- Improved information flows
- Complimentary investments to rural transport interventions

1. MAXIMISING EFFECTIVE DEMAND FOR RURAL TRANSPORT SERVICES

The factor that underpins all the aspects in this paper 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.

Previous papers have shown that Asian transport tends to be more competitive, lower cost, with a higher 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 higher 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. However, rural areas anywhere in the world tend to have lower population densities and hence have greater difficulty in maintaining viable rural transport services.

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 density of demand will also be affected by the nature of farming systems which are largely dictated by land pressures. Where there are few land pressures agriculture tends to be low input and low output. Where there are land pressures a more intensive farming system develops which requires 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.

The single largest obstacle to providing reliable, frequent and cost effective transport services to rural areas is the combination of low cash incomes and low population densities. The viability of transport services is reduced by the need to service poor, small and dispersed rural populations. However, there are a number of ways in which effective demand can be maximised. This paper will explore the opportunities for maximising effective demand for transport services in the following areas:

- Improved provision of rural markets and storage facilities
- Encouraging the use of transport brokers
- Consideration in the planning of the route network to ensure interconnectivity; Improving the flow of information
- Working with other agencies to ensure that complementary investments are being considered

1.1 Provision of rural markets and storage facilities

Rural markets and their significance on the supply of rural transport have already been covered as part of another paper in this knowledge base. The importance of an efficient and competitive marketing system has been stressed as a complement to RTS and infrastructure in promoting development. However, the presence of markets and/or storage facilities 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. These factors also have an influence over vehicle choice.

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 recognised by urban dwellers that farmers often provide the keenest prices.

Where farmers have to 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 1 gives some different examples of marketing structures in SSA and Honduras. It can be seen that the marketing system in Mali lends itself to the efficient provision of rural transport services whereas in Zambia and Malawi the demand for transport is very much more seasonal.

Where goods are amalgamated it means the demand for vehicle services increases. The density of demand is of vital importance in determining vehicle choice. The larger the demand the more an efficient and cost effective vehicle can be justified and hence the unitary costs of transport are reduced. The existence of markets and storage facilities are important at any level. For example, at the village level a small grain store may be able to accumulate enough demand from all the farmers to justify the use of a donkey cart for transportation to market. Without the store individual farmers may only be able to justify headloading their surplus produce to market. Similarly, at the district level a market could attract city traders who bring large trucks to transport the produce bought at the market in bulk.

Box 1: 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 30km 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 up to 50km 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 1,300 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 40km.

Honduras

In the Guinope Municipality of Honduras the nearest market was Tegucigalpa the capital city 60km 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.

The issues that relate to a wider strategy on demand management in rural transport are as follows:

- Where distance to rural markets is large, the creation of more rural markets has the potential for making transport services more viable by encouraging the amalgamation of demand, for 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.
- Storage facilities are important at both the village and district level to allow the amalgamation of goods for subsequent onward movement.
- All interventions in this area need close co-operation with agricultural authorities in the countries involved.

1.2 Interconnectivity of rural infrastructure

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 100km. 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.

1.3 Matching demand and supply - transport brokers

There are a number of ways in which rural transport operators can find loads. Commonly operators will wait in designated areas such as lorry parks or at bus stands and wait for the passengers and/or load to come to them. In many countries this means a long wait for vehicles and passenger alike as the vehicle will not move until full. Vehicle operators can also seek loads more proactively by travelling along a road looking for passengers or loads. However, this tends not to happen in most rural areas. In less populated areas farmers will walk into the main urban centre to find a vehicle that is prepared to go to the village and pick up the load.

In many countries, particularly around harvest time, there are reports of harvest spoiling on the sides of the road because transporters are unaware as to the location of the harvest. At the same time there can be vehicles waiting in urban areas for days at a time waiting for a load. In this regard transport brokers can provide an invaluable service in matching available demand with the available supply of vehicles.

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 it is necessary to have 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. Box 2 provides an example of Pakistan where transport brokers are used as an integral part of an efficient freight transport system.

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. Rural people could contact brokers whether they needed vehicles for the transport of agricultural produce, people or in an emergency. This would prevent the need for rural people making lengthy journeys by foot or bicycle to find vehicles and speed up the process of vehicle operators looking for loads.

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.

While this technology is unproven in the rural transport context there maybe some scenarios where it is applicable. The following are some areas in which communications technology may help the more efficient provision of transport:

- Matching supply and demand i.e. communications facilitating a brokerage service
- Emergency services i.e. communities calling transport services from towns
- As a substitute for travel e.g. speaking to friends and relatives on the phone rather than travelling
- Access to markets and market information. This includes local markets as well as international markets
- Faster transfer of information on technological developments e.g. new seeds and fertilisers

All of the above will affect the demand for transport by increasing the likely returns from travel e.g. choosing to go to the market where product prices are highest.

Box 2: Freight forwarding agents in Pakistan

Pakistan has one of the most efficient freight transport systems of any country in the world and a large network of freight forwarding agents supports it. These agents are normally individually owned and operate from a single office. Freight forwarding is their major income source although some also own vehicles and/or warehousing facilities.

About 25% of the agents dealt with general merchandise and the remainder dealt in specialist consignments such as quarried materials, iron or steel. Almost one third of all the consignments were “smalls” (i.e. less than one ton). Agents tended to be used more for longer distance movements and for particular goods such as agricultural produce and manufactured goods.

Charges for the forwarding service varied from 4.8% for long journeys to 11.3% for journeys of less than 50km. It was found that 90% of agents had a working telephone and 96% had a reliable postal service. However, two thirds of all business was generated by personal callers and one third by telephone. This is because the majority of business came from urban centres.

A crucial feature of the survey was the speed in which agents could find a vehicle. For 64% of agents there was usually no delay, 89% could find a truck within one hour and 96% could find a truck within two hours.

There are a number of issues that a transport planner will need to understand before interventions can take place in this area:

- What are appropriate technologies for rural communities or urban based brokers i.e. conventional radios, two-way radio communications, conventional telephones, mobile telephones, satellite telephones or the internet?
- What are the user costs in terms of the purchase of equipment, air time, electricity and maintenance costs?

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- What are the likely infrastructure requirements for the introduction of the technology? If large investments are likely to be required it is probably not an option.
 - Is it realistic for poor communities to own and maintain these technologies? Do the communities have the skills and resources to operate and maintain the equipment?

1.5 Complementary investments to rural transport interventions

A number of authors have highlighted the need to combine investments in rural infrastructure with investments in other sectors. After all transport is a derived demand and will only be used if there is a social or economic benefit from doing so. Typically the types of investments that transport sector interventions should support include:

- Health e.g. hospitals or health centres
- Education e.g. schools or colleges
- Agricultural extension e.g. improved information and improved availability of seed and fertiliser
- Industrial investments e.g. agro-industries
- Small-scale enterprise e.g. support to local artisans
- Improved availability of credit facilities e.g. improved banking facilities or small scale credit schemes

The existence of these complimentary investments not only increases rural peoples ability to benefit from the interventions but they also improve the prospects for running viable transport services.