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Lecturers' Perception on Agriculture Mechanization in Rivers State, Nigeria

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Abstract— *The study investigated lecturers' perception on agricultural mechanization in Rivers state, Nigeria. A descriptive survey design was adopted, four research questions which sought the information regarding benefits, awareness, challenges and solutions guided the study. The sample size comprised 45 lecturers selected from four tertiary institutions in Rivers state. Data collection was achieved using a questionnaire comprising 35 items structured on a four point rating scale. Mean and standard deviation was used for data analysis. For findings, regarding benefits, the respondents agreed that agricultural mechanization has vast benefits on agricultural activities but disagree that it boosts employment of labour. Findings also shows that lecturers' awareness on the impact of mechanization on agricultural activities is at high level. For challenges, lecturers perceived that lack of appropriate mechanical skills, poor quality of farm machines, inability to access credit facilities among others are challenges to the utilization of farm machines. Lecturers also perceived that favourable government policies, encouragement of agricultural cooperatives among others could enhance agricultural mechanization. The study recommended that government should set up agricultural machinery industries for developing and hiring out mechanized farm tools at subsidized rates to farmers.*

Keywords— ***Agriculture, Mechanization, lecturers.***

I. INTRODUCTION

Agriculture has been the source of man's livelihood since the beginning of time, although farming using basic tools like the hoe and cutlass was the first step in ancient time, the actual records about efforts to promote agricultural mechanization could be traced to the early days of colonization by European masters especially in the early 1900's (Pawlak, Pellizzi & Fiala, 2002). Yohanna, Ango and Williams (2011) pointed out that agricultural mechanization can be achieved simply by the introduction of advanced technologies to farming activities. Mechanization is the art of using machineries to hasten production, accomplish task and reduce fatigue and human labour in order to produce better quality of goods and services. Agricultural mechanization is the process whereby equipments, machineries and implements are utilized to boost food production. It is the application of machines, equipments and implements in the day to day farm activities to increase marginal output in food production and poverty eradication (Clark &Bishop, 2002). Principally agricultural mechanization involves the use of tools implements and machines to improve the efficiency of human time and labour. The most appropriate machinery and power source for any operation depends on the work to be done, cultural settings, affordability and technical efficiency of the Machine. These indications were clearly evident that agricultural mechanization is not an end in itself, but a means of development that must be sustained. Therefore, a social benefits of agricultural production is determined based on a wide range of social, economic and ecological factors. These factors determine whether a technology is practicable, beneficial and sustainable in an area (Olaoye & Rotimi 2010). Agricultural mechanization in its broadest sense can contribute significantly to the development of food systems, as it has the potential to render post-harvest processing and marketing activities efficiently for the farmer.

In Nigeria, population rate is uprising on daily basis, the consequence of this is that the rate of food demand will equally be on the high side. Following the antecedents of food production in Nigeria, Emmanuel and Peter (2012) noted that Nigeria is far from being completely food

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secured. This problem calls for the development of strategies for massive food production in the nation in order to save lives from incessant hunger that may leads to uprising mortality in the nation.

Since majority of farmers in Nigeria are subsistence and use crude tools in there agricultural activities. It's not surprising that the rate of food output would be on the low side. Agricultural mechanization however, enhances the intensification of agricultural process. Xinshen, Silver and Takeshima (2016) noted that agricultural intensification is defined as the increased application of labor and other inputs per unit of land (intensified use of inputs) and more frequent cropping of land through reducing fallow periods (intensified use of land). FAO (2014) noted that, mechanization has the potential to expand the area under cultivation, ability to perform operation at the right time, and maximize production potential. Tractors can be used not only for crop production, but also for transporting stationary power applications and infrastructure improvement (drainage and irrigation canals and road works). Hence, the use of human power for tasks such as hand hoeing for primary tillage will be reduced. Mechanization seek off-farm employment opportunities as a result of the increased time made available to look for and be engaged in such employment (IFPRI, 2016). Mechanization also increases value addition (post-harvest operation, primary and secondary processing) as well as services to support agricultural development (FAO, 2007). The modernization of agricultural activities through the implementation of various equipment has become the major indicator and requirement for development. It is believed that any nation that lacks food sustainability is not developed because development requires a higher output that cater for the demands of the public.

Youth participation in agriculture has drastically reduced in recent years due to the drudgery involved in it (Nlebem & Raji, 2019). However, the application of various engineering principles in agricultural production has reduced the ardency in agricultural activities to the minimum.

Vidya and Jha (2012) asserted that despite the beneficial sides of mechanization in agriculture, there are certain challenges hindering the use of engineering farm implements in farming. Among others identified challenges include poor extension programmes on agricultural engineering, lack of appropriate machine and equipments, no availability of electricity, lack of good farm roads and poor farmers' economic conditions. Some of the challenges also include: Lack of availability of financial products specifically focused on farm equipment investment, misconception of many financial institutions regarding the need for targeted financial product for investment in equipment, basic nature of agricultural production which is a high-risk business, reluctance of commercial financial institutions (mainly banks) to extend credit to poor farmers with little collateral and, lack of financial products to serve the purpose of small-scale farm.

Farmers in Rivers State have a great deal of traditional knowledge and experience accumulated over generations, they have relatively limited access to new knowledge. The level of farmer's training is relatively low and opportunities for further training are limited. Public and private extension and training services do not easily reach rural and remote areas, as distances are great and transport can be scarce. There is a high rate of illiteracy among rural farmers populations. This hinders the improvement of agricultural production and productivity on the general level of farm management. Farmers lack the knowledge and skills to operate mechanized equipment. When machines are used, this lack of proficiency leads to misuse and mismanagement of machinery especially of more sophisticated machinery (FAO, 2009; FAO, 2011)

According to FAO (2016) the whole of the farm machinery subsector, encompassing manufacturers, importers, distributors, retailers and hire services business enterprises, faces constraints that hinder its development. Numerous constraints are common to other developing subsectors in the private sectors, for example lack of enabling laws to facilitate business start-ups and enterprise operations, complex fiscal systems, punitive import regulations and rigid labour laws. Maintenance facilities are poor and there is often a critical lack of spare parts, leading to long periods of underutilization of equipment and, eventually premature write off, low research in development of agricultural machines (Amadi, Adesope & Oguzor, 2008; Brian 2012). Also, illiteracy of the farmers makes it difficult for them to adopt modern farming technique or operate the machine even when it is available (Xiang, 2013).

Numerous market and social imperfections hinder the effective commercialization of hire services tractors. They are expensive, loans are not available due to high transaction costs and equipment sharing is almost non-existent. Machinery hire services can cover a wide range of farm operations (e.g. soil tillage, planting and spraying), post-harvest services (e.g. threshing, shelling and processing), transport services and, collection of bio-waste

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and other refuse in rural, peri-urban and urban areas (Hilmi, 2013 and IFPRI, 2015). The prices of agricultural machinery have risen sharply in the last 20 years, making it unaffordable for the majority of farmers (Ansu-gyeabour, 2004).

In light of the importance of Agricultural mechanization to the development of a nation Mamman (2015) carried out a study to ascertain the influence of agricultural mechanization on crop production in Bauchi and Yobe states of Nigeria. The study employed a survey design utilizing a questionnaire for data collection from 368 farmers. The study found that agricultural mechanization brought about increase in crop yields, farm size, farmers' income and improvement in their standard of living.

In another research, Monk (2015) carried out a study to analyse mechanized systems approach to cassava production in Oyo, Kogi, and Imo states of Nigeria. The study was a mixed method research utilizing both quantitative and qualitative data. A sample of 63 farmers was involved in the study. One of the analyses conducted in the study was farmers' awareness of mechanization in farming. In this regard, the study found that 100% of farmers were aware of mechanized tillage; 63% aware of mechanized planting; 52% aware of mechanized harvest and 23% aware of mechanized weeding.

Furthermore, in a study to ascertain the challenges facing agricultural mechanization, Challa (2016) employed a sample of 173 respondents in Oromia regional State-Ethiopia, The study found poor utilization of technology and education among farmers as factors affecting adoption of agricultural mechanization. It is against this back drop that the researcher is carrying out this study. These studies focused on farmers as subjects of study. It was in view of the researcher that gaining the perception of lecturers would enrich knowledge on the subject of agricultural mechanization in the study area. Based on this, the present study focused on lecturers' perception on mechanization of agriculture in Rivers state.

II. PURPOSE OF THE STUDY

The general purpose of this study was to determine lecturers' perception on Agricultural mechanization in Rivers State. Specifically the objectives of the study were to:

(1) Find out lecturers' perception on the benefit of agricultural mechanization in Rivers State.
(2) Determine lecturers' level of awareness of agricultural mechanization in Rivers State.
(3) Determine lecturers' perception on the challenges facing agricultural mechanization in Rivers State
(4) Find out lecturers' opinion on the solution to the challenges facing agricultural mechanization in Rivers State.

Research Questions

(1) What are the lecturers' perceptions on the benefit of agricultural mechanization in Rivers State?
(2) What are the lectures' level of awareness of agricultural mechanization in Rivers State?
(3) What are the challenges facing agricultural mechanization in Rivers State as perceived by the lecturers?
(4) What are the solutions to the challenges facing agricultural mechanization in Rivers State?

III. METHODOLOGY

The study which was conducted in tertiary institutions in Rivers state employed survey design. The population of the study comprised all lecturers from Agriculture related programmes in tertiary institutions in Rivers state. These include Agricultural programmes under faculties of education and Agriculture. A simple random sampling technique was adopted to select 45 lecturers; faculties of Agriculture (27) and Education (18) from four tertiary institutions in Rivers state. A structured survey questionnaire titled "Lecturers' Perception on Agricultural Mechanization" (LPAM) was used for data collection. The instrument consisted of four sections which elicited information on the benefits of agricultural mechanization (A), awareness level of agricultural mechanization (B), challenges facing agricultural mechanization (C) and their solutions (D). Items on sections A, C and D were structured on a four point rating scale of Strongly Agreed (4), Agreed (3), disagree (2), and Strongly Disagreed (1). Items on sections B were structured on a four point rating scale of Very High Level (4), High Level (3), Low Level (2) and Very Low Level (1). The instrument was face content validated by three experts in the field of Agricultural Science and Education. More so, the instrument was subjected to test of reliability using Cronbach Alpha to achieve a reliability Coefficient of 0.95. Mean and standard deviation were used to analyzed data gathered from the respondents. Mean scores < 2.50 were rejected while mean scores ≥ 2.50 were accepted.

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IV. RESULTS

Research Question 1

What are the lecturers' perceptions on the benefit of agricultural mechanization in Rivers State?

Table 1: Mean response on lecturers' perception on benefit of agricultural mechanization in Rivers State

		Lecturers (FA)=27			Lecturers (FE)=18		
S/N	**Items**	**Mean**	**S.D**	**Remarks**	**Mean**	**S.D**	**Remarks**
1	Mechanization boosts food production	3.12	0.76	Agreed	3.45	0.89	Agreed
2	Mechanization can lead to exportation of excess products	2.99	0.67	Agreed	3.21	0.92	Agreed
3	Exportation will lead to increased income	3.38	1.07	Agreed	3.54	0.75	Agreed
4	Encourages youth participation in agriculture	3.40	0.74	Agreed	3.02	0.81	Agreed
5	Mechanization enhances marketing of process	3.38	0.86	Agreed	2.87	1.08	Agreed
6	It promotes multiple cropping	3.44	0.91	Agreed	2.60	0.94	Agreed
7	It reduces hard labour	3.44	1.02	Agreed	3.31	0.83	Agreed
8	It improves gross/net farm income	3.22	1.00	Agreed	3.33	0.71	Agreed
9	It promotes green economy	2.86	0.87	Agreed	3.02	0.82	Agreed
10	It contributes to women economic empowerment	2.90	0.90	Agreed	3.00	0.54	Agreed
11	It boosts employment of labour.	2.40	0.61	Disagreed	2.21	1.01	Disagreed
	Grand Total	**3.14**	**0.86**		**3.05**	**0.85**	

Source: Field data.

Table 1 shows the mean responses of lecturers on their perception regarding benefits of farm mechanization in the study area . As shown in the table, lecturers in faculty of agriculture and education agreed that farm mechanization: boots food production (3.12 & 3.45), lead to exportation of excess products (2.99 & 3.21), lead to increased income (3.38 & 3.54), Encourages youth participation in agriculture (3.40 & 3.02), enhances marketing of process (3.38 & 2.87), promotes multiple cropping (3.44 & 3.31), reduces hard labour (3.44 & 3.31), improves gross/net farm income (3.22 & 3.33), promotes green economy (2.86 & 3.02), women economic empowerment (2.90 & 3.00) 3.44 and 3.44 respectively. However both respondents disagreed that agricultural mechanization boost employment of labour (2.40 & 2.21).

Research Question 2

What is the lectures' level of awareness of agricultural mechanization in Rivers State?

Table 2: Mean response on lecturers' perception on level of awareness

		Lecturers (FA)=27			Leacturers (FE)=18		
S/N	**Items**	**Mean**	**S.D**	**Remarks**	**Mean**	**S.D**	**Remarks**
12	Awareness of various farm machineries	3.21	0.98	HL	3.09	0.77	HL
13	Awareness of the uses of farm machineries	3.08	0.71	HL	3.11	0.69	HL
14	Awareness of the sub-systems that make up farm machineries	3.32	0.60	HL	3.34	0.82	HL
15	Awareness of the operations of farm machineries	3.21	0.59	HL	3.21	1.05	HL
16	Awareness of simple maintenance for farm machineries	3.00	0.76	HL	3.03	0.67	HL
17	Awareness on the benefits of agricultural	3.06	0.81	HL	2.89	0.59	HL

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	mechanization to farmers productivity						
18	Awareness on the challenges of farm machineries	2.73	0.65	HL	2.86	1.00	HL
	Grand Total	3.09	0.73		3.08	0.80	

Source: Field data. HL = High Level

Table 2 shows the mean responses of lecturers on their level of awareness regarding farm mechanization in the study area. A grand mean of 3.09 and 3.08 shows that the agriculture and agricultural education lecturers in the study area have high level of awareness of farm mechanizations as regards to its benefits to farm productivity, uses, maintenance, challenges, and operations.

Research Question 3

What are the challenges facing agricultural mechanization in institution in Rivers State?

Table 2: Mean response on lecturers' perception on challenges facing agricultural mechanization in Rivers State.

		Lecturers (FA)=27			Lecturers (FE)=18		
S/N	Items	Mean	S.D	Remarks	Mean	S.D	Remarks
19	Farm machineries/tools/equipment are not affordable	3.32	0.76	Agreed	3.05	0.76	Agreed
20	Farm machines are not readily available	3.02	0.65	Agreed	3.43	0.65	Agreed
21	Lack of skill to use them by the farmer	2.98	0.81	Agreed	3.31	0.76	Agreed
22	Lack of awareness of agricultural mechanization by farmers	3.08	0.62	Agreed	2.99	0.80	Agreed
23	Ignorance of the benefits of agricultural mechanization	3.21	0.67	Agreed	3.02	1.02	Agreed
24	Poor quality of farm machines, tools and equipment	3.03	0.88	Agreed	2.81	0.92	Agreed
25	Poor maintenance plan for machines	2.98	1.01	Agreed	3.23	0.78	Agreed
26	Unfavourable government policies	3.05	0.80	Agreed	2.87	0.89	Agreed
27	Inability to access credit facilities	3.43	0.91	Agreed	3.00	0.54	Agreed
	Grand Total	**3.12**	**0.79**		**3.08**	**0.79**	

Source: Field data

Table 3 shows the mean responses of the lecturers regarding the challenges facing farm mechanization in the study area. The table revealed that items listed above 1-9 were all accepted as challenges facing agricultural mechanization in Rivers State. This is indicated by the grand mean of 3.12 and 3.08 for both groups of lecturers. Farm machineries/tools/equipment are not affordable, unavailability, lack of skill, Lack of awareness of agricultural mechanization by farmers, Ignorance, poor quality of farm machines, tools and equipment, unfavourable government policies, and Inability to access credit facilities are challenges facing agricultural mechanization in institution in Rivers State.

Research Question 4

What are the solutions to the challenges facing agricultural mechanization in Rivers State?

Table 4: Mean response on the solutions to the challenges facing agricultural mechanization in Rivers State

		Lecturers (FA)=27			**Lecturers (FE)=18**		
S/N	**Items**	**Mean**	**S.D**	**Remarks**	**Mean**	**S.D**	**Remarks**
28	More agriculture extension workers be	3.02	0.85	Agreed	3.43	0.87	Agreed

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	employed to educate farmers						
29	Maintenance technician should be trained	3.08	0.74	Agreed	3.05	0.68	Agreed
30	Local manufacturers should be encouraged towards production of agricultural machines	2.90	1.01	Agreed	3.42	0.91	Agreed
31	Access to credit facilities should be increased	3.09	0.94	Agreed	3.06	1.02	Agreed
32	Government policies should be made to improve agric sector	2.98	0.64	Agreed	3.21	0.92	Agreed
33	Infrastructure such as road should be improved	3.21	0.87	Agreed	2.99	0.72	Agreed
34	Agricultural cooperatives should be encouraged	3.32	0.81	Agreed	3.01	0.81	Agreed
	Grand Total	**3.09**	**0.84**		**3.17**	**0.85**	

Source: Field data.

Table 4 shows the mean responses on the solutions to challenges facing agricultural mechanization in the study area. As shown the lecturers agreed that there is need for more agricultural extension and maintenance workers; maintenance technician should be trained, encouragement of local production of agricultural machines; access to credit facilities should be increased, government policies should be made to improve agric sector, Infrastructure such as road should be improved and agricultural cooperatives should be encouraged. This is indicated with the grand mean of 3.09 and 3.17.

V. DISCUSSION OF FINDINGS

The first research question sought to find out the benefits of agricultural mechanization as perceived by lecturers in the study area. Findings showed lecturers boots food production, lead to exportation of excess products, lead to increased income, Encourages youth participation in agriculture, enhances marketing of process, promotes multiple cropping, reduces hard labour, improves gross/net farm income, promotes green economy, and women economic empowerment. This result is similar to the result obtained by Mamman (2015) carried out a study to ascertain the influence of agricultural mechanization on crop production in Bauchi and Yobe states and found agricultural mechanization to bring about increase in crop yields, farm size, farmers' income and improvement in their standard of living.

The second research question sought to find out lecturers' level of awareness of agricultural mechanization in the study area. Findings showed lecturers have high level of awareness of farm mechanizations as regards to its benefits to farm productivity, uses, maintanance, challenges, and operations This result is similar to the result obtained by Monk (2015) carried out a study to analyse mechanized systems approach to cassava production in sub-saharan Africa. The study was conducted in three states of Nigeria including Oyo, Kogi, and Imo. Among other findings, the study found that 100% of farmers were aware of mechanized tillage; 63% aware of mechanized planting; 52% aware of mechanized harvest and 23% aware of mechanized weeding.

The third research question sought to find out challenges facing agricultural mechanization as perceived by lecturers in the study area. Findings showed challenges facing farm mechanization as perceived include Farm machineries/tools/equipment are not affordable, unavailability, lack of skill, Lack of awareness of agricultural mechanization by farmers, Ignorance, poor quality of farm machines, tools and equipment, unfavourable government policies, and Inability to access credit facilities. This result corroborates to the result obtained by Challa (2016) who carried out a study to determine Prospects and Challenges of agricultural mechanization in Oromia regional State-Ethiopia, Policy Perspectives. The study found poor utilization of technology and education among farmers as factors affecting adoption of agricultural mechanization.

The fourth research question sought to find out solutions to challenges facing agricultural mechanization as perceived by lecturers in the study area. Findings that there is need for more agricultural extension and maintenance workers; maintenance technician should be trained, encouragement of local production of agricultural machines; access to credit facilities should be increased, government policies should be made to improve agric sector, Infrastructure such as road should be improved and agricultural cooperatives should be encouraged.. This result corroborates the view of

Metha, Chandel and Senthilkumar (2014) who opine that provision of subsidies for small and medium scale farmers would; provide access to land owned by farmers which would enhance agricultural mechanization.

VI. CONCLUSIONS

Mechanization has the potential to increase production and yield and should, thus be fully embraced, it is important to address the existing challenges to mechanization in Rivers State design – coordination and implementation (institutional and organizational capacity) and sustainability (technical, financial) need to put appropriate measures to address these challenges will boost mechanization.

VII. RECOMMENDATIONS

1. Government should set up agricultural machinery industries which should developed or purchased and hire out to farmers at subsidized rates to minimize of certain farm operations as well as creating mechanization awareness among some farmers in the state.
2. Government should organized workshop/seminar on farm mechanization and operator training to create awareness on mechanization activities and to avoid damage of machinery due to unskilled personnel

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