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ASSESSMENT OF MECHANIZATION PROBLEMS OF PEASANT FARMERS IN IREPODUN LOCAL GOVERNMENT AREA, KWARA STATE OF NIGERIA

Timothy Adesoye Adekanye
Landmark University, Nigeria. adekanye.timothy@yahoo.com

Abstract
More than 70% of the working adult population of Nigeria is employed in the agricultural sector directly and indirectly. Over 90% of Nigeria's agricultural output comes from peasant farmers who dwell in the rural areas where 60% of the population live. The vast majority of these farmers has limited access to modern inputs and other productive resources and is unlikely to have access to pesticides, fertilizers, hybrid seeds and irrigation. The successful development of farm mechanization is determined primarily by the transition process from manual tools through animal-drawn implements and finally to the application of mechanical power technologies, which will improve efficiency time, labour and productivity of peasant farmers and thereby enhance food security of a Nigeria. This study investigates constraints to agricultural mechanization in Irepodun Local Government Area (LGA), Kwara State, Nigeria. This study employed a multi stage sampling techniques to collect information on the socio-economic characteristics, agricultural machines available and equipment used for specific farm operations. Analysis revealed that farmers in the study area are middle-aged and are relatively uneducated. Most of the farm sizes in the study area range from 1-5 ha and many of the farm operations were carried out manually; land clearing (93%), tillage (83%), planting (88.54%), fertilizer application (97.5%), weeding (98.7%) and harvesting (97.5%). This study also shows that majority of respondents were smallholder farmers who are often too poor to employ modern tools, such as tractors and plows even though over 80% of the foods consumed in this country come from these peasant farmers in rural areas. This confirms that agricultural mechanization is still beyond the reach of the peasant farmers in rural areas.

Keywords: Agricultural mechanization, Assessment, Peasant farmers, Tractorization, Irepodun LGA.

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INTRODUCTION

Agriculture employs three quarters of the Nigerian working population, but agricultural landholdings are generally small and scattered. The average number of farm plots per household ranges between 2 and 28 plots and between 0.5 and 5.0 ha, increasing in size from the south towards the north. Farming is generally rainfed and of the subsistence variety [9]. The solution to the hunger problem lies in serious farm mechanization, high yielding varieties of seeds and the availability of fertilizers, pesticides and other farm inputs. Farm mechanization has been seen as the pivot to agricultural revolution in many parts of the world, and has contributed greatly to increased output of food crops and other agricultural products to meet the demands of the ever increasing world population. Through farm mechanization, many industrial raw materials are produced for the rapidly expanding world industries [15]. Tools, implements and powered machinery are essential and major inputs to agriculture. The term mechanization is generally used as an overall description of the application of these inputs [4].

Agricultural Mechanization has been described as application of the most locally appropriate tools, implements, machines, and approaches to make the most sustainable beneficial decisions. If it is implemented in the right way, it will have a considerable effect on agricultural utilization. It will optimize inputs costs. Initial application of

agricultural mechanization was tractor entrance to the land. But during last century or so, it has found several interpretations; and the description was changed from tractorization to precision farming [4]. Agricultural mechanization could also be described as the application of tractorization technology into the field of agriculture in order to improve agricultural output, as well as deliberate conscious departure from the peasant and subsistence agriculture into a commercial agriculture. This process also involves the development and management of machines for field production, water control, material handling as well as post harvest operation [21, 23].

Agricultural Mechanization has made a significant contribution to agricultural and rural development in many parts of the world; levels of production have increased, soil and water conservation measures were constructed, the profitability of farming improved, the quality of rural life enhanced, and development in the industrial and service sectors was stimulated [3]. However, Ituen [6] opined that agricultural mechanization development depends on the farmers' satisfaction and capability to identify opportunities for achieving sustainable benefits by improved and/or increased use of power and machinery, selecting the most worthwhile opportunity and carrying it through to successful implementation. Because of its obvious contribution, mechanical aspect of agricultural mechanization has been presented till now. But it was a progression of technological innovation that influenced all of society throughout the twentieth century. Anazodo *et al*., [2] observed that even in high crowded populations, it can be difficult to attract or retain laborers to work in farm operations. Much of the stimulus for agricultural mechanization has come from laborer shortages in the more economically advanced countries. They described mechanization as tractorization. Mechanization reduces agricultural required labour and can reduce or remove the costs in countries which energy is cheap. But for poorer countries, mechanization forces increased costs caused by fuel, oil, engines and spares.

The present state of mechanization in Nigeria agriculture is still far from increasing the rate of farming earnings and productivity. This is because mechanization plan has not been formulated following a well designed, reliable and thorough analysis [16]. Nigeria has over 80% of its populace engaged in agricultural activities from where the people derive their means of livelihood either directly or indirectly [7]. Nigeria has an estimated 32,474,000 ha of land under cultivation, 11,900 tractors and 2,729 ha of land cultivated per tractor (as at 1996). This mechanization level is grossly low compare to Niger whose land area under cultivation was 11,097,000 ha, with total tractor owned as 180 and about 61,650 ha was cultivated per tractor [7]. Ozmerzi [22] affirmed that the agricultural mechanization level of a country in terms of kW/ha, ha/tractor, number of tractors/1000 ha, equipment weight/tractor and mechanical power/total power. The current level and practice of agriculture in Nigeria is characterized by low level of distribution and utilization of farm machinery and associated implements for farm operations [18].

Iheanacho *et al*., [10] stated that the machines used for agricultural production in Nigeria include: hand tools, animal drawn implements, two wheel and four -wheel drive tractors, motorized or mechanically driven post-harvest handling and processing machines, crop storage equipment and pumps for irrigation. Thus, agricultural mechanization in Nigeria can be divided into three levels of technology; hand tools technology, draught-animal technology and engine powered technology [20, 24].

Engine powered agricultural mechanization technology include the use of a wheel range tractor sizes as mobile power for field operations, engines or motors to power such machines as threshers, mills, irrigation pumps, aircraft for spraying chemicals and self-propelled machine for production harvesting and handling of wide variety of crops. Mechanization is a new technology to the farmers in the study area; this is as a result of limited spread of machine use, the prevalence of small and fragmented farm holding and lack of capital to acquire the machines, and also adverse cultural practices. In addition, illiteracy of the majority of the farming populace, inadequate rural infrastructural facilities (road, water and electricity) unavailability of spare parts, lack of enough trained machinery operators, poor credit facilities inadequate research programmes to cope with foreign technology [5]. The objective of this study is to investigate mechanization problems of peasant farmers in Irepodun Local Government Areas of Kwara State, Nigeria, in order to develop appropriate tools for them and to enhance transition process from

manual tools to the application of mechanical power technologies, which will undoubtedly affect agricultural production and time requirement of farm operations.

MATERIALS AND METHOD

Area of study

This study was conducted in Irepodun Local Government area of Kwara State, Nigeria. The local government has an area of 737 km^2, a population of about 148,610 people according to the 1991 Population Census and a landmass of 1,095 Square Kilometer. It shares boundary with Ifelodun Local Government Area to the North, Osun State to the South, Ekiti and Offa Local Government to the East and West respectively. The area is located between latitude 70 45N and 9 030N and longitude 20 30E and 60 35E. It is endowed with Savannah and Rain forest vegetation on a plain terrain with patches of rivers and streams. The occupation of the people of the local government is primarily farming. They produce food crops as well as cash crops. This research was carried out using participant observation, on spot assessment and interview schedule. Twelve communities were randomly selected in the local government area. These communities include; Omu Aran, Ajase-Ipo, Oro, Ayedun, Rore, Igbonla, Ijomu-Oro, Esie, Ijan-Otun, Arandun, Monasara and Surulere.

Sampling Techniques

The data collected for this study were mainly primary data collected from twelve Local Government Areas (LGAs) which were selected based on their agricultural activities using multistage sampling technique. Fifteen farmers from each of the community were randomly selected giving a total of 180 respondents however, 23 farmers did not respond to the questionnaires. The data/information was collected with the use of a designed structured questionnaire. The data was collected with the use of structured questionnaire designed and administered to both literate and illiterate farmers to extract information from them. For the illiterate, an assistant was used to interpret and filled the questionnaires for them. Primary data included farm size, cropping patterns, kind of farm machines, type of tools, and time required for each stage operation of farm operations.

RESULTS AND DISCUSSION

Degree of Mechanization (M_1, M_2) of the study area was calculated using Equations 1 and 2. Degree of Mechanization M_1 is the average energy input of work provided exclusively by human power (labour) per hectare: it expressed as

$$L_H = 0.1^{\times} N_H^{\times} T_H / A \qquad (1) \quad [16]$$

Where;
L_H = average energy input or work provided per hectare by human labour (kW hr/ha).
N_H = average number of labour employed.
T_H = average rated working time devoted to manual operation
0.1= Theoretical average power of an average man working optimally.
A = Area of land cultivated (ha)

Degree of Mechanization M_2 represents the first degree of mechanization, motorized machinery co-existing with a high participation of workers. It is indicated as;

$$LM = 0.2^{\times} NM^{\times} TM / A \qquad (2) \quad [16]$$

Where;
L_M = Average energy input or work per hectare by motorized machines
0.2 = Corrector co- efficient of the tractor-powered machine.
N_M = rated working power of the tractor (kW)
T_M = rated working time of the motorized energy source, hr/ha
A = Area worked in hectare by motorized machines.

Table 1 shows the socio characteristics of farmers in the study area. The table revealed that majority of the farmers had their farm sizes between 1-5 hectares (92.36%) while only 12 farmers (7.64%) had access to 6-10 hectares of land. Fragmentation of farm lands or small land holdings and poor capital base is one of the many problems of agricultural mechanization in the study area [3, 9]. Proceeds from these small landholdings will not meet the expenses on machinery, and other farm inputs [15]. Ali El Hossay, [1] affirmed that land fragmentation with numerous canals and drainage ditches, narrow access roads to individual farm plots seriously restrict the use of mechanized equipment. Peasant farmers' production problems are intensive labour needs, poor technology, low operating capital, fixed capital investment and poor management [8, 19].

It was observed that literacy level was low among the respondents (62.42% for primary schools, 20.38% for no-formal education and only 5.73% had tertiary education. This may make enlightenment programmes on agricultural mechanization difficult to pass across to the respondents consequent upon their low level of education. This has serious negative implications for agricultural production, particularly the receptiveness of farmers to extension services and the adoption of innovations.

Table 2 shows machines used by the farmers in the LGA. It was observed that most of the respondents do their farm work manually; only 2.55% use planting equipment, 1.27% used mechanical weeders while none of the respondents have access to irrigation facilities. Table 3 shows agricultural machinery and equipment available in the LGA. The few farm machinery and implements available are used for tillage operations. The table shows that only 7% of the respondents had their farm partially mechanized and only 1.27% of the respondents owned some equipment. Table 4 shows prevailing problems encountered by the respondents in carrying out their farm operations in the study area. The prevailing problems in the study area were inadequate capital as identified by 93% of respondents, land tenure identified by 98%, 92% of the respondents identified lack of equipment while all respondents (100%) identified lack of storage facilities as a major problems militating against their farming activities. From the results it can be inferred that inadequate capital and poor storage facilities were identified as the prevailing problems in the study area.

Table 1: Socio characteristics of farmers in the study area

Item	Frequency/No.	Percentage (%)
Sex		
Male	**139**	**88.54**
Female	**18**	**11.46**
Marital status		
Single	**26**	**16.56**
Married	**118**	**75.16**
Divorced	**5**	**3.18**
Widow/widower	**8**	**5.10**
Age		
21-30 years	**12**	**7.64**
31-40 years	**17**	**10.83**
41-50 years	**80**	**50.96**
51-60 years	**29**	**18.47**
Above 60 years	**19**	**12.10**
Level of Education		
Primary	**98**	**62.42**
Secondary	**18**	**11.46**
H.N.D/B.Sc	**9**	**5.73**
Non- formal	**32**	**20.38**
Family Size		
1-5	**12**	**7.64**
6-10	**139**	**88.54**
11 and above	**6**	**3.82**
Farming experience		
1-5 years	**15**	**9.55**
6-10 years	**28**	**17.83**
11-15 years	**25**	**15.92**
16-20	**36**	**22.93**
21-25	**25**	**15.92**
Above 25 years	**28**	**17.83**
Farm Size		
1-5 hectares	**145**	**92.36**
6-10 hectares	**12**	**7.64**
11-15 hectares	**Nill**	
16 hectares and above	**Nill**	
Means of land acquisition		
Purchased	**31**	**19.75**
Gift	**12**	**7.64**
Inherited	**114**	**72.61**

Table 2: Machine use by farmers and number of users

Operation	Equipment used	Percentage
Land clearing	Cutlass and hoe (146)	93
	Plough (11)	7
Tillage	Hoe (131)	83.44
	Plough (26)	16.56
Planting	Cutlass and hoe (139)	88.54
	Hand planter (14)	8.92
	Tractor (4)	2.55
Fertilizer application	Manual (153)	97.45
	Machine (4)	2.55
Weeding	Cutlass and hoe (155)	98.73
	Machine (2)	1.27
Irrigation	Watering can (0)	0.00
	Machine (2)	1.27
	No irrigation (155)	98.73
Harvesting	Manual (153)	97.45
	Machine (4)	2.55

Table 3: Agricultural machinery and equipment available in the Study Area

Determinant	Rating	Percentage
Plough	Available (5)	3.18
	Not available (152)	96.82
Harrow	Available (4)	2.55
	Not available (153)	97.45
Ridger	Available (0)	0.00
	Not available (157)	100
Method of acquisition of implements	Purchased (2)	1.27
	Hired (11)	7
Irrigation facilities	Available (0)	0.00
	Not available (157)	100
Storage facilities	Available (0)	0.00
	Not available (157)	100
Mechanical crop processing	Available (0)	0.00
	Not available (157)	100
Mechanized agricultural practice	Fully mechanized (0)	0.00
	Partially mechanized (11)	7
	Non- mechanized (146)	93

Table 4: Agricultural mechanization Problems in the Study Area

Problems	Frequency	Percentage
Land tenure	**154**	**98**
Inadequate capital	**146**	**93**
Lack of equipment	**144**	**92**
Lack of storage facilities	**157**	**100**
Insufficient farm inputs	**146**	**93**

Source: Field work, 2013

CONCLUSION AND RECOMMENDATIONS

The majority of respondents are smallholder farmers who are often too poor to employ modern tools, such as tractors and plows, even with substantial government support. It has been often shown that over 80% of the foods consumed in this country come from the peasant farmers who live in the rural areas poorly served by almost all public amenities [2, 8, 11, 17].

In this respect, an agricultural mechanization policy would need effective targeting with regard to particular farming activities and types of farmers for which different forms of mechanization efforts could be directed. Key knowledge gaps for such targeting in Nigeria include the important roles of farm power1in comparison with other improved agricultural inputs, such as improved seeds and fertilizer, and the prospects for adopting different forms of mechanization, including the use of improved hand tools [9].

Despite Nigeria's rich agricultural resource endowment, the agricultural sector has been growing at a very low rate. Less than 50% of the country's cultivable agricultural land is under cultivation. Most of this land is cultivated by the smallholder and traditional farmers who use rudimentary production techniques with low yields. The smallholder farmers face many problems including poor access to modern inputs and credit, poor infrastructure, inadequate access to markets, land and environmental degradation, and inadequate research and extension services.

The followings are recommended;

1. Peasant farmers are too poor to purchase modern tools, and therefore, policies and projects are needed to increase the affordability of modern tools as well as improve the hand tools currently in use. This is because peasant farmers' demand for agricultural mechanization depends on its relative affordability compared to other modern inputs such as improved seeds or fertilizer, which are also needed to support productivity improvement.
2. Funding should be made available for the development of appropriate agricultural machines to boost food production.
3. The Federal and State Governments should set up agricultural machine industries to develop and/or hire machines to farmers at subsidized rates and
4. There is a need to create awareness on farm mechanization, this will help the local farmers to appreciate and adopt agricultural mechanization.

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