World Journal of Engineering Research and Technology
WJERT
www.wjert.org
SJIF Impact Factor: 4.326

EVALUATION OF TILLAGE MACHINERY USAGE AND MAINTENANCE IN EKITI STATE, NIGERIA

I.O. Oni, M.O. Lasisi and P. O. Ajewole*

Department of Agricultural and Bio-Environmental Engineering, the Polytechnic, Ado- Ekiti, Ekiti State.

Article Received on 01/06/2017 **Article Revised on 16/06/2017** **Article Accepted on 02/07/2017**

***Corresponding Author**
P. O. Ajewole
Department of Agricultural and Bio-Environmental Engineering, the Polytechnic, Ado- Ekiti, Ekiti State.

ABSTRACT

This paper evaluates the usage and maintenance of the tillage machinery in Ekiti State, Nigeria. An inventory of the basic tillage machinery in agricultural establishment of the State was carried out. The source of the tillage machinery and the types of maintenance carried out on them were also determined. Data collected were analyzed using Statistics Package for Social Science (SPSS 2014), including the use of bar chart for the data's that could not be computed by SPSS. The highest number of tillage machinery existing in the state are tractor and plough representing 27% each in which 64% of the tractors were in good working condition,30% were bad and 6% were serviceable. The disc ploughs approximated 42% were found to be in good working condition while 28% that were serviceable were being abandoned and exposed to weather condition on the field alongside the 30% of the tillage machineries that were in bad working conditions. On the other hand, disc harrows were 45%, 20% and 35% in good, fair and bad working conditions respectively. Also, the result reveals that, 58% of the disc ridgers were functional while 42% were not functional due to loss of some vital components. The result also indicates that, only 30% of the establishment under study organize training for their operators and mechanics on quarterly basis followed by 35% and 15% on bi-annually and occasionally basis respectively while 20% never organized any training. However, 77.78%, 66.67%, 50%, 72.22 and 77.78% strongly agreed that economic, operator's deficiency, technical knowledge, environmental and availability of spare parts respectively are factors contributed to tillage machinery deterioration and abandonment in the study area. Result

obtained showed that, only 10% updatedtheirs log books regularly though, all the organization do carry out maintenance on their tillage machineries but the study showed that, daily maintenance was taken for granted despite the fact that there are skilled workers employed to carry out maintenance on them, only 24.22% of the firm normally carry out their maintenance daily, ranging from cleaning to checking of oil level, water level in the radiator, air pressure of tyres, battery terminals and others. 43.56% carried out major maintenance like changing of engine oil quarterly and 20.22% did theirs monthly with respect to level of work done by the machine while 12% attended to maintenance when there is breakdown. Results of the analysis of the information showed that the major plight to the use of the tillage machineries in Ekiti State, Nigeria were inadequate machinery, lack of proper maintenance and lack of regular training for operators of the available ones.

KEYWORDS: Tillage, machinery, maintenance, usage, Ekiti State Nigeria.

INTRODUCTION

Tillage, according to Davies (2003), is a terminology that is applied to creation of enabling environment for the germination and growth of crops. Technically according to Makanjuola (2003), tillage refers to the mechanical stirring of the soil to provide a suitable soil environment for growth of crops. The Nigerian small-scale farmers are estimated to account for about 90% of the total cultivated land area in Nigeria, producing nearly 90 percent of total, agricultural output and rural cooperation, 1997. Nigeria is blessed with a land mass of about 98 million hectares, out of which 83 million hectares are suitable for cultivation but with only 30 to 34 million hectares presently under cultivation (Ashaye, 2003; Federal ministry of Agric & Rural Dev. 2001; Agricultural machinery, parts and tractors market, 2003). Adebayo (2003) asserted that manual labour predominates Nigerianagriculture, from tillage to harvesting and processing. He further added that, for meaningful agricultural development by stating that mechanization of tillage was a viable option.

According to Oni (1996), agricultural machinery plays a significant role in advancing agricultural productivity and agricultural industry in Nigeria. Farm machinery failures especially during the peak farming season, can result in inefficient equipment labour utilization and serious losses in farm output. It was further suggested that, effective planning and management of farm operation coupled with efficient and timely repair and maintenance programme for farm machinery would guarantee a profit-oriented enterprise. This is because no suitable programme has ever been put in place, most machinery repairs were undertaken at

the farm centres, mechanical workshops of the ministries of agricultural and of such similar locations at the research institutes and other agricultural institutions. In the research conducted by Olaoye and Olarotimi (2010) on the evaluation of agricultural mechanization in Ondo State, sited by (Akinfiresoye and Agbetoye, 2013) low production efficiency, drudgery, under-utilization of mechanical power, and uses of old tractors with attendant constant breakdown during operation, were reported to have contributed to low level of mechanization in the State.

Emphasis on maintenance of agricultural machinery is to be view in relation to natural development. Various types of manufactured machineries and equipment found their ways into the country without the necessary maintainability support. According to Odigboh(1991), agricultural mechanization is the use of a machine to accomplish a task or an operation involved in agricultural production. Agricultural mechanization leads to reduction in drudgery, improvement of timeliness and efficiency of various agricultural operations, bringing more land under cultivation, preserving the quality of agricultural products, providing better rural living conditions and markedly advancing the economic growth (Akinfiresoye and Agbetoye, 2013).

Therefore the objectives of this study were to: conduct an inventory of tillage equipment in Ekiti State, find out the availability and maintenance status of tillage equipment, investigate factors responsible for tillage machinery deterioration and abandonment in Ekiti State and identify types of maintenance carried out on them.

METHODOLOGY

Description of the Site

The study area for the research covers the agricultural institutions in all the sixteen local governments within Ekiti State where tillage machinery are widely used.Ekiti, State Nigeria, with an area of 543,500 hectares (5435 km^2) (NBS, 2012b), is situated between 4^0 51^1 and 5^0 45.1^1 East Longitude and 7^0 15.1^1 and 8^0 51^1 North Latitude. Agriculture is the mainstay of the State economy, employing 75% of the State working population. with the capital located at Ado-Ekiti. The 2006 population census by the National Population Commission put the population of Ekiti State at 2,384,212 people (NPC, 2006). By agro- ecological classification, the State spans through from the rain forest to the Southern Guinea Savanna (the northern part), where the length of the growing period is over 210days. An averagely, annual rainfall in Ekiti State varies from 1200 to 1800 mm, while the mean atmospheric temperature is

between 21^0 and 28^0 (Ugwuja et al., 2011). Ekiti State is mainly an upland zone rising over 250 m above the sea level.

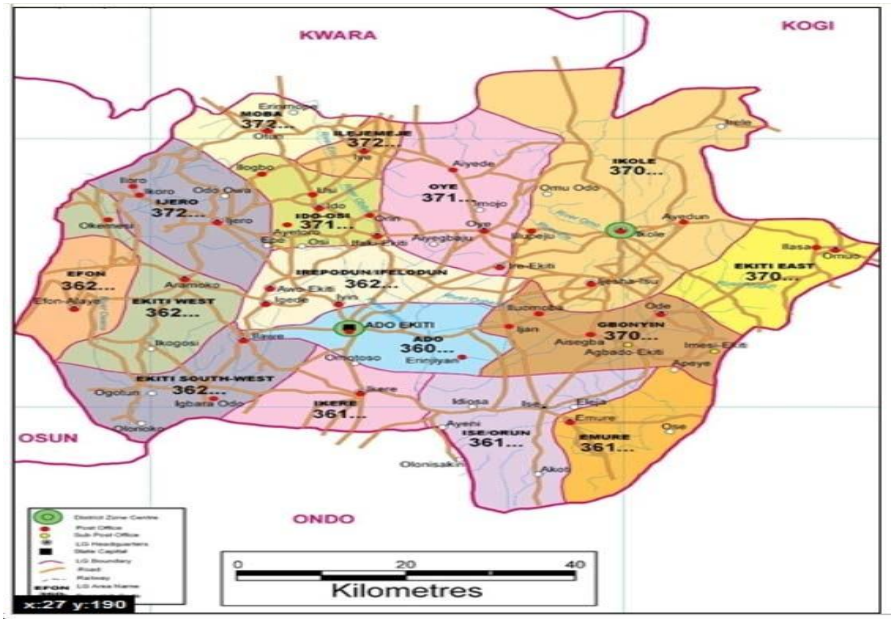

Figure 1: Map of Ekiti state, Nigeria.

Experimental Procedure

Questionnaires were developed and distributed to the mechanized agricultural organizations and post-secondary institutions across Ekiti State to collect necessary data. The questionnaire, consisted of the three parts. The first part sought general information about the organization while the second part sought information about the tillage machineries available, their usage and status. The third aspect dealt with the operation and maintenance of the machineries. Furthermore open ended questions were asked where appropriate and were arranged in chronological order. During each consultation with respondent, the questionnaires were filled in as the respondent answered the various questions. Data collected at the end of survey were collated and analyzes using Statistics Package for Social Science (SPSS 2014), including the use of bar chart for the data's that could not be computed by SPSS.

RESULTS AND DISCUSSION

The results obtained from the survey and on the spot assessment of all the available tillage machineries are presented in the tables 1 to 4. The highest numbers of machinery existing in Ekiti State are tractor and plough representing 27% of the total number of tillage machineries, followed by other tillage implements with 25%, 19% and 2% for disc harrow and disc ridger respectively. In another development, spike tooth harrow takes 2% of the total machinery in

the state. This shows that, where there is availability of tractor, there is a minimum of a disc plough. The overwhelming usage of tractor, disc plough and disc harrow was due to the fact that, majority of the farmers only used such tillage machinery for maize production. In another development, Table 2 showed that, all of the tractors and other tillage implements are imported to the country. None was fabricated locally.

In Table 3, the study showed that about 64% of these tractors were in good working condition while 6% were serviceable and 30% were in bad working conditions. Some of the tractors have their functional parts such as tyre, radiator, injector pumps, and starter key etc. removed. Adekoya and Otiono (1997), previous work had identified unavailability of some parts as a major bottleneck in effecting prompt repairs on farm machine whereas, regular availability of some parts is an essential requirement. About 42% of ploughs were found to be in good working condition while 28% that were serviceable were been abandoned and exposed to weather condition on the fields alongside the 30% which were in bad working condition. This is supported by the claim of Faborode (2001) that, most often faults cannot be conclusively identified until the machine are opened-up thus when machine has been dismantled and parts are not available, the tendency to keep the dismantled parts until the parts are obtained.
For the disc harrow, 45% were in good working condition, 20% were serviceable and 35% were not functional. Also, the study showed that, 58% of disc ridgers were functional while 42% were not functional due to loss of some vital components. Table 4 shows the frequency of training organized for the tractor operators and mechanics. It showed that, only 30% of the establishment under study organize training for their operators and mechanics on quarterly basis followed by 35% and 15% on bi-annually and occasionally basis respectively while 20% never organized any training.

The amount voted for maintenance is small as shown in Figure 2. 44.44% of the organization visited, voted less than ₦10000 monthly on maintenance. 5.56% voted ₦50000 and above monthly. The level of maintenance carried out on the machinery was still at low level.
It was discovered from the study as shown in Figure 3 that, 55.56% of the respondents strongly agreed that tillage machinery deterioration and abandonment in the study area was due to poor maintenance. Furthermore, 77.78%, 66.67%, 50%, 72.22 and 77.78% strongly agreed that economic, operator's deficiency, technical knowledge, environmental and availability of spare parts respectively are factors contributed to tillage machinery deterioration and abandonment in the study area.

Though, all the organization do not carry out maintenance on their tillage machineries but the study showed in Figure 4 that, daily maintenance was taken for granted despite the fact that there are skilled workers employed to carry out maintenance on them, only 24.22% of the firm normally carry out their maintenance daily, ranging from cleaning to checking of oil level, water level in the radiator, air pressure of tyres, battery terminals and others. 43.56% carried out major maintenance like changing of engine oil quarterly and 20.22% did their monthly with respect to level of work done by the machine while 12% attended to maintenance when there is breakdown. It was noted in Figure 5 that, 55.56% of the organizations visited never make use of log book.). Out of 44.44% that have log book, only 10% updated theirs regularly while the remaining 33.44% do not have records of any activities on theirs. Those that updated their log books find it very easy to provide necessary information on maintenance carried out on tillage machineries and the usage of the machineries. Some of the obsolete and machines that the spare parts are not available were found in the record books.

Table 1: Basic Tillage Machineries available a in Ekiti State.

Serial Number	Machinery	Number	Percentage (%)
1	Tractor	18	27
2	Disc plough	18	27
3	Disc harrow	17	25
4	Disc ridger	13	19
5	Spike tooth harrow	1	2

Table 2: Sources of Tillage Machinery in Ekiti State.

Serial Number	Machinery	Number	Percentage (%)
1	Tractor	18	England/ china
2	Disc plough	18	England
3	Disc harrow	17	England/ china
4	Disc ridger	13	England/ china
5	Spike tooth harrow	1	England

Table 3: Tillage Machinery Status in Percentage.

Tillage Machinery Type	Number	Good (%)	Fair (%)	Bad (%)
Tractor	18	64	6	30
Disc plough	18	42	28	30
Disc harrow	17	45	20	35
Disc ridger	13	58	0	42
Spike tooth harrow	1	100	0	0

Table 4: Training of Operator.

Training of Operator	Frequency	Percentage (%)
Quarterly	6	30
Bi-Annual	7	35
Occasional	3	15
Never	4	20

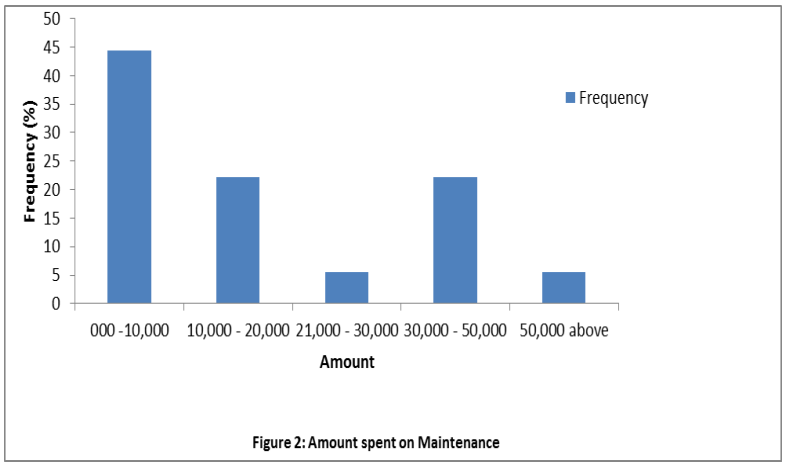

Figure 2: Amount spent on Maintenance

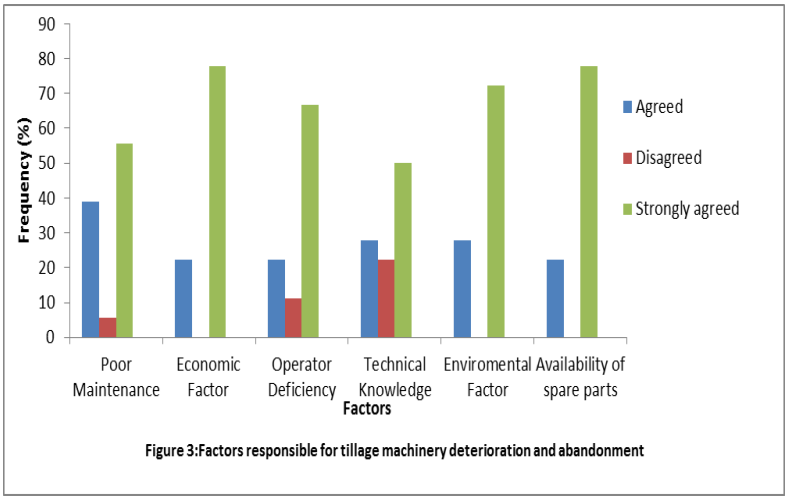

Figure 3:Factors responsible for tillage machinery deterioration and abandonment

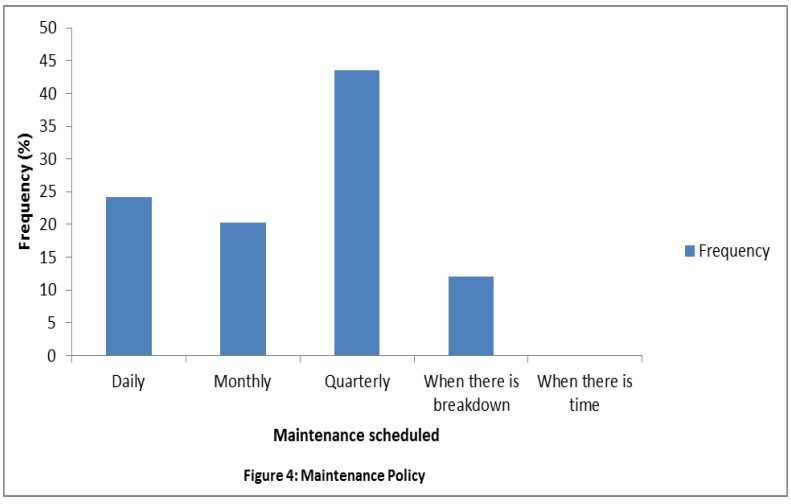

Figure 4: Maintenance Policy

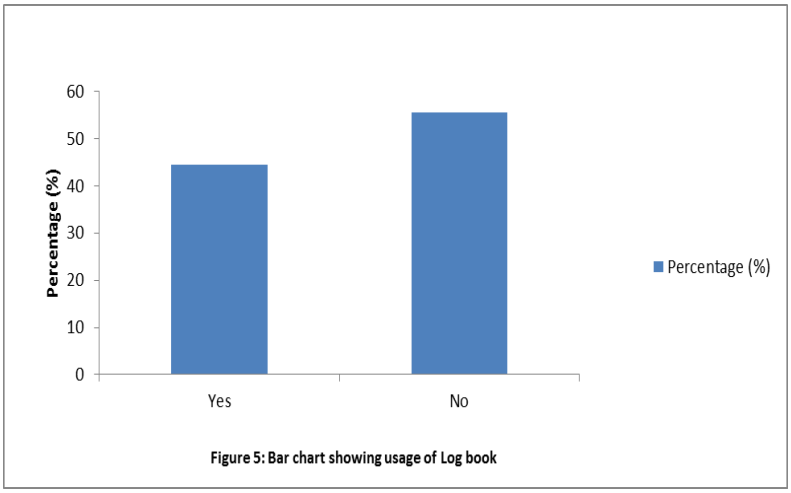

Figure 5: Bar chart showing usage of Log book

CONCLUSION

The study was conducted to evaluate the tillage machinery usage and maintenance in Ekiti State, Nigeria. It was evident that: The number of tractors and plough in the study area are higher than every other tillage machinery. Only 64% of the tractors were functioning while the remaining 36% that was bad was due to poor maintenance and non-availability of spare parts to replace the damaged parts. This is because none of the tractors was manufactured in the country. Furthermore, log books were not being used properly by the operators; only 10% updated their log books regularly. It was also revealed that, poor maintenance, operator's deficiency and non-availability of spare parts caused the tillage machinery deterioration and abandonment. Therefore, it is recommended that; training/workshops and seminar should be organized for the operators handling these machines and their supervisors regularly, more money should be voted for maintenance and should not be diverted to another project, maintenance unit should be created and be headed by a qualified Agricultural Engineer and the use of log books should be enforced and all activities should be properly recorded.

REFERENCES

1. Adebayo, C.O. (2014): Agricultural Machinery, Parts and Tractors Market in Nigeria, Lagos Nigeria, 2014.
2. Adefiresoye, W. A, and Agbetoye, A.S (2013): Evaluation of Farm Machinery Usage and Maintenance in Ondo State, Nigeria. International Journal of Agric Science, November 2013; 3(11): 807-813.
3. Adekoya, L.O, Otiono, P.O Tractor maintenance cost in Nigeria. Tropical Agriculture, Trinidad, 1997; 62: 119.

4. Ashaye, Suitability of Nigerian Soils to Mechanical Cultivation. Proceedings of the First Nation Tillage Symposium of the NSAE, 2003; 57-69.
5. Davies, J.H. Tillage Research and Development in Nigeria. Proceedings of the First National Tillage Symposium of the NSAE, 2003; 15-20.
6. Makanjuola, G.A. (2003): Appropriate Machines for Tillage Nigeria in Nigeria. Proceeding of the First National Tillage Symposium of the NSAE, 2003; 21-34. NBS 2012b.
7. Faborode, M. O Strategies for Sustainable National Agricultural Infrastructures Development. Paper presented at the proceedings of National Engineering Conference and Annual Meeting. Port Harcourt, 2001; 126-131.
8. Odigboh, E.U Continuing controversies on tillage mechanization in Nigeria. Agricultural Technology Journal, 1991; 1: 15-22.
9. Olaoye J.O, and Olarotimi A.O Measurement of Agricultural Mechanization Index and Analysis of Agricultural Productivity of Some Farm Settlements in South West, Nigeria. Agricultural Engineering International, 2010; 12: 11-13.
10. Oni, K.C Effective Maintenance and Maintenance of Agricultural Equipment in Nigeria. Paper presented at the proceedings of the Annual Conference of the Society of Agricultural Enginees. Kaduna, 1996; 18: 343.
11. Reynolds, P.A. Implement Maintenance, Maintenance of Horticultural Equipment. Published by George Allen & Unulin Ltd, London, 1995; 83-84.