



---

## Investigation into the State of Agricultural Machinery and Equipment Maintenance Workshops in Edo State, Nigeria

E. O. Atanda

Department of Agricultural & Bio-Environmental Engineering Technology, P.M.B 13, Auchi Polytechnic, Auchi, Edo State, Nigeria

E-mail: [olugbenga\\_atanda@yahoo.com](mailto:olugbenga_atanda@yahoo.com)

---

**Abstract** An investigation into the state agricultural machinery and equipment maintenance workshops in Edo State, Nigeria was carried out. Information gathering was accomplished through the use of a well-structured questionnaire that was administered during field visits while additional information were gathered through personal communication. Data collected were collated and analyzed. Results from the study shows that the state of agricultural machinery and equipment maintenance workshops in Edo State, Nigeria was generally poor with Presco farms, Okomu farms and Nigeria Institute for Oil Palm Research, Benin having standard workshops. The investigation also revealed that the federal and state agricultural mechanization establishments/organizations; educational institutions including majority of the local government areas in the state have one or more workshops and professional personnel for repair and maintenance of their equipment but not all of them have facilities for a standard workshop. Also, the common maintenance practiced by most local government secretariats is breakdown maintenance while other federal and state agricultural mechanization establishments/organizations; educational institutions; local government councils as well selected privately owned mechanized farms in Edo State, Nigeria embraced preventive, corrective and breakdown maintenance.

**Keywords** Workshop, Agricultural Machinery and Equipment, Maintenance and Repair

---

### 1. Introduction

The importance of workshop cannot be over-emphasized in any organizations/establishments because it plays important role in the effective maintenance and repair of agricultural machinery and equipment. The cost of adequate maintenance is very small when it is compared to the cost of major breakdown at which time there is no production/service delivery. Machines and tools provided in any workshop will depend on the type and extent of maintenance and repair work to be carried out. Thus, machines and tools required to performing day-to-day maintenance on farm machinery and equipment and those required for general repair work and fabrication jobs need to be considered. Equipment maintenance, adequate workshop facilities and availability of professional personnel for repair and maintenance has been identify as the key factors to improve the life span of machines and equipment available within an organization. Maintenance of farm machinery and implements are needed to ensure that the components carry out the purpose for which they were designed. The basic objectives of maintenance activity are to deploy the minimum resources required to make sure that components perform their intended purposes properly and to ensure system reliability and to recover from breakdowns [1]. Agricultural machinery maintenance has a crucial role to play for successful agricultural production. It aims at guaranteeing the safety of operations and availability of machines and related equipment for agricultural production operations at all times. Moreover, it is one major cost for agriculture operations. Thus, the increased



competition in agricultural production demands maintenance improvement aiming at the reduction of maintenance expenditures while keeping the safety of operations [2].

When repairs are needed, a good maintenance workshop should be readily available but the reverse is the case in many agricultural mechanization establishments/organizations; educational institutions; local government councils as well as privately owned mechanized farms in Nigeria. Several studies in Nigeria have shown that workshop facilities are serious problems that need urgent attention in many agricultural mechanization establishments [5]. The high rate of breakdown and grounded machinery in many of these establishments could be attributed to lack or poor repairs and maintenance workshops in these establishments in Nigeria. Not many agricultural mechanization establishments in Nigeria could be said to be having standard maintenance workshop as most repairs are done manually to the ability of the workers and not to standard. In addition, the availability of adequate number of technical personnel is directly related to the effectiveness of agricultural machinery maintainability. Insufficient maintenance officers to effect repairs and maintenance works adversely affect their service delivery as a whole. Many of the agricultural mechanization establishments have lesser number of qualified maintenance officers and those that had, had too many senior officers actively or directly involved in repairs/maintenance and hence a reduction in the number of needed technical personnel.

An ideal workshop is divided into a number of sections such as service areas including a pit, welding section, battery charging section, electrical section and a lockable store where spare parts and tools are kept [6]. The purpose of a workshop is also to service and repair farm machinery and equipment. If a farm has only a few farm machinery and equipment, it may be more economical to take the equipment to the nearest settlement where the services can be obtained or invite a mechanic to the farm when the need for such services arises, rather than establishing a workshop on the farm and employing a mechanic to manage it. However, if the farm has a fleet of equipment, it may be more economical to have a workshop on the farm and employ repair technicians, since the need for servicing and repair are likely to be more frequent [6]. The provision of a workshop in any agricultural mechanization establishments/organizations; educational institutions; local government councils as well as privately owned mechanized farms in Nigeria is determined by the number of equipment available because this will determine the frequency of maintenance and repairs that will be required by such establishments/organizations and hence the justification for a workshop.

However, so far, no comprehensive study has been conducted in recent times on the state of agricultural machinery and equipment maintenance workshops in Edo State, Nigeria. The findings and recommendations from this study will also aid policy makers in government establishments/organizations, mechanize farmers and other prospective investors in mechanize agriculture towards improving their maintenance culture and repair of farm machinery and equipment in Edo State, Nigeria.

### **1.1 Objectives of the Study**

The objective of the study, therefore, is to investigate the state of agricultural machinery and equipment maintenance workshops in Edo State.

The specific objectives of the study are to:

- (i). Examine the workshop layout and design in terms capacity and size;
- (ii). Determine if the workshops are capable of carrying out maintenance and repair practices effectively;
- (iii). Find out the types of maintenance being carried out in such workshops;
- (iv). Determine the various types of machinery, equipment and tools available in such workshops.

### **2. Materials and Methods**

The survey was conducted in all the agricultural mechanization establishments/organizations; educational institutions, local government councils as well as selected privately owned mechanized farms in Edo State, Nigeria. This method involves dividing the entire survey locations into government establishments/organizations, government and private educational institutions, local government councils and their headquarters and privately owned agricultural mechanized farms. Information gathering was accomplished through the use of a well structured questionnaire that was administered during field visits while additional



information was gathered through personal communication and observation. Photographs of some workshops were also taken during the field survey.

Information sought apart from the personal profile of the organizations/establishments include the class of machinery and equipment maintenance and repair workshop; layout and design of the workshop; inventory of the available machines, equipment and tools available in the workshop; workshop capability to carrying out effective maintenance and repair work on agricultural machinery and equipment; various types of maintenance and repair work mostly carried out on farm machinery and equipment in the workshop; adequate spare-parts provisions for carrying out effective maintenance and repair work; organization structure of workshop staff in order of hierarchy, etc. A total number of 40 questionnaires were distributed out of which 35 questionnaires were retrieved at the end of the study which implies 87.5% coverage. The questionnaires were administered to the respondents by research assistants upon arrival at the various survey locations in Edo State of Nigeria. The completed questionnaires were retrieved from the respondents on the spot and used for data analysis. The map of the study area is shown in Fig. 1:



Figure 1: Map of Edo State



### 3. Results and Discussion

#### 3.1. Results

The information obtained from the completed questionnaires were compiled and analyzed using tables. Figure 1 shows the map of Edo State in Nigeria showing the study areas.

##### 3.1.1. State of Maintenance workshops layout/design in terms of capacity and size in Edo State, Nigeria

The results of the workshop layout/design including ability of the personnel working in various workshops across the state is presented in Tables 3.1, 3.2 and 3.3 for Local Government secretariats, Private establishments, academic institutions and ministries respectively. A workshop is said to be sub-standard when machines and facilities that defines a standard workshop are not present. These machines include lathe machine, drilling machine, milling machines, arc welding machines, trolley jacks, grinders, etc. The maintenance and repair personnel are professionals because the least level of qualification held by each of them was City and Guilds of London and Trade Test Certificates.

**Table 3.1:** Workshop Layout and the ability of the Workshop Personnel Available within Local Government Secretariats of Edo State, Nigeria to carry out effective maintenance and repair work

LGA	Workshop layout/design	Ability of personnel in the workshop	Remarks
<b>EDO NORTH</b>			
ETSAKO WEST	Sub-standard	Professional	No lathe machine, drilling machine, trolley jacks, grinders, etc
ETSAKO EAST	Sub-standard	Professional	No lathe machine, drilling machine, trolley jacks, grinders, etc
ETSAKO CENTRAL	Sub-standard	Professional	No lathe machine, drilling machine, trolley jacks, grinders, etc
OWAN WEST	Sub-standard	Professional	No lathe machine, drilling machine, trolley jacks, grinders, etc
OWAN EAST	Sub-standard	Professional	No lathe machine, drilling machine, trolley jacks, grinders, etc
AKOKO EDO	Sub-standard	Professional	No lathe machine, drilling machine, trolley jacks, grinders, etc
<b>EDO CENTRAL</b>			
ESAN SOUTH EAST	Sub-standard	Professional	No lathe machine, drilling machine, trolley jacks, grinders, etc
IGUEBEN	Sub-standard	Professional	No lathe machine, drilling machine, trolley jacks, grinders, etc
ESAN NORTH EAST	Sub-standard	Professional	No lathe machine, drilling machine, trolley jacks, grinders etc,
ESAN WEST	Sub-standard	Professional	No lathe machine, drilling machine, trolley jacks, grinders, etc
ESAN CENTRAL	Sub-standard	Professional	No lathe machine, drilling machine, trolley jacks, grinders, etc
<b>EDO SOUTH</b>			
IKPOBA-OKHA	Sub-standard	Professional	No lathe machine, drilling machine, trolley jacks, grinders, etc
OREDO	Sub-standard	Professional	No lathe machine, drilling machine, trolley jacks, grinders, etc
OVIASOUTH WEST	Sub-standard	Professional	No lathe machine, drilling machine, trolley jacks, grinders, etc
OVIASOUTH EAST	Sub-standard	Professional	No lathe machine, drilling machine, trolley jacks, grinders etc,
UHUNMODE	Sub-standard	Professional	No lathe machine, drilling machine, trolley jacks,



			grinders, etc
ORHIONMWON	Sub-standard	Professional	No lathe machine, drilling machine, trolley jacks, grinders, etc
EGOR	Sub-standard	Professional	No lathe machine, drilling machine, trolley jacks, grinders, etc

**Table 3.2:** Workshop Layout and the ability of the Workshop Personnel Available within Educational Institutions, Research Institutes, and Ministries in Edo State, Nigeria to carry out effective maintenance and repair work

Name of institution	Workshop layout/design	Ability of personnel in the workshop	Remarks
IGBINEDON UNIVERSITY, OKADA-BENIN CITY	Sub-standard	Professional	All requirements that define a standard workshop are not available ranging from machine to space in the workshop
BENSON IDAHOSA UNIVERSITY, BENIN CITY	Sub-standard	Professional	All requirements that define a standard workshop are not available ranging from machine to space in the workshop
UNIVERSITY OF BENIN, BENIN CITY	Sub-standard	Professional	All requirements that define a standard workshop are not available ranging from machine to space in the workshop
AMBROSE ALI UNIVERSITY, EKPOMA	Sub-standard	Professional	All requirements that define a standard workshop are not available ranging from machine to space in the workshop
AUCHI POLYTECHNIC, AUCHI	Sub-standard	Professional	All requirements that define a standard workshop are not available ranging from machine to space in the workshop
FEDERAL MINISTRY OF AGRICULTURE, BENIN CITY	Sub-standard	Professional	All requirements that define a standard workshop are not available ranging from machine to space in the workshop
AGRICULTURAL DEVELOPMENT PROGRAMME, BENIN CITY	Sub-standard	Professional	All requirements that define a standard workshop are not available ranging from machine to space in the workshop
EDO STATE MINISTRY OF AGRICULTURE, BENIN CITY	Sub-standard	Professional	All requirements that define a standard workshop are not available ranging from machine to space in the workshop
NIGERIA INSTITUTE FOR OIL PALM RESEARCH, BENIN	Standard	Professional	All requirements that define a standard workshop are not available ranging from machine to space in the workshop
RUBBER RESEARCH INSTITUTE, BENIN	Sub-standard	Professional	All requirements that define a standard workshop are not available ranging from machine to space in the workshop



**Table 3.3:** Workshop Layout and the ability of the Workshop Personnel Available within Private Farms in Edo State, Nigeria to carry out effective maintenance and repair work

Name of institution	Workshop layout/design	Ability of personnel in the workshop	Remarks
PRESCO FARMS, BENIN	Standard	Professional	Adequate standard machines and equipment including facilities
LEVENTIS FARMS, WEPPA	Sub-standard	Professional	No lathe machine and other workshop machines like milling machine, shaping machine, etc
DANSOF FARM, EKPERI	Sub-standard	Professional	Lack of many standard machines and equipment, facilities and poor working environment
OKOMU OIL PALM, BENIN	Standard	Professional	Adequate standard machines and equipment including facilities
AGBEDE FARMS	Sub-standard	Professional	No lathe machine and other workshop machines like drilling and milling machine, shaping machine, etc
HAL-YAQUM TRACTOR HIRING UNIT	Sub-standard	Professional	No lathe machine and other workshop machines like drilling and shaping machine, bench grinders, etc

### 3.1.2. Inventories of the Type of machine, Equipment and Tools in the workshops

The results on the inventories of the type of machines, equipment and tools in the workshops available within the Local Government secretariats, private establishment and academic institutions within Edo state of Nigeria are presented in Tables 3.4, 3.5 and 3.6 respectively.

**Table 3.4:** Type of Machines, Equipment and Workshops Tools Available within the Edo State Local Government Secretariats

LGA	Machines	Equipment	Workshop facilities
EDO NORTH LOCAL GOVERNMENTS			
ETSAKO WEST	Tractors, bull dozer, sprayer and trailer	Ploughs and harrows	Bench vice, set of toolbox
ETSAKO EAST	Tractors and trailer	Ploughs and harrows	Bench vice, set of toolbox
ETSAKO CENTRAL	Tractors and trailer	Ploughs and harrows	Bench vice, set of toolbox
OWAN WEST	Tractors and trailer	Ploughs and harrows	Bench vice, set of toolbox
OWAN EAST	Tractors and trailer	Ploughs and harvester	Bench vice, set of toolbox
AKOKO EDO	Tractor, grader and trailer	Ploughs and harrows	Bench vice, set of toolbox
EDO CENTRAL LOCAL GOVERNMENTS			
ESAN SOUTH EAST	Tractors and trailer	Ploughs and harvester	Bench vice, set of toolbox
IGUEBEN	Tractors and trailer	Ploughs and harrows	Bench vice, set of toolbox
ESAN NORTH EAST	Tractors, bull dozer and trailer	Ploughs and harrows	Bench vice, set of toolbox
ESAN WEST	Tractor, grader and trailer	Ploughs and harrows	Bench vice, set of toolbox



ESAN CENTRAL	Tractors and trailer	and	Ploughs and harrows	Bench vice, set of toolbox
EDO SOUTH LOCAL GOVERNMENTS				
IKPOBA-OKHA	Tractors and trailer	and	Ploughs and harrows	Bench vice ,set of toolbox
OREDO	Tractor, dozer, trailer and grader	bull and	Ploughs, harvester and harrows	Bench vice, set of toolbox
OVIA SOUTH WEST	Tractors and trailer	and	Ploughs, harvester and harrows	Bench vice, set of toolbox
OVIA NORTH EAST	Tractor, dozer, and grader	bull and	Ploughs, harvester and harrow	Bench vice, set of toolbox
UHUNMODE	Tractor, dozer, and trailer	bull and	Ploughs, harvester and harrows	Bench vice, set of toolbox
ORHIONMWON	Tractor, dozer, and trailer	bull and	Ploughs, harvester and harrows	Bench vice, set of toolbox
EGOR	Tractor, and trailer	grader	Plough and harrows	Bench vice, set of toolbox

**Table 3.5:** Type of Machine, Equipment and Workshops Tools Available within the Educational Institutions, Research Institutes and Ministries

Institutions	Machines	Equipment	Workshop facilities
IGBINEDON UNIVERSITY, OKAD-BENIN CITY	Tractors, trailer and boom sprayer	Ploughs and harrows	Bench vice, lamp stand, set of toolbox, spray guns, pit jack,
BENSON IDAHOSA UNIVERSITY, BENIN CITY	Tractors, trailer and boom sprayer	Ploughs and harrows	Bench vice, set of toolbox, trolley jack, lamp stand,
UNIVERSITY OF BENIN, BENIN CITY	Tractors, trailer and boom sprayer	Ploughs and harrows	Bench vice , set of toolbox, pit jack ,lamp stand
AMBROSE ALI UNIVERSITY, EKPOMA	Tractors and trailer	Ploughs and harrows	Bench vice, set of tool box,
AUCHI POLYTECHNIC, AUCHI	Tractors, trailer, lathe machine, motorized sprayer, cassava grater, maize sheller &decorticating machine	Ploughs, harrows, ridger, boom sprayer, rotary slasher and fertilizer distributor	Bench vice, set of toolbox, lamp stand and trolley jack,
FED. MINISTRY OF AGRIC, BENIN CITY	Tractor and bulldozer	Ploughs, harrows and rotary slashers	Bench vice ,set of toolbox
AGRICULTURAL DEVELOPMENT PROGRAMME, BENIN CITY	Tractor and bulldozer	Ploughs, harrow and rotary slasher	Bench vice, set of toolbox
STATE MINISTRY OF AGRICULTURE, BENIN CITY	Tractors and bulldozer	Ploughs, harrow and rotary slasher	Bench vice , set of tool box
NIGERIA INSTITUTEFOR OIL PALM RESEARCH, BENIN	Tractors	Buckets, slashers, harrows, ridgers,	Bench vice , set of toolbox , trolley jack,
RUBBER RESEARCH INSTITUTE, BENIN	Tractors	Buckets, slashers, harrows, ridgers,	Bench vice, set of toolbox



**Table 3.6:** Type of Machine, Equipment and workshops Tools Available within the selected private farms in Edostate of Nigeria

Organizations/farms	Machines	Equipment	Workshop facilities
PRESKO FARMS, BENIN	Power hack saw, pressing machine, tractor, drilling machine, grinding machine, welding machine & Sprayer	Work bench, forklift, plough, harrow, planter, ridger and sprayer	Bench vice, set of toolbox, trolley jack, oil and lubricating service equipment, injector pump test stand, lamp stand
LEVENTIS WEPPA FARMS,	Tractors, excavator, wheel loader, box grader and wood shopper	Slasher, plough, harrow, clarifier, steeper digester and press	Bench vice ,set of toolbox, test lamp
DANSOF EKPERI FARM,	Tractors, trailer and grader	Ploughs, ridger and harrow	Bench vice, set of toolbox
OKOMU OIL PALM FARMS, BENIN	Tractors, trailer, bulldozer, grader, boom sprayer and excavator	Ploughs, harrows, knapsack sprayer and planters	Bench vice, set of toolbox, trolley jack, lamp stand, injector pump tester.
HAL-YAQUM TRACTOR HIRING UNIT	Tractor and bulldozer	Ploughs and harrows	Set of tool box

### 3.1.3. Types of Maintenance Practices on the Machinery and Equipment Available

The results of the type of maintenance practices on the machinery and equipment available within the Edo State Local Government secretariats, private establishments, academic and research institutions within the state are presented in Tables 3.7, 3.8 and 3.9 respectively.

**Table 3.7:** Type of maintenance practices on the Machinery and Equipment Available within the Local Government Secretariats in Edo state of Nigeria

LGA	Maintenance Types	Remarks
EDO NORTH LOCAL GOVERNMENTS		
ETSAKO WEST	Preventive, corrective and breakdown	Tools are available to carry out repair and maintenance but no spare parts in stock
ETSAKO EAST	Preventive and breakdown	Tools are available to carry out repair and maintenance but no spare parts in stock
ETSAKO CENTRAL	Preventive and breakdown	Tools are available to carry out repair and maintenance but no spare parts in stock
OWAN WEST	Preventive and breakdown	Tools are available to carry out repair and maintenance but no spare parts in stock
OWAN EAST	Preventive, corrective and breakdown	Tools are available to carry out repair and maintenance but no spare parts in stock
AKOKO EDO	Preventive and breakdown	Tools are available to carry out repair and maintenance but no spare parts in stock
EDO CENTRAL LOCAL GOVERNMENTS		
ESAN SOUTH EAST	Breakdown	Tools are available to carry out repair and maintenance but no spare parts in stock
IGUEBEN	Preventive and breakdown	Tools are available to carry out repair and maintenance but no spare parts in stock
ESAN NORTH EAST	Preventive and breakdown	Tools are available to carry out repair and maintenance but no spare parts in stock
ESAN WEST	Preventive and breakdown	Tools are available to carry out repair and maintenance but no spare parts in stock





ESAN CENTRAL	Preventive and breakdown	Tools are available to carry out repair and maintenance but no spare parts in stock
EDO SOUTH LOCAL GOVERNMENTS		
IKPOBA-OKHA	Breakdown	Tools are available to carry out repair and maintenance but no spare parts in stock
OREDO	Breakdown	Tools are available to carry out repair and maintenance but no spare parts in stock
OVIASOUTH WEST	Preventive and breakdown	Tools are available to carry out repair and maintenance but no spare parts in stock
OVIASOUTH EAST	Preventive, corrective and breakdown	Tools are available to carry out repair and maintenance but no spare parts in stock
UHUNMWODE	Preventive, corrective and breakdown	Tools are available to carry out repair and maintenance but no spare parts in stock
ORHIONMWON	Preventive and breakdown	Tools are available to carry out repair and maintenance but no spare parts in stock
EGOR	Preventive and breakdown	Tools are available to carry out repair and maintenance but no spare parts in stock

**Table 3.8:** Inventory of the type of maintenance practice on the Machinery and Equipment Available within the Educational & Research Institutions and Ministries

Educational Institutions & Ministries	Maintenance Types	Remarks
IGBINEDON UNIVERSITY, OKADA BENIN CITY	Preventive, corrective and breakdown	Adequate tools and spare parts in stock
BENSON IDAHOSA UNIVERSITY, BENIN CITY	Preventive, corrective and breakdown	Adequate tools and spare parts in stock
UNIVERSITY OF BENIN, BENIN CITY	Preventive, corrective and breakdown	Adequate tools and spare parts in stock
AMBROSE ALI UNIVERSITY, EKPOMA	Preventive, corrective and breakdown	Adequate tools and spare parts in stock
AUCHI POLYTECHNIC, AUCHI	Preventive, corrective and breakdown	Tools are available to carry out repair and maintenance but no spare parts in stock
FEDERAL MINISTRY OF AGRICULTURE, BENIN CITY	Preventive, corrective and breakdown	Tools are available to carry out repair and maintenance but no spare parts in stock
AGRICULTURAL DEVELOPMENT PROGRAMME, BENIN CITY	Preventive, corrective and breakdown	Tools are available to carry out repair and maintenance but no spare parts in stock
STATE MINISTRY OF AGRICULTURE, BENIN CITY	Preventive, corrective and breakdown	Tools are available to carry out repair and maintenance but no spare parts in stock
NIFOR	Preventive, corrective and breakdown	Adequate tools and spare parts in stock
RUBBER RESEARCH	Preventive, corrective and breakdown	Tools are available to carry out repair and maintenance but no spare parts in stock

**Table 3.9:** Inventory of the type of maintenance practices on the Machinery and Equipment Available within the Private Farms in Edo State of Nigeria

Private Farms	Maintenance Types	Remarks
PRESCO FARMS, BENIN	Preventive, corrective and breakdown	Adequate tools and spare parts in stock
LEVENTIS FARMS, WEPPA	Preventive, corrective and breakdown	Adequate tools and spare parts in stock



DANSOF FARM, EKPERI	Preventive	No adequate tools and spare parts in stock
OKOMU OIL PALM, BENIN	Preventive, corrective and breakdown	Adequate tools and spare parts in stock
HAL-YAQUM TRACTOR HIRING UNIT.	Preventive, breakdown	Adequate tools and no spare parts in stock

### 3.2. Discussion of the Results

#### 3.2.1. State of Maintenance Workshops in Edo State

Table 3.1 showed the state of maintenance workshop in the 18 local government secretariats in the state. The results revealed that the entire workshops within the local government secretariat and academic institution within the state are below standard and lacks all necessary machines and facilities despite the professional level of the personnel operating the workshops. Also, among the seven private farms visited in the state (as shown in Table 3.3); two farms namely Presco and Okomu oil palm have standard workshops in the entire state.

#### 3.2.2. Inventories of the type of machines, Equipment and tools in the workshops

The inventory of the machines, equipment and tools available in the workshop within Edo State Local Government Secretariats, Academic & Research Institutions and Ministries including Private Farms in Edo State are (Table 3.8 and 3.9). The results revealed that all the local government council secretariats, educational and research institutions, ministries and private farms in the Edo state have a number of tractors, bulldozers, graders, excavators, wheel loader, graders and wood shopper, etc with sets of tool box in their workshops.

#### 3.2.3. Type of Maintenance Practice on the Machinery and Equipment Available

The results of the maintenance practices carried out on the machinery and equipment are presented in Tables 3.7, 3.8 and 3.9 respectively. The results revealed that all the local government council secretariats in the state always carryout preventive, corrective and breakdown maintenance on their equipment except Esan South East, Irrua and Oredo that only carries out breakdown maintenance but with no adequate tools or spare parts available. Also, adequate tools or spare parts were used in all forms of maintenance practices that were carried out in all the educational & research institutions, agricultural ministries and private farms.

## 4. Conclusion and Recommendations

### 4.1. Conclusion

The investigation into the state of agricultural machinery and equipment maintenance workshops in Edo State was carried out. The investigation categorized the organization visited into the local government secretariats, the academic institutions, government ministries and private workshops within the state. The investigation was carried out with a well-structured questionnaire which was distributed to the respondents. The results of the investigation revealed that the entire local government secretariats in the state has one or more workshops and professional personnel for repair and maintenance of their equipment but not all of them have facilities for a standard workshop. It is also concluded that educational and research institutions, government ministries, private farms in the state have a number of workshops equipped with adequate facilities and professional personnel for repair and maintenance of their equipment and machinery. This category of the organizations also maintained their equipment as they carry out, preventive, corrective and breakdown maintenance.

### 4.2. Recommendations

Based on the investigation carried out, the following recommendations were made:

- (i) Provision of spare parts and tools for effective maintenance and repair works so as to avoid delay in carrying out operations
- (ii) Institutions should be provided with funds to carry out safety training and practices
- (iii) Adequate space should be provided for future expansion of the workshops



**Acknowledgement**

The author wishes to acknowledge the funding assistance provided by the Tertiary Education Trust Fund (TETFUND), Institutional Based Research (IBR) Grant assessed through the Centre for Research, Innovation and Development (CRID), Auchi Polytechnic, Auchi, Edo State, Nigeria to carry out this project in the 2019/2020 intervention Session.

**References**

- [1]. Knezevic, J. (1993). Reliability, Maintainability and Supportability Engineering: A probabilistic approach. McGraw Hill Publication limited. Pp12.
- [2]. Khodabakhshian, R. (2013). A Review of Maintenance Management of Tractors and Agricultural Machinery: Preventive Maintenance Systems. Agric Eng Int: CIGR Journal. Volume 15, No. 4, Pp147-158.
- [3]. Mijinyawa, Y and Kisaiku, O.O. (2004). Assessment of the Edo State Tractor Hiring Services. Proceedings of the Nigerian Institution of Agricultural Engineers (NIAE), Volume 25, Pp 116-121.
- [4]. Ladeinde, M.A., Atanda, E.O. and Ageh, A.J . (2009). Training of Agricultural Machinery Operators and Mechanics in Nigeria: AMMOTRAC perspective. A paper presented and published in the proceedings of the 5th Engineering Forum, School of Engineering, The Federal Polytechnic, Ado-Ekiti State, Nigeria. Pp 151-156.
- [5]. Akinbamowo, R.O. 2011. Trends and Challenges to Government Tractor Hiring Units in Ondo State, Nigeria. Journal of Agricultural Engineering and Technology (JAET), Volume 19 (No 2) December, Pp1-8.
- [6]. Mijinyawa, Y. (2010). Farm Structures. Second Edition, Published by Ibadan University Press, Ibadan, Nigeria, Pp 148.

