IMPACT OF FARM MECHANIZATION ON THE PRODUCTIVITY OF CROP FARMERS IN RIVERS STATE

OKAGWA, PROMISE OMURUKA
Department of Vocational & Technology Education
Rivers State University
Port Harcourt, Nigeria

And

NNODIM, KINGDOM ALABEKE
Department of Vocational & Technology Education
Rivers State University
Port Harcourt, Nigeria

Abstract

The study examined Impact of Farm Mechanization on the Productivity of Crop Farmers in Rivers State. The study employed three objectives and was descriptive survey design to measure opinions of the respondents. The population of the study consists of crop farmers in the 23 local government areas in Rivers State out of 102 crop farmers were randomly selected from 6 local government areas, resulting the total sample size of 612 respondents. The data gathered was analyzed using mean and standard deviation with acceptance mean value of 3.00. The study reviewed that farm mechanization can be very effective for crop farmers in different farm operations, However, revealed the poor competencies/operational standard of farm operators on farm mechanization by crop farmers in Rivers State who are not widely practicing the use of farm mechanization processes due to lack of trained machinery operators. The study also revealed that there are so much benefits on the use of farm mechanization by the crop farmers processes through high level of productivity, ensuring food security, increases farmers livelihood. Therefore, the study recommended that Government should found and invest more in agriculture especially in rural areas to enhance farmer's productivity.
Keywords: Farm Mechanization, Crop Farmers, Farm Benefit, Productivity.

Introduction

In Africa, such as in Nigeria, anecdotal evidence indicates that on farm labor costs have been rising. Reasons potentially include a growing urban sector and the rural nonfarm economy (Oseni and Winters 2009), factors that often raise rural farming wages (Reardon et al. 2000). Although rising rural wages may benefit some farmers through increased off-farm income-earning activities, farmers who receive a higher return from farming than nonfarm activities may lose from the higher labor costs. Effective support for mechanization may be critical when high labor costs have negative effects on agricultural productivity and the welfare of smallholder farm households.

The demand for mechanization may be determined by various factors including farming systems, population density, and labor wages (Pingali 2007). Given the heterogeneity in the agroecological environment and socioeconomic characteristics of farm households common in Nigeria, farm mechanization may play diverse roles. For example, farm mechanization may be more effective at reducing labor costs than expanding area cultivated. In such a case, the goal

for an effective mechanization policy, may be to raise incomes of smallholder farm households through reduced production costs rather than to grow large-scale farmers.

The market for mechanization services is underdeveloped in countries such as Nigeria, with an uneven supply across locations. Tractor services in Nigeria are mostly provided by the government through either subsidized direct sales or public tractor-hiring services, and to a lesser extent by the private owner-operators (PrOpCom 2011). Although a commercial market exists in Nigeria where imported tractors are sold, the effective demand may be small and limited to private owner-operators who have managed to accumulate sufficient capital through expansion of business after acquiring subsidized tractors. Given the low operational capacity and poor maintenance of equipment in public tractor-hiring services, the suboptimal distribution of subsidized tractors, and the high fixed costs for starting a private mechanization service, current mechanization may be highly constrained by the lack of supply, leaving potential demand unmet for the majority of smallholder farmers.

According to Nkakini, Ayotamunoa, Ogaji & Probert (2006) farmers in Rivers State employed only a low level of mechanization. Hilkiah & Okparanma (2004) also noted that some of the factors identified for the low level of agricultural mechanization in Rivers State include continued fragmentation of farmlands, poor capital based of individual farmers and weak commitment to implementation of mechanization programmes. The resulting low productivities were due to poverty, lack of knowledge of the implements, lack of incentive to use machinery in agricultural practices, and traditional tools being cheap and readily available to the rural farmer. Nigerian farmer have often been described as "The man with the hoe", (Odigboh, 2000). This is as a result of farmers' use of crude implements for farming despite the huge revolution that the agricultural industry have undergone in the past decade as countries such as USA, Japan, Thailand, Switzerland, Canada among others have taken mechanization as a technique for improving productivity. Reid (2011) noted that farm mechanization is one factor that has a significant effect in agriculture since the beginning of modern agriculture. Agricultural mechanization according to Wikipedia (2013) is a process of using machinery to do agricultural work, which to great extent increases productivity. Folaranmi (2014) stated that agricultural mechanization is the process whereby equipments, implements and machineries are utilized by farmers to boost food and agricultural production in order to solve the problem of drudgery in production. Agricultural mechanization is described as a major agricultural input which covers the application of mechanical technology and increased power to agriculture, which is a means of enhancing productivity of land and human labour (Republic of Kenya, 2015). It is the application of machines in the production process in agriculture ranging from land clearing, tilling, planting, harvesting among others, to maximize productivity, reduce time at work and meet up with food demand of the society.

Agricultural mechanization are of different types including the hand tools technology, manual work, animal drought technology, electrical power and renewable energy machine (Maharijan & Cheltri, 2006). These various powers are been used in different region depending on the choice of the farmer and the farm operation the farmer wants to carry out. The basic importance of the use of these implements is to maximize productivity thereby increasing the input to farming activities hence intensifying productivity in the agricultural sector and meeting the high demand of agricultural products. The technique is been employed by farmers at different stages of production. According to Rijk (2016) machines are used in ploughing of land,

crop production, planting, stumping, ridging, fertilizer application, weeding, harvesting among others. Other area where mechanization is applicable includes land clearing, tilling operation, harrowing, transportation, processing and storage.

As a result of the adoption of agricultural mechanization, Mbanasor and Onwusiribe (2014) noted that the use of machines, greatly increase farm workers' productivity. Lamidi and Akande (2013) opined that there is reduction in drudgery, improved timeliness and effectiveness in various farm operations thereby bringing more land under cultivation, preserve the quality of production as well help in improving the living condition and notably improve the economic growth of the rural sector. Ani and Onwualu, (2002). Mechanised farming is the use of machinery and equipment to make farm work easier and faster in order to increase farm productivity. In modern times, powered machinery has replaced many jobs formerly carried out by men or animals such as oxen, horses and mules. The level, appropriate choice and subsequent proper use of farm machinery and equipment in agriculture has a direct and significant effect on achievable levels of land productivity, labour productivity, profitability of farming, the environment and the quality of life of people engaged in agriculture. Therefore, the impact of Farm Mechanization tends to improve Productivity of Crop Farmers in Rivers State.

Statement of the Problem

In spite of Nigeria's teeming population of about 167 million (National Population Commission, 2011), its diverse agro-ecological conditions and rich agricultural resource endowment, there has been a gradual decline in the contributions of agriculture to the nation's economy over the years. In the 1960s, agriculture accounted for 65-70% of total exports; but fell to about 40% in the 1970s, and crashed to less than 2% in the late 1990s (Fruitfulgleans, 2010). In spite of the fact that, the contribution of Agriculture to the GDP rose slightly risen to 41.84% in 2009, it is on record that, of the 84 million hectares of Nigeria's arable land, only 40 per cent is cultivated and of this, not more than 10 per cent is optimally cultivated (FGN, 2013).This implies that agriculture has great potentials for supporting the economy if well harnessed over the years.

Governments at various levels have taken various measures toward improving the Agricultural Sector but it appears that the objectives of increasing farm output and maximising cultivable land through mechanised farming have not yet been realised. Onwualu and Pawa (2004) found that 90% of farmers in Nigeria use rudimentary technology (hand tools), 7% animal-drawn tools and only 3% use engine powered technology. It is also noted that poor access to modern inputs and credit facilities, poor infrastructure, inadequate access to markets, land and environmental degradation, inadequate research and extension services retard growth in the sector.

For a country richly endowed with good climatic conditions, land and human resources and where Agriculture is one of the major contributor to its real national Gross Domestic Product (GDP), there is no justifiable reason not to have a strong and highly productive Agricultural Sector. Besides, as a developing nation that aspires to meet her Millennium Development Goal of eradicating extreme poverty and hunger, there is need to identify why rapid development of the Agricultural Sector has eluded the nation. The Study therefore, was

conducted to examine the impact of farm Mechanization on the Productivity of Crop Farmers in Rivers State.

Purpose of the Study

The main purpose of the study is to examine impact of farm mechanization on the productivity of crop farmers in Rivers State. Specifically, the study seeks to:

1. Identify the competencies/operational standard of farm operators and technicians on farm mechanization by crop farmers in Rivers State..
2. Identify farming system operation stages where farm mechanization are being used in Rivers State
3. Determine the benefits on the use of farm mechanization by crop farmers in Rivers State

Methodology

The study was carried out in Rivers State. Rivers east, west and among other parts has more land scale with small river rang while, Rivers State within the south east is surrounded more with ocean. The area that has more land scale (the region) was chosen as there is substantial number of crop farmers who depend solely on agriculture as a means of livelihood. The study adopted a descriptive survey design. The population of the study comprise of all the crop farmers in the 23 local government areas in Rivers State. About 102 rural farmers were randomly selected from 6 local government areas, giving the total sample size as 612 respondents. Data for the study were gathered using a structured questionnaire. Collected data were analyzed using mean and Standard Deviation with an acceptance mean value of ≥3.00.

Results and Discussion

Table 1: Mean and standard deviation responses of competencies/operational standard of farm operators and technicians on farm mechanization by crop farmers.

S/N	Variable	WM	SD	Decision
1.	Lack of trained machinery operators	4.11	0.21	Agreed
2.	Shortage of spare parts	3.71	0.98	Agreed
3.	Lack of capital	3.69	1.32	Agreed
4.	Scarcity of machinery	4.21	1.60	Agreed
5.	Prevailing agronomic practices	3.45	0.99	Agreed
6.	Lack of good access road to the farm	4.32	0.44	Agreed
7.	Fragmentation	4.91	1.02	Agreed
8.	Lack of maintenance and repairs	3.94	0.97	Agreed
9.	Illiteracy of farmers	3.00	0.20	Agreed
10.	Land tenure system	3.55	0.29	Agreed
	Grand Mean	**3.89**	**0.80**	

Source: field survey, 2019 **WM=Weighted Mean, SD= Standard Deviation**

Table 1 showed that respondents agreed that; lack of trained machinery operators (4.11), shortage of spare parts (3.71), lack of capital (3.69), Scarcity of machinery (4.21), Prevailing agronomic practices (3.45), Lack of good access road to the farm (4.32), fragmentation (4.91), Lack of maintenance and repairs (3.94), Illiteracy of farmers (3.00), Land

tenure system (3.55) respectively are some of the operational standard/competencies rocking farm mechanization by crop farmers in the study area. This study is accompanied by the studies of Lamidi & Akande (2013), Onyema (2010), Odigboh (2000), Rijk (2016) among others who share the view of lack of competencies/operational standard with the above mentioned variables from the table among other factors rocking farm mechanization by crop farmers in the study area.

Table 2: Mean and standard deviation responses of farming system operation stages where farm mechanization are being used.

S/N	Variable	WM	SD	Decision
1.	Weeding	3.00	1.42	Agreed
2.	Transportation	3.61	0.14	Agreed
3.	Planting activities	4.21	0.90	Agreed
4.	Land clearing	3.09	0.59	Agreed
5.	Processing	4.52	1.00	Agreed
6.	Storage	3.06	0.97	Agreed
7.	Tilling operation	3.05	0.99	Agreed
8.	Harrowing operation	4.00	0.66	Agreed
9.	Fertilizer application	3.20	0.72	Agreed
10.	Ridging	3.27	1.3	Agreed
11.	Stumping operation	3.14	1.59	Agreed
12.	Harvesting	4.20	0.91	Agreed
	Grand Mean	**3.53**	**0.94**	

Source: field survey, 2019 **WM=Weighted Mean, SD= Standard Deviation**

Table 2 showed that the respondents agreed that weeding (3.00), Transportation (3.61), Planting activities (4.21), Land clearing (3.09), Processing (4.52), Storage (3.06), Tilling operation (3.05), Harrowing operation (4.00), Fertilizer application (3.20), Ridging (3.27), Stumping operation (3.14), Harvesting (4.20) respectively. These are the farming system operation stages where farm mechanization are being used. Therefore, the study commiserates with by Rijk (2016) and Amadi, & Ekezie (2016) who identified that in this modern days of word of technology, there are achiness which are used for different farm operations such as weeding machine, tractor, processing among others. These operations have different applications to implement to achieve them at different levels.

Table 3: Mean and standard deviation responses of the benefits on the use of farm mechanization by crop farmers.

S/N	Variable	WM	SD	Decision
1.	High level of productivity	3.47	0.91	Agreed
2.	Increasing income generation opportunities	3.07	1.00	Agreed
3.	Ensuring food security	3.56	1.02	Agreed
4.	Eliminating drudgery	3.17	0.42	Agreed
5.	High level of economic growth	4.41	1.96	Agreed

6.	Increasing stable generation of food system	3.50	1.04	Agreed
7.	Reducing spoilage and wastage of farm produce	4.01	1.06	Agreed
8.	Improving farmers livelihood	3.72	0.86	Agreed
9.	Reducing timeliness of operation	3.41	0.86	Agreed
10.	Steady supply of farm produce	3.16	0.65	Agreed
	Grand Mean	**3.55**	**0.98**	

Source: field survey, 2019 **WM=Weighted Mean, SD= Standard Deviation**

Table 3 revealed that respondents agreed that; High level of productivity (3.47), Increasing income generation opportunities (3.07), Ensuring food security (3.56), Eliminating drudgery (3.17), High level of economic growth (4.41), Increasing stable generation of food system (3.50), Reducing spoilage and wastage of farm produce (4.01) Improving farmers livelihood (3.72), Reducing timeliness of operation (3.41) and Steady supply of farm produce (3.16) respectively were the benefits the farmers have as a result of the use of farm mechanization by crop farmers. This study is complemented by Amadi, & Ekezie (2016), Mbanasor & Onwusiribe (2014), Faborode (2001), Lawal (2013) among others, who opined that agricultural mechanization is beneficial, in that it boost increase in food production, reduces drudgery, improves timeless and precision operation, increases sustainable development of food system resulting in improve income, high level increase in productivity among other numerous benefits. That means when farmers resolve to the use of agricultural mechanization in the agricultural sector, there will be massive production of goods that will meet the food demand of consumers in the market and even on the long storage and preservation of farm produce is ensured as there are sophisticated farm implement used for the preservation of food to avoid spoilage and wastage.

Conclusion

Based on the findings of the study, it was reviewed that farm mechanization can be very effective for crop farmers in different farm operations. However, revealed the poor competencies/operational standard of farm operators on farm mechanization by crop farmers in Rivers State who are not widely practicing the use of farm mechanization processes due to lack of trained machinery operators, lack of good access road to farm, lack of maintenance and repairs, lack of capital among others that makes farmers not to function effectively. It was found that farming system operation stages where farm mechanization are being used by the crop farmers by ranging from ridging, land clearing, processing and many more. More so, the study deduced that there are so much benefits on the use of farm mechanization by the crop farmers processes through high level of productivity, ensuring food security, increases farmers livelihood, increases the income generation of farmers among others which are the factors that impend on the part of farmers in the study area not to feature effectively in farm mechanization on the productivity of crops in Rivers State.

Recommendations

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

1. That there should be urgent training and re-training of machine operators and routine maintenance by the Government.

2. Consistently, Government should provide functional operational farm mechanism such as tractors, pumping machines among others for farmers especially the rural farmers.
3. Government should provide conducive and enabling environment for farmer's security to ensure food security and increases farmer's livelihood and enhance farmer's productivity.
4. Government should found and invest more in agriculture especially in rural areas to enhance farmer's productivity.

References

Amadi, N.S & Ekezie, A.I.A (2016). Rural farmers perception on the use of agricultural mechanization in agricultural production in rivers state, Nigeria. Journal of Agriculture and Social Research (JASR) 16(2): 9-15

Ani, O. & Onwualu, A.P. (2002). Agricultural Mechanization: A Pre-requisite for Food Security in West Africa. *Proceedings of the West African Society for Agricultural Engineering.* 1(1), 252-274.

Faborode, M. O. (2001). Strategies for Sustainable National Agricultural Infrastructures Development. *A Paper Presented at the Proceedings of National Engineering Conference and Annual General Meeting, Port Harcourt, Nigeria*, 126-131

Federal Republic of Nigeria. (2013). Review of On-going Agricultural Development Efforts. Publication of the Federal Government Nigeria.

Folaranmi, A. G. (2014). The Role of Agricultural Mechanization in the Enhancement of Sustainable Food Production in Nigeria. Retrieved from: https://www.linkedin.com/pulse/20140617225331-162049572

Hilkiah I. A. & Okparanma R. N. (2004). Cost implication of farm mechanization in Rivers State of Nigeria. *Journal of Scientific and Industrial Studies*. 2(1), 69-74.

Lamidi, W. A. & Akande, L. O. (2013). A Study of Status, Challenges and Prospects of Agricultural Mechanization in Osun State, Nigeria. *Journal of Education, Arts and Humanities*, 1(1), 1-8.

Lawal, G. (2013). Farm Mechanization in Nigeria. Next Generation African Farmers. Retrieved from: https://nextganafricanfarmers.com/2013/07/31/farm-mechanization-in-Nigeria-by-gafer-lawal/htmp.

Maharjan, K. L. & Cheltri, A. K. (2006). Household Food Security in Rural Areas of Nepal: Relationship Between socio-Economic Characteristics and Food Security Status. *Paper Presented at the International Association of Agricultural Economists Conference. Gold Coast Australia*, August 12-26.

Mbanasor, J. A. & Onwusiribe, N. C. (2014). Impact of Mechanization, Energy Availability and Usage on Agricultural Sector Output of Nigeria: An Empirical Approach. International *Journal of Agricultural Science and Bioresource Engineering Research,* 1(1&2), 39-56.

National Population Commission (2011). National Population Commission. Population Census of the Federal Republic of Nigeria. Census Report. National Population Commission, Abuja.

Nkakini, S.O., Ayotamunoa, M.J., Ogaji S.O.T. & Probert S.D. (2006). Farm Mechanization Leading to More Effective Energy utilization For Cassava And Yam Cultivation In Rivers State, Nigeria. *Applied energy*, 83(12);1317-1325

Odigboh, E.U. (2000). Confronting the Challenges of Agricultural Mechanization in Nigeria in the next decade. Some notes, some options. Invited paper for maiden issue of Agro-Science. *Journal of Tropical Agriculture, Food, Environment and Extension.* 1(1): 68-79.

Onwualu, A. P. & N. P. Pawa. (2004). Engineering infrastructure for the manufacture of Agricultural engineering machines in Nigeria: The role of NASENI. Proc. 2nd International Conference of the West African Society of Agricultural Engineering,

Onyema, M.C, (2010). Alternative Energy for Agricultural Production and processing in Nigeria. *International food policy Research Institute*. Version 24.

Oseni, G., & P. Winters. (2009). "Rural Nonfarm Activities and Agricultural Crop Production in Nigeria." *Agricultural Economics* 40 (2): 189–201.

PrOpCom. (2011). *Making Tractor Markets Work for the Poor in Nigeria*: *A PrOpCom Case Study*. PrOpCom, Abuja, Nigeria.

Reid, F. J. (2011). The Impact of Mechanization on Agriculture. *National Academy of Engineering*, 41(3), 9-22.

Republic of Kenya (2015). Agricultural mechanization Policy. Ministry of Agriculture, Livestock and Fisheries. Kilimo House, Cathedral Road, Nairobi, Kenya.

Rijk, G.A. (2016). Agricultural Mechanization Strategy. Retrieved from: *http:// www. unapcaem.crg,* 1-17.

Wikipedia, (2013). Mechanized Agriculture. *http://en.m.wikipedia.org/wiki/Mechanised_agriculture#cite_note-3*