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ASSESSMENT OF MECHANIZATION CHALLENGES OF PEASANT FARMERS IN GBOKO LOCAL GOVERNMENT AREA, BENUE STATE OF NIGERIA

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Abstract

This study assesses the mechanization challenges of peasant farmers in Gboko Local Government Area of Benue state in Nigeria. The peasant farmers produce over 90 % of Nigeria's agricultural output and these peasant dwell in the rural areas wherein about 60 % of the population live. The vast majority of these farmers have serious challenges in accessing modern inputs and other productive resources, including education and they are unlikely to have access to assortment of fertilizers, hybrid seeds and irrigation. This study employed a multi stage sampling techniques to collect information on the socio-economic characteristics of the farmers and available machinery. Analysis revealed that farmers in the study area were relatively low educated. Most of the farm sizes in the study area are in the range of 1-5 ha, most of the needed modern machinery were not available and many of the farm operations were carried out manually, that is, land clearing (70.56 %), tillage (91.77 %), planting (78.79 %), fertilizer application (84.85 %), weeding (65.80 %), and harvesting (80.52 %). This study also show that majority of respondents were smallholder farmers who were often too poor to employ the available machinery. Despite this ugly situation, over 75 % of the foods consumed in this country come from these peasant farmers in rural areas. The current world food situation, socio-economic and population displacement as result of internal and external conflict of all kinds, this situation of peasantry should not be allowed to continue if the population must be salvaged from hunger.

Key words**:** *assessment, agricultural mechanization, farm operations, peasant farmers, Gboko LGA*

INTRODUCTION

Agricultural mechanization is a complex field embracing the science of materials and forces of nature in development, exploitation and management of equipment and installation that enhance scientific production in agriculture. Agricultural mechanization does not only mean the use of tractors (tractorization), it also includes the exploitation and management including the selection and replacement, of mechanical facilities and equipment for field production, water control, material handling as well as post-harvest operations [25]. [14] stated that agricultural mechanization encompasses the use of farm equipment including the power sources that are used to operate the various machines. [15] take it to imply increase in production per worker and per hectare of land cultivated while others take it to be the act of making judicious use of agricultural inputs such as seeds, irrigation water, fertilizers, fungicide herbicides/insecticide and farm equipment in order to promote cost efficiency through maximum output and economy of large scale.

Agriculture is the most important economic activity in Nigeria, in terms of revenue (apart from oil sector revenue) especially in the rural areas. According to the national survey conducted by the Federal Ministry of Agriculture which assessed the quality and quantity of food production and agricultural development in Nigeria in the period 1973-1985, there was an enormous problem of modernization of the country's agriculture being devoid of the dissemination of modern technologies for agricultural production [16]. This was to be brought about by investment in

mechanical technology programmes through public delivery system such as Agricultural Development Agencies (ADP), Operation Feed the Nation (OFN), Green Revolution, River Basins Development Authority (RBDA) and other agricultural development institutions.

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 holdings, lack of sufficient capital to acquire the machines and also the effect of cultural practices [6]. In addition, illiteracy of the majority of the farming populace, inadequate rural infrastructural facilities (road, water and electricity), unavailability of spare parts, insignificant number of trained machinery operators, poor credit facilities, inadequate research programmes, etc contribute to in their inability to cope with the much needed foreign technology [19].

Mechanization inputs are often subsidized by government to lower prices for tractors and machinery purchase and/or hiring to small and medium scale farmers. Though this may appear to be disadvantageous to private large scale farm holders but the insignificant number of such farm holders as often justified such intervention of government concerned with ensuring adequate supply of food and raw materials for the populace [3]. Another point of consideration is the cost of the labour supply. It is difficult to assess the costs of power in near-subsistence farming where human labour and in some areas, draught animal power are likely to be the dominating power sources [2]. Consequently it is not possible to make a convincing exact comparison of costs for alternative farming systems under varying degrees of mechanization and with a variety of power sources. Smallholding farmers readily accept cost payment in cash or kind, that is to say there is flexibility in medium of exchange of services. In the advanced nations of Europe, United State of America and the “Asian Tiger” the introduction of mechanization brought about optimization of inputs, labour efficiency and high output. The 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 [7]. Consequently there emerged improved agricultural output as well as deliberate conscious departure from the peasant and subsistence agriculture into commercial agriculture [22]; [20]. Today it is an obvious fact that 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 have been well developed; profitability of farming improved which in turn improved the quality of rural life thus stimulating the development of the industrial and service sectors which transformed the rural areas [24]; [4]. It is the progression of technological innovations that have influenced the emergence of all societies throughout the world in the twentieth century [10]. [9], including high crowded populations, which made it difficult to attract or retain labourers to work in the farms. Much of the stimulus for agricultural mechanization has come from labourer shortages in the more economically advanced countries. Mechanization reduces agricultural labour and can reduce or remove high labour costs in countries where energy is cheap. But for poorer countries, mechanization activities increase costs as a result of high consumption of fuel, diesel, oil, spare parts [21]. The present state of mechanization in Nigeria agriculture is still far from foundational and therefore left much to be done, moreso, in the study area. This is because mechanization plan has not been formulated following a well-designed, reliable and thorough analysis [17]. The current level and practice of agriculture in Nigeria is characterised by low level of distribution and utilization of farm machinery and associated implements for farm operation [18];[12]; [23].

The government policy on agricultural mechanization was to encourage the development of efficient "home grown" tools, equipment and systems which improve agricultural production and productivity,

relieve the continuously increasing labour constraints, enhance farmer's income, reduce food imports, increase food export and save foreign exchange [8]. Consequently the National Centre for Agricultural Mechanization (NCAM) was established and it was envisaged that it would accomplish these tasks through carrying out, among other functions, the standardization and certification of agricultural tools, machines and equipment in Nigeria, as well as testing and evaluating the suitability of all types of imported and locally developed agricultural tools, machines and equipment already in use and those proposed to be used in Nigeria [6]. Thus, there has been a long felt need in Nigeria by the government, concerned institutions and individuals to use standardization to promote the evolution of appropriate agricultural mechanization through a rapid development of indigenous agricultural equipment since it was realized that standardization represents the "fastest vehicle" to integrate agricultural mechanization to technological and economic development of the nation [1].

The objective of this study was to see how the challenges of farm mechanization in the area could be confronted for the benefit and progress of the farmers and Gboko LGA. Taking into consideration the environmental features: topography, hydrography, soil, climate, land tenure/ownership system and economic empowerment of the people.

MATERIALS AND METHODS

Area of Study

This study was conducted in Gboko Local Government Area of Benue State, Nigeria. The local government has a population of about 419,800 people according to the 2011 population census and a landmass of 1,206 Square Kilometres. The local government area is located between Latitude 7^{o} 13'and 7^{o} 35'N and Longitude 8^{o}30'and 9^{o}03' E. The occupation of the people of the local government area mainly farming. They produce food crops as well as cash crops. This research was carried out using direct contact/interaction with the farmers using questionnaire completed on the spot by the researchers. Six communities were randomly selected in the local government area. These communities are: Mbayion, Ipav, Mbatierev, Yandev, Mbatiav and Gboko Town as shown in Fig. 1 below.

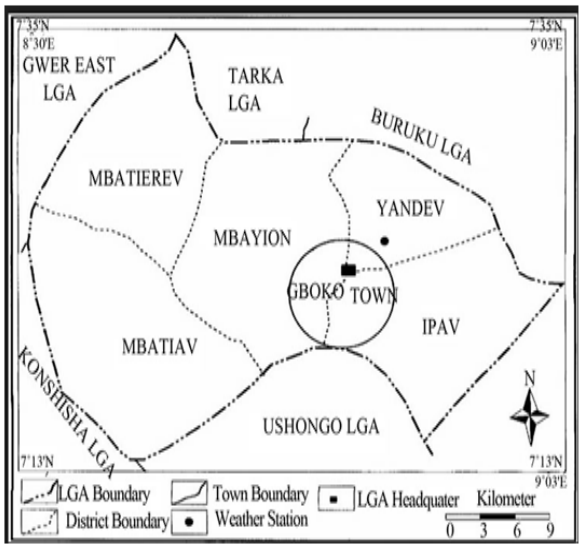

Fig. 1: Map of Gboko LGA of Benue State
Source: Adapted from Benue state Map

Sampling Techniques

The data collected for this study were mainly primary data collected from six communities in the Local Government Areas (LGA) which were selected based on their agricultural activities using multistage sampling technique. Forty farmers from each of the community were randomly selected giving a total of 240 respondents. 9 farmers did not give response for the completion of the specifically structured questionnaires. After the completion of the questionnaires, the researchers visited the farms to physically observe the farmers discharging there farming activities as a way of verifying the information contained in the questionnaires. The primary data include farm size, cropping patterns, availability of chemical inputs, kind of farm machines, type of tools and time required for each operation, etc. in the farm production activities.

RESULTS AND DISCUSSIONS

Table 1 shows some socio-economic characteristics of the respondents in the study area that were considered for the study. This

includes sex, marital status, age, education, household size, years of farming experience, farm size and means of land acquisition**.**

Table 1. Socio – Characteristics of farmer in Gboko LGA Benue State

Item	Frequency	Percentage (%)
Sex		
Male	195	84.42
Female	36	15.58
Marital status		
Single	40	17.32
Married	163	70.32
Divorced	12	5.19
Widow/Widower	16	6.93
Age (years)		
21 – 30	82	35.50
31 – 40	96	41.56
41 – 50	26	11.26
51 – 60	17	7.40
Above 60	10	4.33
Level of Education		
Primary	106	45.89
Secondary	73	31.60
Tertiary	16	6.93
Non-formal	36	15.58
Family Size		
1 -5	68	29.44
6 – 10	152	65.80
11 above	11	4.76
Farming Experience (Years)		
1 – 5	47	20.35
6 – 10	62	26.84
11 – 15	18	7.79
16 – 20	68	29.44
21 – 25	21	9.09
Above 25	15	6.49
Farm Size (hectares)		
1 - 5	165	71.43
6 – 10	46	19.91
11 – 15	14	6.06
Above 16	6	2.06
Means of Land Acquisition		
Purchased	36	15.58
Hired	14	6.06
Gift	9	3.90
Inherited	172	74.46

Source: Field work, 2016 and and Own Calculation.

The table reveals that majority of the farmers' (165) farm sizes between 1–5 hectares (71.43%), 46 farmers (19.91 %) have access to 6 – 10 hectares of land, 14 farmers (6.06%) have access to 11-15 hectares while 6 farmers (2.60 %) have 16 hectares. Fragmentation of farm lands or small land holdings and poor capital base is one the many problems of agricultural mechanization in the study area [11]. Proceeds from these small landholdings will not meet the expenses on machinery and other farm inputs [13]. [5] affirmed that land fragmentation with numerous canals and drainage ditches, narrow access roads to individual farm plots seriously restrict the use of mechanical aggregates. Peasant farmers' production problems are intensive labour as a result of the poor technology applied, low operating capital, no fixed capital investment and poor management [7].

It was observed that literacy level was low among the respondents 106 (45.89 %) for primary schools, 73 (31.60 %) for Secondary education, 16(6.93 %) had tertiary education, and 36 (15.58 %) for no formal education. T his 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 presents machines used by the farmers in the LGA, it was observed that most of the respondents do their farm works manually; only 7.79 % use planting aggregate (tractor and planting equipment).

Table 2. Equipment Used by Farmers and Numbers of Users

Operation	Equipment Used	Frequency	Percentage (%)
Land Clearing	Cutlass and Hoe	163	70.56
	Plough	68	29.44
Tillage	Hoe	212	91.77
	Plough	19	8.23
Planting	Cutlass and Hoe	182	78.79
	Tractor	18	7.79
	Hand planter	31	13.42
Fertilizer Application	Manual	196	84.85
	Machine	35	15.15
Weeding	Cutlass and Hoe	152	65.80
	Machine	79	34.20
Irrigation	Watering can	24	10.39
	Machine	53	22.94
	Non Irrigation	154	66.94
Harvesting	Manual	186	80.52
	Machine	45	19.48

Source: Field work, 2016 and Own calculation.

Cutlass and hoes are the major tools used for planting as shown by their highest percentage in the table. 186 (80.52 %) manually harvest crops and 45 (19.48 %). farmers have used machine in harvesting upland rice.

Table 3 shows agricultural tools and machinery available in the LGA. The few farm machinery and implements available are used for tillage operations. The farmers who were able to use rice harvester hired the equipment from Benue state capital (Makurdi). The table shows that only 35 (15.15) % of the respondents had their farm partially mechanized and only 39.83 % of the respondents owned some equipment.

Table 3. Agricultural Machinery and Implements Available

Determinant	Rating	Frequency	Percentage (%)
Plough	Available	56	24.24
	Not Available	175	75.76
Harrow	Available	86	37.23
	Not Available	145	62.77
Ridger	Available	24	10.39
	Not Available	207	89.61
Method of acquisition of Implements	Purchased	92	39.83
	Hired	139	60.17
Irrigation Facilities	Available	16	6.93
	Not Available	215	93.07
Storage Facilities	Available	11	4.76
	Not Available	220	95.24
Mechanical Crop Processing	Available	18	7.79
	Not Available	213	92.21
Mechanized Agricultural Practice	Fully Mechanized	16	6.93
	Partially Mechanized	35	15.15
	Non-Mechanized	180	77.92

Source: Field work, 2016 and Own calculation.

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 identify by 100 % of respondents, land tenure identified by 91.77 %, lack of equipment (97.84 %), lack of storage facilities (95.24 %) insufficient farm inputs (99.13 %).

From the results it can be inferred that inadequate capital and insufficient farm inputs were identified as the prevailing and major problems of the peasant farmers in the study area (Gboko LGA, of Benue State).

Table 4. Agricultural Mechanization Challenges in the Study Area

Problems	Frequency	Percentage (%)
Land Tenure	212	91.77
Inadequate Capital	231	100.00
Lack of Equipment	226	97.84
Lack of Storage facilities	220	95.24
Insufficient farm inputs	229	99.13

Source: Field work, 2016 and Own calculation.

CONCLUSIONS

From the above result and the analysis and interpretation the data most of the farmers are small farm holders with most of their land fragmented and individual farm size not more than 5 hectares with most of their labour coming from manual source. With the introduction of mechanisation and its efficient management together with good soil conservation practices there is bound to be a positive impact on farm productivity and income. The soil management expertise and machinery capital base will have to be provided under the Public-Private arrangement since the farmers are willing to improve their socio-economic status by improving their agricultural production through the application of modern technology based primarily on mechanization having seen the benefits derivable as seen in the experience of the very few farmers who were able to apply machines in their farms. There is need also for the government and other organizations to provide a forum for education for the rural farmers on how to adopt and accept the modern technology in agriculture which will enable the realization of quality, timely and quantitative works as well as quality and economic produce/products from minimum physical labour.

Modern technology in agriculture in the study area has high potentials in increasing farm productivity. However, it is generally agreed that appropriate agricultural mechanization

technology for Nigeria must evolve from a gradual development of indigenous technology. The mechanization approach must be an integrated one to include most, if not all, the agricultural production processes and operations and must also be part of and include the essential elements of the overall agricultural and rural development strategies in order to get to the roots of rural poverty. The following are recommended:

-The roles of the government, financial institutions, the research institutes, the private sector and other interest groups must be carefully and effectively articulated if the dream of developing sustainable agricultural productivity in Nigeria is to be realized.

-There is need to create awareness on farm mechanization, this will help the local farmers to appreciate and adopt agricultural mechanization.

-Government should provide financial assistance to specialist in agricultural mechanization in partnership with specialist in soil conservation and management to establish prototype mechanization unit to render hiring services to local farmers.

-The Federal and state Governments should set up agricultural engineering research and development centre and separate and distinct from agricultural mechanization centres.

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