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A Survey of Farm Machinery Utilization and Maintenance in Ebonyi State.

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Abstract

A survey of farm machinery utilization and maintenance for increased Agricultural production in Ebonyi State was carried out with emphasis on tractors and implements. The relative status and performance of different makes of tractors were determined. The survey revealed that thirty-nine (39) tractors are owned by the Federal Government, sixty-one (61) are owned by the State Government, forty (40) tractors by Local Government and fifteen (15) are owned by Private Organizations. Eighty-six (86) of the tractors were acquired through direct purchase and fifty (50) through second hand purchase. Seventy-five (75) of the organization surveyed have standard functional workshop but only 50 are adequately equipped. Ninety- eight (98) of the workshops obtain their spare parts from open market and other (80) are available with difficulty. One hundred and ten (110) of the tractors surveyed are used for farming operations while the remaining forty-five (45) are used for haulage of farm products. The survey shows the different makes of tractors available in Ebonyi State to include: 20 Fiats, 6 Fords, 2 David Browns, 4 John Deores, 4 Internationals, 76 Steyrs, 28 Massey Fergusons, 9 Landinis and 6 Hollands. Twenty-five (25) of the tractors are 2-wheel drive, one hundred and twenty-three (123) are 4-wheel drive and 6 are track lying. 72.3% of the tractors surveyed are serviceable. Most of the causes of tractor breakdown are due to poor storage facilities, lack of genuine spare parts, obsolete machinery, careless operators, over-loading, mismanagement, poor maintenance and lack of funds. The negative attitudes to maintenance of tractors according to the people were attributed to the high cost of spare parts and unavailability of skilled or experienced mechanics. It is therefore recommended that storage facilities should be provided for the machineries and government should always organize programs such as workshop and seminars on farm machinery utilization and maintenance or rehabilitation to improve private/cooperative farmers' knowledge. They should also provide financial assistance to the private or cooperative farmers.

Keywords: Farm machinery, tractors, implements, utilization, maintenance, increased crop production.

INTRODUCTION

Farm machinery consists of complex machineries which can be used to prepare land for planting, fertilizer application, spraying, harvesting, processing, milking, hatching of eggs, etc. According to McColly and Martin (1955), farm machinery is a collection of machines for agricultural operations and includes all types of implements and devices for applying power on the farms. These include ploughs and harrows, seeders/seed drills and planters, cultivators, harvesters, haying machines, processing machines such as silage cutters, feed grinders, cotton gins, trucks and tractors.

The utilization of machines in agricultural production has been one of the outstanding developments in American Agriculture (Yohonna, 2001). The burden and drudgery of farm work have been reduced and the output per worker has been greatly increased by the use of machines. Some of the increased production that has been realized during the past century was credited to better crop varieties, more effective use of fertilizers, improved cultural practices and more essentially, the increased utilization of non-human energy and more effective machines and implements (Kepner et al, 1978). According to Whitney (1988) during the early stages of agricultural mechanization, there was a fall in the size of the total work force and was accompanied by an increase in tractor ownership.

Hori (1974) observed that human power accounts for over 90% of farm power inputs in Nigeria. He noted very little investment on farm tractors, machinery and related implements. Makanjuola (1981) opined that agricultural mechanization must be effectively introduced in Nigeria farming system if meaningful increase

in agricultural production can be achieved. He emphasizes limitations associated with farm implements powered by human muscles.

The constraints that hinder efficiency in tractor operation in Nigeria were examined by Mabawonku (1984). These were found to be mismanagement, negligence and poor maintenance. Obviously, adequate maintenance is a strategy for improving the life and efficiency of farm machineries for maximum production. Although machines are thoroughly tested and inspected by the manufacturers before selling it and by the purchaser before it is put to use. When it is used it will be subjected to wear and tear, hence proper attention should be given to protect the machine and its components from undue wear and failures. A proper attention means adequate lubrication, cleaning, timely inspection and systematic maintenance. Maintenance of a machine means effort directed towards the upkeep and repair of that machine. Every machine will require maintenance even if it is best designed; hence the maintenance must be done at such a time when it may have least disruptions in its utilization. Usmand and Bobboi (2003) observed that the main cause of breakdown or failure in farm tractors is the failure to adopt preventive maintenance practices and also lead to high operating cost. Tuft and Hitts (1982) reported that most machines of the same make a nd model are designed to have some performance and utilization efficiency and life span but the difference observed in practice are due to the operators, environmental and maintenance practices.

Consequent upon these backgrounds, there is the need to carry out field investigation of farm machinery utilization and maintenance in Ebonyi State. Data are not available to describe the status of farm tractors and implement inventory, utilization and their efficiency in Ebonyi State. Therefore, there is the need to identify the tractors and implement utilization and their maintenance, and evaluate their present conditions and requirements for enhancing their efficiency.

The main goal of this research work is to examine the relative importance of farm machinery utilization and maintenance practices in the three zones of Ebonyi State. The specific objectives are as follows:

- To examine the extent of farm machinery utilization within the government and private organizations in Ebonyi state.
- To assess the extent of maintenance of the machineries used by the government and private organizations of the state.
- To identify the tractors statistical distribution by makes, types, ownership and use in Ebonyi state.
- To determine the present conditions of the tractors in order to identify the extent of their problems.
- To make recommendations on the ways that will enhance farm machinery utilization and maintenance in Ebonyi State.

MATERIALS AND METHODS

Questionnaires were developed and distributed to mechanized agricultural organizations in the study area to collect the necessary data. The questionnaire consists of 3 types. Type 1, sought general information on farm power systems and machinery including number of each farm machinery available in an organization, management systems and availability of skilled operators. Type 2 questionnaire sought information on standard and equipped workshops, availability of spare parts, availability of skilled mechanics and maintenance practices. Type 3 sought information on the farm machinery inventory such as tractor and implements types, makes, and condition and storage provisions

The questionnaires were distributed to three zones of the study area, namely: Ebonyi North, Ebonyi South and Ebonyi Central. The division was based on the three Senatorial Zones of the state for effective management and study. The questionnaires were administered to mechanized agricultural departments, local government council's secretariat, Ministry of Agriculture, Ebonyi State Agricultural Development Programme (EBADEP), farm mechanization agencies, co-operative farmers and other private organizations.

Data Collection and Presentation

The data were collected from primary and secondary sources. The primary sources of data include information obtained from the structured questionnaire (type 1, 2 and 3), personal contact,

oral interview and observations. The secondary sources of data were obtained from Agricultural documents such as journals, bulletins, conference papers, newsletters, workshops/seminar papers etc.

The data obtained from the study are presented in tabular form using descriptive statistical method.

RESULTS AND DISCUSSION

Table 1 shows the farm machinery inventory according to the three zones of Ebonyi State. It was observed from the inventory that Ebonyi North Zone has the highest number of tractors and implements followed by Ebonyi Central and Ebonyi South least. The general terms of reference are the ownership pattern, age, and mode of acquisition, maintenance attitude, maintenance workshop, spare parts and the task performed by tractors.

Table 1: Farm Machinery Inventory based on the three zones of the study

Machinery Type/Implementation	Ebonyi North	Ebonyi South	Ebonyi Central	Total
Tractors	65	34	56	155
Ploughs	54	48	61	163
Harrows	52	43	60	155
Cultivators	50	26	30	106
Ridgers	30	53	42	122
Planters	34	38	20	92
Bulldozer	41	16	12	69
Scrapper	2			2
Graders	8	6	4	18
Seed drills	32	28	26	86
Fertilizer broadcaster	26	21	13	60
Sprayers	102	98	65	265
Mowers	20	15	10	45
Harvesters	35	20	21	76
Rice threshers	41	32	28	101
Maize shellers	100	17	25	142
Grain/seed winnowers	33	22	26	81
Trucks	122	58	63	243
Total	**1118**	**450**	**413**	**1981**

Table 2 reveals that the highest number of tractors is owned by the state government followed by local government and federal government least. The mean age of the available tractors is 7.5 years after purchase.

The most general mode of acquisition of the tractors is by direct purchase. Some were acquired through second hand sales. About 5 of the tractors were acquired by leasing while 14 of them were hired.

Table 2: Features of Sampled Tractors

GENERAL FEATURES		
S/N	**OWNERSHIP**	**NO OF TRACTORS**
1	Federal Government	39
	State Govenment	61
	Local Government	40
	Private	15
	Total	**155**
2	Average age	7.5 years
3	**Mode of Acquisition**	**Frequency**
	Direct Purchase	86
	Leasing	5
	Second hand purchase	50
	Hired	14
	Total	**155**
4	**Maintance Workshop**	**Frequency**
	Standard functional	75
	Adequately equipped	50
	Spare parts easily available	30
	Spare parts available with difficulty	80
	Spare parts unavailable	35
	Total	**270**
5	**Sources of Spare Parts**	**Frequency**
	Manufacturers	90
	Government ServiceCenters	44
	Open market dealers	98
	Total	**232**

Table 3 reveals that Steyr tractors are most commonly used than all the other makes of tractors in Ebonyi State. The reason may be attributed to the fact that Nigeria assembles Steyr tractor at Bauchi State which encourages their usage by Nigerian farmers. This may equally account for their extensive use in Ebonyi State.

Table 3: Number of tractors by make (trade name of manufacturers).

Make(Trade name)	No. of Tractors
Fiat	20
Ford	6
David Brown	2
John Deore	4
International	4
Steyr	76
Massey Fergusson	28
Landini	9
Holland	6
Total	**155**

It is observed from Table 4 that four wheel tractors are most commonly used for farming operation than other tractor models

Table 4: Distribution of tractors by types

Make	2 Wheel	4 Wheel	Tractor	Laying	Total number of tractors
Fiat	4	16	-		20
Ford	2	4	-		6
David Brown	-	2	-		2
John Deore	1	3	-		4
International	-	4	-		4
Steyr	12	64	-		76
Massey Fergusson	4	23	1		28
Landini	2	4	3		9
Holland	1	3	2		6
Total	**25**	**123**	**6**		**155**

Table 5 reported that some of the tractors are in bad working condition and the cause may be attributed to negative attitude of owners, poor maintenance, and use of unskilled operators and lack of funds.

Table 5: Present conditions of the tractors according to make.

Make of Tractors	No of Tractors	No of Serviceable Tractors	No of unserviceable tractors	Percentage (%) of serviceable	Percentage (%) of unserviceable
Fiat	20	14	6	70	30
Ford	6	3	3	50	50
David Brown	2	1	1	50	50
John Deore	4	1	3	25	75
International	4	2	2	50	50
Steyr	76	69	7	90.8	9.2
Massey Fergusson	28	18	10	64.3	35.7
Landini	9	4	5	44.4	55.6
Holland	6	-	6	0	100
Total	**155**	**112**	**43**	**72.3**	**27.7**

These plights make tractor repairs so difficult. Most of repairs are handled in the private workshops. Spare parts are mostly purchased from open markets and always very difficult to come by. Tractors are mostly engaged in farming operations such as land clearing, stumping, ploughing, harrowing, ridging, planting etc. and hauling of farm products and other related goods either to the farm, to the storage houses or processing centers or to the market for sales etc.

Table 6 reveals that most of the tractors about 59 are broken down, 50 of them are under repair and the rest in good working condition. Some of the broken down tractors are serviceable while some are not. Between 32 and 70% of the broken down tractors are serviceable.

Table 6: Attitude towards repair of tractors

Make of Tractors	No of Tractors	No under good working condition	No under repair	No of broken down tractors	Percentage (%) of broken down
Fiat	20	5	6	9	45.0
Ford	6	-	2	4	66.7
David Brown	2	-	2	-	-
John Deore	4	4	-	-	-
International	4	-	1	3	75.0
Steyr	76	22	24	30	39.5
Massey Fergusson	28	12	7	9	32.1
Landini	9	3	2	4	44.4
Holland	6	-	6	-	-

Table 7 identifies the causes of the tractors breakdown or failure and includes obsolescence, careless operators, lack of genuine spare parts, overloading, poor maintenance and poor storage facilities.

Table 7: Causes of Tractors breakdown (frequency of causes)

Tractors Make	No of Tractors	Obsoletes (%)	Careless Operators spare parts(%)	Lack of Genuine (%)	Over-loading (%)	Poor Maintenance (%)	Poor Storage (%)
Fiat	20	14(29.1)	12(8.6)	4(8.3)	2(2.4)	2(66.8)	27(5.1)
Ford	6	5(26.4)	9(11.3)	3(10.6)	5(3.1)	7(90.8)	18(3.2)
David Brown	2	26(16.3)	3(23.4)	5(4.4)	3(3.4)	11(67.3)	12(4.3)
John Deore	4	2(14.2)	6(22.0)	2(8.2)	4(50.2)	7(32.1)	16(1.2)
International	4	4(100)	4(3.9)	3(3.6)	1(33.1)	30(53.6)	4(3.2)
Steyr	76	16(27.8)	19(36)	6(4.2)	2(6.0)	2(18.1)	6(11.3)
Massey Fergusson	28	4(12.3)	4(20.1)	1(4.1)	8(1.1)	3(100)	7(18.1)
Landini	9	3(18.2)	12(41.3)	7(2.3)	3(2.0)	6(17.1)	2(11.4)
Holland	6	7(11.1)	3(54.1)	2(11.5)	4(100)	5(2.0)	4(2.8)

Table 8 explains the reasons for inadequate maintenance of the available tractors and includes lack of funds, lack of maintenance workshops, lack of skilled mechanics, negligence, poor management and high cost of spare parts at times very difficult to get except on special order from the manufacturers.

Table 8: Reasons for inadequate maintenance of tractors

Tractors Make	Spare parts difficult to obtain (%)	Spare parts costly (%)	Lack of funds (%)	Lack of maintenance workshop	Lack of skilled mechanics	Negligence (%)	Poor management
Fiat	64.6	58.5	92.1	66.9	54.0	46.6	65.3
Ford	75.3	78.1	88.3	70.1	66.3	38.3	65.3
David Brown	45.6	50.1	74.1	81.0	72.1	50.4	67.8
John Deore	53.1	63.2	80.2	56.5	90.3	28.3	73.1
International	72.4	81.0	93.1	72.0	82.0	61.0	82.8
Steyr	55.8	63.8	96.2	63.2	59.5	61.3	66.4
Massey Fergusson	66.4	68.9	91.6	72.6	77.2	39.2	70.3
Landini	74.1	82.1	68.8	68.0	75.4	40.1	58.6
Holland	83.4	94.0	78.9	67.7	57.0	53.2	62.7

Conclusion and Recommendations

In order to ameliorate the problems of tractor breakdown or failure during operations, there should be a systematic maintenance or rehabilitation programme of the equipment as evidenced by large number of tractors in poor mechanical conditions.

Nearly all the broken down tractors can still be economically repaired. It is clear that the attitude towards repair of tractors is very poor. This was evidenced by the fact that the tractors were usually over used before services were carried out.

Lack of genuine spare parts, poor storage facilities, obsolescence and poor maintenance skill were found to be the major causes of machinery breakdown in Ebonyi State and these causes are mostly with tractors, ploughs, harrows and ridgers during farming operations. Based on the above factors the following recommendations can therefore be made:

- The whole engineering system management should be re-organised to effect proper care and maintenance of the machinery and equipment available in Ebonyi State.
- Government should organize programmes (workshops and seminars) on farm machinery rehabilitation and utilization to enable other private or cooperative farmers to benefit since they own the bulk of the obsolete machinery whose spare parts are unavailable.
- The financial capacities of the farmers should be enhanced through supervised credit facilities and subsidy.
- A programme of services and maintenance chart of machinery should be kept and operated by government and corporate agencies.
- Proper operator training be installed to avoid damage of the machinery due to ignorance or unskilled operation.
- Genuine spare parts should be made available directly from the manufacturers to reduce the breakdown of the tractors.
- Storage facilities/sheds should be provided for all the machinery available to reduce the effect of vagaries by weather.

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