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Impact of Agricultural Mechanization on Commercial Timber Processing Among Etche People of Rivers State

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Abstract
This study examined the impact of agricultural mechanization on commercial timber processing among Etche people of Rivers State. The study areas were Omuma and Etche Local Government Areas of Rivers State. The study employed a descriptive survey design. The population of the study consists of all commercial timber producers in Omuma and Etche Local Government Areas. The sample size consists of 140 commercial timber producers in the study areas. Five research questions guided the study. Two hypotheses were formulated and tested at 0.05 level of significance. A research questionnaire consisting of two sections A and B was structured to elicit response from the respondents. The instrument was structured using a 4-point rating scale of agreement (SA-4, A-3, D-2 & SD-1). Cronbach alpha reliability coefficient was used to test the instrument and was found to have 0.81 reliability coefficient which was considered high enough to be used for the study. Instruments were administered by the researcher and four assistants and were retrieved within few days. Collected data were analysed using mean statistics and standard deviation with mean value ≥2.50 as accepted whereas otherwise rejected. The null hypotheses were tested using *z-test* at 0.05 level of significance. It was revealed that agricultural mechanization have positive impact in that it quickens timber felling process, reduces wastage during harvesting, leads to reduction of drudgery during harvesting, among others. It more so revealed positive impact on timber processing in that there is specialization of labour, reduces wastage of timber, ensures accuracy in the production of timber, among others. It further revealed that epileptic power supply, high cost of hiring/purchasing of machine, unavailability of machine spare parts, among others were some of the challenges of agricultural mechanization in commercial timber production in the study areas. The study therefore recommended that commercial timber producers should ensure there is a proper operational and maintenance culture for agricultural equipment and farm machinery; government should ensure that machines and equipment for timber production are affordable by subsidizing the cost of machines.
Keywords: Impact, Agricultural Mechanization, Commercial Timber Production

INTRODUCTION

Agricultural mechanization is regarded as sine-qua-non to reducing the human drudgery thereby enhancing agricultural productivity. During the post-green revolution period, the impact of mechanization on agricultural production more especially timber production has been well recognised as this is virtually required by all who venture into construction be it building, bridges, furniture making and so on. Consequently, as a result of the employment of mechanization, the agricultural production and productivity in all sector witnessed three-to-four-fold increase. Studies have been conducted by various organisations and individuals which have highlighted the impact of agricultural mechanization on timber production. Singh and Singh (2003) asserted that tractor farms gave higher yields of agricultural crops such as wheat, paddy and sugarcane as well as timber, and produced a higher overall gross output per hectare compared to those that did not employ tractors.

Agricultural mechanization involves the use of tractors, trucks, combine harvesters, airplanes (crop dusters), helicopters, and other vehicles. Modern

farms even sometimes use computers in conjunction with satellite imagery guidance to increase yields. Agricultural mechanization is a major agricultural production input that encompasses the application of mechanical technology/equipment which in turn increases the power in agricultural production, to a large extent as a means to enhance the productivity of land and human labour. According to Bagheri and Moazzen (2009), Agricultural mechanization is the application of suitable machine, recognition of technologies and applying suitable methods for production and processing of agricultural products for continuous increase in productivity.

According to Olaoye and Rotimi (2010), the use of mechanized inputs into agriculture has a direct and significant effect on achievable high level of land productivity, labour productivity, profitability and sustainability of farming, the environment and the quality of life of people engaged in agriculture. In line with this, Xinshen, Jed and Hiroyuki (2016) opined that Mechanized ploughing significantly reduces the amount of labour required for land preparation and typically results in small decrease in the labour required for weeding and harvesting.

Daramola, Igbokwe, Mosuro and Abdullahi (2000) stated that adoption of mechanization in crop production speeds up many farm operations. Adoption of agricultural mechanization in crop production increases food production. In the same vein, Rijk (2010) reports that, mechanization contributes to increase in food production, productivity and advancement of rural economy. The use of modern farm machines encourages youths' participation in agricultural activities.

According to Ugochukwu, Otegbade, Okeke, Suleiman, Idriss and Patrick (2007), agricultural mechanization has led to increase in production and efficiency of farm operations. It was further added that the technology in agriculture makes youths to specialize in agricultural operations. It is often believed that manual agricultural labour can make farming unattractive to youths and influences them to seek off-farm employment that can be potentially less productive (Mrema, Baker & Kahan, 2013). With mechanization, a youth that is into agriculture can comfortably accomplish his tasks with ease and in good time. Therefore, youths can comfortably engage in agriculture since their physical strength will not be fully needed.

According to Spore (2002), agricultural mechanization brings about changes in production methods, logistics and equipments. Such tasks or operations according to Odigboh (2000) include reduction of human drudgery, improvement of timeliness and efficiency of various agricultural operations, hence bringing more land under cultivation, preserving the quality of agricultural products, providing better rural living conditions and advancing the economic growth. In the words of Verna (2016), farm mechanization is regarded as sine-qua-non to reduce the human drudgery and enhance the agricultural productivity. Basically, agricultural mechanization plays important role in agricultural production such as increased working capacity and speed of execution are proof of the technical roles of mechanization (Isa, 2015). Due to the strenuous nature of agriculture, it is believed that some farmers could not otherwise undertake the processes involve such as rapid clearing of forest, ploughing in dry weather in order to plant with the early rains. These labour bottlenecks occur in farming due to short planting windows in semi-arid areas with few days of rainfall and in areas with bimodal rainfall that practices multiple cropping, where the first season's crop must be harvested and threshed before ploughing and planting for the second season can take place (Cossar, 2015).

There are several challenges that hinder the use of machines in the production of timber. According to Nwaru, Onuoha and Onwukwalu (2008), the level of technology prevailing in a given society reflects its capacity to optimize the use of natural and human resource in production. Aniedu (2007) opined that most essential machines needed by farmers are not readily available or their cost is beyond reach. It was further stated that other problems to include; lack of access to credit

facilities, funding of research and inadequate storage facilities.

More so, Youdeowei (2004) stressed that the problem of agricultural mechanization pointed out that absence of incentives for indigenous design and manufacture of farm equipments by the government that such militate against the adoption of agricultural mechanization. It was further added that some of the major problems facing farm mechanization in developing tropical countries include poor credit facilities and lack of classified data and information on the suitability, adaptability and performance of commercially available agricultural equipments to the prevailing types and condition of soil.

All these served as hindrance on the adoption of agricultural mechanization. Daramola, Igbokwe, and Abdullahi (2000) stressed that machinery remains idle after the cropping season and this makes their purchase uneconomical. Anyanwu and Anyanwu (2008) affirmed that the available machines were not enough to reach all those who would like to hire them. The problem that militates against the mechanization of agriculture in rural areas is that farmers were poor and lack the money to purchase the machines. Also, poor topography of the landscape leading to malfunctioning of the machines and the machine may breakdown hindering the adoption of agricultural mechanization (Isa, 2015).

Lamidi and Akande (2013) affirmed that the constraints to agricultural mechanization as they apply to production in Nigeria as a whole may include the following: access to credit, non-setting up of manufacturing and repair services by entrepreneurs, no improved infrastructure, non-affordable and secure access to complementary inputs (fuel, electricity, and larger consolidated plots of land), worst legal and regulatory capacity to protect the rights of owners of machinery and lower efficiency and capacity of public sector for implementing policy.

Traditional farming system does not give way to complete mechanization. That is, mechanization can be employed only in land preparation in mixed cropping system. Amapu (2008) added that scarcity and high cost of purchasing and hiring machines, lack of access to loan scheme by the farmers, poor knowledge of extension agents in engineering and land tenure system, are some of the challenges of agricultural mechanization. Furthermore, he stressed that the individual farm-size of the farmers are too small for the deployment of motorized farm implements such as tractors, and this is because ownership of land is predominantly through inheritance. According to Ogeiva (2008), technical know-how and seasonality of farm operation were the problems confronting the adoption of agricultural mechanization by the farmers. A number of farmers are illiterate and cannot read the instructions attached to the machines concerning their operations. The mode of operation of farm machines is too tedious to be learnt. Also, agricultural practices are seasonal in Nigeria and machines only work in the rainy season, machines can rust and get damaged during the dry season.

This low state of technology has been the problem of agriculture and technical progress in the states. Since the early 1970s, efforts have been geared mainly towards tractorization. It is evident that this has not yielded the expected results for a number of reasons including lack of skilled operators and maintenance personnel, lack of suitable implements and spare parts and increase in the cost of tractors and implements (Bodet, 2011).

In order to realize the full benefit of agricultural mechanization, overall technological development of the country is necessary. This means the availability of improved crop varieties, fertilizer and storage facilities as well as transportation system to distribute and market agricultural produce (NERDC, 2006). Smith (2004) stated that a farm mechanization innovation will only be accepted by farmers if it provides a solution that the farmer is actively seeking. This means that it must be compatible with the farming system and the needs of the farmer taking technical, social and economic factors into account

Purpose of the Study

The study examined the impact of agricultural mechanization on commercial timber production among Etche people of Rivers State. Specifically, the study sought to;

1. ascertain the impact of agricultural mechanized tools on processing of timber in the study area.
2. examine the challenges of agricultural mechanization in commercial timber production in the study area.

Research Questions

Based on the stated purpose of the study, the following research questions guided the study:

1. What are the impacts of agricultural mechanized tools on processing of timber in the study area?
2. What are the challenges of agricultural mechanization in commercial timber production in the study area?

Hypotheses

The following null hypotheses were tested at 0.05 level of significance

1. There is no significant difference in the mean responses of Etche and Omuma commercial timber producers on the impacts of agricultural mechanized tools on processing of timber in the study area.
2. There is no significant difference in the mean responses of Etche and Omuma commercial timber producers on the challenges of agricultural mechanization in commercial timber production in the study area.

METHODOLOGY

The study adopted a descriptive survey research design. Nworgu in Nwankwo (2013) described descriptive surveys as studies which aim at collecting data for the purpose of describing systematically the characteristics, features and facts about a given population. The present study is a descriptive survey based on the fact that it gathered information from commercial timber producers in the study areas in order to describe the impact of agricultural mechanization on their timber production. The study was carried out in Omuma and Etche Local Government Areas of Rivers State, Nigeria which is named after the Echie people of South-South Nigeria. The Etche people speak their own native language which is similar to the Igbo language. They inhabit Omuma and Etche Local Government Areas of Rivers State. The Etche people are known for farming; hence, they are fully involved in agricultural production which involves the production of arable crops, cash crops, forest products (timber), livestock farming among others. Timber is produced in almost all the communities in Etche and Omuma Local Government Areas. Therefore, the areas are suitable for this research work, which seeks to investigate the impact of agricultural mechanization on commercial timber production among Etche people of Rivers State. The population of the study comprised all commercial timber producers in the selected communities in both Omuma and Etche Local Government Areas of Rivers State. A sample of 140 commercial timber producers was used for the study. The study sample was achieved by taking a simple random sampling of commercial timber producers in Omuma and Etche Local Government Areas respectively. The sample size in the selected communities in Omuma was 54, while that of Etche was 86, which therefore serve as the respondents for this study. The instrument for the study was a survey questionnaire title "Impact of Agricultural Mechanization on Commercial Timber Processing (IAMCTP)", which was used to elicit information on the impact of agricultural mechanization on commercial timber production among Etche people of Rivers State. The questionnaire was structured in the pattern of 4-point Likert rating scale of Strongly Agree (SA-4), Agree (A-3), Disagree (D-2) and Strongly Disagreed (SD-1). The instrument was face validated by the research supervisor and two experts in the Department of Vocational and Technology Education in Rivers State University, Port-Harcourt. The reliability of the instrument was established using Cronbach Alpha Reliability

Coefficient method for a measure of internal consistency of the instrument. The coefficient value obtained was 0.81 which was used to judge the reliability of the instrument and was considered high enough for the study. Copies of the instrument were administered directly to the respondents by the researcher and four research assistants. Percentage, mean and standard deviation was used to answer the research questions while z-test was employed to test the hypotheses at 0.05 level of significance. Mean values less than 2.50 was rejected, while Mean values ≥ 2.50 was accepted. The data was analyzed with SPSS 23.0 version and Excel software

RESULT

Research Question 1: What are the impacts of agricultural mechanized tools on processing of timber in the study area?

Table 1: Mean responses of commercial timber producers (CTPs) on the impacts of Agricultural Mechanized Tools on Processing of Timber

		Omuma CTP's Response			Etche CTP's Response		
S/N	**Variables**	$\bar{x}_1$	**SD_1**	**Decision**	$\bar{x}_2$	**SD_2**	**Decision**
1.	specialization of labour	2.87	.78	Accepted	2.78	1.03	Accepted
2.	contributes to the quality of wood	2.74	.83	Accepted	2.80	1.08	Accepted
3.	ensures accuracy in the processing of timber	2.59	.84	Accepted	2.80	1.00	Accepted
4.	encourages reliability	2.69	.82	Accepted	2.76	1.05	Accepted
5.	it makes processing of timber easier	2.83	.95	Accepted	2.87	.97	Accepted
6.	enhances efficiency in timber processing	2.70	.84	Accepted	2.86	.97	Accepted
7.	Encourages fast processing of timber	2.57	.92	Accepted	2.72	1.10	Accepted
8.	reduces wastage of timber	2.63	.90	Accepted	2.77	1.01	Accepted
	Grand Mean & SD	**2.70**	**.86**		**2.80**	**1.03**	

Source: Field Survey, 2017 $\bar{x}$ **= Mean; ≥ 2.50 accept, otherwise reject; SD= Standard deviation**

Result in Table 1 above shows the mean response of respondents on the impacts of agricultural mechanized tools on processing of timber among Etche people of Rivers State. All respondents (Omuma and Etche commercial timber producers) accepted that agricultural mechanized tools have positive impact on the processing of timber. That is, it encourages or leads to specialization of labour (mean=2.87 & 2.78), contributes to the quality of wood (mean=2.74 &2.80), ensures accuracy in the processing of timber (mean=2.59 & 2.80), encourages reliability on the tools (mean=2.69 & 2.76), makes processing of timber easier (mean=2.83 & 2.87), enhances efficiency in timber processing (mean=2.70 & 2.86), encourages fast processing of timber (mean=2.57 & 2.72), reduces wastage of timber (mean=2.63 & 2.77). The grand mean and SD are 2.70 & 0.86 respectively for Omuma, while that of Etche is 2.80 and 1.03 respectively.

Research Question 2: What are the challenges of agricultural mechanization in commercial timber production in the study area?

Table 2: Mean responses of commercial timber producers (CTPs) on the challenges of Agricultural Mechanization in Commercial Timber Production

S/N	Variables	Omuma CTP's Response			Etche CTP's Response		
		$\bar{x}_1$	SD_1	Decision	$\bar{x}_2$	SD_2	Decision
1.	epileptic power supply	2.89	.84	Accepted	2.94	.95	Accepted
2.	poor access road	2.72	.92	Accepted	2.84	1.02	Accepted
3.	lack of machine maintenance	2.63	.92	Accepted	2.73	1.02	Accepted
4.	cost of purchasing machine	2.67	.93	Accepted	2.78	1.02	Accepted
5.	High cost of diesel/petrol	2.83	.97	Accepted	2.95	1.04	Accepted
6.	government policies on mechanization	2.78	.92	Accepted	2.93	.99	Accepted
7.	lack of operational skill	2.59	1.06	Accepted	2.74	1.14	Accepted
8.	high cost of hiring equipment	2.69	.95	Accepted	2.84	1.03	Accepted
9.	lack of access to credit facilities	2.70	.96	Accepted	2.86	1.04	Accepted
10.	cultural belief on mechanization	2.78	.96	Accepted	2.93	.97	Accepted
11.	absence of incentives	2.57	.94	Accepted	2.67	1.03	Accepted
12.	poor topography	2.83	.84	Accepted	2.99	.86	Accepted
13.	inadequate maintenance experts/personnel	2.69	.86	Accepted	2.81	.95	Accepted
14.	unavailability of machine spare parts	2.70	.90	Accepted	2.81	1.00	Accepted
15.	lack of top management support	2.72	.98	Accepted	2.87	1.04	Accepted
	Grand Mean & SD	**2.72**	**0.93**		**2.85**	**1.01**	

Source: Field Survey, 2017 $\bar{x}$ = Mean; ≥ 2.50 accept, otherwise reject; SD= Standard deviation

Result on table 2 above shows the mean response of respondents on the challenges of agricultural mechanization in commercial timber production among Etche people of Rivers State. Majority of the respondents (Omuma and Etche commercial timber producers) accepted that epileptic power supply (mean 2.89 & 2.94), poor access road (mean=2.72 & 2.84), lack of machine maintenance (mean=2.63 & 2.73), cost of purchasing of machine (mean=2.67 & 2.78), high cost of diesel / petrol (mean=2.83& 2.95), government policy on mechanization (mean=2.78 & 2.93) are some of the challenges of agricultural mechanization in commercial timber production in the study areas. Other challenges as accepted by the respondents in both Omuma and Etche include; Lack of operational skills (mean=2.59 & 2.74), high cost of hiring equipment (mean 2.69 & 2.84), lack of access of credit facilities (mean=2.70 & 2.86), cultural belief on mechanization (mean=2.78 & 2.93), absence of incentives (mean=2.57 & 2.67), poor topography (mean=2.83 & 2.99), inadequate maintenance expert/personnel (mean=2.69 & 2.81), unavailability of machine spare parts (mean=2.70 & 2.81) and lack of top management support (mean=2.72 & 2.87) respectively. However, the grand mean and SD for Omuma CTPs are 2.72 and 0.93 respectively, while that of Etche are 2.85 for grand mean and 1.01 for standard deviation (SD).

Test of Hypotheses

Hypothesis 1

There is no significant difference in the mean responses of Etche and Omuma commercial timber producers on the impacts of agricultural mechanized tools on processing of timber in the study area.

Table 3: *Z-Test* for Omuma and Etche Commercial Timber Producers on the Impacts of Agricultural Mechanized Tools on Processing of Timber

Categories	$\bar{x}$	SD	N	df	Level of Sign	z-cal	z-crit	Decision
Omuma CTP's	2.70	0.86	54	138	0.05	0.62	1.96	Accepted
Etche CTP's	2.80	1.03	86					

Source: Field survey, 2017. z-cal (z-test calculated), z-crit (z-test critical)

The result in Table 3 shows that Omuma commercial timber producers have mean and standard deviation scores of 2.70 and 0.86, while Etche commercial timber producers have mean and standard deviation scores of 2.80 and 1.03 at 0.05 level of significance, with ***z-cal*** value of 0.62 and ***z-crit*** value of 1.96. The result shows that the ***z-cal*** value is less than *z-**crit*** value. Since the ***z-cal*** value of 0.62 is less than the ***z-crit*** value of 1.96, therefore the null hypothesis is accepted. This implies that there is no significant difference in the mean response of Omuma and Etche commercial timber producers on the impacts of agricultural mechanized tools on processing of timber in the study areas. More so, this is evident in the fact that the mean response of commercial timber producers in Omuma is 2.70 as against 2.80 for commercial timber producers in Etche in table 3 above.

Hypothesis 2

There is no significant difference in the mean responses of Etche and Omuma commercial timber producers on the challenges of agricultural mechanization in commercial timber production in the study area.

Table 4: *Z-Test* for Omuma and Etche Commercial Timber Producers on the Challenges of Agricultural Mechanization in Commercial Timber Production

Categories	$\bar{x}$	SD	N	DF	Level of Sign	z-cal	z-crit	Decision
Omuma CTP's	2.72	0.93	54	138	0.05	0.78	1.96	Accepted
Etche CTP's	2.85	1.01	86					

Source: Field survey, 2017. z-cal (z-test calculated), z-crit (z-test critical)

The result in Table 4 shows that Omuma commercial timber producers have mean and standard deviation scores of 2.72 and 0.93, while Etche commercial timber producers have mean and standard deviation scores of 2.85 and 1.01 at 0.05 level of significance, with *z-cal* value of 0.78 and *z-crit* value of 1.96. The result shows that the *z-cal* value is less than *z-crit* value. Since the *z-cal* value of 0.78 is less than the *z-crit* value of 1.96, therefore the null hypothesis is accepted. This implies that there is no significant difference in the mean response of Omuma and Etche commercial timber producers on the challenges of agricultural mechanization in commercial timber production in the study areas. More so, this is evident in the fact that the mean response of commercial timber producers in Omuma is 2.72 as against 2.85 for commercial timber producers in Etche in table 4 above.

Discussion of Findings

Majority of the commercial timber producers accepted that specialization of labour, contributes to the quality of wood, reduces wastage of timber, encourages fast processing of timber, ensures accuracy in the production of timber, it makes procession of timber easier, enhances efficiency in timber processing,

among others, as were some of the impacts of agricultural mechanized tools on processing of timber. Majority of the commercial timber producers accepted that epileptic power supply, cost of purchasing of machine, high cost of hiring equipment, cultural belief on mechanization, government policies on mechanization, lack of access to credit facilities, inadequate maintenance experts/personnel, lack of operational skill, lack of top management support, unavailability of machine spare parts, among others were some of the challenges of agricultural mechanization in commercial timber production in the study area. This study is in accordance with the findings of Aniedu (2007), who opined that, most essential machines needed by farmers are not readily available or their cost is beyond reach. Also, in line with this study, is the findings of Youdeowei (2004) who stressed that the problem of agricultural mechanization is the absence of incentives for indigenous design and manufacture of farm tools and equipment by the government. In accordance with this research work is the findings of Anyanwu, Anyanwu and Anyanwu (2008) who affirmed that the available machines were not enough to reach all those who would like to hire or use them. Amadi (2002) confirmed that poor road construction and maintenance is one of the challenges of agricultural mechanization. This present work is also in agreement with the findings of Fernando (2012) who identified factors which constitute main constraints to agricultural mechanization in most Sub-Saharan African countries as lack of adequately trained personnel with the technical expertise, low level of research and extension activities on appropriate technologies for land preparation, crop harvesting and processing operations.

CONCLUSION

Based on the findings of the study, it was deduced that some of the challenges of agricultural mechanization in commercial timber production in the study areas were high cost of purchasing and hiring equipment, epileptic power supply, cultural belief on mechanization, government policies on mechanization, lack of access to credit facilities, inadequate maintenance experts/personnel, lack of operational skill, lack of top management support, unavailability of machine spare parts, among others.

RECOMMENDATIONS

Based on the findings of the study, the following recommendations were made:

1. Government should ensure that machines and equipment for timber production are affordable by subsidizing the cost of machines. Possibly buy agricultural machines and hire them out to commercial timber dealers at affordable price.
2. Group ownership is a possibility and should be encouraged by commercial timber producers in the study area as this can be supported by public sector incentives. Private sector mechanization services are probably one of the most appropriate vehicles and should also be supported by the public sector incentives.

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