

## **A COMPARATIVE ANALYSIS OF TRACTOR USE IN BORNO STATE OF NIGERIA IN 1984 AND 1998**

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### **Abstract**

The paper compares the levels of tractor use in both public and private sectors in Borno State, Nigeria in 1984 and 1998. The major tractor operations performed in 1984, namely disc harrowing and disc ploughing, were still the important operations carried out in 1998. The available tractor makes and models rose from 12 and 31 in 1984 to 16 and 61 in 1998 respectively. Despite this increase, the specific tractor population density (STPD) decreased from 0.28 in 1984 to 0.22 in 1998. Also, there was a decrease in the specific tractor wattage from 16 W/ha in 1984 to 12 W/ha in 1998. This means that farm mechanization suffered a setback during the 15-year period, with fewer functional tractors and less power available per 1000 ha of cultivated land. The major problems of tractor use in the state were high overhead cost, lack of spare parts of some makes and poor operation skills. Despite these odds, there was an appreciable improvement in tractor maintenance culture by both private and public sectors in the state during the 15-year period. The STPD and tractor use need to be increased so as to uplift farm mechanization in Borno State.

### **1. Introduction**

One of the major problems of food production in many developing countries is that, improvements in farm mechanization do not match with the increasing population growth rates. The implication of this situation means that even though the agricultural labour force increases, most farming operations are still performed using small hand tools/implements. What consequently follows is marginal increase in food production due to increased participation and not due to enhancement of farming techniques.

The agricultural tractor is the backbone of farm mechanization and the density of tractors in a country or a region corresponds directly to its level of mechanization. For instance, between 1950 and 1960 the population of tractors increased by 250% in Turkey, while the total area under cultivation increased by 60% (Özmerzi and Gökcebay, 1986). In Nigeria, the specific tractor population density, STPD (i.e. the number of functional farm tractors available per 1000 ha of cultivated land) was 0.30 in 1981 (FAO, 1985). If one considers the estimated number of tractors available in 1996 as reported by FAO (1997), the STPD after this 15-year period comes merely to 0.36. These values are negligible when compared with the corresponding values of 3.6 and 8.2 for India and 10.2 and 11.2 for Brazil for 1981 and 1996 respectively.

Farm mechanization in some rapidly developing countries like China, Brazil and India is propelled by large increases in the number of tractors that are 100% indigenous. For instance, as at 1994 there were over 10 manufacturers of local wheel tractors in India (Verma and Singh, 1994). In Nigeria, economic recession has forced the two tractor assembly plants available (Fiat in Kano and Steyr in Bauchi) to stop production (Holtkamp, 1990). Currently, these plants are merely engaged in tractor rehabilitation. The major problems associated with

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tractorization in almost all the states in Nigeria, for instance, are high overhead costs due to poor maintenance, unskilled operators and low levels of tractor use (FAO, 1985).

Borno State is one of the 36 states of Nigeria and is located in the North-Eastern part of the country. Prior to the split of the state into two in 1991, it was the largest in the country with a land area of about 11.66 million ha, which is 11.8% of the total area of the country. Even after the split, it is still one of the largest states in the federation with an area of about 6.94 million ha. The state is agrarian in which millet, guinea corn, cowpea and maize are grown in large quantities. However, land utilization in the state has been very poor. Two main reasons can be attributed to this – harsh weather conditions and low level of agricultural mechanization.

For the greater part of the year, the weather in the state is hot and dry with low level of rainfall. Generally, the rainy season spans from June to September. The southern part of the state experiences more rainfall than the northern part. The average annual rainfall and daily minimum and maximum temperatures of Maiduguri (located approximately in the centre of the state) are 558 mm and 20°C & 35°C for the period 1988 – 1997. This paper aims at assessing improvements or otherwise of tractor use in Borno State between 1984 and 1998.

## **2. Methodology**

The results presented in this paper are based on two surveys conducted in 1984 and 1998. In both cases, the study covered all the public and private organisations that employed tractors for agricultural operations in Borno State. Questionnaires were used to collect information on the population, sizes, makes, models, conditions and ownership of tractors, as well as the operations they performed. The data obtained were analysed using descriptive statistics.

## **3. Results and discussion**

Table 1 shows the land use in the former and present Borno State. Tractor statistics for the state in 1984 and 1998 are presented in Table 2. The table shows an increase in the number of makes and models during the period under consideration, from 12 and 31 in 1984 to 16 and 61 in 1998 respectively. The common tractor makes available in the state were Fiat, Massey Ferguson, Steyr and Ford. Despite these increases in makes and models, there was a decline in the specific tractor population density (STPD). In 1984, the STPD for the state was 0.28 and the corresponding figure in 1998 was 0.22, which is a decline of about 21%. Both figures were lower than the national STPD estimated at 0.36 in 1996 (FAO, 1997). This indicated that tractorization in the state has remained very low for the 15-year period under review. This is in spite of the various government policies that are geared towards increased food production to cater for the teeming population that increases at 3%. Table 1 shows that in 1984, 16% of the total land in Borno State was under cultivation, whereas the corresponding figure in 1998 was 26%. This increase could be attributed to increase in the farming population, rather than to increase in tractor use. The major problems of tractors identified earlier are still valid in Borno State, in addition to the proliferation of tractor makes and models. Spare parts are

expensive and not readily available, especially those of the rare tractor makes that were imported long ago.

The level of tractor utilization in 1998 was not different from what it used to be in 1984 (Table 2). Due to the nature of soils found in this area (sandy loam and clay), only disc harrowing and disc ploughing were performed in the state. The next most important operation after seedbed preparation in which tractors are used is threshing of staple crops (guinea corn, millet, maize and cowpea). For this operation, the tractor PTO (power take off) shaft is used to operate stationery threshers. The least performed operation by tractors in Borno State for the period under review was transportation of farm inputs to the farm and harvested produce from the farm. All other field operations – seeding, weeding, fertilizer application, spraying, harvesting, etc. are almost entirely not tractorized.

**Table 1: Land use in former and present Borno State (in ha)**

Land use	1984 (former Borno)	1998 (present Borno)
Area under cultivated crops	1, 825, 370 (16%*)	1, 794, 400 (26%)
Grazing area	1, 159, 000 (10%)	1, 312, 300 (19%)
Area covered by rocks, mountains, lakes, human dwellings, etc.	800, 000 (7%)	479, 100 (7%)
Area available for expansion and farm development	7, 874, 530 (67%)	3, 357, 700 (48%)
Total	11, 658, 900 (100%)	6, 943, 500 (100%)

\* Percentage of total area

Source: Ministry of Agriculture and Natural Resources, Borno State.

**Table 2: Tractor statistics and uses in Borno State**

Item	1984 (former Borno)	1998 (present Borno)
Total number of tractors	1311	610
Number of tractor makes	12	16
Number of tractor models	31	61
Functional tractors (% of total)	39	65
Private tractors (% of total)	41	52
Public tractors (% of total)	59	48
Standard tractor population density	0.28	0.22
Specific tractor wattage	9	12
Major operations performed in order of decreasing importance	Disc harrowing, disc ploughing, threshing, transportation	Disc harrowing, disc ploughing, threshing, transportation

Similar to the STPD, the specific tractor wattage, STW (the total power of functional tractors available per ha of cultivated land) also recorded a decrease from 16 W/ha in 1984 to 12 W/ha in 1998 (Table 3). An STW of either 16 or 12 W/ha is too low compared to the generally accepted minimum level of about 400 W/ha for obtaining reasonable crop yields in developing countries (Giles, 1975).

Table 4 shows the conditions of farm tractors in Borno State for 1984 and 1998. Generally, the state had more functional tractors in both the public and private sectors in 1998 than in 1984. Better maintenance is being practised these days as a result of the economic hardship experienced in recent years. New tractors have become very expensive to acquire, hence tractor owners are forced to maintain their fleet better. It can be noted from Table 4 that the private sector had higher percentages of functional tractors in both 1984 and 1998 than the public sector. For instance, in 1998, 75% of private tractors were functional, as against only 53% in the public sector. This asserts the need for the state government to assist private farmers in the acquisition of more tractors so as to uplift agricultural tractorization in Borno State.

**Table 3: Distribution of tractors by engine power**

Power range, kW	Percentage of available tractors	
	1984	1998
40 – 60	98	90
60 – 80	0	5
80 – 100	2	5
Total	100	100

**Table 4: Percentage of functional (F) and non-functional (NF) farm tractors in Borno State in 1984 and 1998**

Tractor ownership	1984		1998	
	F	NF	F	NF
Private	61	39	75	25
Public	24	76	53	47

#### 4. Conclusion

The level of tractor use in Borno State in 1998 was not significantly different from what it used to be in 1984. The farm operations performed by tractors remained the same over the 15-year period. These were mainly disc harrowing and disc ploughing. Full benefits of tractors are not fully exploited and tractor power is wasted across the state. Thus, there is a need to diversify tractor use to include other farm operations (such as seeding, weeding and spraying) as well. The STPD values for the state for both 1984 and 1998 were lower than the national

value and it decreased by 21% during the period under consideration. Also there was a 25% decrease in the STW, which shows that there was no improvement in farm mechanization over the last 15 years. Both the STPD and the STW need to increase appreciably to cater for the growing population of the state inhabitants.

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