

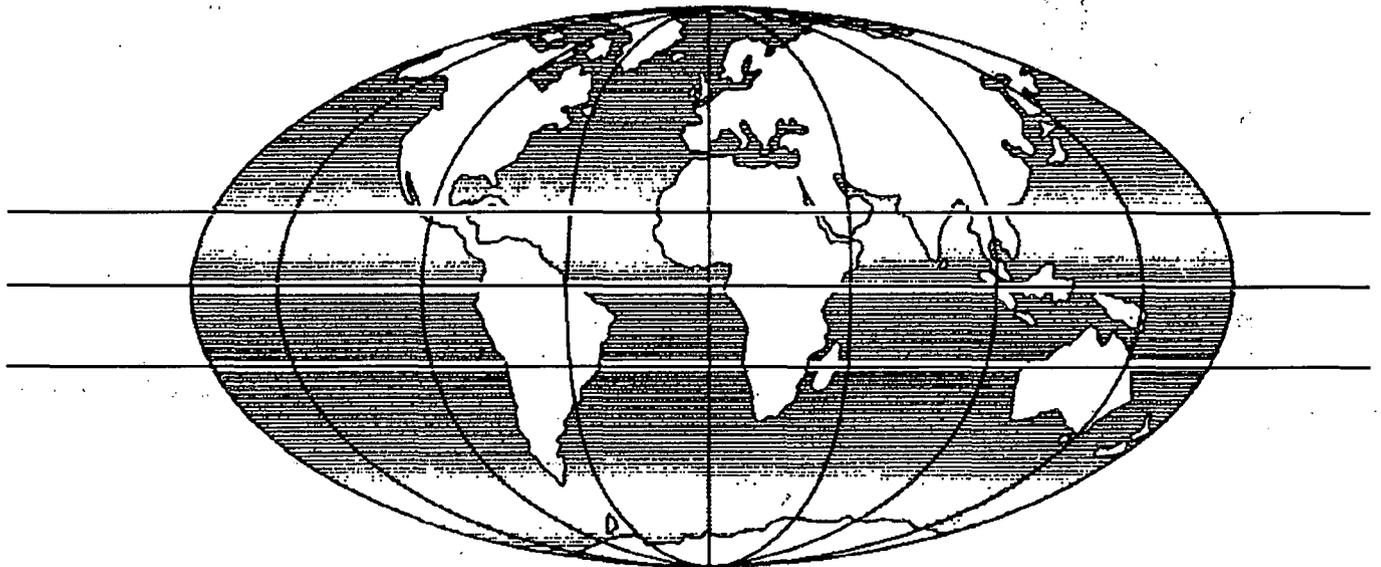


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**TITLE Transport and marketing priorities to
improve food security in Ghana and the
rest of Africa**

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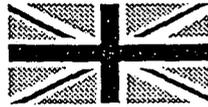


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HINE, JL, 1993. Transport and marketing priorities to improve food security in Ghana and the rest of Africa. In: International Symposium: *Regional Food Security and Rural Infrastructure*, Giessen, May 1993.



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Paper presented to
International Symposium:
Regional Food Security and Rural Infrastructure
Giessen, May 1993

**TRANSPORT AND MARKETING PRIORITIES TO
IMPROVE FOOD SECURITY IN GHANA AND
THE REST OF AFRICA**

By John L Hine

This is an paper prepared for the Overseas Development Administration. The views expressed are those of the author and not necessarily those of the ODA.

Overseas Centre, TRL, 1993

TRANSPORT AND MARKETING PRIORITIES TO IMPROVE FOOD SECURITY IN
GHANA AND THE REST OF AFRICA

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ABSTRACT

The paper describes research carried out by the Transport Research Laboratory in Ghana and other developing countries 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 divergencies 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.

TRANSPORT AND MARKETING PRIORITIES TO IMPROVE FOOD SECURITY IN GHANA AND THE REST OF AFRICA

1 INTRODUCTION

Within the field of transport and marketing there is a wide range of measures which can be taken to assist with food security and agricultural development in developing countries. Examples include investment in rural roads and tracks, assistance to improve the availability and efficiency of freight vehicles, and measures to reduce the variability of agricultural prices between different markets. For any proposed investment or policy measure, changes in transport costs and the implications for producer and market prices provide a useful guide to help identify which measures should take priority.

Transport costs affect the farmer in two ways. These are the costs of bringing inputs to the farm and of taking produce from farm to home and market. Most agriculture practised in Africa involves the movement of very few material inputs to the farm. The applications (in terms of weight per unit area) of modern inputs such as fertiliser, insecticides, herbicides are usually very limited. In general the most important input is farm labour which usually walks from the house to the farm for distances typically up to five kilometres away. Hence the benefits of reduced medium and long distance transport costs will be concentrated on taking produce from farm to market.

Reduced transport costs of taking produce to market can be shared between farmers (through higher producer prices), consumers (through lower market prices) and transporters and middlemen (through increased profits). Agricultural supply price elasticities have been shown to lie in the range of 0 to 1.5 (Oury, 1968). So, if transport costs are reduced and this results in higher producer prices then, in general, we can expect agricultural production to increase as farmers find it worthwhile to devote more effort to raise production.

This paper summarises the results of research carried out by the Transport and Road Research Laboratory (TRRL), (now renamed the Transport Research Laboratory), in

cooperation with other research institutes, that is most relevant to achieving food security in Africa. Case study material, from the Ashanti region of Ghana, is presented which examines the relationship between accessibility and agricultural development. The need for road investment, changes in the pattern of agricultural marketing, and measures to reduce freight transport costs in Africa are investigated.

2 THE IMPACT OF ACCESSIBILITY ON AGRICULTURE IN GHANA

A cross-sectional study of the effects of accessibility on agricultural production was undertaken between 1978 to 1982 in the Ashanti Region of Ghana by the Building and Road Research Institute (Kumasi) in cooperation with the Overseas Unit of the TRRL (Hine, Riverson and Kwakye, 1983a, 1983b) The purpose of the study was to determine how parameters of agricultural development varied with distance and transport costs to district and central markets.

In Ashanti Region food crop cultivation and cocoa farming are the major sources of livelihood for most of the rural population. This is supplemented by the rearing of poultry, sheep and goats. Marketing, the provision of services, rural industry and handicrafts provide additional sources of income.

The regional capital, Kumasi, has a population of about 400,000 which is many times larger than the combined population of all other urban centres in the region. Besides being the major administrative centre, Kumasi is also the major market, the transport and distribution centre of central southern Ghana and all major roads in the region radiate from there.

Survey method

Ministry of Agriculture enumerators collected cross-sectional socio-economic data for the study from 491 farmers in 33 villages using the sampling frame for their smallholders survey. All but two of the villages in the sample had vehicle access and were between 8 and

102 km by road from Kumasi. Thirty one villages were located in the forest zone, while two were located in the northern savanna zone of the region.

A number of parameters such as farm area, cocoa production, cocoa and maize yields, labour input, finance, crop sales and the use of modern inputs were used to indicate agricultural development. Data on local population density, soil fertility, and crop diseases were also collected to test alternative development hypotheses. Because rainfall in the main crop season was adequate for all crop requirements across the region, it can be excluded as a major explanatory variable. The transport charges of moving the equivalent of a headload of produce from each village to Kumasi and to each district centre were the two main parameters of accessibility used.

In order to determine whether agricultural development can be explained by accessibility, a cross-sectional framework of analysis was used. Survey data from each holder was collected and averaged within each of the 33 villages. Using regression analysis, the parameters of accessibility were tested as explanatory variables of agricultural development.

In the following, 'accessible' villages are those with low transport charges to Kumasi and their district centres, while 'inaccessible' villages have relatively high transport charges. An 'increase in inaccessibility' refers to an increase in transport charges as survey villages at different distances away from Kumasi are compared.

Survey results

Over half of the smallholders interviewed were female; the proportion of male holders in each village increased the further the village was from Kumasi. Nearly 60 per cent of holders were over 40 years old; this proportion also increased with distance from Kumasi. The average household size in the survey was found to be 4.66 people, and the average holding size 1.68 hectares. Total farm area per holder was found to increase with inaccessibility. This applied to both cocoa and non cocoa holdings.

The major source of livelihood was reported to be food farming for 59 per cent of holders and cocoa for a further 28 per cent; the balance looked to remittances and paid employment.

As a source of livelihood, food farming was found to be relatively more important in the more accessible villages and cocoa in the more inaccessible villages. Non farming jobs were more commonly reported in the more accessible villages. Household labour used in farming was found to rise with inaccessibility when measured either in terms of days worked per person or in terms of days worked per holding. The labour input per hectare tended to fall with inaccessibility which probably reflects the smaller labour demands of the cocoa crop.

Much greater use was made of fertiliser and other modern inputs in the two remotely located savanna zone villages than in the rest of the region. One of these villages was found to have 32 % of the reported extension contact, 65 % of the machinery hire and 75 % of the fertilizer used in the whole study. Even if these two villages are excluded there is nothing to suggest that inaccessibility prevented the use of fertilizer, machinery or insecticide or that it prevented contact with extension workers. Overall, it appeared that the pattern of extension contact was more dependent on the local management and enthusiasm of individual extension workers than on the problems posed by inaccessibility (even though the latter might well hinder the overall efficiency of each extension organisation).

The proportion of holders in a village that applied for loan finance was found to rise with inaccessibility and age. However loan applications were more successfully made by the more accessible villages.

It was found that the proportion of holders growing cocoa, the average crop area per holder and the proportion of farmed area covered by cocoa increased with inaccessibility. No significant relationship was found between accessibility and cocoa sales per grower or cocoa sales per hectare. It was found that women were more successful in maintaining higher cocoa yields.

No evidence was found to suggest that maize yields or food crop farming techniques varied with accessibility. However the data relating to crop yields are difficult to interpret where multiple intercropping is practised as widely as in Ashanti Region. No evidence was found of any significant relationship between accessibility and the ownership of sheep and goats;

one of the most inaccessible villages accounted for a quarter of all sheep and goats recorded in the survey.

The average distance between field and village was found to be 3.9 km; most of this consisted of footpaths. In over 90 % of the households surveyed, the principal means of carrying goods from the field was by headload. Most (57%) holders sold the dominant proportion of their food produce at their house. A further 24 % sold their food principally at the local village market. Cocoa was sold at the village buying posts of the Cocoa Marketing Board at a fixed price set for the whole country.

Over 55 % of all holders sold maize, 36 % cocoa, 17% cassava and 13% plantain. Overall, it appears that accessibility did not explain the proportion of farmers in a village selling food crops. Although the proportion of farmers selling more than 30% of any crop increased with inaccessibility, this may reflect the indirect influence of other factors such as farm size and the use of labour. No significant relationship was found between the sale of maize and accessibility but cassava was sold relatively more frequently in the accessible villages. By contrast plantain was sold more frequently in inaccessible locations. This may have been because plantain was often grown as a cover crop for cocoa.

Transport costs - an explanation for the limited impact

The survey results suggested that variations in accessibility had a relatively minor impact on agricultural sales or farming techniques. If anything, the study found that the more remote villages were more agriculturally developed than the more accessible ones. The only clear disadvantage to the more remote villages was their ability to obtain loan finance.

An analysis of transport tariff data for the movement of wholesale quantities of produce to Kumasi Central Market found that transport tariffs represented only a small component of the final market prices. For example, the average wholesale transport charge as a proportion of market price for maize was 5.3 % (mean distance 120 km), for yam was 5.2 % (mean distance 197 km) and for plantain was 3.5 % (mean distance 116 km). Regression analysis confirmed that transport charges were closely related to travel distance. These figures are

similar to; but a little smaller than the average of 7 to 8 % found by Gore (1978) in his study of marketing in Korforidua the capital of Eastern Region.

Clearly transport charges, as a proportion of final market price, will be dependent on a range of factors such as commodity type, the efficiency of transport and marketing practises and travel distance. It is not unusual for transport costs to amount as much as 20-30 per cent of final market price in Africa. A recent Ghanaian study carried out by the Ministry of Transport found that average agricultural transport costs were much higher for Accra than for Kumasi. Being larger and located on the coast, food transport distances for Accra are likely to be longer. Typical examples of wholesale transport costs, as a proportion of final price, were 11 % for maize (420 km), and 25 % for tomatoes (360 km).

With a knowledge of marketing margins and wholesale transport charges it is possible to estimate how producer prices might decline with increasing distance from market. Assuming that wholesale and retail marketing margins account for about one third of the final retail price (the balance made up by transport costs and the producer price) and, assuming that all producers' prices were set in relation to the Kumasi price, then it may be calculated that farmers located 100 km by road from Kumasi would receive about 7% less for maize and yam and about 5 % less for plantain than those selling direct to wholesalers at Kumasi market. This can only be a very crude indication of the effect of location on producer prices. In practice a very wide spread of prices has been found in the district markets which appear unrelated to transport costs (see the analysis presented below); inevitably this will affect producer prices and may mask the effects of accessibility on agricultural production.

Because 31 of the 33 survey villages had direct road connections and the maximum road distance to Kumasi central market (102 km) was not particularly far, the range of transport costs considered in the analysis was probably insufficient to identify the main disadvantages of poor accessibility. Perhaps a different picture would have emerged if the survey had covered a much greater area.

Food marketing and transport costs

Food marketing in southern Ghana is dominated by a large number of independent operators, most of whom are women. The produce may pass through up to five intermediaries between farmer and consumer. They include rural assemblers (who collect produce from the farmer's house or local market), travelling wholesalers, (who arrange for its transport to town), transporters, wholesalers, and finally retailers. At the major urban markets, retailers of the same commodity will be located together. For each commodity, the wholesalers and retailers form themselves into associations of sellers. They will appoint a 'Yam Queen' or a 'Cassava Queen' to be in charge of the association and represent their interests. These associations enable the retailers and wholesalers to act as a cartel.

At each stage the market operator makes use of economies of scale, particularly the economies of the wholesale movement of produce by truck. There is plenty of scope for monopolistic collusion at all stages of the marketing chain, to the disadvantage of the farmer and final urban consumer. The limits to the exercise of this monopoly buying and selling power is governed by the total costs to the farmer of taking his own produce to market and bypassing all intermediaries. However it is obviously expensive for the farmer to sell a small quantity of his own produce in town. It was found that he must pay between 2 and 2.5 times as much as the wholesaler to the transporter to carry one bag of maize. In addition, he must also pay his return passenger fare, he may have extra expenses for food and he will lose a day's labour on his farm.

In Ashanti Region, only a relatively small proportion of produce is sold directly by the farmer in an urban centre. More often than not the farmer sells his produce to only one travelling wholesaler or rural assembler with whom he has a long standing relationship. In fact, the farmer may have little choice because of an agreement between wholesalers who visit that village and allocate farmers between themselves. This tie may be strengthened by a credit relationship between the farmer and the wholesaler. In most instances, the farmer will be at a disadvantage in bargaining. The wholesalers who trade in the village will travel together and will tend to discuss prices and purchasing arrangements; they will also possess more up-to-date marketing information than the farmer. For many farmers, indebtedness will force them to sell at peak harvest time when prices are low.

The marketing associations can attempt to control urban markets through the enforcement of minimum prices (including actively discouraging the giving of large discounts or 'dashes'). Also the market can be controlled through regulating the amount of produce that is brought in. In Eastern Region Gore (1978) has reported how fines have been imposed on traders and transporters who bring too much of one commodity into the market. Likewise instructions have been issued to retailers not to buy from wholesalers who 'break' the rules. These attempts to control are not always successful and limits are imposed on the levels of retail prices by competition from non-association traders and by those farmers who sell their produce directly on arrival at the lorry parks.

An analysis of the monthly market prices in Ashanti Region demonstrated very considerable variations in prices between markets at the same time. For example it was found that the prices of plantain, cocoyam and tomatoes varied by more than two to one in the different district markets. In one month the price of cassava in one market was reported to be six times the price at another! A number of factors can contribute to the wide range of prices: high transport costs, small volumes, poor price information, commodity perishability and a monopolistic marketing system. However as Table 1 shows transport charges appear to account for only a small proportion of the variability in prices.

Overall it appears that little arbitration takes place between the district markets and other factors besides transport charges (such as poor information and monopolistic marketing structure) are the major determinants of price variation within Ashanti Region.

Table 1
Transport charges as a proportion of the difference between
minimum and maximum market retail prices, September 1978.

| Commodity | Maximum price Cedis | Minimum price Cedis | Distance between markets km | Estimated transport charge between markets Cedis | Transport charges as a % of the difference |
|-----------------------|------------------------|------------------------|--------------------------------|-----------------------------------------------------|--------------------------------------------|
| Maize, 100 kg bag | 120 | 56 | 87 | 3.61 | 5.6 |
| Plantain, 10 kg bunch | 18.6 | 7 | 73 | 0.49 | 4.2 |
| Yam, 100 tubers | 447 | 316 | 89 | 20 | 15.3 |

3 THE NEED FOR IMPROVED ACCESSIBILITY

The relative transport costs of different modes

Where no roads or tracks exist, animals and people may be needed to transport agricultural commodities. However non-motorised transport can be very expensive. In the Ghanaian case study, headloading for a 10 km journey was found to be 15 times the cost of moving goods by truck. In other developing countries, transport by animal carts and pack animals has been found to be around three to four times as expensive as motor vehicles (Clark and Haswell, 1964)

In practice, the relative costs of different modes depends closely on the size of load and distance to be travelled. For very short distance and low volume trips, motor vehicles can be more expensive than headloading. In the Ghanaian study, it was estimated that, even if the roads and tracks were available, distances were too short and the demand too dispersed for trucks to be used economically between farm and village. It is only when goods (and people) are to be transported some distance away from the village/farm area that motor vehicle transport becomes economically viable.

In Asia a wide variety of personal transport aids and intermediate forms of transport are used to transport agricultural commodities, water and firewood short distances in the local vicinity of the village. Apart from the bicycle, these diverse forms of transport are largely unknown

in most of rural Africa and there would appear to be a good prima facie case for their widespread introduction.

Vehicle accessibility

In view of the general high costs of non-motorized transport, vehicle accessibility is critically important to the development of commercial agriculture. However, for most developing countries, it is not known to any reliable degree how far people live from vehicle access or how accessible their farmland is.

An analysis of 22 large scale maps covering 70 per cent of Ashanti Region in Ghana showed that 98 % of the rural population lived less than 2 km from a road or motorable track and only 0.3 % lived further than 5 km from vehicle access. In terms of land area 31 % and 3.3 % was located further than 2 km and 5 km respectively from road access. A study of 25 large scale maps of Kenya showed that 2.5 % of the rural population and 9.5 % of the land area of Kenya was found to be located further than 3 km from vehicle access (Hine, 1984). Because these maps are now rather out-of-date it is probable that vehicle accessibility is better than indicated.

Africa has a greater population density than North or South America, Australia or the Commonwealth of Independent States (CIS) yet it has a much lower road density than any other continent. In terms of road length per unit of agricultural land area, Africa has 0.16 km /sq km, this compares with 0.38 km/sq km for South America, 0.45 km/ sq km for Asia (excluding Japan and the CIS) and 0.52 for the World as a whole. For Africa, it would appear that whilst there are still some small pockets of population that live further than, say, three kilometres from vehicle access, there are still very large areas of land suitable for agriculture which lie considerable distances from a motorable road or track.

The benefits of upgrading versus new road access

In order to assist with planning road investment and maintenance, a number of studies have been carried out by TRRL into quantifying the effects of road surface and alignment on vehicle operating costs. Using the Ghanaian case study data, relating to the transport of

produce from farm to market, changes in vehicle operating costs resulting from the upgrading motorable tracks to a gravel road were calculated, and from this the likely impact on producer prices was estimated. It is assumed that all the benefits result in increased producer prices; the effect of reduced transport costs on farm inputs is ignored. The results are shown in Table 2.

Table 2

The potential improvement in producer prices following road investment

| Average percentage increase in producer price | | | | |
|-----------------------------------------------|--------------------------------------|------|----------|-----------------------------------|
| | Upgrading earth track to gravel road | | | Upgrading footpath to earth track |
| | Maize | Yam | Plantain | Maize |
| 2 km | - | - | - | 4.3 |
| 5 km | 0.08 | 0.11 | 0.09 | 11.4 |
| 20 km | 0.29 | 0.3 | 0.24 | 70.6 |
| 50 km | 0.67 | 0.5 | 0.37 | - |

The figures indicate that upgrading a 5 km earth track will increase producer prices by about one tenth of one per cent. The analysis assumes that both the earth track and the gravel road are fully motorable before and after the improvement. Obviously if the track suffered from impassability during the harvest season then the impact could be much bigger. In the Ghanaian study, seasonal impassability was explicitly considered and little evidence was found to suggest that it had any significant effect on food sales.

Also shown in Table 2 are the estimated impact on producers' maize prices of bringing vehicle access to a village that was previously only connected by a footpath to the road network. Savings in costs can be substantial if the goods collected at the village need to be headloaded on the first leg of a journey to an urban market some distance away. The table shows that it is in the order of 140 times more beneficial to the farmer to have vehicle access brought 5 km nearer to his village (where the alternative is headloading) than to improve 5 km of existing motorable earth tracks up to a good gravel road standard.

Overall, this analysis indicates that improving small lengths of feeder roads which do not have any effect on vehicle access will have little or no impact upon agriculture. However,

over the past twenty years many billions of dollars have been spent by aid agencies on rural access road programmes where the main component has been for upgrading existing access rather than for providing completely new access. Most often the justification has been in terms of an expected impact on agriculture (Hine, 1982); it seems likely that much of this effort has been wasted.

The analysis suggests that resources should be diverted towards bringing new vehicle access to previously isolated villages or to help opening up new areas. Where resources are available, it would appear that small scale spot improvements (particularly to water crossings and low lying areas) to keep vehicle access open are probably the most cost effective measures that can be taken.

It is also important to ensure that the main and secondary road network is kept in good repair. Typically about ninety per cent of the journey distance between farm and final urban consumer will be on the main and secondary road network. A good surfaced road can reduce operating costs by up to half compared with a very poor alternative. Unfortunately, much of Africa's main road network is in need of repair and improvement.

4 THE POTENTIAL FOR REDUCING COMMODITY TRANSPORT COSTS IN AFRICA

There appears to be enormous scope to reduce road freight transport costs in much of Africa without recourse to high technology, expensive equipment or sophisticated management. Research carried out by TRRL in cooperation with the French Research Institute, INRETS (Hine and Rizet, 1991) has shown that long distance road freight transport costs in three African CFA Franc zone countries (Cameroon, Côte D'Ivoire, and Mali) was about five times as expensive as in Pakistan (which in 1986 was about 1.5 US cents per tonne-km). The high rates found in the three CFA countries were also comparable with rates found in other African countries, in particular the rates for international traffic between Zambia, Zimbabwe and neighbouring countries. Likewise there is also evidence to suggest that similar low rates to those found in Pakistan could also be found in India and other Asian

countries. Although the differences in costs and tariffs were somewhat less for two-axle trucks running short distances, even greater differences in tariffs was calculated for three-axle rigid trucks.

A range of factors account for the wide differences in costs and tariffs between Africa and Pakistan. Pakistan gains from low initial vehicle costs, low fuel costs and maintenance costs and from high levels of utilisation. In Pakistan, the freight transport industry is extremely competitive; transporters are very cost conscious and take a wide variety of measures to keep their productivity high. Simple vehicles with four or five forward gears are strengthened to take heavier loads. Annual distance travelled (130,000 km for tractor-trailers and 110,000 for two axle trucks) is much higher than in Africa where tractor-trailers average 50,000 km and two-axle trucks can often be less than 20,000 km. In Pakistan, a sleeping compartment is added so that with two drivers one can sleep whilst the vehicle is in motion. High levels of utilisation are achieved by working night and day and going from job to job for up to three weeks at a time before returning to base.

Freight forwarding agents play a pivotal role in the efficient operation of the industry in Pakistan. In most of the major towns there are ten to twenty agents competing for business. Freight rates are set by the agents in response to supply and demand. The agent will entrust goods to the first operator that accepts the tariff on offer. Here queuing for loads is prevented by the agent; if he sees a surplus of trucks waiting for business he will respond by lowering the rate.

In Pakistan the drivers are given a lot of responsibility to find loads, collect revenue, keep accounts and repair the vehicle. To minimise fuel and maintenance costs they drive very slowly (around 50 kph). The drivers continuously check and maintain their vehicles and, if necessary, make use of the many well equipped small workshops. And, despite night driving accident rates are low.

In much of Africa often very powerful, sophisticated and therefore expensive vehicles are used, and despite higher driving speeds (70-80 kph) vehicle utilisation is low. Night driving is often banned or strongly discouraged. Maintenance costs are high because of the higher

costs of spare parts and the rougher treatment of the vehicles. Old vehicles with high operating costs are kept working that in a more competitive environment would have been scrapped. In the larger firms, drivers have very little responsibility, other than to drive the vehicle; maintenance is carried out exclusively at the owner's workshop.

In much of West Africa, associations of trucking operators keep vehicle utilisation low and prevent competition through a system of queuing for loads (this is particularly the case for inland locations where most food transport is arranged). For example, at the current time in Ghana, virtually all the lorry parks are controlled by one trucking union. It is now common for trucks to wait for one week at a lorry park in Kumasi before being allocated a load.

5 CONCLUSIONS

There are clearly a wide range of measures that can be taken within the general area of transport and marketing that can assist with the development of agriculture in Ghana and more generally Africa as a whole. The Ashanti Region case study has shown that small and moderate changes in accessibility (such as upgrading a few kilometres of feeder roads) would have little impact on agricultural practices and production. However, in view of the large savings in transport costs, vehicle accessibility can be absolutely critical to development of remotely located communities. For a given level of demand, the benefits of five kms of new vehicle access appears to be over one hundred time greater than upgrading the same length of track. Spot improvements to keep vehicle access open on lightly trafficked roads and tracks are the best use of engineering resources.

There is some evidence to suggest that only a very small proportion of Africa's rural population does not have direct vehicle access. However new roads are needed to open up remotely located agricultural areas. The improvement and maintenance of the main and secondary road network remains a problem.

The paper has identified a lack of competition in both food marketing and freight transport as a very important factor inhibiting the development of agriculture. Very large commodity price differences in adjacent markets have been found in Ghana which cannot be justified by transport costs. This suggests a very inefficient marketing structure; better price information, more marketing space (particularly adjacent to lorry parks) and better facilities for non-association traders and farmers (selling their own produce) would help to break down marketing cartels.

In a number of African countries long distance freight transport tariffs have been found to be many times higher than in Pakistan and other Asian countries. Tariffs and costs could be reduced through increasing awareness amongst consignors that substantial reductions in rates are possible, by encouraging more competition through reducing the power of the trucking unions, by giving drivers more training and responsibility and by informing operators of the advantages of slow and careful running.

6 RECOMMENDATIONS

1. Upgrading the surfaces of rural access roads and tracks which do not affect vehicle accessibility will have little impact upon agriculture. Engineering resources for lightly trafficked rural roads should be devoted to providing new vehicle access and to maintaining existing vehicle access. Spot improvements, particularly of water crossings and low lying areas to prevent vehicles becoming bogged down, are an excellent use of resources.
2. Effort should be devoted to identifying and bringing new vehicle access to the small proportion of village communities that remain isolated.
3. Within Africa and the rest of the developing world there are still large areas of good agricultural land which lie a long way from vehicle access and can be developed. New roads have an important role to play in opening up these areas.

4. Food marketing in Africa can be inefficient and subject to monopolistic practices of marketing associations to the detriment of farmers and consumers. Every effort should be made to encourage competition and ensure that facilities are provided, particularly next to lorry parks, for farmers and non-association market operators to sell their produce easily without harassment.

5. In Africa road freight transport costs appear to be very high in relation to Pakistan and the rest of Asia. There is scope to reduce costs by a number of measures including increasing the awareness of all concerned, through driver training and through measures to reduce the power of the trucking unions. Increased competition in freight operations is vital. Of particular concern is the union control of lorry parks and the practice of queuing for loads; it may be that a greater number of smaller lorry parks would be beneficial.

6. Further research is required in many areas. To assist with identifying priorities of rural road construction and maintenance, much more information is needed on measuring exactly how accessible rural communities are. In other words 'How far are they from vehicle access?' and 'When and for how long do roads become impassable?'. There is also a very important research requirement to help understand both how rural transport and food marketing works and how they can be made more competitive and efficient.

7 ACKNOWLEDGEMENTS

The work described in this paper forms part of a programme of research of the Overseas Resource Centre, of the Transport Research Laboratory and was funded by the Engineering Division of the Overseas Development Administration, UK.

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