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Assessment of Tractor Utilization and Ownership for Crop Production in Ondo State, Nigeria

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ABSTRACT
A study was conducted on utilizing and owning tractors for agricultural production in Ondo State. Stakeholders contacted as respondents include farmers, tractor owners, tractor mechanics, public and private institutions like government ministries, local government secretariats, tertiary institutions, and agro-allied industries. Structured questionnaires and personal interviews were used for the collection of data. The results of this study revealed that the age of the respondents varied between 15 and 70 years and 41 -50 years as the age group with the highest percentage distribution. The ownership of tractors as revealed was dominated by individuals with a percentage distribution of 35.85%. The dominating farm tractor in the state was Massey Fergurson with 33.9% percentage distribution and the age of tractors varied from 0 – 20 years. Among the tractor implements, ploughs were the most common (29.55%) and soil tillage (preparation) consequently had the highest usage percentage at 50%. Tractors in the state were bought as new and second-hand with respective distribution percentages of 58.5% and 41.5%. The hiring cost of tractors varied between ₦45,000.00 and ₦325,000.00, with land clearing as the most expensive farm operation and pesticide application as the cheapest. It was observed that tractor mechanics with standard workshops and operators were not adequate and spare parts were not available for purchase in the state. Based on these findings, there is a need to improve on tractor utilization and ownership in the state for optimum food production as recommended in this study.
Keywords: *Hiring cost, operations, repairs and maintenance, tractor distribution, tractor usage.*

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I. INTRODUCTION

The measure of the wealth of a nation is the number of citizens who can afford to feed their families. Mechanization of agriculture cannot be negotiated for the past oil boom, which can be described as the doom of agricultural development. The neglect of agriculture on which the nation was built is being regretted with the recent international crash in the price of crude oil. According to some reports, money cannot by itself create wealth unless people are given the power to effectively mobilize money into both agriculture and viable industries. Takeshima *et al.* (2014) said agricultural mechanization is integral to agricultural transformation in countries like Nigeria. They said most farmers still relied on manual labour and draught animals for farming activities with a limited number of tractor users.

A study by Alhassan *et al*. (2024) examined the short and long-run impacts of tractor acquisition on agricultural output and employment, considering other controlling variables based on their relevance from empirical studies, like credit to the agricultural sector, exchange rates, land cultivation, and rainfall. The findings showed the significance of tractor acquisition alongside other key variables. According to the result, credit to the agricultural sector, land cultivated for agricultural purposes, and tractor acquisition were statistically significant contributors to agricultural output. Odey *et al.* (2007) suggested the government should prioritize procurement of more tractors, corporate groups, and individuals.

Dauda *et al.* (2010) examined the concept of Agricultural tractor ownership and off-season utilization in Ogun State. According to the study, Massey Fergusson, Styr, and Fiat tractors were used mainly for ploughing. The average capacity utilization for ploughing by each tractor was 289 ha/year and they were hardly used during the offseason. The study showed potential for making ownership cost-effective, but cost analysis of farm operations and issues of maintenance were recommended for farmers for profit realization. According to the findings by Dauda *et al*. (2019), the stakeholders in tractor usage and ownership were male-dominated and the age group of most of the respondents ranged between 30 and 59 years. The educational background was low, the majority of the operators (92.68 %) learned how to operate the tractor from other tractor operators

rather than through a formal tractor training school and the most dominant tractor make used by respondents was Mahindra (49.6 %). Igbeka (2014) reported that the cost of operating machinery was the largest single farm expenditure due to machine failure or breakdown.

An inventory of the basic machinery in agricultural establishments of Ondo state was carried out by Akinfiresoye and Agbetoye (2013). The study showed that Fifty percent (50%) of tractors assessed were in functional but good condition; 10% functional but fair and 40% in bad condition. For disc ploughs, approximately 67% were in functional, but good working condition, and the remaining 33% were recorded as nonfunctional. About 20%, 40%, and 40% of the disc harrows were found to be in good, fair, and bad working conditions. Akinbamowo (2011) reviewed the benefits and problems attached to the methods of multi-farm use of farm machinery including problems hampering the growth and profitability of Government Tractor Hiring Units (THU) in Nigeria. The problems reviewed include a lack of requisite infrastructural facilities including repair and maintenance tools and fuel storage facilities; high cost of operations per area basis; inadequacy of trained personnel; time and resources to embark upon long-term staff training and development; non-release of subsidy fund by the Government to support equipment maintenance; lack of loyalty of company staff when handling government investments and loyalty to other government agricultural programmes. Improving agricultural productivity requires the application of Science and Technology of which the use of the tractor and its implements has been found important to replace the crude tools like the hoes and cutlasses. Therefore, the objective of this study was to assess tractor utilization and ownership for agricultural production in Ondo State.

II. MATERIALS AND METHODS

Study Area

This research was conducted in all the eighteen local governments of Ondo State, Nigeria. Ondo State was created out of the former Ondo province of the former Western state in 1976. The State is entirely in the tropics between latitude 50 451 and 80 151 North and longitude 40 451 and 60 East. It is bounded in the North-West by Ekiti State, West-Central by Osun State, South-East by Ogun State, South-East by Delta State, and South by the Atlantic Ocean (Ondo, 2024).

Figure 1: Map of Ondo State, Nigeria
Source: Akinbolati *et al.* (2016)

Data Collection Method and Analysis

The major instruments used for the collection of data were structured questionnaires. Four types of questionnaires were drawn to collect information from the farmers, tractor mechanics, tractor hiring units, and institutions like ministries and parastatals, tertiary institutions, and local government councils. The questionnaires were administered by distribution and personal communication via interviews. Places and stakeholders visited for the study are the ministries of agriculture (Federal and State), Agricultural Development Project (ADP), Agricultural Mechanics and Machinery Operators Training Centre (AMMOTRAC), local

government secretariats, tertiary institutions, farmers (commercial and subsistent), tractor hiring units, and tractor mechanics. The data collected were subjected to descriptive statistical analysis using Microsoft Excel 2016.

III. RESULTS AND DISCUSSION

Age and Sex Distribution of the Respondents

The research revealed as presented in Figure 2 that the age of the respondents varied from 15 to 70 years with the highest percentage distribution of 42.21% in the age group of 41-50 and the lowest percentage distribution of 1.3% in the age group of 15-20. This result is similar to the findings of Dauda *et al*. (2019) and Dauda *et al.* (2010) that reported that the age group with the highest percentage distribution in tractor usage and parts breakdown in Minna, Niger State, and agricultural tractor ownership and off-season utilization in Ogun State, Nigeria is between 40 and 50 years. But this is contrary to what is obtainable about the age group with the lowest percentage distribution. Dauda *et al*. (2019) reported that the least age group in their finding is between 60 and 69 years, while Dauda *et al.* (2010) presented the age group between 21 and 30 years as the range with the lowest percentage distribution of the respondents. It was also observed in this study that the use of tractors for farming was dominated by the male sex. This conforms with the findings of Odey *et al.* (2007) who reported that 75% of the respondents in their study were male.

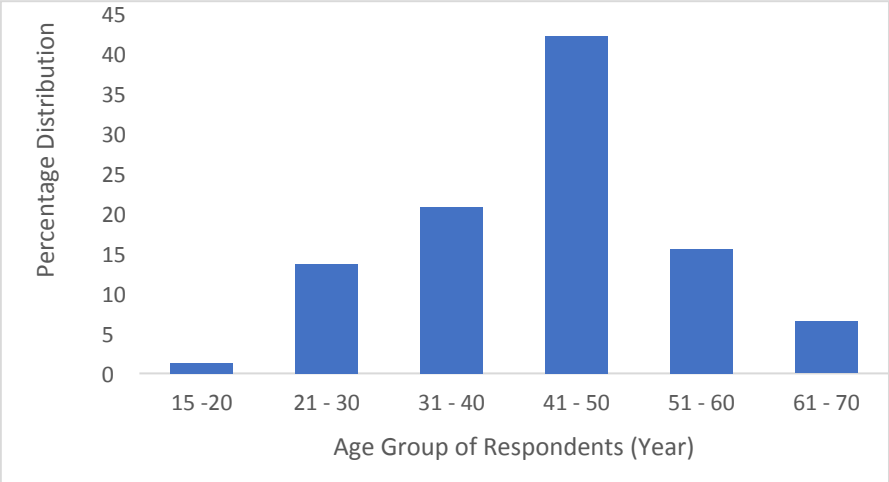

Figure 2: Age Distribution of Respondents

Tractor Ownership Distribution

It was recorded that the highest percentage distribution of tractors (35.85%) in the state was owned by individuals (farmers and tractor hiring units) and the least distribution belonged to the Federal Ministry of Agriculture and its agencies (Figure 3). This is similar to what is obtainable in the study by Onyeagba *et al*. (2019) which reported that individuals owned the highest number of functional agricultural tractors in Ondo State. The result of this study is evidence of the Federal government policy of shifting its focus from direct distributions of subsidized tractors to the promotion of private-sector tractor-hiring services as reported by Takeshima *et al*. (2014). It was also observed that none of the tractors in the state belonged to the Local Government Area Councils.

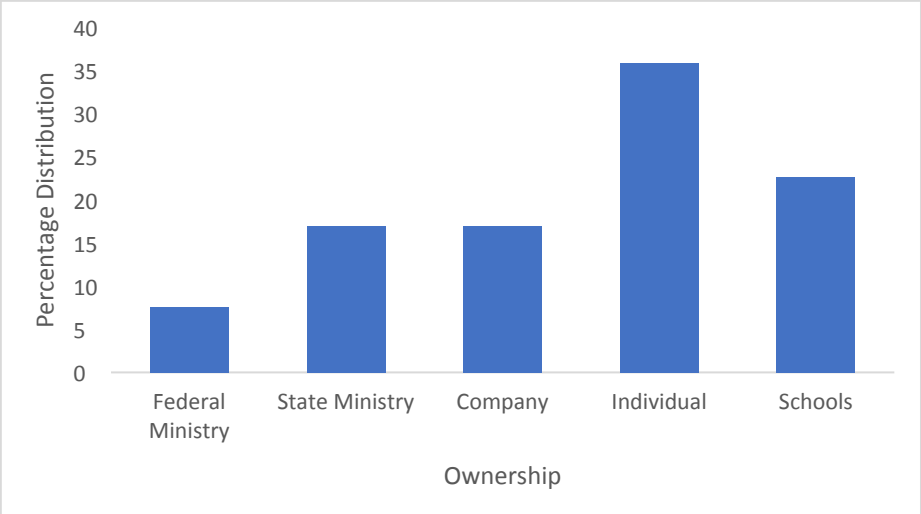

Figure 3: Tractor Owners among the Stakeholders

Tractor and Implement Distribution

According to the result of this study, as presented in Figure 4, there are 15 major types of tractors available in Ondo State. The makes of the tractors include Massey Fergurson, Fiat, Ford, John Deere, International, David Brown, Swaraj, Case I H, New Holland, Kubota, Mahindra, Deutz-Fahr, Eicher, and Tack. Massey Fergurson had the highest frequency percentage of 33.9% was the Massey Fergurson tractor. This is followed by New Holland, while Ford, International, Kubota, and Deutz-Fahr were recorded with the least percentage of frequency distribution of tractors according to make/ manufacturer in the state. This is contrary to the study by Dauda *et al.* (2014) that also presented Mahindra as the tractor maker with the highest percentage distribution of 49.6% in Niger State, Nigeria.

According to the age of the tractors in the state, it was observed that the newest set of tractors fell within the age range of 0-4 years with a percentage distribution of 24% and the oldest (17-20 years) had 3.45% percentage distribution, but Majority of the tractors available fall within the age group of 5-8 and 9-12years with 31 percentage distribution of 31% each (Figure 5). That means 62% of the available tractors in the state are between the ages of 5 and 12 years. This is different from the report by Akinfiresoye and Agbetoye (2013) that indicated that the oldest tractor in Ondo State was 33 years old and that the age of most of the tractors in Ondo State fell between 18 and 33 years.

On Tractor implements (Figure 6), the available implements recorded are the ploughs, harrows, cultivators, ridgers, planters, sprayers, mowers, and combine harvesters. The ploughs had the highest percentage distribution of 29.55% and combine harvesters were observed as the least available machinery in the state with a 1.14% distribution. This conforms with the study by Akinfiresoye and Agbetoye (2013). For tillage implements, the ridger had the least percentage distribution of 18.18% and the plough as the highest as earlier stated. Planters and sprayers were rarely available with a percentage distribution of 2.27and 4.55% respectively. The age range of the oldest implement was recorded between 5 and 8 years (Figure 7). This is also similar to the findings by Akinfiresoye and Agbetoye (2013).

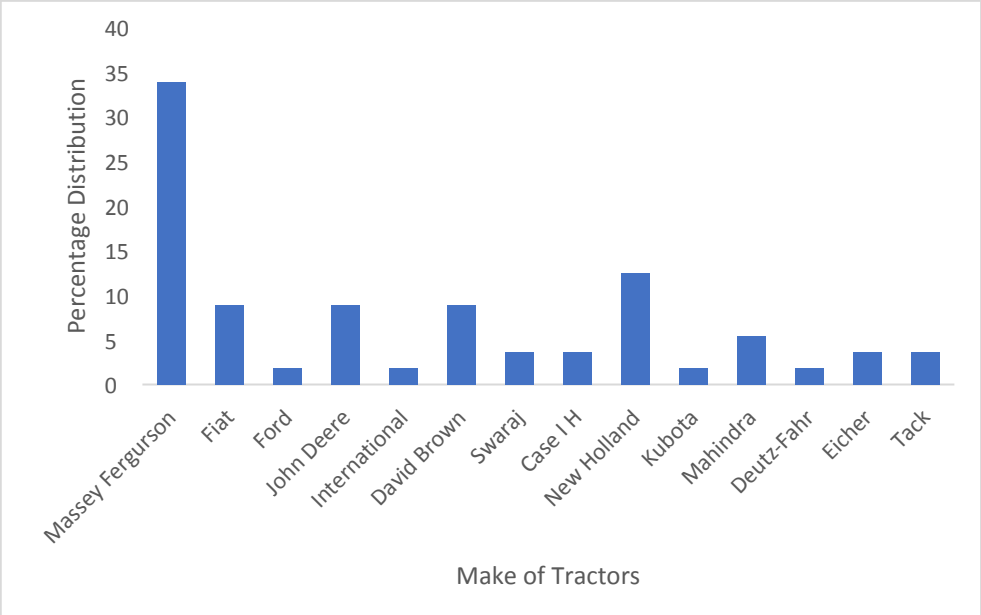

Figure 4: Tractor Distribution by Make

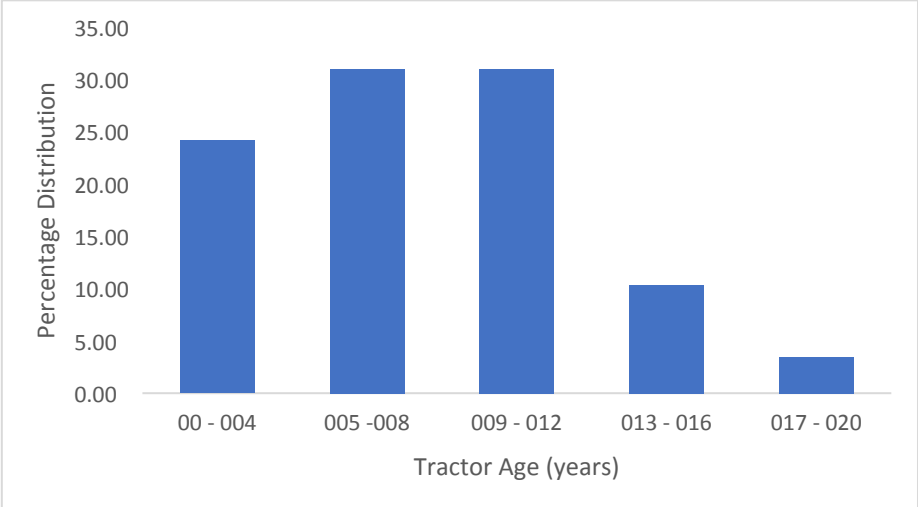

Figure 5: Percentage Distribution of Tractors by Age

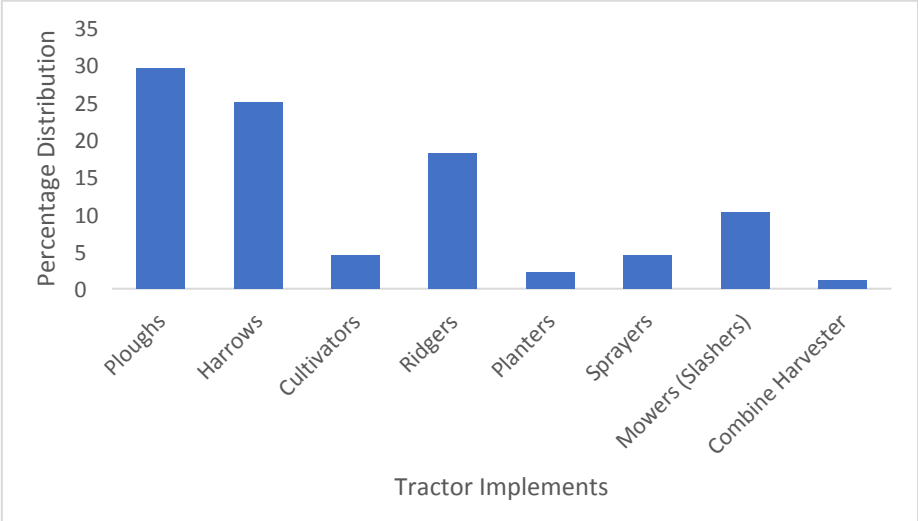

Figure 6: Percentage Distribution of Tractor Implements by Types

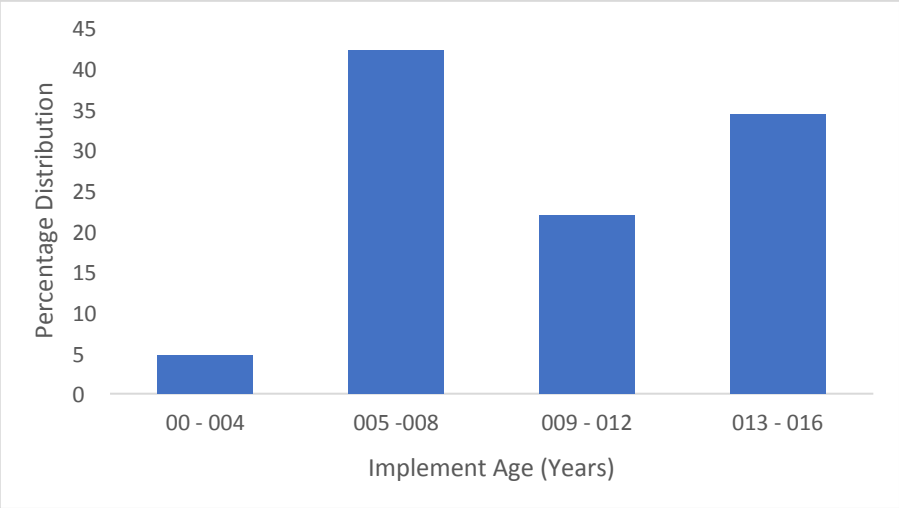

Figure 7: Percentage Distribution of Tractor Implements by Age

Tractor Acquisition, Utilization, and Hiring Cost

According to this study, a higher percentage of the tractors in Ondo State were bought new. The percentage distribution in Figure 8 showed that 55.56% of the tractors were bought as new tractors while 44.44% were procured as second-hand tractors. This result conforms with the findings of Dauda *et al.* (2019) which reported 58.5% and 41.5% distribution as new and second-hand tractors respectively in research conducted in Niger State, Nigeria. As presented in Figure 9, farmers in the state used tractors for soil tillage more than other farm operations. Soil tillage shared 50% of the percentage distribution on the use of tractors available in the state and the least mechanized farm activities are land clearing and seed planting with each percentage of distribution of 11.8%. Pesticide application (spraying) and haulage (transportation) had equal percentages of 13.2%. This shows that farmers rarely used tractors for their farm activities except for tillage operations. This is similar to a study reported by Dauda *et al.* (2010) that observed ploughing a major operation carried out with the use of tractors in Ogun State, Nigeria.

The cost of tractor utilization for farm operations per hectare as recorded in this study (Figure 10) varied between forty-five thousand naira (₦45,000.00) and three hundred and twenty-five thousand naira (₦325,000.00) in the state. Average cost per hectare of ₦325,000 for land clearing, ₦65,000 for ploughing, ₦55,000 for harrowing ₦60,000 for ridging, ₦55,000 for harvesting, ₦50,000 for planting and ₦45,000 for pesticide application (spraying). These operational costs of tractors were a bit different from the ones reported by Takeshima et al. (2014) which ranged between 50 and 128 US dollars (₦75,000 and ₦192,000).

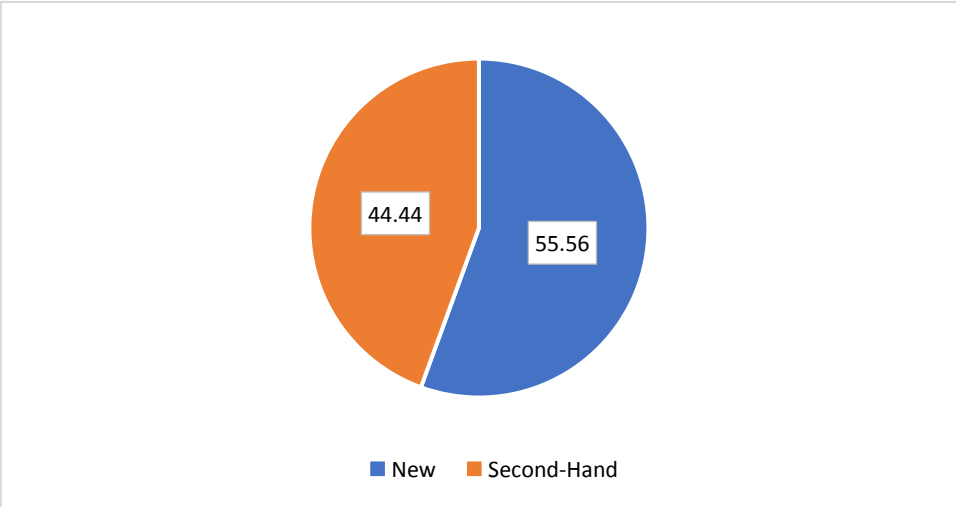

Figure 8: Percentage Distribution of Tractor Acquisition (%)

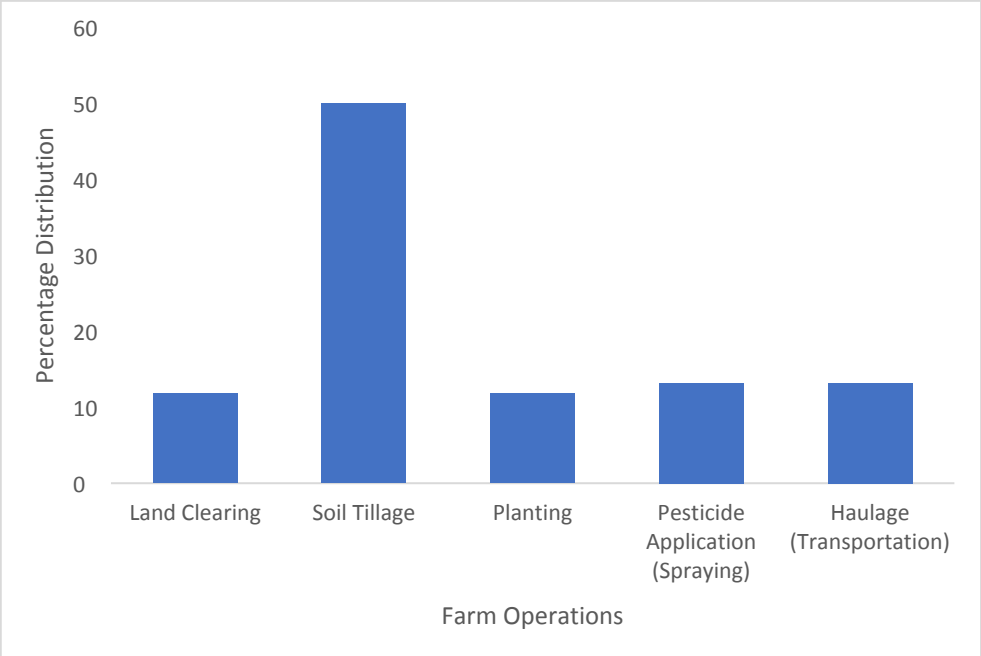

Figure 9: Percentage Utilization of Tractors

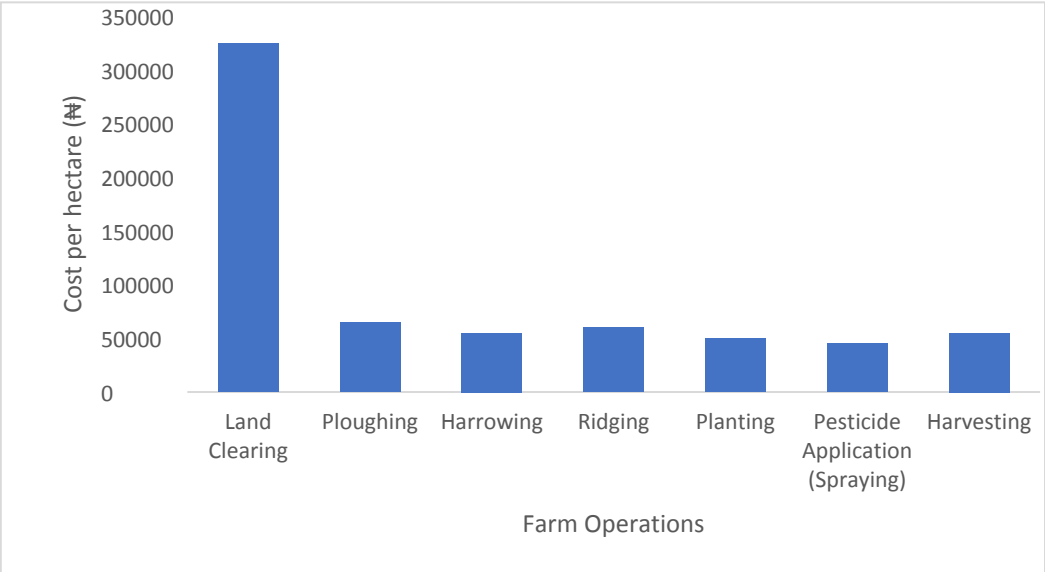

Figure 10: Cost of Tractor Utilization for Farm Operations

Tractor Operation, Repairs and Maintenance

The scarcity of tractor operators was observed in this study as most of the operators were part-time workers (Figure 11). 86.67% and 13.33% were part-time and full-time employees of the tractor owners respectively.

On the repairs and maintenance of tractors, it was revealed that maintenance workshops were available in the state. The data collected showed that 58.07% of the respondents indicated that there were tractor mechanics in the state, but only 78.79 of the mechanics had workshops for maintenance activities (Figures 12 and 13). This is similar to the study by Dauda *et al*. (2010) in which most of the service providers of tractors were within the local environment. But it is different from the study conducted in Niger state by Dauda *et al*. (2019) which revealed that 96.7 % said that tractor mechanics are not readily available.

It was also revealed that tractor spare parts were usually procured outside the state. This was the major reason for the obsolescence of tractors in the state (Figure 14). This is not in line with the report by Takeshima *et al*. (2014) which showed that only 15% of the respondents declared that spare parts for tractor repairs and maintenance were procured outside the state of a study conducted in Kaduna and Nasarawa States. This research also showed that only 13.79% of tractor owners provided shelter for their tractors (Figure 15). This can lead to the short lifespan of tractors in the state.

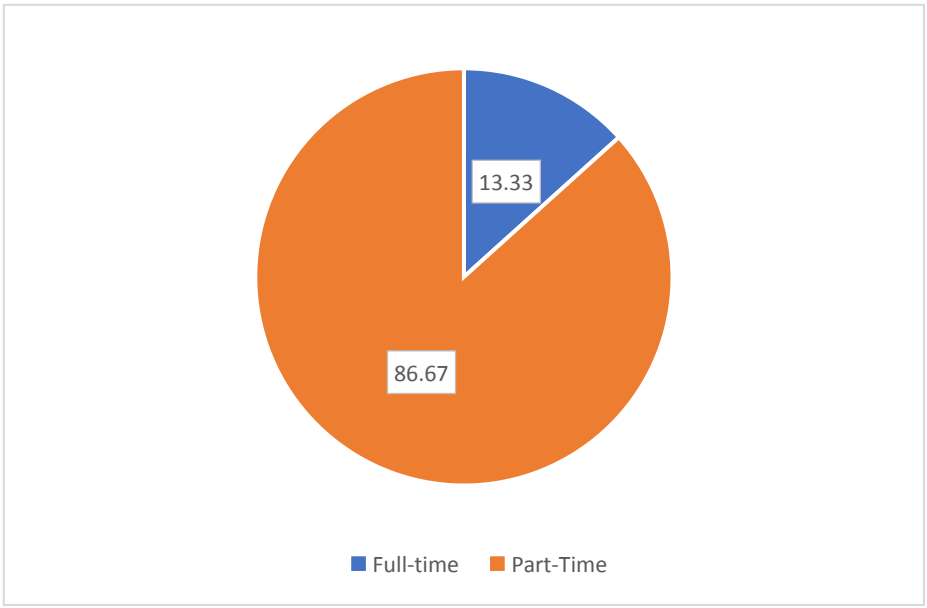

Figure 11: Employment Types of Tractor Operators (%)

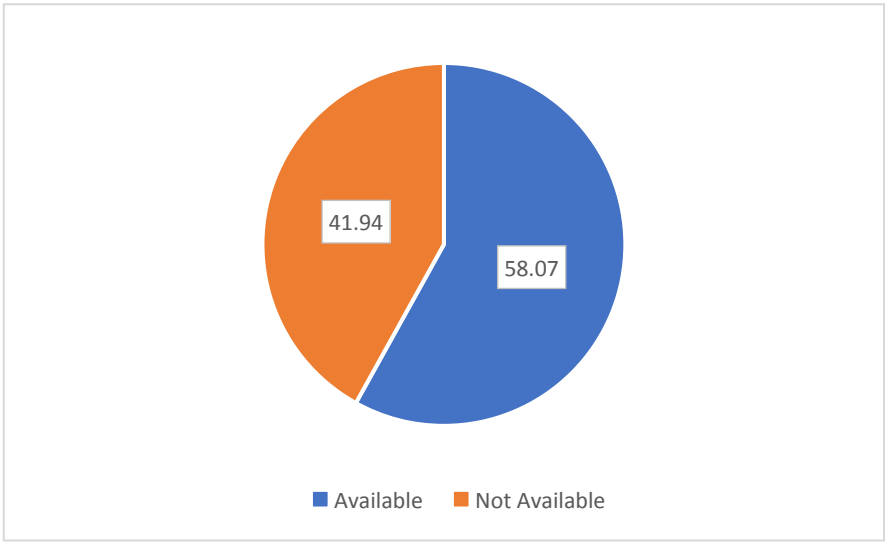

Figure 12: Availability of Tractor Mechanics (%)

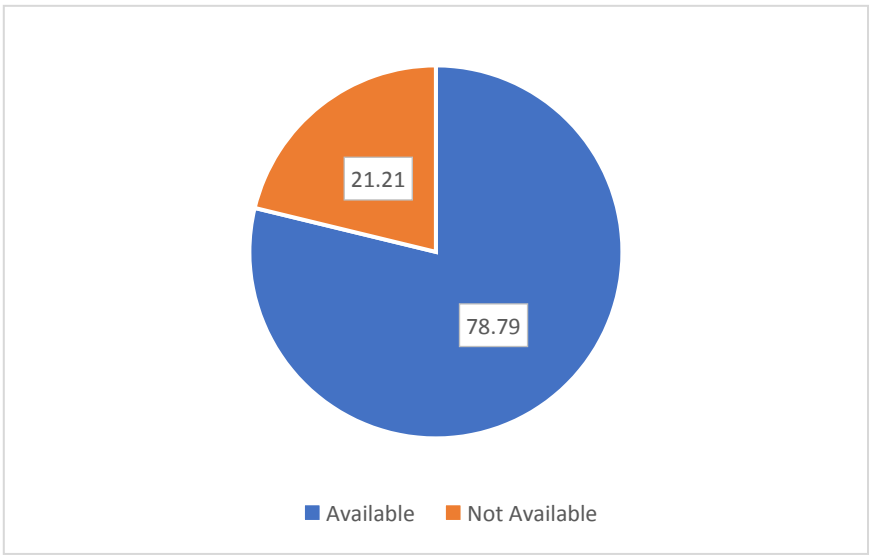

Figure 13: Availability of Tractor Maintenance Workshops (%)

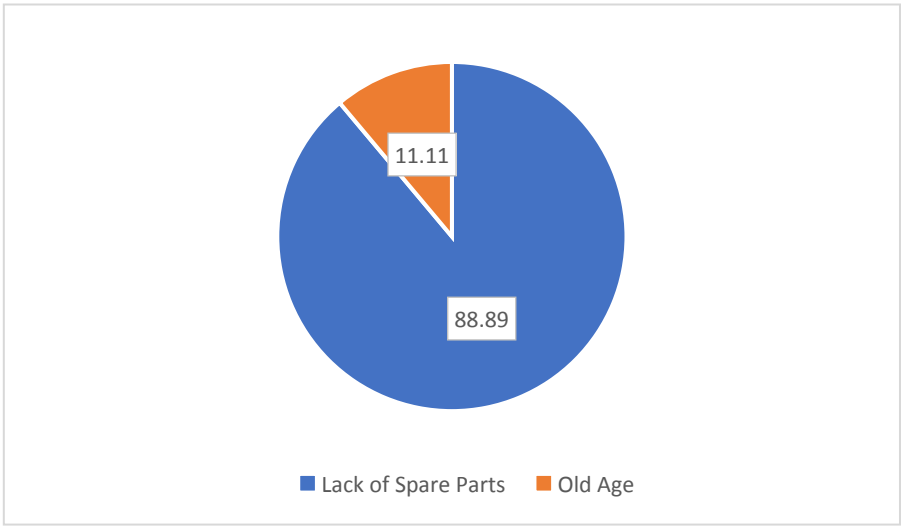

Figure 14: Causes of Tractor Obsolescence in Ondo State (%)

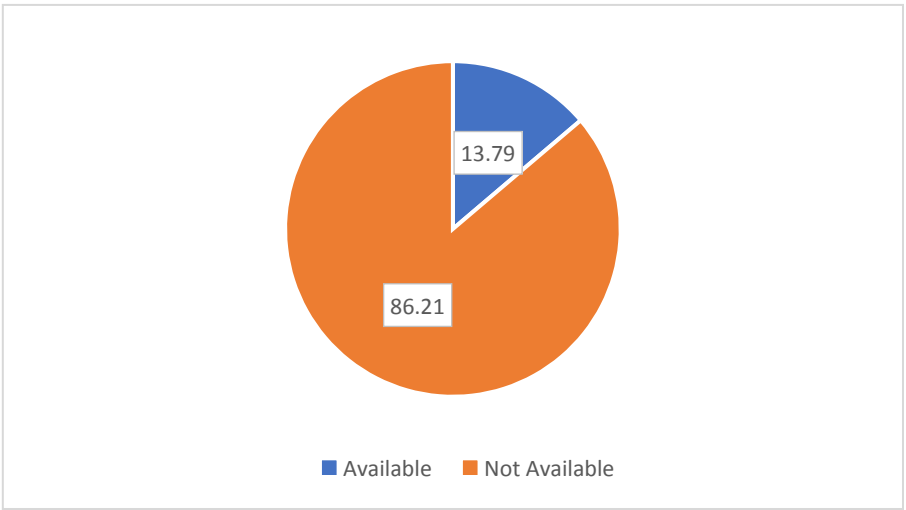

Figure 15: Availability of Machinery Shed (%)

Common Tractor Problems

It was as presented in the study that the hydraulic system of the tractor had the highest number of occurrence of faults with 33.33% of percentage distribution of respondents on the investigation on tractor problems. This is similar to study by Dauda *et al.* (2010) which showed hydraulic problems as one of the most frequent problems with over 27% distribution of the response of the respondent.

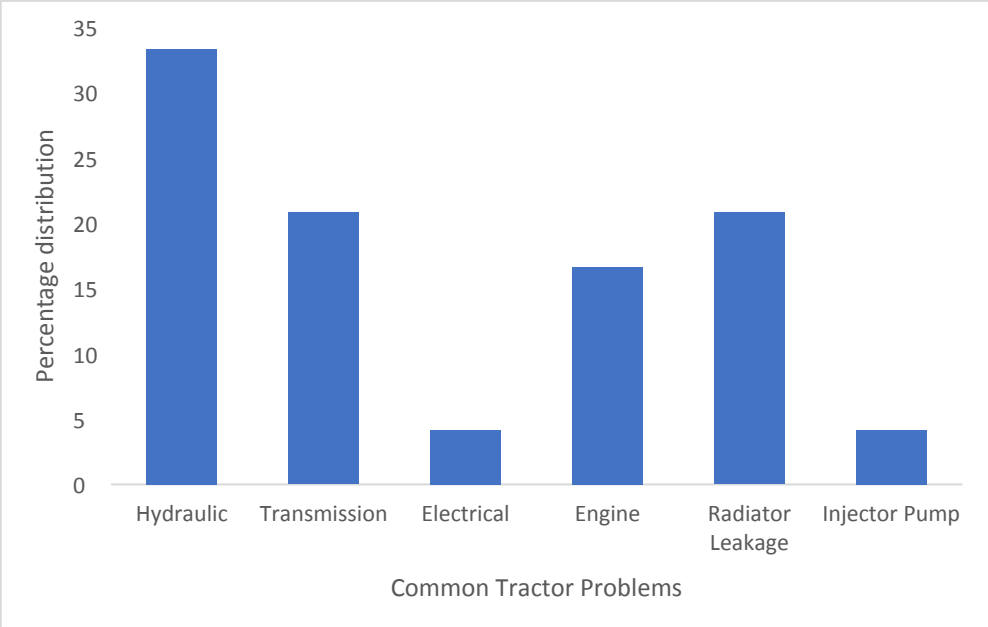

Figure 16: Common Tractor Problems

IV. CONCLUSIONS AND RECOMMENDATIONS

Conclusions

The following conclusions were drawn from this study as discussed in earlier sessions:

1. The age group of the majority of the respondents was between 41 and 50 years and the stakeholders in the ownership and utilization of tractors were male-dominated.
2. Highest percentage of the tractors in Ondo state was owned by individual farmers and tractor hiring centres. There is little contribution from the federal and tate governments in the mechanization of farming in the state.
3. None of the agricultural tractors in the state belonged to the Local Government area Councils.
4. Fifteen (15) major makes of tractors were available in the state and Massey Fergurson was the most dominant make with a 33.9% percentage distribution of the respondents.
5. The majority (86%) of the tractors were within the age of 0 and 12 years and the age of tractor implements was between 5 and 8 years.
6. The common tractor implements available in the state are ploughs, harrows, cultivators, ridgers, planters, sprayers, mowers and combine harvesters and ploughs had the highest percentage distribution of 29.55%.
7. A higher percentage (55.56%) of the tractors in Ondo State were bought as new tractors.
8. The most common tractor operation in the state was soil tillage with a 50% percentage distribution of the respondents and the average cost of operation per hectare ranging between 55,000 and 65,000 depending on the type of tillage operation.
9. Tractor operators and mechanics in the state were not adequate and most of the available operators (86.67%) were on part-time employment with the tractor owners.
10. There were no spare part shops in the state and the spare parts were procured outside the state. This had been majorly responsible for the obsolescence of tractors in the state.
11. Most tractor owners (86.21%) did not provide shelter for the available tractors.

Recommendations

The following are recommended based on the revelations from this study:

1. Youths should be attracted to mechanized farming by introducing a subsidy policy on tractors and other farm machinery.
2. Ondo State government should procure a large number of tractors to reestablish an agricultural mechanization agency and revive the old Tractor Hiring Centres in all 18 local government areas.
3. The local government area councils should procure agricultural tractors for farmers to hire at a subsidized rate.
4. Awareness campaigns, Extension workshops, and seminars on agricultural mechanization should be organized for farmers and other stakeholders in tractor utilization in the state.
5. Ondo State government in collaboration with automobile spare parts dealers should establish tractor spare parts centres in all 18 local government areas.

6. Agricultural Mechanization should be established as a course of study in all the technical colleges of the state.
7. The Federal government should include direct distribution of tractors as being planned to farmers and empower the Agricultural Mechanics and Machinery Operators Training Centre (AMMOTRAC) as a federal government agency in the state for appropriate training of the farmers, tractor owners, operators, mechanics on the requisite maintenance system of the tractors.
8. A digital linkage should be developed for interaction among the stakeholders in tractor utilization for easy access to available tractors in the state.

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