

**EVALUATION OF THE SOURCES OF POWER FOR AGRICULTURE IN NIGER
STATE**

BY

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MATRIC No. 2005/21570EA

DEPARTMENT OF AGRICULTURAL & BIORESOURCES ENGINEERING

FEDERAL UNIVERSITY OF TECHNOLOGY MINNA,

NIGER STATE

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TITLE PAGE

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BEING A FINAL YEAR PROJECT REPORT SUBMITTED IN PARTIAL FULFILLMENT
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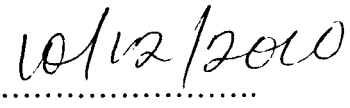
DECEMBER, 2010

DECLARATION

This project work titled “Evaluation of the Sources of Power for Agriculture in Niger State” was carried out by me under the guidance and supervision of Engr. Dr. A. A Balami, Head, Department of Agricultural and Bioresources Engineering, Federal University of Technology Minna.



Sadiq, Alfa Ahmed



Date

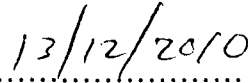
CERTIFICATION

This is to certify that the project entitled "Evaluation of the Sources of Power for Agriculture in Niger State" by Sadiq, Alfa Ahmed meets the regulations governing the award of the degree of Bachelor of Engineering (B, Eng.) of the Federal University of Technology, Minnaand it is approved for its contribution to scientific knowledge and literary presentation.

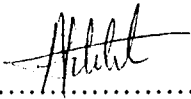


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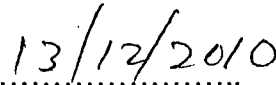


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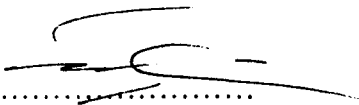


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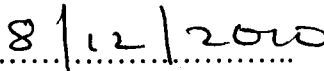
Head of Department



Date



External Examiner



Date

DEDICATION

This project is dedicated to my parent's Mallam Shafiyi and Malama Maryam for their moral, spiritual and financial support. May Almighty Allah forgiveness and mercy be upon them (Amen) and lastly, to my beloved ones.

ACKNOWLEDGEMENT

I give thanks to Almighty Allah the creator, nourisher and the sustainer of the entire universe. May his peace and blessing be upon the last prophet Mohammed (S.A.W), his pure family and his companions. I praise him for his mercy and favours upon me throughout this programme.

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ABSTRACT

The Evaluation of Sources of Power for Agriculture in Niger State of Nigeria were measured and the productivity of each of the surveyed farm areas was analyzed. Structured questionnaire was used to establish the socio-economic characteristics, educational level, and technical knowhow of the farmers. A total of 104 places were visited, 48 places from zone (A), 35 places from zone (B) and 21 places from zone (C). The results of the sources of power for agriculture revealed that the level of adoptable power sources in the State was 13% which is observed to be very low due to the inconsistency in agricultural mechanization policy in the State. The average level of mechanization was 65% while the hand tool technology (HTT) was 51%. There is no significant interaction between the farmers and the government to evaluate the problems relating to sources of power for agriculture. The detailed analyses of the observed sources of power and recommendations were made based on the findings of this study.

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CHAPTER ONE

INTRODUCTION

1.0 Background to the Study

Sources of power for agriculture is the highest technology level in agricultural mechanization. It embraces all agricultural machinery which obtains its main power from other sources other than muscular power (Adrianus, 1989).

Sources of power for agricultural mechanization is the application of mechanical technology and increased power to agriculture, largely as a means to enhance the productivity of human labour and often to achieve results well beyond the capacity of human labour. This includes the use of tractors of various types as well as animal-powered and human-powered implements and tools, and internal combustion engines, electric motors, solar power and other methods of energy conversion (Vienna, 2008).

Sources of farm power is a very broad field covering the farm equipment, including the power sources that are used to operate the various machines. Farm equipment constitutes a vital input to the crop production cycle and a wide range of equipment is highly sophisticated and demands that the technical qualification and background of the managers and operators is of an adequate standard (Gana, 2010).

Tropical sources of power for 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, availability and technical efficiency of the options. 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 socially beneficial 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 (Nwokwo, 1990).

1.1 Statement of Problem

Agricultural production is one of the major economic activities of people in Niger State. National Cereals Research Institute (NCRI) and Niger State Agricultural Development Project under its programme namely, farming system research programme however, shows that the farmers in the State are still depending on the use of traditional production technique in their cropping system and uses simple Hand Tools Technology (HTT) such as hoe and cutlass to carry out farm operation, often a lot of labour is involved and much time is consumed in carrying out total farm operation by using simple farm tools. Therefore, there is need to examine the extent to which the traditional farmers have adopted the new farming techniques and the uses of modern agricultural machinery to carry out farm operation in order to meet the needs of increasing population in the state. Agricultural mechanization is therefore paramount, in the process of building close relationships with the farmers, assessing needs and satisfying demands. In this kind of operational scenario, demand for mechanization is likely to be satisfied and agricultural productivity enhanced. The Government may have a role in facilitating trade relationships with new suppliers of technology or equipment. The Government may need to make the first moves, such as importing the first consignment in partnership with the private enterprise, and thereafter allowing it to take over.

1.2 Objective of the project

1. To identify the sources of power for agricultural mechanization in Niger State.
2. To highlight the problems of agricultural mechanization in the State and suggest possible solutions.

1.3 Justification of the study

The study of evaluation of level of Agricultural Mechanization is an attempt to provide a pathway through which farmers and rural communities in the State can achieve higher intensities of Agricultural production through investment in mechanization. Therefore, it is necessary to study and investigate the practice of agricultural mechanization for proper evaluation and or assessment of the level of agricultural mechanization in Niger State.

1.4 Scope of the study

The study of this research work is to cover a wide range of areas in agricultural production such as land clearing and preparation, planting, harvesting and processing, material processing and handling, poultry production, agro-allied processing and storage. Twenty-five (25) Local Governments in Niger State would be sampled to have only fifteen (15) Local Governments representing the population. The Local Governments were used as working sample so as to ease data collection and simplify analysis.

CHAPTER TWO

2.0

LITERATURE REVIEW

Odigboh (1991), reported that the strategy for a shift from the traditional concept of primitive tools technology to achieving sufficiency in food could be undertaken through the development of farm settlement schemes in rural communities. The expectation of these innovations was to provide for the farmers certain production conditions that will be technically feasible and socio-culturally compatible with production technology that will be well sustained. Up till this present time, Nigeria has not been able to define the economic role of sustainable agricultural mechanization that can transform the experimental phase presently existing in the farm settlement schemes to a sound commercial position. Nigeria needs to embark on sustainable mechanization because there is current national awareness on the immense potential of agriculture in boosting the economy of the country. The nation can achieve this goal through accelerated food production by increasing both labour and land productivity as well as expanding areas of cultivated land.

Clarke (1997), argued that the level, appropriate choice and subsequent proper use of mechanized inputs into agriculture has a direct and significant effect on achievable levels of agricultural production, the profitability of farming and the environment. In general, in a situation where the expansion of agricultural land is limited, the application of advanced tools and machines does not, by itself, lead to increased unit yields. However, the full benefit achieved through the use of many advanced crop husbandry inputs such as improved seed, fertilizer, and pesticides, cannot be realized without the use of improved tools. Only under certain conditions, where production increases achieved through the use of other improved inputs has come to its limits, can improved tools and equipment by themselves lead to production increases, cost reductions or improvements in the environmental

sustainability of farming. In situations where land is not a constraint, increased farm power can lead to direct increases in production by simply increasing the land area or animal numbers that one man can handle. In the past, misunderstood concepts and inappropriate selection and use of certain mechanization inputs (mainly tractors and heavy machinery) have, in many parts of the world, led to heavy financial losses and lower agricultural production as well as environmental degradation. Mechanization has often become a burden to the national budget and the farming community rather than being a productive input. This has especially been the case in centrally planned economies, where mechanization was heavily subsidized through the provision of government planned and operated machinery services. Similar models of government provision of services has been tried in many developing countries and has in every case failed. The development of "appropriate" tools and equipment has also been a favourite subject for development assistance.

Ozmerzi (1998), 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.

2.1 Need for Agricultural Mechanization planning

Bagheri and Moazzen (2009), opined that lack of a practical plan for agricultural mechanization development is the major problem. For planning in this field, it is necessary to determine mechanization definition, development process and cycle, challenges, mission (fundamental adjective), long-term goal, and optimum strategy for agricultural mechanization development. Therefore for compilation of optimum strategy, a descriptive

and practical research was taken place with survey and documentation research method for agricultural mechanization development planning –with maximum practical capability. The sequential changes in science and technology, which has had certain effects over agricultural mechanization, was the cause for using strategic planning methodology for optimum strategy planning. We used brain storming methods for recognizing challenges. Also interview and field observation was used for information gathering and analyzing questionnaires. Sample statistical society, was composed from 809 persons, who were experts in social, economic, planning, management, agricultural engineering and mechanization. With the results, the mission (fundamental objective), long-term goal and optimum strategy were determined. The results showed that the most important challenges for mechanization development are classified into four groups: social, economic, technical, plan and management. In the research, practical definition of agricultural mechanization, its process and cycle, its challenges and its optimum strategy were given. Optimum strategy for agricultural mechanization development is, increasing knowledge and technical skills of producers and machinery operators, development of economical insight of producers, development of guild organizations, improving financial affair and reducing injuries of machinery operators and producers.

Ou, et al. (2002), reported that agricultural mechanization as system engineering requires not only advances in machine development and applications but also the close cooperation of many sections. In recognition of this fact, certain environmental, agricultural, social and economic conditions must be ascertained to favour investment in mechanization technologies and their sustainable use. Timeliness of tillage and planting, weeding and/or harvesting are critical factors where affordable labour is insufficient to permit timely

operation. Other key factors that influence successful mechanization include Socio-economic factors, supporting infrastructure, land and agro-ecological conditions, and technical skills and services.

2.2 Confronting the challenges of Agricultural Mechanization in Nigeria

Odigboh (2000), “The man with the hoe” still remains an apt description of the Nigerian farmer today. In spite of decades of immense expenditures and investments into agriculture, in terms of money men and materials, by national and international governments and agencies, the average Nigerian farmer remains an indigent serf, regarded by today’s youths as a dreadful anachronism.

The Nigerian agricultural industry, populated as it is by aged and ageing peasants, has progressively developed into a world of drudgery for losers, shunned and despised by Nigerian youths. To change this ugly/unsavoury image of Nigerian agriculture, it has now become imperative to adopt an appropriate level of engine-power agricultural mechanization technology (EPAMT), necessary and sufficient to modernize, energize and revitalize the industry. The paper opines that the most viable option to achieve the objective is a mechanization strategy which can create the conducive environment for the emergence of small-to-medium-scale (SMS) market-oriented, youthful farmers, who will voluntarily choose to go into agriculture as a respectable and profitable business. This canvassed SMS farmers-oriented mechanization strategy is justified in this paper with objective analyses of information and data collected through surveys, interviews and a requisite review of relevant literature.

2.3 Measurement of Agricultural Mechanization Level

Olaoye and Rotimi (2010) , measured the levels of Agricultural mechanization at some farms in two states in south-west of Nigeria. An analysis of productivity of each of the surveyed farms was carried out. Factors that lead to profitability of farm activities and whole farms were deduced. Structured questionnaire was used to establish the socio – economic characteristics, educational level, technical knowhow of the farmers. The inventory of the farm machinery was also established at each of the farm settlements visited. Agricultural mechanization index was used to evaluate the level of agricultural mechanization while the level of productivity for each farm settlement was determined as an inverse of the work output of the explicit factors involved in production function (capital or machine and labour). Profitability of activities was measured in terms of Gross margin and of whole farms. This was measured subjectively as net benefits of physical productivity (Crop yield) and the returns from the resources used during production activities. The results of the farm mechanization index revealed that the average level of mechanization in Ogun and Osun States were 31.3 % and 28.6 %, respectively and the average level of mechanization in the two States was 30.6 % while the total productivity ranges between 0.0115 ha / kWhr and 0.0951 ha / kWhr. The average physical productivity (crop yield) on maize ranges between 1.2 to 1.7 tons / ha and that of cassava was about 11.5 tons / ha in the two States. The sustainability analysis of the schemes indicated that inconsistency in agricultural mechanization policy, lack of favorable conditions for full integration of agricultural mechanization, lack of essential infrastructure and financial credits among other variables explained the observed low spectrum in the scale of production.

Table 2.1: Energy used for mechanical operations in Ogun and Ondo States (kWhr/ha)

Farm settlements (Ogun State)								
	<i>Ajgunle</i>	<i>Ado-Odo</i>	<i>Ibi-ade</i>	<i>Ikenne</i>	<i>Ilewo-orile</i>	<i>Coker</i>	<i>Ago-Iwoye</i>	<i>Sawonjo</i>
Farm Operations	Work Output							
Ploughing	0.06359	0.0245	0.0593	0.0837	0.0445	0.0277	0.0252	0.0442
Harrowing	–	0.0151	0.0323	0.0516	–	0.0171	0.0156	0.0272
Ridging	–	0.0038	0.0085	0.0134	–	0.0044	0.00396	0.0069
Planting	2.5	3	2.4	2.1	3.5	2.5	2.8	2.4
Herbicides Application	4.9	5	4	4	6	6	4.5	5
Fertilizer application	3.3	2.8	3	2.5	3.2	2.5	4	3.2
Harvesting	9	9	9	10.8	9	6	7	6

Farm settlements (Ondo State)					
	<i>Onisere</i>	<i>Okiti-pupa</i>	<i>Ile-Oluji</i>	<i>Imariwo</i>	<i>Ifon-Isobe</i>
Ploughing	0.0335	0.0397	0.0663	–	–
Harrowing	0.02064	0.0245	0.0409	–	–
Ridging	0.0053	0.0063	0.0104	–	–
Planting	2.5	3	2.5	–	–
Herbicide Application	4	5	5.5	–	–
Fertilizer application	3.6	3.6	3.2	–	–
Harvesting	9	7	7.5	–	–

Source: (Olaoye and Rotimi, 2010)

Table 2. 2: Summary of the Level of Mechanization in Relation to Total Output Power, Human productivity, Machine Productivity and Total Productivity per Unit Areas of Cultivated Land

Farm Settlements	Area of land cultivated for arable crops (ha)	Actual tractor power (kW/ha)	Human power (kW/ha)	Total Output Power (kW/ha)	Level of Mechanization (%)	Productivity of Machine Am ha/kWhr	Productivity of human labour Ah ha/kWh/hr	Total productivity AT ha/kWhr
<i>Ajegunle</i>	200	94.2	1.8	96	40.3	0.0158	0.01064	0.0427
<i>Ado-Odo</i>	520	88.25	1.9	90.15	27.6	0.0689	0.0262	0.0951
<i>Ibi-ade</i>	236	88.25	1.6	89.85	28.8	0.0316	0.0128	0.0444
<i>Ikenne</i>	152	88.25	1.8	90.05	27.8	0.0216	0.0078	0.0294
<i>llewo-Orile</i>	88	94.2	2	96.2	36.9	0.0069	0.0046	0.0115
<i>Coker</i>	459	88.25	1.8	90.05	29	0.0611	0.0249	0.086
<i>Ago-Iwoye</i>	504	88.25	1.6	89.85	29.2	0.067	0.0275	0.0945
<i>Sawonjo</i>	288	88.25	1.8	90.05	31.2	0.0383	0.0174	0.0557
<i>Onisere</i>	380	88.25	1.8	90.05	28.3	0.0505	0.0199	0.0704
<i>Okiti-Pupa</i>	320	88.25	1.9	90.15	28.8	0.0426	0.0172	0.0598
<i>Ile-Oluji</i>	192	88.25	1.9	90.15	28.7	0.0255	0.0103	0.0358
<i>Imariwo</i>	—	—	—	—	—	—	—	—
<i>Ifon-Isobe</i>	—	—	—	—	—	—	—	—

Gana (2010), examined various factors that determined the level of adoption of Agricultural mechanization in four selected National Programme for Food Security sites, the sites are Doko, Dama, Makangara and Garam all in Niger state . Data was collected directly from the farmers through the administration of questionnaires and oral interviews. The data were statistically analyzed using test statistics. The study revealed that mixed cropping is the predominant farming system practiced in the selected study areas, and the commonly grown crops include sorghum, maize, rice, yam, millet and groundnut. About 44.4% of the farmers practiced mixed cropping while 9.9% who are large scale farmers practiced sole cropping. The study also revealed that majority of farmers in these areas are

small scale farmers who employed human labour as their main source of farm power which involves the use of simple hand tools. The study showed that 50.7% of farmers are illiterate while only 13.4% of them attended Higher Institution of learning and can handle modern machinery. Farmers in Makangara site employed animal power as their main source of farm power which is also a level of mechanization and farmers in Dama, Garam, and Doko site stand better chance of adopting modern mechanization methods because they have large farmland, have access to Bank loan and are fairly educated.

2.4 Benefit of Agricultural Mechanization to farmers

Investment in agricultural mechanization has enabled farmers to intensify production and improve their quality of life as well as contributing to national and local prosperity as stated Rome (2008) and thus:

- Reduce drudgery in farming activities, thereby enhancing lifestyles;
- Improve the timeliness and efficiency of farm operations;
- Accomplish tasks that are difficult to perform without mechanical aids;
- Improve the quality and value of work, produce and processed products;
- Provide agriculture-led industrialization and markets for rural economic growth.

CHAPTER THREE

3.0 METHODOLOGY

3.1 Background of the area under study

Niger State is located at latitude 4° - 14° N and longitude 11° - 30° E, having a land area of about 76,363 sq. km. It is comprised of twenty five (25) local government areas. It has an estimated population of 3,950,249 (Census 2006). Niger State falls in Middle Belt zone of Nigeria and the vegetation found in the state are Guinea savannah.

The annual rainfall varies from 1100mm in the north to 1600mm in south. The rainy season falls between April and October while the dry season falls between November and March.

3.2 Instruments of Investigations and Measurements

Primary data were collected through administration of questionnaire. The questionnaire was structured following Gittinger (1982). The questionnaire covered the general background information of some selected farm settlement across the State. The Questionnaire consist of two (2) parts. Section A: Personal data and Section B: Research questions. There were seventeen (17) questions in section B of the questionnaire. The questionnaire also delved down into information on the socio-economic characteristics of the farmers such as age, level of education, hired/family labour contributions, availability of farm resources (land, labour, capital and modern management). Questionnaires were administered at the farmers' farm and their residences. Information on socio – economic characteristics, educational level, technical knowhow of the farmers were garnered.

3.3 Procedures used

The Local Government areas of the state were zoned into three (3).

- i. Bida zone (Southern part of the state) consisting of eight (8) local Government areas.
- ii. Kuta zone (Eastern part of the state) consisting of nine (9) local Government areas.
- iii. Kotongora zone (Northern part of the state) consisting of eight (8) local Government areas.

Data of medium and large scale farmers across the state were collected from Niger State Agricultural Development Project (NSADP), which shows all the areas where agricultural mechanization are adequately practiced. Out of the working sample of fifteen local Government areas that were chosen for this research work, five (5) Local Government areas were selected from each zone i.e zone A, B and C. which make the total of fifteen samples.

From zone A (Bida zone), the local Government areas selected are: Katcha, Gbako, Edati, Lavun, Bida.

From zone B (Kuta zone), the local Government areas selected are: Bosso, Chanchaga, Paikoro, Rafi, Shiroro. And finally,

From zone C (Kotongora zone), the local Government areas selected are: Mashegu, Borgu, Rijau, Wushishi, Kotongora.

Fifty (50) copies of questionnaire were distributed in each of the three (3) zones of the State (Northern, Southern, and Eastern zone of Niger State). Therefore, making the total sum of 150 questionnaires distributed across the local Government areas selected above. The responses obtained were also recorded based on the three zones.

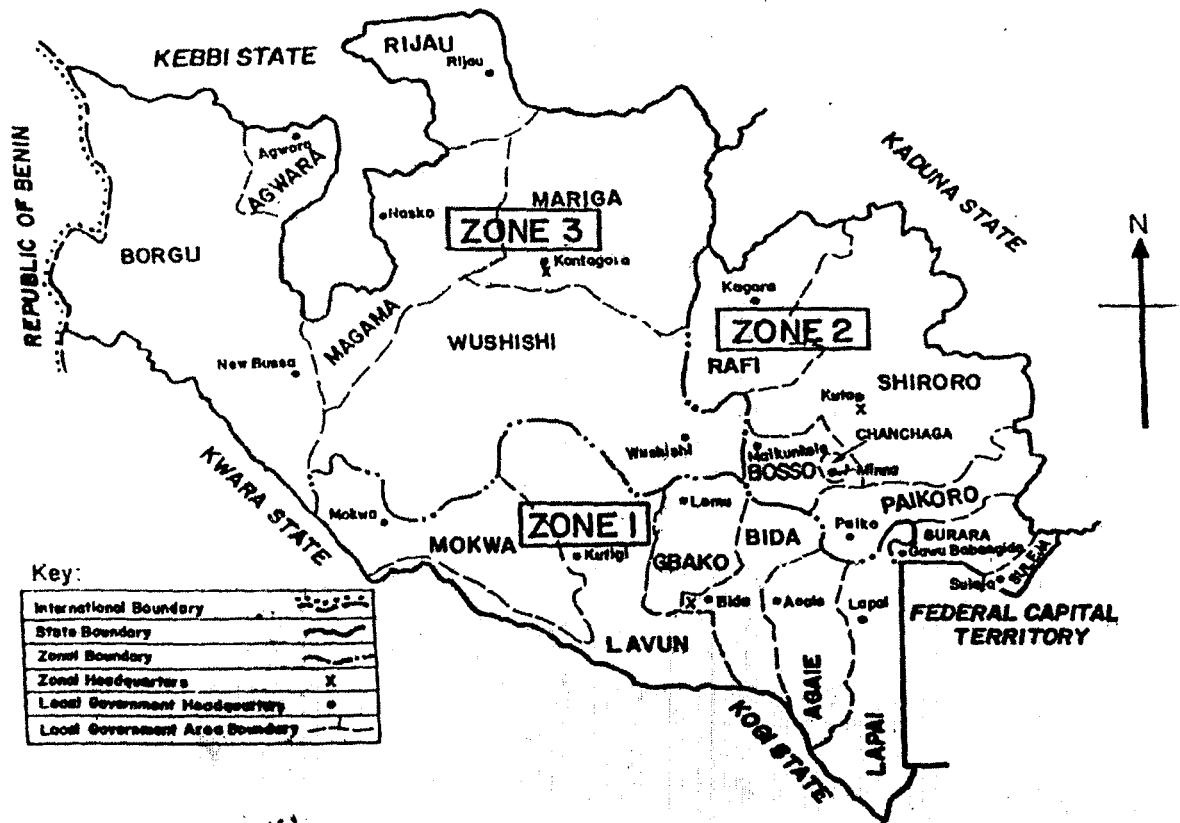


Fig. 3.1 Map of Niger State with location of the fifteen Local Governments areas used as working sample.

3.4 Analytic tool used

The data obtained were analyzed using the relationship (Robert, 1974):

Percentage Response = x/y

X is the sum of responses on a question in all the three zones.

Y is the expected number of responses on a question in all the three zones.

The Analysis provide a level of response on percentage basis of each individual respondent.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

4.1 Results on the level of Agricultural Mechanization in Niger State

Data were obtained inform of responses from administered questionnaires. These responses were presented on zonal basis in a tabular form.

Tables 4.1, 4.2, and 4.3 show the results obtained from the responses from the three zones of Niger State. These zones are Niger south, Niger east and Niger north respectively. while Tables 4.5 and 4.6 show the total responses and percentage responses from the fifteen Local Governments in the State.

Table 4.1: Responses from zone (A)

Research Questions	Responses								Total No. of Respondents	Unretrived Questionnair
	Option one	No. of Responses	Option two	No. of Responses	Option three	No. of Responses	Option four	No. of Responses		
Major Agric. mechanization operation within the area	Land preparation	26	Application of fertilizer	15	Planting	07	Agro-processing	–	48	02
Sources of finance	Government	02	Personal saving	29	Partnership	13	Bank loan	04	48	02
Education level	Primary	21	Secondary	17	Tertiary	03	None	07	48	02
Total no. of hectare covered	1-20	10	20-35	14	35-50	08	Above 50	16	48	02
Sources of power supply	Electricity	42	Solar energy	06	Manual	–	None	–	48	02
Major Agric. Production within the research area	Crop production	22	Irrigation	17	Dairy farming	08	Agro-processing	01	48	02
Sources of farm power	Engine power	15	Animal power	08	Human power	25	None	–	48	02
Method of weed control	Manual	30	Chemical (herbicide)	16	Both	02	None	–	48	02

Table 4.1: Continued

Research Questions	Responses								Total no. of Respondents	Unretrived Questionnaires
	Option one	No. of Responses	Option two	No. of Responses	Option three	No. of Responses	Option four	No. of Responses		
Major method of planting	Manual	28	Mechanical	19	Both	01	None	-	48	02
Major method of harvesting	Manual	32	Mechanical	14	Both	02	None	-	48	02
Level of awareness of agric. Mech.	High level	39	Moderate level	08	Low level	01	Insignificant level	-	48	02
Do you carryout processing	Yes	06	No	42	-	-	-	-	48	02
Annual income	N50,000-N100,000	02	N100,000-N200,000	06	N200,000-N500,000	16	Above N500,000	24	48	02
Level of farm contribution	0-40%	35	40-60%	12	60-80%	01	80-100%	-	48	02
Requireme nt by farmers for Agric Mech	Finance	40	Adoptable power sources	05	Training	03	Relevant	-	48	02
Position of farmers with respect to Agric. Mech.	Reluctant to adopt Agric. Mechaniza tion operation	02	Cannot afford to use Agric. mechanizatio n	18	Willing to adopt Agric. mechanizati on	22	Agric. Mechanizatio n is unprofitable	06	48	02

Research Questions	Responses								Total No. of Respondents	Unretrived Questionnai
	Option one	No. of Responses	Option two	No. of Responses	Option three	No. of Responses	Option four	No. of Responses		
Major Agric. mechanization operation within the area	Land preparation	14	Application of fertilizer	10	Planting	09	Agro-processing	16	49	01
Sources of finance	Government	03	Personal saving	24	Partnership	13	Bank loan	09	49	01
Education level	Primary	28	Secondary	10	Tertiary	07	None	04	49	01
Total no. of hectare covered	1-20	29	20-35	18	35-50	01	Above 50	01	49	01
Sources of power supply	Electricity	46	Solar energy	02	Manual	-	None	01	49	01
Major Agric. Production within the research area	Crop production	27	Irrigation	11	Dairy farming	05	Agro-processing	06	49	01
Sources of farm power	Engine power	17	Animal power	09	Human power	23	None	-	49	01
Method of weed control	Manual	25	Chemical (herbicide)	13	Both	11	None	-	49	01

Table 4.2: Continued

Research Questions	Responses								Total no. of Respondents	Unretrieved Questionnaires
	Option one	No. of Responses	Option two	No. of Responses	Option three	No. of Responses	Option four	No. of Responses		
Major method of planting	Manual	21	Mechanical	18	Both	10	None	—	49	01
Major method of harvesting	Manual	31	Mechanical	09	Both	09	None	—	49	01
Level of awareness of agric. Mech.	High level	29	Moderate level	15	Low level	05	Insignificant level	—	49	01
Do you carryout processing	Yes	01	No	48	—	—	—	—	49	01
Annual income	N50,000-N100,000	23	N100,000-N200,000	12	N200,000-N500,000	09	Above N500,000	05	49	01
Level of farm contribution	0-40%	36	40-60%	11	60-80%	02	80-100%	—	49	01
Requirement by farmers for Agric Mech	Finance	26	Adoptable power sources	13	Training	10	Relevant	—	49	01
Position of farmers with respect to Agric. Mech. operation	Reluctant to adopt Agric. Mechanization	01	Cannot afford to use Agric. mechanization	03	Willing to adopt Agric. mechanization	30	Agric. Mechanization is unprofitable	15	49	01

Table 4.3: Responses from zone (C)

Research Questions	Responses								Total No. of Respondents	Unretrived Questionnaire
	Option one	No. of Responses	Option two	No. of Responses	Option three	No. of Responses	Option four	No. of Responses		
Major Agric. mechanization operation within the area	Land preparation	22	Application of fertilizer	10	Planting	08	Agro-processing	05	45	05
Sources of finance	Government	03	Personal saving	21	Partnership	18	Bank loan	03	45	05
Education level	Primary	14	Secondary	12	Tertiary	11	None	08	45	05
Total no. of hectare covered	1-20	07	20-35	17	35-50	08	Above 50	13	45	05
Sources of power supply	Electricity	43	Solar energy	—	Manual	—	None	02	45	05
Major Agric. Production within the research area	Crop production	26	Irrigation	15	Dairy farming	03	Agro-processing	01	45	05
Sources of farm power	Engine power	11	Animal power	04	Human power	30	None	—	45	05
Method of weed control	Manual	29	Chemical (herbicide)	09	Both	07	None	—	45	05

Table 4.3: continued

Research Questions	Responses								Total no. of Respondents	Unretrived Questionnair
	Option one	No. of Respon ses	Option two	No. of Responses	Option three	No. of Respons es	Option four	No. of Responses		
Major method of planting	Manual	29	Mechanical	09	Both	07	None	—	45	05
Major method of harvesting	Manual	22	Mechanical	14	Both	09	None	—	45	05
Level of awareness of agric. Mech.	High level	33	Moderate level	07	Low level	05	Insignific ant level	—	45	05
Do you carryout processing	Yes	06	No	39	—	—	—	—	45	05
Annual income	N50,000- N100,000	17	N100,000- N200,000	12	N200,00 0- N500,00 0	08	Above N500,00 0	05	45	05
Level of farm contribution	0-40%	23	40-60%	14	60-80%	08	80-100%	—	45	05
Requirement by farmers for Agric Mech	Finance	32	Adoptable power sources	08	Training	05	Relevant	—	45	05
Position of farmers with respect to Agric. Mech.	Reluctant to adopt Agric. Mechanizati on operation	03	Cannot afford to use Agric. mechanizat ion	05	Willing to adopt Agric. mechani zation	24	Agric. Mechani zation is unprofita ble	15	45	05

Table 4.4: Total Responses from fifteen Local Governments in Niger State

Research Questions	Responses							
	Option one	No. of Responses	Option two	No. of Responses	Option three	No. of Responses	Option four	No. of Responses
Major Agric. mechanization operation within the area	Land preparation	62	Application of fertilizer	35	Planting	24	Agro-processing	21
Sources of finance	Government	08	Personal saving	74	Partnership	44	Bank loan	16
Education level	Primary	63	Secondary	39	Tertiary	21	None	19
Total no. of hectare covered	1-20	46	20-35	49	35-50	17	Above 50	30
Sources of power supply	Electricity	131	Solar energy	08	Manual	--	None	03
Major Agric. Production within the research area	Crop production	75	Irrigation	43	Dairy farming	16	Agro-processing	08
Sources of farm power	Engine power	43	Animal power	21	Human power	78	None	--
Method of weed control	Manual	84	Chemical (herbicide)	38	Both	20	None	--

Research Questions	Responses							No. of Responses
	Option one	No. of Responses	Option two	No. of Responses	Option three	No. of Responses	Option four	
Major method of planting	Manual	79	Mechanical	43	Both	20	None	-
Major method of harvesting	Manual	85	Mechanical	37	Both	20	None	-
Level of awareness of agric. Mech.	High level	101	Moderate level	30	Low level	11	Insignificant level	-
Do you carryout processing	Yes	13	No	129	-	-	-	-
Annual income	N50,000 - N100,000	42	N100,000- N200,000	30	N200,000- N500,000	33	Above N500,000	37
Level of farm contribution	0-40%	94	40-60%	37	60-80%	11	80-100%	-
Requirement by farmers for Agric Mech	Finance	98	Adoptable power sources	26	Training	18	Relevant	-
Position of farmers with respect to Agric. Mech.	Reluctant to adopt Agric. Mechanization operation	06	Cannot afford to use Agric. mechanization	26	Willing to adopt Agric. mechanization	76	Agric. Mechanization is unprofitable	34

Research Questions	Responses							
	Option one	% of Responses	Option two	% of Responses	Option three	% of Responses	Option four	% of Responses
Major Agric. mechanization operation within the area	Land preparation	41	Application of fertilizer	23	Planting	16	Agro-processing	14
Sources of finance	Government	05	Personal saving	49	Partnership	29	Bank loan	11
Education level	Primary	42	Secondary	26	Tertiary	14	None	03
Total no. of hectare covered	1-20	31	20-35	33	35-50	11	Above 50	20
Sources of power supply	Electricity	87	Solar energy	05	Manual	—	None	02
Major Agric. Production within the research area	Crop production	50	Irrigation	29	Dairy farming	11	Agro-processing	05
Sources of farm power	Engine power	29	Animal power	14	Human power	52	None	—
Method of weed control	Manual	56	Chemical (herbicide)	25	Both	13	None	—

Research Questions	Option one	% of Responses	Responses				% of Responses	
			Option two	% of Responses	Option three	% of Responses		Option four
Major method of planting	Manual	53	Mechanical	29	Both	13	None	-
Major method of harvesting	Manual	57	Mechanical	25	Both	13	None	-
Level of awareness of agric. Mech.	High level	67	Moderate level	20	Low level	07	Insignificant level	-
Do you carryout processing	Yes	09	No	86	-	-	-	-
Annual income	N50,000-N100,000	28	N100,000-N200,000	20	N200,000-N500,000	22	Above N500,000	25
Level of farm contribution	0-40%	63	40-60%	25	60-80%	02	80-100%	-
Requirement by farmers for Agric Mech	Finance	26	Adoptable power sources	13	Training	07	Relevant	-
Position of farmers with respect to Agric. Mech.	Reluctant to adopt Agric. Mechanization operation	04	Cannot afford to use Agric. mechanization	17	Willing to adopt Agric. mechanization	51	Agric. Mechanization is unprofitable	23

2 DISCUSSION

A total of 104 places were visited in Niger State. 48 places from zone (A), 35 places from zone (B) and 21 places from zone (C). Table 4.1-zone (A), shows high level of agricultural mechanization in the area 78%, with mechanized system of land preparation 52%, planting 38%, fertilizer application 30%, and harvesting 64%. The study also revealed low level of education and weed control, willingness to adopt agricultural mechanization and contribute about 40% of agricultural production to the State (Table 4.2- zone B).

From (Table 4.3-zone C), it can be seen that the sources of farm power were engine power 34%, which was as a result of high level of education and awareness in the area with (40-60)% contribution of agricultural production to the State. Table 4.4, shows the total number of responses from the fifteen Local Government areas. The practice of selective mechanization was prominent in all the farm settlement visited. The adoptable sources of power for agriculture is 33% while the average level of mechanization is 65%. Mechanical operations were restricted only to operations such as land preparation 41%, planting 53%, weeding 56%, fertilizer application 23%, and harvesting 57% (Table 4.5).

The study showed that the farmers in the State are willing to adopt agricultural mechanization 51%, but with relatively low support from the government 05% and lack of availability of machinery and equipments at affordable price as well as access to spare parts and services.

CHAPTER FIVE

5 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

In all the three zones visited, 85% of the populace in the State are small scale farmers, and owned by individuals, cooperative and non- governmental bodies. More than 31% of the farmers are having less than one (1) ha on which to carryout agricultural production. Only 33% of the farmers carryout agricultural production on more than twenty (20) ha, and about 12% of them investing above N100,000 in agricultural production.

Although there was 67% awareness of the farmers on the practice of agricultural mechanization in Niger State, the adoption of engine power technology (EPT) for agricultural mechanization is mainly in the areas of land preparation. Other agricultural operations are carried out using either draught animal technology (DAT) 14.2% or hand tool technology (HTT) 1.7% or combination of both 60.3%.

The high cost of agricultural machinery and equipment constituted a problem for the adoption of agricultural mechanization in the State. However, the adoptable sources of power in the State by the farmers was 13% which is very low due to the inconsistency in agricultural mechanization policy.

Therefore, provision of capital is the immediate requirement by 65% of farmers for the practice of agricultural mechanization.

There is no significant interaction between the farmers and the government to evaluate the problems relating to the level of agricultural mechanization.

5.2 Recommendations

To improve on the present state of agricultural mechanization practiced by farmers in Niger State, the following are recommended:

- i. Education and training: Training is necessary and paramount, not only for farming skills but also for management of farm machineries, in order to assist farmers to adopt new technology in the State.
- ii. Provision of credit facilities to support the purchase of farm inputs such as tractor, implements like: disc plough, disc harrow, combine harvester, boom sprayer etc.
- iii. Proper and adequate assessment of agricultural mechanization inputs should be made so as to introduce the appropriate type and level of technology needed by the farmers in the State.
- iv. Availability of farm tools, machinery and equipment at affordable prices as well as access to spare parts and services to allow the farmer to make the best choice available to suit his own business.

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APPENDIX

QUESTIONNAIRE

**RESEARCH TITLE: EVALUATION OF SOURCES OF POWER FOR AGRICULTURE
IN NIGER STATE**

RESEARCHER NAME: AHMED .A. SADIQ

Dear respondent;

The questionnaire is strictly for research purposes, whatever supplied shall be treated
confidentially.

SECTION A (PERSONAL DATA)

1. Name of the organization or farm
2. Name of farm Manager/qualification
3. Total number of Employees
4. Sources of Finance Government Personal saving Partnership
 Bank loan
5. Educational level Primary Secondary Tertiary No formal
education

SECTION B (RESEARCH QUESTIONS)

6. Total number of hectares covered
7. Sources of water supply Deep well Dam River Lake
8. Sources of power supply Electricity Solar energy Manual
9. What is your major agricultural production system that you practice in your area?
 Crop production Irrigation Dairy farming Agro-processing

10. What sources of farm power do you used? Engine power Animal power
 Human power
11. What method of weed control do you adopt? Manual weeding Chemical Control (herbicide)
12. What type of method do you use for planting? Manual Mechanical
13. What type of method do you adopt for harvesting? Manual Mechanical
14. What is the level of awareness of agricultural mechanization within your area?
 High level Moderate level Low level Insignificant level
15. Do you carry out any processing operation in your farm? Yes No
16. If yes, what kind of processing
17. What is the total estimate of annual income from your farm produce N.....
18. How does your farm has contributed to the food availability in the state 0-40%
 40-60% 60-80% 80-100%
19. What is the requirement by farmers in Niger State for agricultural mechanization?
 Finance Adoptable power sources Training Relevant technology
20. What is the position of farmers in Niger State with respect to adoption of agricultural Mechanization? Reluctant to adopt agricultural mechanization operation.
 Cannot afford to use agricultural mechanization. Willing to adopt agricultural mechanization. Agricultural mechanization is unprofitable