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Vol XXIII  
No. 2

ISSN 0019-5014

APRIL-  
JUNE  
1968

# INDIAN JOURNAL OF AGRICULTURAL ECONOMICS



INDIAN SOCIETY OF  
AGRICULTURAL ECONOMICS,  
BOMBAY

# ECONOMICS OF MODES OF TRANSPORTATION OF FOODGRAINS IN RURAL INDIA

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## I

### *Food Transporting System*

In respect of transportation of foodgrains in India, three broad features of the transportation system in the country may be distinguished : (i) a thin grid of low capacity routes blanketing each food producing and food consuming area, (ii) a scattering of focal points within each of these grids that serve as collection and distribution centres, and (iii) a loose network of high capacity routes that connects the collection-distribution centres with major cities. Each of these links is an essential ingredient of the national transportation system, and its effectiveness is no greater than the effectiveness of its weakest link.

The transport grid in the food producing areas in India is a weak link in the food transporting system of the country. It is unfortunate that the critical importance of the transport grid is recognized only for the urban, food consuming areas in India but not for the rural, food producing areas. The objective in each type of region is the same—convenience in marketing or acquiring products, whether it be the white collar going to work to sell his services, or the farmer taking his produce to market and picking up his supplies. In rural or urban settings, transport alone can break isolation, and in its absence the individual will not have the incentive to produce or to purchase more than the minimum. The rural transport network is, thus, of crucial importance in the food supply problem. Farm operations are, by their very nature, geographically widespread. Unless it is reasonably convenient for the farmer to exchange surplus crops for consumer goods, he lacks an important incentive to exploit the full potential of his land. Lack of an efficient rural transport network may be the real limiting factor in attempts to increase agricultural productivity in India and several other developing countries (1).

### *Products Carried, Types of Roads and Modes Employed*

This paper reviews the transport grid in the food producing areas in India, i.e., the rural roads and the transport modes presently employed on them, with special reference to the market roads and the bullock cart which together constitute the most common feature of the transport grid.

The production of foodgrains in India is mostly the production of cereals like rice, wheat and sorghum and non-cereals like pulses.<sup>1</sup> Farming here is carried on very small holdings, and is largely subsistence farming. Nevertheless, marketable surplus of over 25 million tonnes of foodgrains are carried every year from the farms to the markets in India.<sup>2</sup>

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\* The views expressed are the personal views of the author.

N. B.: Figures in parenthesis refer to the bibliography given at the end of the text.

1. The production of rice, wheat, sorghum and pulses accounted for about 80 per cent of the total production of foodgrains in recent years.

2. It is estimated that the average percentage of marketable surplus for all-India is 31 in the case of rice, 37 in wheat, 24 in sorghum, and, perhaps, about 50 in pulses.

The estimate of marketable surplus of foodgrains is based on the estimates of percentage of marketable surplus for different foodgrains formulated by the Directorate of Marketing and Inspection, Government of India (3, 5, 6, 7 and 8).

The Directory of Wholesale Agricultural Produce Assembling Markets in India (2) lists 3,405 assembling markets, of which 1,375 handle paddy/rice, 1,367 handle wheat and 843 sorghum, a great many of these dealing in pulses and other foodgrains like maize, millets, *ragi*, etc., as well. These markets are located at some distance from the farms, their distance being known to vary from about 2 kms. to over 60 kms.<sup>3</sup> The roads which connect the farms with the assembling markets are as a rule *kacha* roads.<sup>4</sup> The chief means of conveyance over these roads or tracks are the bullock carts. Pack-animals such as donkeys, mules, bullocks, camels and buffaloes also move over them as beasts of burden. Paddy and rice are carried by men in head-loads or suspended baskets along footpaths in some areas of States like Madhya Pradesh (3). Donkeys are stated to be a common means of transport for wheat in some parts of northern India such as Gurdaspur and Amritsar districts of Punjab. They are used chiefly in the monsoon because the bullocks are needed for agricultural purposes and also because of the bad condition of the unmetalled roads and the cessation of vehicular traffic. The average donkey-load is about  $\frac{1}{2}$  quintal. Mules are occasionally used in the foothills of the Himalayas and carry twice as much as a donkey. Camels are the most important means of transportation in Rajasthan and Haryana. In these areas, the *kacha* roads are poor owing to the soil being light and friable and the camels are highly suited to such unmetalled roads. The average carrying capacity of a camel varies from about 2 to 3 quintals. Of late, trucks have also come on the scene, though in small numbers, for transporting farm produce to the markets in States like Punjab, Madhya Pradesh, Mysore, etc. A very recent development in the field of transportation is the use of tractor-trailers. In Ferozpur and Bhatinda districts of Punjab, where mechanical cultivation has been introduced on big holdings, transport by tractor-trailers has assumed great importance. The cultivators who possess their own tractors and trailers transport their produce to the markets in the tractor-trailers(5).

## II

### *Adequacy of Rural Roads*

Generally speaking, the roads, existing and planned, connecting the villages in India where most of the foodgrains are produced, and the main markets, may not be considered inadequate, in so far as the total road length is concerned(9). A recent study (10) made under the auspices of the Joint Technical Group for Transport Planning, Planning Commission has, however, shown that there are areas important from the point of view of food production and food surpluses, where the road mileage is well below the average. For instance, it has been noted that in Andhra Pradesh 245 villages in Nalgonda district, 51 in Krishna district, 17 in West Godavari and 36 in Guntur (districts with large rice surpluses) are over 16 kms. from a surfaced road. In the case of Madras State, it is stated that Thanjavur district, the granary of the South, has only 21 kms. of road per 100 square kms. and the corresponding figures for the rice surplus districts of Tiruchirapalli and South Arcot in the State are even lower at 13 kms. and 14 kms.

3. The distance varied from 2 kms. to 20 kms. in the case of the 42 sample movements of paddy/rice investigated by the Directorate of Marketing and Inspection in 1959-60 (4). The distance in the case of wheat may be up to 30 kms. in large surplus tracts and up to 60 kms. or more in areas where production is less and scattered (5).

4. A general term applied to unmetalled or unsurfaced roads, *i.e.*, roads constructed of earth, gravel, moorum and stabilised soil.

respectively. The rural roads, particularly the rural market roads, are at best fair weather roads, and are in a bad state during the rainy season. They cry for badly needed culverts, sometimes better surfacing and even realignment. The National Council of Applied Economic Research has noted that the road alignment in Thanjavur district is tortuous and circumambulatory, but due to the high cost of land there, straightening out of alignments would now be a costly process. Nevertheless, this is a problem that has to be faced if the road system is to handle larger volumes of traffic anticipated in future (11, p. 20).

### *Types of Roads and Their Serviceability*

The unsatisfactory condition of rural market roads has been reported from several States. The condition of roads in Maharashtra State, as it appears from a survey of Regulated Markets in that State in 1964-65 (12) is revealing. It is seen that only one-fourth of the roads connecting villages to the markets<sup>5</sup> in Maharashtra State are main roads maintained by the State Public Works Department, three-fourths being village roads, cart track, foot track, etc., which presumably are left to the care of local authorities like panchayats. It is also seen from the survey that in only one-third of the villages in that State, traffic is possible throughout the year. In about 12 to 20 per cent of the villages in the State, the traffic in sorghum, wheat, rice and other farm produce is interrupted during monsoon due to flooding of rivers and nallahs. In about 35 to 45 per cent of the villages, the road links become muddy and unserviceable during monsoon.

### *District Road Plan*

Of late, the need for construction and improvement of village roads has received much public attention in the country. Voluntary contributions of the people in the villages have helped to build up a considerable number of unsurfaced roads, but these have tended to deteriorate rapidly, without proper maintenance. It is now felt that the village approach roads constructed through local efforts should form part of a larger area plan (district road plan) which provides both for continuous maintenance and for gradual changeover to higher specifications. In pursuance of a recommendation made recently by the Committee on Transport Policy and Co-ordination (13, p. 67), the Central Government has suggested to the State Governments to consider earmarking for rural roads 20 per cent of the total allocation for roads in the State Plans. The Committee has urged the preparation of district road plans, so that within the framework provided by the National and State Road Plans, roads connecting market centres, small towns and villages in the different districts could be planned and executed in a systematic manner. Some progress has been made in the preparation of district road plans, but a lot still remains to be done. The preparation of district road plans would facilitate in each area of the country development of an integrated economy of its own. It may be mentioned in this connection that the overall objective of development of an integrated economy should not be lost sight of when special road programmes are conceived of in this country and sought to be pushed through to serve different objects in view, such as the programmes of inter-State

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5. As stated earlier, the markets surveyed include only the Regulated Markets in Maharashtra which in 1963-64 handled 1,45,400 tonnes of paddy and rice, 1,09,300 tonnes of wheat, 3,81,600 tonnes of sorghum and 3,15,000 tonnes of pulses (12).

roads, iron ore roads, forest roads, fisheries roads, and sometimes roads for providing unemployment relief.<sup>6</sup>

### III

#### *Bullock Cart, the Most Common Mode*

Of all the modes of transport currently employed on the rural market roads, the bullock cart is the most common mode. A recent study of the transport of rice, wheat and other farm produce in one of the districts of Punjab (14) has estimated that of the total produce transported by different modes, the bullock cart accounted for 70 per cent of the total produce transported. Next came tractor trolley with 18.2 per cent followed by donkeys 5.1 per cent, truck 3.7 per cent, camel 2.5 per cent and tonga 0.5 per cent. The study observes that the donkeys are used mostly in the water-logged areas of Ferozepur district, trucks by big landlords with farms by the side of metalled roads and tongas by small cultivators.

#### *Case Studies by P.E.O.*

The Programme Evaluation Organisation (P.E.O.), Planning Commission, conducted in 1962-63 some case studies (15) of the role of bullock carts and trucks in rural transport in 5 selected wholesale markets in 5 different States, viz., Sirhind in Punjab, Gorakhpur in Uttar Pradesh, Lasalgaon in Maharashtra, Sainthia in West Bengal and Tindivanam in Madras. These markets handled varying quantities of rice, wheat, sorghum, pulses and other farm products. Rail traffic from the farms to these markets was small or nil, except to the Gorakhpur market where rice to rice mills and cash crops like linseed and mustard moved largely by rail. Barring Gorakhpur, the proportion of road traffic to the markets varied from 76 per cent to 100 per cent of the *total traffic*. Of the *total road traffic*, the proportion of traffic moved by bullock carts has been estimated to vary from 58 per cent to 96 per cent. The P.E.O. notes that the share of carts as compared to that of trucks has witnessed a decline over the period 1949-50 to 1959-60 in four markets, the decline being very sharp in Gorakhpur, significantly large in Sainthia and Lasalgaon, and not significant in Tindivanam. The main reason for the decline is stated to be the rise in the volume of traffic and the availability of *pucca*<sup>7</sup> roads on which trucks could ply. In Tindivanam, however, in spite of the entire traffic being on *pucca* roads, the transport of paddy and other produce from the farms to the markets continued to be the stronghold of carts. It is reported that trucks in these areas are generally more interested in longer hauls than in 'local' traffic. It is also stated that the share of trucks is stated to be generally higher in higher distance groups in all the four markets. Trucks handled about 90 per cent of the traffic originating from points between 15 kms. and 20 kms. away in Sirhind and 95 per cent to 100 per cent of that coming from beyond 30 kms. in Gorakhpur. All the traffic from beyond 40 kms. in Sainthia came by

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6. The Sub-Panel on Transportation of the U. S. President's Science Advisory Committee has suggested a system analysis of transportation in relation to food production and distribution. The Sub-Panel has also suggested a five-year programme for India estimated to cost Rs. 230 crores (including a foreign aid of \$200 million for imports of trucks, road machinery, and equipment for augmenting India's vehicle production capacity) for providing 400,000 kilometres of rural market roads and an unspecified number of trucks in her intensive agricultural areas (1, pp. 589-592).

7. A general term applied to metalled or surfaced roads, i.e., roads constructed of waterbound Macadam or black-top surface or cement concrete surface.

trucks. On the other hand, all the traffic from within 8 kms. from Sirhind and Sainthia came by carts.

#### *Characteristics of Bullock Carts*

Most of the bullock cart traffic reaching the markets was farm produce carried in the producers' own carts, hired carts forming only 3 per cent to 23 per cent of the total carts in the markets surveyed. The carts ply at low speeds, ranging from 2-5 kms. per hour in Gorakhpur in Uttar Pradesh to 5-6 kms. per hour in Tindivanam in Madras. The capacity of the bullock cart ranges from 0.4 tonne in Sainthia in West Bengal to 0.9 tonne in Sirhind in Punjab, but 23 per cent to 69 per cent of the carts carried less than three-fourths of their capacity; and the carts were put to use for only 3 to 13 days in a month. In most of the markets, the carts were used less for marketing of farm produce, and more for other agricultural uses like carrying fertilizers and manures to the fields, fodder from distant fields, etc.

An important characteristic of the bullock cart in India borne out by the P.E.O. studies is its responsiveness to demand. The carts are put into service or withdrawn depending on the demand for them. This characteristic of the bullock cart may be noteworthy, in the context of the abundance of men and animals that could be engaged on this primitive mode of transport.

#### *Conclusions of the P.E.O. Studies*

Notwithstanding several instances of penetration of motor trucks in rural areas, the broad conclusions from the case studies of the P.E.O. have been as follows :

- (i) The bullock cart continues to occupy an indispensable place in the rural economy because the villages are mostly connected with wholesale markets through *kacha* roads, the marketable surplus per household is small, and the cultivators use the carts for various agricultural uses besides marketing, and
- (ii) Trucks are not likely to make any major impact on rural transport. A major shift in the use of trucks can come only with the necessary improvements to roads, and also structural changes in the unit of farming and marketing.

#### *Conclusions of the National Sample Survey*

A Report recently put out by the Indian Statistical Institute on non-mechanised transport in India (16) in the Fifteenth Round of the National Sample Survey concludes that rural transport is seldom a principal activity either for the men who are engaged on it or for the animals who supplied the motive power. The Survey showed that 73 per cent of the rural transport surveyed were animal drawn, and in nearly 90 per cent of the cases, the animal drawn transport was only a subsidiary activity. As for the animals (bullocks and buffaloes), the motive power provided by them amounted to only about 0.1 per cent of the total animal labour days provided by 70 to 80 million working animals in rural India. These working animals worked only about  $3\frac{1}{2}$  days in a week on an average.

### *Improvement of Bullock Carts*

The reality of the situation in regard to rural transport in India, as it would appear from the P.E.O. studies and the National Sample Survey, seems to have been missed, however, in recent studies of transportation in agricultural areas in India, as also in some global studies of the subject (1 and 17). The bullock cart in India cannot be wished out of existence, now or for many years to come. The indispensable position of the bullock carts in the rural economy is a fact to be reckoned with. Measures that should be considered for the improvement of the bullock cart have been referred to in the transportation study (10) of foodgrains by the Joint Technical Group for Transport Planning, as also in some earlier studies (17 and 18). Two studies (19 and 20) undertaken by the Central Road Research Institute on the use of tyres and ball bearings by bullock carts conclude as follows :

- (i) The test results indicate the superiority of the pneumatic tyred carts on dry earthen tracks, wet sandy track, and for those with shallow mud. For deep muddy tracks, bullock carts with conventional wooden or iron tyred wheels were found more efficient.
- (ii) The life of the axle and hub of the bullock cart increases manifold by the use of ball bearings as compared to the life with bush bearings. The ball bearings safeguard the axle and the hub from wear and tear considerably.

On the basis of experiments, it has been shown that provision of pneumatic tyres could lead to an increase in the speed of bullock carts by about 20 per cent (3, p.273) and their capacity by about 50 per cent (14, p. 11). The ball bearings prolong the life of the cart. The suggestions made for the improvement of bullock carts have often come from quarters concerned with maintenance of roads, particularly surfaced roads which are badly damaged by iron tyred bullock carts. The damages caused to roads in India are estimated at Rs. 230 per cart per annum (3, p. 273). With an estimated 12 million carts in India (13, p. 8), the total cost of damages may be imagined.<sup>8</sup>

### *Summary*

To sum up, rural transport, *i.e.*, transport from the farms to the markets by bullock carts over market roads, constitutes a weak link in the food transporting system in India. The weakness in the link arises from the bad condition of rural roads which are particularly unserviceable during the rainy season. The bullock cart still thrives, and is likely to continue to play its role in rural transport. Motor trucks are not likely to make an impact in rural transport so long as structural changes in Indian farming do not take place and the market surplus per farm is small. On the other hand, bullock carts are anyhow required to be employed for other agricultural purposes besides marketing, and cart transport is just a subsidiary activity for the men and animals engaged on it. Recent studies indicate the need for improvement of rural roads and improvement of bullock carts.

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8. In Madras State and Pondicherry, the National Council of Applied Economic Research has estimated that in 1960-61 the bullock cart traffic per day in gross tonne kms. per road km. came to 477 on National Highways, 637 on State Highways, 464 on Major District Roads and 385 on Other Roads (11).



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