

AGRICULTURAL MARKETING AND ACCESS TO TRANSPORT SERVICES

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Objectives of the paper

Abstract

The paper describes research relating to the role that road transport has to play in maintaining rural development and food security. From case study material the relationship between accessibility, marketing and agricultural development is examined. It is argued that transport costs play a critical role in identifying the link between accessibility and agricultural development. It is estimated that replacing a footpath by a vehicle track may have a beneficial effect to the farmer of over a hundred times more than improving the same length of a poor quality earth track to a good quality gravel road. Wide divergences in market prices suggest that food marketing is inefficient and subject to monopolistic practices. From comparative research between Africa and Pakistan it is argued that there is scope for major reductions in Africa's road freight transport costs.

Key issues

- The importance of developing basic vehicle access to areas of high agricultural potential over increasing the quality of access to areas which already have vehicle access.
- Some countries have much higher transport costs than other countries. This impacts on final market prices.
- Marketing systems can be inefficient and suffer from monopolistic practise. This impacts on the final price of products and on the demand for transport services.
- The use of IMT's can significantly improve rural peoples marketing opportunities.
- The positioning and availability of markets has a large impact on the demand for transport services and the type of vehicle used.

Key topic areas

- Transport costs and agricultural development
- Agricultural markets and marketing
- The use of IMT's in agricultural marketing

1. INTRODUCTION

An efficient transport system is critically important to efficient agricultural marketing. If transport services are infrequent, of poor quality or expensive then farmers will be at a disadvantage when they attempt to sell their crops. An expensive service will naturally lead to low farm gate prices (the net price the farmer receives from selling his produce). Seasonally impassable roads or slow and infrequent transport services, coupled with poor storage, can lead to losses as certain crops (e.g. milk, fresh vegetables, tea) deteriorate quickly over time. If the journey to market is made over rough roads then other crops (e.g. bananas, mangoes) may also suffer losses from bruising; this will also result in lower prices to the farmer.

Agriculture is best served by consistent high urban, and international, demand. This is best brought about by an efficient, high volume, transport and marketing system where the transporting and marketing unit costs are low. If the margin between what the farmer receives from the sale of his produce and what the urban consumer pays for his produce is high then the effective demand transferred to the farmer will be correspondingly be reduced. Similarly if internal transport costs in a country are particularly high then the scope for agricultural exports will also suffer in comparison with other more efficient countries.

The pattern of agricultural marketing is strongly influenced by the nature of transport services. Many developing countries suffer from monopolistic, low volume and high cost transport and marketing systems. Economies of scale are present in both transport and marketing operations.

In the following we will consider transport costs, the impact of roads on rural development, access to markets and the potential use of IMTs.

2. TRANSPORT COSTS

It is generally recognised that transport operating costs, are higher on rough roads than on good quality bitumen roads and generally this will be reflected in passenger fares and freight tariffs. For example in Zambia the route from Chipata to Mpetamai (24 km) is on good quality gravel road and costs Kwacha 62.5 per passenger kilometre; while the route from Chipata to Mwanga (74km) is on poor quality earth road and costs twice as much per km. However a wide range of transport costs (measured per passenger/km or tonne/km) have also been found in different countries for similar types of transport operation on similar roads. This indicates that there is substantial scope for improving efficiency of transport operations in many countries.

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 30km. In this case data was collected from a variety of different types of vehicles including tractors, power tillers pickups and trucks (Ellis and Hine 1998).

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%. 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.

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 10km) are on average six times those of long distance transport (i.e. 50km) (LET, ENSTP and INRETS, 1989). Similarly in Madagascar freight charges on non-national routes were some three times higher than on national routes (Ninnin, 1997).

3. THE IMPACT OF TRANSPORT COSTS ON AGRICULTURAL PRODUCTION

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 120km to 200km (Hine, Riverson and Kwakye, 1983). In another study an average of 7 to 8% were found for Koforidua. A more recent study carried out by the Ministry of Transport found that for Accra the proportion was 11% for maize (420km) and 25% for tomatoes (360km).

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. The results will, of course, vary from country to country and year to year. However, Ahmed and Rustagi

(1987) 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 6%.

Road investment has an important part to play in reducing transport costs, however improving short lengths of feeder roads may have little impact if no change in transport mode occurs. It has been calculated that upgrading 5km of feeder road from earth to gravel standard might only increase farmgate prices by about one tenth of one per cent. In comparison bringing new motor vehicle access 5km closer to a village (or farm) when the alternative was headloading by hired labour could increase farmgate prices by over a hundred times as much.

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 600km 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 may collude and set prices to the farmer 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%.

4. AGRICULTURAL MARKETS AND MARKETING

The importance of an efficient and competitive marketing system has been stressed as a complement to rural transport services (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 may not be viable.

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.

5. ACCESS TO MARKETING AND STORAGE FACILITIES

The following are the results of the analysis from case studies in Ghana, Thailand, Zimbabwe, Sri Lanka and Pakistan looking at the provision of transport services and the impact that marketing facilities may have (Ellis 1996).

The presence of markets and storage facilities play an important role in affecting choice of vehicle. Markets and storage facilities both provide the same role of acting as a place where agricultural produce can be amalgamated. This may be for the purpose of immediate sale or for transportation to the next destination. Access to markets and storage facilities therefore affect vehicle choice in two main ways.

Firstly, the ease of access to these facilities, whether in terms of distance or ability to use the facilities, will dictate the farmer's decision on which vehicle to use. For example, if the storage facility is close he/she may decide to buy a non-motorised vehicle which would have been of no use if the facility was beyond a certain distance. Similarly, if once the farmer had reached the facility he was unable to use it either because of its expense or because of exclusionist type practises, the need for a vehicle becomes redundant, and the farmer's produce may as well be sold to the village trader. The farmer will only demand a more advanced vehicle if it is the perception that the vehicle will enable an effective increase in farm gate prices.

Secondly, where goods are amalgamated it means that the density of 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.

The ease with which farmers and traders have access to markets and storage facilities will be reflected in their distribution costs (transport and storage). If distribution costs are low this will effectively increase farm gate prices which will give farmers the incentive to increase production. One of the factors of production in this case would be agricultural and/or transport vehicles.

Table 1 shows the characteristics of market and storage accessibility in the five survey sites. It demonstrates that in the Asian case studies, markets and storage facilities were on average closer to villages than in the African ones. In addition farmers were more able to sell their produce at those markets. In Ghana for example, the multitude of middlemen that are involved in the marketing process means that even if a farmer is able to get to a market he may not have the facilities or contacts needed to sell his produce at reasonable prices. The lack of storage facilities also means that farmers will take lower prices rather than risk not being able to sell their produce.

Table 1: Characteristics of market and storage accessibility in the five survey sites

	Thailand	Sri Lanka	Ghana	Zimbabwe	Pakistan
Typical Dist. to nearest markets or storage	1-25 km's	5-10 km's	> 20 km's	10-100 km's	5-20 km's
Market access to farmers	Good.	Good.	Poor - market women have all marketing contacts.	Good - but must sell to the GMB or CMB.	Good.
Farmer ability to transport own produce	Good - except in hill country.	Good - but sometimes crop too small to justify.	Farmers have very little mobility.	Within 20km's it is good, but poor beyond this distance.	Good - will travel hundreds of kilometres.
Reliance on traders	Very little - except in hill country.	The poorer/smaller farmers are reliant on them.	Almost complete reliance.	Technically illegal but less accessible villages rely on them.	Very little.

6. THE POTENTIAL OF IMTS FOR AGRICULTURAL MARKETING

Intermediate means of transport IMTs can play a useful role in agricultural marketing. This section draws on the work of Sieber (1999).

In SSAfrica the marketing of agricultural produce is often restricted by poor transport. Many reports show that harvests are rotting in the fields and at collection points due to a lack of transport to markets. Table 2 shows that in 1987- 88 a considerable amount of the Tanzanian harvest was not collected due to both bad road conditions and lack of transport services. Had more transport capacity been available - particularly IMTs - the position might have been very different.

Table 2: Share of 1987-88 harvest in Tanzania stranded

Region	Crop Type (% stranded)
Northeast Highlands	cotton (24%), coffee (38%), cardamon (13%)
Coastal Belt	food crops (13%), cash crops (35%)
Central and Western	cotton (89%), maize (13%), paddy (22%)
Southern Highlands	all crops purchased by Union (27%), paddy (80%)
Lake Victoria	cotton (50- 60%)

Source. Gaviria (1991)

As this section will show, IMT can significantly improve access to markets and can create new opportunities for farmers. To analyse the role of IMT, it is necessary to distinguish between markets within and beyond walking distance and markets that can only be reached by motorized transport.

6.1 If markets are within walking distance

Headloading can play a considerable role in marketing of agricultural produce. Sieber (1996) observed in Makete that more people used a footpath to travel to a local market than were transported by vehicle on a comparable road. Some villages preferred to transport a large proportion of their products by walking instead of selling it to traders with trucks because the traders would pay them less than they receive at the market. A footpath improvement was found to reduce travel times, increase transport loads and diminish accidents. This caused stronger market integration and reduced rural isolation.

However, transport by walking is restricted by weight carried or distance to market if more than half-day walk is involved. IMT can increase the carrying capacity and speed, reducing transport costs. IMT create additional economic opportunities; for example, farmers could grow more or heavier crops (in terms of US\$/ ton). IMT enable farmers to sell their produce when road conditions are bad, motor vehicles rare and, therefore, producer prices are high. In Kenya, farmers report that they pass roads in the rainy season with their ox carts, where trucks are stuck in the mud.

6.2 If markets are too far to walk

IMT enable farmers to reach distant markets. Three-to-four hours of walking (one way 10 - 15km) is often regarded as the threshold for access to markets. A pack animal can extend the distance to 20km in hilly areas, a bicycle to 30km in flat terrain and a single-axle tractor with trailer covers up to 50km. Thus, IMT make new markets accessible where producer prices might be higher; new products might be demanded, or inputs might be cheaper.

6.3 If markets are beyond the reach of IMT

For long distances the use of motor vehicles is essential. However, an appropriate approach can be applied, if multimodal transport is considered. The conventional approach, focusing mostly on roads and motor transport, has drawbacks that shall be discussed briefly to explain the appropriateness of multimodal transport.

Another cause for poor rural transport is inadequate transport services, restricted by road conditions, low demand and short supply with vehicles. In 1988, only nine motor vehicles per 1000 inhabitants were registered in Sub-Saharan Africa (excluding the Republic of South Africa). Since then this ratio has probably not increased significantly due to the economic crisis and a foreign exchange shortage. Most vehicles are used in big cities and not in rural areas.

In rural areas of SSAfrica the static or declining transport fleet has created a situation that favours the sellers of transport services and not the buyers. In many rural areas the competition among service providers is very low and therefore they are not under pressure to transmit cost reductions to their clients. A non-competitive environment might be one of the reasons why transport costs in the Côte d'Ivoire are six times higher on rural roads than on major highways. The quasi-monopolistic rural transport market enables operators to charge excessive fares that directly reduce farmers' income.

In Section 2 the high costs of road freight transport in Africa has been identified. The main causes appear to be a combination of high input costs, low utilisation and poor maintenance and operating practices that are often the result of monopolistic practices. In attempting to solve rural transport problems aid donors have largely focused on the supply and maintenance of road infrastructure. Clearly this approach has major limitations:

- insufficient provision of transport services, especially during harvest times;
- low competition of service providers on rural roads;
- high vehicle operating costs on bad roads; and
- inefficient vehicle operations

Multimodal transport may help solve many of these problems: using the comparative advantages of IMT in the transport chain from the field to the market. IMT can efficiently carry small quantities from the field or storage facility to collection points, where trucks operate to their optimum: fully loaded on long distances and good roads. Assuming free market entry for transport operators, the use of IMT will increase competition because:

- a) IMT operate at low costs between collection point and village
- b) more efficient transport operations between collection point and market will be an incentive for other enterprises to offer their services.

Increased competition will break the monopolies of rural transport operators, forcing transport costs down and, thus, raising the income of rural producers.

Additionally, IMT can use low-cost infrastructure, reducing public expenditure for infrastructure provision and maintenance: bicycles and pack animals can operate on footpaths, animal carts and rickshaws on low cost tracks. Low-volume roads can be downgraded to tracks; wooden bridges or fords can be built instead of concrete bridges.

6.4 IMT's can reduce transport costs

The most important economic criterion for the modal choice is transport costs. Table 3 shows the variations of the costs for transport from the field to storage or collection point (the assumed distance is 5km). Transporting the yield of 1 hectare of cacao, rice or maize is much cheaper than yams, plantains or palm oil. The use of IMT for high yielding crops can considerably reduce transport costs. If the farmer uses an animal cart instead of headloading his plantains a saving of US\$41 is made for every hectare he cultivates. If an ox cart is used, income will increase by US\$60/ha.

Next to agro-ecological factors, transport costs have a significant influence on the cropping patterns. More than a century ago Thijnen (1783 - 1850) observed circular structures of the agricultural land use around the market towns; with the intensity of agricultural production decreasing with further distance to the market. More often than not this holds true for the cropping patterns on farms in Sub-Saharan Africa: some authors have found that heavy crops are only cultivated around the farmstead and collection points, whereas high-value crops like cocoa are grown further away from the road network. Often, new fields are not taken under cultivation if the distance to collection points is long and therefore transport costs too high. Table 3

also indicates that the radius of cultivation can be extended if farmers use IMT to transport their produce. It has been observed that ox carts in Zambia can extend the agricultural area to a radius of 20 km around markets and depots.

Table 3: Transport costs for evacuation of the annual yield of 1 Hectare

	Transport cost \$/ha					
	Yield(kg/ha)	Walking	Animal cart	Cycle trailer	Hand cart	Ox cart
Cocoa	900	7	3	2	2	1
Rice	1500	12	5	3	3	2
Maize	1900	15	6	4	3	2
Cocoyam	7000	54	22	16	12	7
Yams	8000	62	25	18	14	8
Plantain	9000	69	28	20	16	9
Oil palm	10000	77	31	23	18	10
Cassava	10000	77	31	23	18	10

Assumption: distance field to collection point = 5 km.

6.5 The overall role of IMTs in agricultural marketing

Walking, the dominant mode of on-farm transport, can restrict any increase in agricultural production. IMT can improve the efficiency of on-farm agricultural transports by reducing transport costs and time. The effects on agricultural production can be manifold:

- cultivation of bigger areas;
- utilization of more fertile, but remote, soils;
- production of heavier crops,
- increased utilization of fertilizer and manure;
- reduced pest damage and spoilage at crop harvest time;
- reduction of transport time, partly used for income generation;
- reduced effort and drudgery involved in human portage; and
- spill-over effects if animals are used for ploughing and transport

Thus, IMT enable the farmers to respond better to markets by augmenting or changing their production. Additionally, they reduce losses, save transport costs and time.

If markets are within walking distance than headloading is important. Transport efficiency can be significantly increased by improvement of footpaths or the use of IMT. If markets are more than half a day's non-motorized travel, a multimodal transport system is a cost-effective solution. Trucks are unbeatable on long distances, good roads and fully loaded, and IMT operate more efficiently on short distances with small loads and on bad roads making a multimodal approach the best solution for rural transport problems.

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