THE IMPACT OF FEEDER ROAD INVESTMENT ON ACCESSIBILITY AND AGRICULTURAL DEVELOPMENT IN GHANA

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Objectives of the case study

In a cross-sectional study of 33 villages in The Ashanti Region of Ghana, little evidence was found to suggest that agriculture was adversely affected by inaccessibility, apart from some difficulty in obtaining loan finance in the more remote areas. The more accessible villages were observed to have a higher proportion of people employed outside agriculture. The improvement of existing road surfaces was estimated to have a negligible impact on prices paid to the farmer. However, connecting a village to a road head by converting a footpath to a vehicle track was calculated to have a gross beneficial effect in the order of a hundred times greater than improving the same distance of earth track to good gravel road.

1. INTRODUCTION

In order to help with road investment planning in a more typical environment a study of the impact of feeder roads was carried out in the Ashanti Region of Ghana by the Building and Road Research Institute (Kumasi) in co-operation with the Transport and Road Research Laboratory. The study was carried out in the period 1978-1982 for the Ghana Highway Authority as part of its Second Highway Project and was supported by the World Bank.

The purpose of the study was to determine how parameters of rural development (particularly agricultural practises, costs and prices) varied with accessibility within the region. From this it was hoped to infer how rural development would change if access were improved through road investment, and hence lead to better methods of planning rural roads in Ghana and elsewhere.

2. SURVEY BACKGROUND

2.1 The Road Network

Kumasi is the major administrative centre and major market, transport and distribution centre of central southern Ghana and all major roads in the region radiate from there.

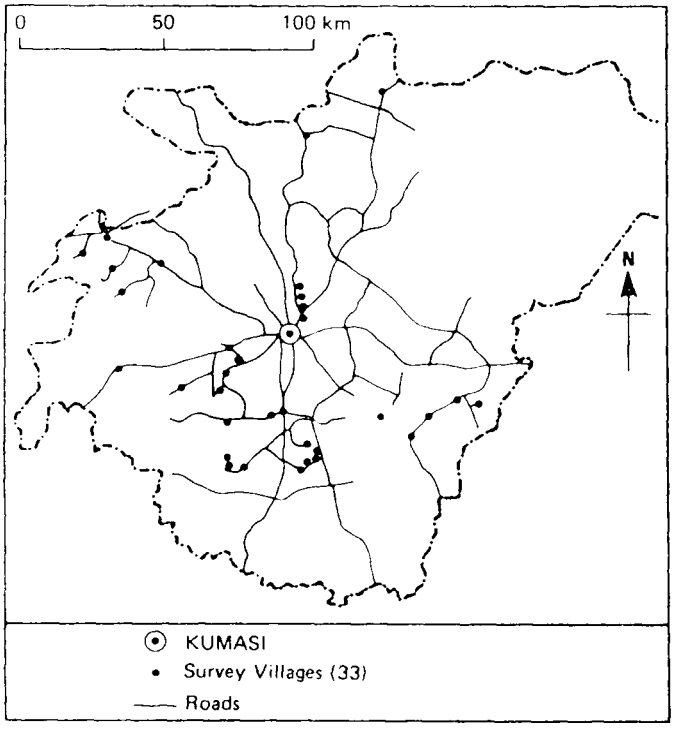
Excluding Kumasi and the Afram plains, i.e. in 70% of the region, there are 4,400km of gravel surfaced roads and motorable earth roads and tracks. Ninety-eight per cent of the rural population lives less than 2km from a road or motorable track but only 0.3% lives more than 5km from a road or track. Thirty-one per cent of the land area of the region lies more than 2km from vehicle access but only 3.3% lies further than 5km from a motorable road or track.

3. SURVEY METHOD

3.1 Definitions and Sampling Frame

Ministry of Agriculture enumerators collected cross-sectional socio-economic data for the study from 491 holders in 33 villages[1]. The sampling frame for the normal Ministry small holders survey was used to keep the data set conformable with other Ghanaian statistics. All but two of the villages in the sample had vehicle access and were between 8 and 102km by road from Kumasi, lying in the cocoa growing forest zone (except for two villages in the savannah to the north of the region). Figure 1 shows the location of the survey villages.

Figure 1: Ashanti region showing location of survey villages



[1] The term 'holder' is used to denote an individual who manages a family farm holding. One holding may represent several dispersed fields or farms but in general totalling less than 20 acres (8 hectares). Data was collected on a holding basis.

3.2 Parameters of Accessibility

Two key parameters were applied in this study. These were:

(i) the transport charges of moving a unit of produce equivalent to a headload of produce from each village to Kumasi,

(ii) the transport charges of moving a unit of produce equivalent to a headload of produce from each village to its district centre.

The transport charges of moving produce from field to Kumasi and from field to district centre were also used as subsidiary parameters of accessibility. The transport charges were found to vary directly with distance travelled.

3.3 Data Analysis

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 this data the parameters of accessibility were tested as explanatory variables of the parameters of agricultural development by regression analysis.

4. THE RELATIONSHIP BETWEEN ACCESS1BILITY, TRANSPORT AND MARKETING

4.1 The Initial Movement and Location of Sale of Crops

The distance between the average field and village was found to be 3.9km; 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. Tractors were used occasionally in the savannah villages.

Fifty-seven percent of 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. Food is mainly sold to travelling wholesalers at the village who arrange for its transport and onward sale in urban markets. It is expensive for the farmer to arrange to sell his own produce in urban markets because not only must he pay his own return fare but transporters charge two to three times as much for individual loads (such as a bag of maize) than any would charge for movement of goods in wholesale quantities.

4.2 Social Mobility and Migration

The level of trip making per holder was found to vary greatly with proximity to urban centres. As might be expected, the most accessible villages demonstrated much higher levels of mobility than the more inaccessible villages. For example one village very close

to Kumasi reported a trip rate to Kumasi of 84 journeys per holder per year. By contrast the most inaccessible villages were found to have trip rates to Kumasi of only one journey per holder per year. The average trip rate of Kumasi for all villages was 19 journeys per holder per year.

4.3 The Impact of Accessibility on Farm Gate Prices

The impact of accessibility on farm gate prices was estimated using Ministry of Agriculture data. Regression analysis confirmed that transport charges were closely related to travel distance. If it is assumed that one third of the Kumasi market price covers wholesale and retail margins and that all producers' prices are set in relation to the Kumasi market price, then it can be calculated that farmers located 100km from Kumasi would receive 6.7% less for their maize than those selling direct to wholesalers at Kumasi market. The calculated decline in farmers prices was little different for yam (6.5%) or for plantain (5.2%) at the same distance from Kumasi.

5. ROAD INVESTMENT AND FARMERS' PRICES

5.1 Improvement from Motorable Earth Track to Good Gravel Surface

In order to assess the relative change in farmers' prices following road investment it is necessary to estimate the proportionate change in transport costs to the transporter following an improvement in the road surface. Unfortunately because of the difficulty in quantifying the engineering standards of motorable tracks and earth roads an exact figure cannot be given and so two separate estimates of the change in vehicle operating costs (following an upgrading of an earth track to gravel standard) were used to calculate reduced transport charges following road investment (see references 1 and 4). Overall it was estimated that transport costs would fall by about 20%.

Table 1: Potential improvement in farm gate prices following a road upgrading from earth to gravel surface

Length of improvement	Average percentage increase in farm gate price		
	Maize	Yam	Plantain
5km	0.08	0.11	0.09
20km	0.29	0.30	0.24
50km	0.67	0.50	0.37

Estimates were made for different commodities of the likely increase in farm gate prices following road improvement. These are shown in Table 1.

These figures demonstrate the only small increases in farm gate prices could be expected from improving the road surface of an existing motorable track - provided that a vehicle could pass easily in the first instance. All the figures here assumed that the transport cost savings would be fully passed on to the farmer, and that none of the benefits from the

road investment would go to the final consumers or to the wholesalers, retailers or transporters.

5.2 An Improvement from Pathway to Basic Motorable Earth Track

Headloading is many times more expensive than vehicle transport, the survey found that the average charge to a farmer for moving one headload of produce from farm to village was Cedis(¢) 2.9 for 3.9km. The impact on farm gate prices of converting a footpath from the village to the road head to the most basic vehicle track can be substantial. Nevertheless though large they might not justify the costs of construction and maintenance. Although a majority of holders preferred to use domestic labour for this purpose 40% of the holders did hire labour when necessary.

If it is assumed that it costs ¢0.5 to move a standard 40kg headload one kilometre then the costs of moving a 100kg bag of maize would be ¢1.25 per km. Assuming that the farmer is able to sell his produce to a travelling wholesaler at the village after the construction of vehicle access, the calculated proportionate increase in farmers' maize prices following the conversion of a footpath to an earth road is shown in Table 2.

Table 2: Potential improvement in farm gate maize prices following conversion of footpath to an earth road

	Length of footpath to be changed to vehicle access		
Improvement in farm gate maize prices	2km	5km	20km
	4.3%	11.4%	70.6%

These estimates suggest that it is in the order of one hundred and forty (140) times more beneficial to the farmer to have vehicle access brought 5km nearer to his village (where the alternative is headloading) than to improve 5km of existing earth roads and motorable tracks up to a good gravel standard.

6. CONCLUSION

Within the range of accessibility considered in the study little evidence was found to suggest that agriculture was adversely affected by inaccessibility. It appears that the more inaccessible villages concentrate more on agriculture than the more accessible villages. The latter have the advantage of their position to concentrate their efforts on non-agricultural sources of income such as marketing, rural industry and the provision of services. Accessibility was also shown to influence strongly the level of passenger trip making.

The only important drawback of inaccessibility to agriculture identified was difficulty in obtaining loan finance. The provision of other modern inputs to agriculture were not

observed to be adversely affected by inaccessibility. 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 may well hinder directly or indirectly the efficiency of each extension organisation.

Very high differences were observed in mobility rates between accessible and inaccessible villages. The average trip rate per year per holder was found to be 19 journeys per year. This varied from a village close to Kumasi which had a trip rate of 84 journeys per year to a remotely located village that recorded only one trip per year. Good communications are clearly very important to social mobility and access to social facilities.

The study found that improved road surfaces (to reduce road roughness) of short lengths of roads and tracks would have a negligible effect on the prices paid to the farmer. However replacing a 5 km footpath between a village and the road by a motorable vehicle track may benefit the farmer through increased farm gate prices by over one hundred times more than improving the same length of poor quality road surface to a good quality gravel road. However these benefits would have to be carefully weighed against the cost of construction.

Overall the figures indicate the advantages of ensuring that all villages have direct vehicle access. The quality of the road surface is of minor importance. From the points of view of agriculture, investment in bridging, drainage work and other small scale remedial work to extend vehicle access and keep routes open to vehicle traffic probably represent the best use of scarce engineering resources

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