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Review Article

Mechanization Approach in Solving Farmers and Processors Needs in the Rural Areas of Nigeria

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Abstract

This paper takes a good look at mechanization approach in helping farmers and processors solve their needs in boosting food security in the rural areas of Nigeria. It delved into the history of mechanization during the pre-independence and post-independence era. The colonialist saw the great need to boost food production through the introduction of tractors, planters, harvesters and processing machinery for agricultural development. After Nigeria's independence in 1960, successive government recognized the importance of mechanization for the development of the agricultural sector which brought about introducing diverse programmes and initiatives to encourage mechanized farming. One of such programmes was, operation feed the nation (OFN) where farmers were encouraged to embrace mechanized farming techniques as against the old traditional way of farming that involved mainly the use of hoes and cutlasses in carrying out farming operations. In the same vein, the Green Revolution was introduced to promote mechanization and modern agricultural practices. The importance of mechanization to both farmers and processors are numerous as it helps the farmers to minimize time and labour, increase their yield and as well improving the efficient use of resources. Mechanized equipment enable processors to carry out more volumes of agricultural products proficiently. This paper also looked into the myriad of challenges faced by farmers and processors as these include mechanization and environmental impact, inadequate access to information and technical know-how, high startup cost, uneven and small land holdings, availability and problem of quality machine/equipment, low market demand and poor marketing channels, cultural beliefs and socio-economic factors, low technical know-how of mechanization, lack of adequate infrastructural facilities and lack of maintenance and repair services. Resulting from these challenges faced by both farmers and

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processors, the paper offered ways forward on the country's drive for food sufficiency through the effective use of mechanization by farmers and processors in the rural areas of Nigeria.

Keywords: mechanization, approach, farmers, processors, rural, areas

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Introduction

Agriculture is an important occupation in Nigeria with over 70% of her population depending on it directly or indirectly for livelihood. It provides the bulk of employment, income and food for the rapidly growing population as well as supplying raw materials for agro-based industries (Asoegwu and Asoegwu, 2007). Due to a number of factors, which include rising population, increasing pressure on land resources, natural and man-made disasters such as drought, desertification, soil erosion and degradation (Raoult-Wack and Bricas, 2001), the problem of sustainable agricultural production in Nigeria has assumed greater importance than ever before.

Agricultural development involves three approaches namely bio-chemical, socio-economic, and engineering known as the trio of technologies (Mrema and Odigboh, 1993). The bio-chemical approach includes the development of improved animal and plant species, animal and plant nutrients (fertilizer and feed) and plant and animal protection (veterinary drugs, pesticides and herbicides). The socio-economic approach includes financial packages and management programmes (economics, business management, accounting, sociology, extension services, agricultural marketing and pricing strategies). The engineering approach deals with the provision of agricultural machines and equipment (be they human, animal or mechanically powered) for production and post-harvest systems, handling and storage systems and farm structures, erosion control measures, water resources development as well as irrigation and drainage structures, meteorological systems, and the technologies for optimally utilizing the above and their proper and economic use and management (Ani and Onwualu, 2002; Ampratwum et al., 2004; Onwualu and Pawa, 2004).

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The word "agricultural mechanization" refers to the replacement of human and animal labour with mechanical devices in carrying out farming activities. Agricultural mechanization in a wider term embraces the manufacturing, distribution and operation of all types of tools, implements, machines and equipment for agricultural activities such as land development, farm production and crop harvesting and primary processing. According to Oni (2013), agricultural mechanization embraces the use of tools, implements and machines for agricultural land development, crop production, harvesting, preparation for storage, storage, and on-farm processing. It includes three main power sources: human, animal, and mechanical. Mechanized agriculture therefore is the process of using agricultural machinery to increase farm productivity. Ademosun (2015) noted that without any doubt, agricultural mechanization holds the key to every country's food security as most nation around the world have succeeded in using agricultural mechanization to boost food security.

Agricultural mechanization entails the selection, operation, utilization and maintenance of mechanical devices and systems in agricultural operation and more so their management in crop production for the utmost benefits of man (Almasi *et al*., 2005, Fadavi *et al*., 2010). Agricultural mechanization is dated back to the time of the colonial era when the British introduced mechanized farming in order to boost food production as a way to achieve food security for the country.

In order to encourage farmers to embrace mechanization the government introduced tractor hiring units (THU) in the various regions of Nigeria. As early as 1925, a tractor unit farm started operation in Agege, Lagos State (Aboaba, 1977). A tractor hiring unit began operation in Northern Nigeria in 1956 (Nwosu, 1989). To further promote mechanization, the Federal Government during its third development plan period which spanned from 1975 to 1980, established the National Centre for Agricultural Mechanization (NCAM) in Ilorin Kwara State. The centre has hired out tractors to farmers within its reach and as well fabricated few number of tractors and lots of processing machines and equipment in order to encourage farmers to embrace agricultural mechanization practice in Nigeria.

Agricultural mechanization has the immense benefit of transforming a country's agriculture just as what happened in America many years ago. Mechanized agriculture helped to transform the American agriculture from the situation where one farmer fed five people in 1880 to that where one farmer could feed eighty people in 1982 (Ani and Onwualu, 2002). With the dwindling and unstable oil revenue, government is now

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shifting her focus on the development of agriculture through the introduction of various government policies to encourage farmers and processors to embrace mechanize farming as a means of eradicating poverty, mitigate hunger and promote food security across the nation.

Statement of the Problem

The practice of agricultural mechanization as important as it is in Nigeria in boosting food security is posed with lots of difficulties going by the bitter experiences expressed by our farmers and processors into the various fields of agricultural practices. If at this level, we fail to tackle these problems of theirs which is hindering their success on the field, very soon we may run out of food supply and put our total reliance on food importation in order for the country to feed her ever-teeming population. The present exchange rate of $1 to ₦1, 510 is not nationwide friendly which will further worsen the economy situation if we rely totally on food importation for our survival in the country today. Various governments from the past and even till today are trying to shun food importation which have been consuming huge part our national budget over the years and due to this fact many of our scholars in the country believe that Nigeria has all it takes to grow the various crops they import into the country so far government is ready to provide the enabling environment by putting things right. At the moment, there is need to take a drastic look at what can be done to help our farmers and processors solve their individual problems on the field. The various difficulties being faced by our farmers and processors irrespective of which part of the country they are practicing from is a general one which this paper tends to generalize the way forward for all the farmers and processors involved into agricultural practices in Nigeria.

1. HISTORY OF MECHANIZATION IN NIGERIA

The introduction of mechanization into Nigeria's farming culture is dated back to the time of the colonial era when British introduced mechanized agriculture in their desire to enhance agricultural productivity. The following are the milestones in the history of mechanization in Nigeria:

i. **Pre-independence era:** In the colonial period, the mechanized farming practice was introduced by the British. This involved large scale plantation which focus primarily on cash crops like cocoa, palm oil and rubber using mechanized equipment such as tractors, planters, harvesters and processing machinery. This was the beginning of the introduction of mechanization in the agricultural sector of Nigeria. In order to promote agricultural development, a ten year

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development programme from 1946 to 1956 by the colonial government with emphasis on mechanized farming, the government encouraged commodity crop production which focused mainly on oil palm, cocoa, cotton, rubber and groundnut which made the county to have a very vibrant agricultural sector with self-sufficiency in food production and minimal imports of processed food for the elites; farmers produced enough food crops to feed the population and foreign exchange receipts from exported crops were used to finance government expenditure in other sectors such as education, health, construction and finance, etc. (Ojeka et al., 2016).

ii. **Post-independence era:** After Nigeria's independence, the government in its recognition of the importance of mechanization for the development of its agricultural sector introduced diverse initiatives to encourage mechanized farming. These initiatives include the establishment of agricultural mechanization departments; training centers and research institutes to enhance quality agricultural products; and the provision of subsidies and loans to assist farmers to acquire tractors and other machinery through the government. Aside these aforementioned initiatives, the government between 1962 and 1968 rolled out the first national development plan on agriculture. The plan was created to increase the production of exported crops by providing farmers with better seed distribution and mechanized modern methods of farming. Tractor hiring units were setup and the expansion of agricultural extension services. (Asoegwu and Asoegwu, 2007).

In the 1970's especially in 1976, the Operation Feed the Nation (OFN) programme was inaugurated. This first major agricultural policy pronouncement and effort by government generated awareness among Nigerians about the consequences of an empty national food basket. The programme focused on building the spirit of dignity of labour and reengaging the idle hands back to land. In the same year, and consequent upon the plan document, Marketing Boards were abolished. Production and Marketing Companies were established such as National Grain Production Company for food grains and National Root Crop Production Company for root crops. Other policy and strategic measures taken by government during this period were the establishment of River Basin Development Authorities (RBDAs), National Seed Multiplication Scheme, Agro-Service Centers, Agricultural Development Projects (ADPs). Many research and tertiary institutions were established to formulate and implement research

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programmes aimed at improving agricultural food production. Even with all these policies, the total Capital allocation to Agriculture by both Federal and State Governments further declined to 7.1%. This goes further to show that government was not supporting the agricultural sector with adequate financial backing for proper execution of the programmes (Asoegwu and Asoegwu, 2007).

Green Revolution was an agricultural programme initiated by Alhaji Shehu Shagari in April 1980 which tried to give more powers and impetus to the River Basin Development Authorities and the ADPs to produce more food for the nation with more Capital (12.7%) allocated to the agricultural sector (Osakwe and Ojo, 1986). Even though these efforts seemed to have been guided by genuine concerns, they failed to make the necessary impacts in the agricultural sector because of fundamental structural problems in the economy. There was obvious decline in the agricultural sector share of the GDP to about only 20% in the 1981 - 1985 Plan period (CAADP, 2004); underdevelopment of the sector; frequent changes in government policies and implementation strategies; no serious agricultural mechanization policy; poor infrastructures and facilities; poor research and development work. There was increasing shortage of food evidenced by increased food imports and increased high prices. Agricultural exports dwindled at an alarming rate as well as decline in labor force for agriculture.

The agricultural transformation agenda (ATA) which took place from 2011 to 2015 was a programme initiated by President Goodluck Jonathan with the aim to modernize agriculture. Mechanization was a key component of this programme, and the government provided support for farmers to access mechanized equipment through schemes like the Growth Enhancement Support Scheme (GESS) by which E-Wallet was developed for input delivery to farmers. (The Presidency, 2013).

2. THE IMPORTANCE OF MECHANIZATION PRACTICE TO FARMERS AND PROCESSORS

The important role played by mechanization practice to both farmers and processors in the rural areas in Nigeria are to enormous. Some of the benefits derived from its importance are discussed under this Section.

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Increase in Yield

The embrace of mechanization by both farmers and processors enable them to multi task in agricultural processes thereby leading to efficiency on an enlarge scale. With the introduction and use of mechanized equipment like tractors, harvesters and irrigation methods, farmers can process with ease land preparation, planting, harvesting and processing of farm products accurately which leads to increase in output and better quality crop yields, giving farmers more income and reliable food supply for processors. Mechanized equipment enable processors to carry out more volumes of agricultural products proficiently. The use of automated machines and other types of processing equipment now enable processors to process raw materials on a voluminous scale and at a faster speed thereby meeting up demand from the market, attain bulk orders and enlarge their business operations.

Minimization of Time and Labour Cost

Adoption of mechanized equipment reduce considerably the amount of time and labour engaged manually to perform agricultural farm duties and processing operations. The crude traditional method are time consuming, labour intensive which often lead to reduce output and hamper efficiency in farming and processing operations. With the adoption of mechanization, farmers and processors can now save time, channel their resources to other activities that can generate more income and invest time that would have been wasted to improving their farming practices. Also, mechanized processing equipment lead to cost reduction, improve efficiency and also streamline operations. Automated machines can perform tedious task quickly and with accuracy than engaging manual labour. It also reduces the processing time and labour cost. Mechanization minimizes wastage and operational costs.

Enhancement of Product Quality and Consistency

The engagement of mechanize system of farming leads to consistency and quality being maintained in the course of different stages of farming and processing operations. For instance, when mechanized planters are used seeds are evenly spaced for uniform growth and maturity of the crops. With mechanize farming, advance farming techniques are embraced such as precision agriculture enable farmers to apply fertilizers and pesticides in accurate quantities to a particular area of their farm thereby leading to nutrient management, reduced chemical usage and improved crop. In processing stages, mechanization help processors to maintain steady quality throughout the processing stages. The use of automated machines guarantee uniform processing techniques, accurate measurements, and accurate mixing or blending of ingredients, leading to

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reliable product quality and this help to preserve the quality and market value of agricultural products. Human error is avoided in mechanization thereby enhancing standardized.

Improving the Efficient use of Resources

The use of mechanize equipment help in managing the use of resources such as land, water and other farm inputs like seeds and fertilizer. New trend of irrigation system allow for effective water management, reduce wastage and get the most out of crop yields. The use of harvesters enable fast and effective harvesting which reduces post-harvest losses. Mechanization also enables accurate farming techniques for example applying fertilizers and pesticides in correct measurement to a specific location reduce the cost and impact on the environment.

Profit Increase and Sustainability

The adoption of mechanize farming has led to improve quality and productivity, reduction in labour cost, and drastic reduction in post-harvest losses thereby contributing to the profit of both farmers and processors. Processors also profit from constant and regular supply of quality raw material thereby enabling them to operate successfully and also meet their market demand. With the inflow of higher incomes, farmers can diversify and engage in value added activities such as processing or packaging of farm produce. This new found economic stability can now enable farmers to reinvest in their farms, improve standard of living and add to the economic growth of the communities.

Mitigation of Poverty and Rural Development

The use of mechanize farming in rural areas have brought immense socio-economic advantages such as creating job opportunities in the manufacturing, sales and the maintenance of agricultural machines. With upsurge in agricultural productivity, excess production can then be sold at the local or national markets, bringing in income for farmers thereby reducing poverty and rural urban migration thereby leading to development of rural communities.

Promote Food Safety and Hygiene

The introduction and extensive use of mechanized equipment by farmers and processors in processing operations help in promoting food safety and hygiene. The use of crude or traditional equipment often lead to injury sustained by farmers when directly in contact with the equipment but with the introduction of modern or mechanized equipment with

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its automated nature, safety is promoted, food contamination is reduced and hygiene enhanced due to less contact with humans.

Mechanization enables access to Advanced Technology

The adoption of mechanized farming often gives the farmers the avenue to the use of advance technologies. The rural farmers benefit immensely from the use of technologies such as precision farming, remote sensing and data driven decision making. It enable farmers to gather actual information about their crops, monitor soil conditions, and make informed decisions regarding irrigation, fertilization, and pest control. By adopting mechanization, it gives the farmer an edge and improves their technological know-how thereby leading to an increase in their total output.

3. LEVELS OF MECHANIZATION IN THE RURAL AREAS OF NIGERIA

There are three levels of mechanization in the rural areas of Nigeria which can be grouped under (i) human powered technology, (ii) animal powered technology and (iii) engine powered technology.

Human Powered Technology

This form of technology, although primitive is the most simplest and basic level of agricultural mechanization in Nigeria. It is the kind of technology that has kept the population going all through the years (Sani, 2014). It involves the use of human energy for driving of basic tools such as cutlasses, hoes, spades, digging forks and hand planters. In most African countries, greater percentage of the land prepared for agricultural purposes are carried out using hand tools powered by human energy which are cumbersome, tedious and less productive. The use of hand tools made it difficult for farmers to cultivate large acres of land and hence little yield in crop production when compared to the use of mechanized equipment (Ozmerzi, 1998). As observed by Mrema and Odigboh (1993), hand tool technology with entire reliance on human muscle power remains the predominant power source used for primary land preparation in Africa, while draught animals and tractors are used on only 20 percent of the cultivated land. Moreover, when compared to Latin America and Asia, agricultural mechanization has stagnated in Africa. If anything, there are indications that agricultural mechanization has retrogressed in a number of countries (FAO, 2005).

Animal Powered Technology

This form of technology is an improvement on the human powered technology. It involves a range of implements, machines and equipment that are powered by animals

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which has been found to be very useful in farming operation reducing energy expended by human. This involves improve hand tools, animals and tractor drawn equipment. In most cases, the use of animals are mostly for tillage and transportation, however, the output of using this means is far better in worth when compared to human powered technology (Sani, 2014). One major shortcoming in the use of this technology is the lack of local production of animal drawn equipment and also the cost of maintaining the work bull is becoming prohibitive.

The draught animal power has been vigorously promoted in sub-Saharan African (SSA) countries, including Nigeria, since the 1920's with the belief that it is a power source suitable for the peasant farmers' operations and skills. But draught animal power has been the subject of increasing criticism, with a great deal of international and national debates on its merits and demerits from the opposing schools of thought (Odigbon, 1991; Mremma and Mrema, 1993; Mrema and Odigboh, 1993). This technology, according to Odigbo (1991), cannot lift the image and dignity of farming to a level that can attract young Nigerians into agriculture by free choice.

Engine Powered Technology

According to Sani (2014), engine powered technology involves the use of modern technology in agricultural productivity. The engine powered technology engages the use of tractors, engines, and electricity to power motorized machine for farming operations. Odigboh (2000) stated that engine powered technology involves the use of a very wide range of implements, machines and equipment powered by a similarly wide range of mobile or stationary power sources, engines and motors, using petroleum fuels, alcohol or electricity. The power sources and their associated implements are available in sizes, power ratings, level of sophistication and technical complexity that vary tremendously. The most common and best known power source in agriculture today is the tractor which comes in a wide range of types, makes, sizes, power ratings and capabilities. With such a wide range of engine powered technology systems to choose from, it is relatively easy for the expert to select and match a system that is appropriate to a specific situation. Considering all the relevant factors, engine power technology is considered the most appropriate mechanization package for agricultural intensification programmes in Nigeria.

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4. CRUDE APPROACH OF LOCAL FARMERS AND PROCESSORS TO MECHANIZATION

In most part of the country, farmers and processors approach to mechanization varies and this may be characterized by a crude or low level of implementation of mechanization due to the following factors as discussed under this section.

Use of Manual Labour and Obsolete Equipment

The use of obsolete farming tools like cutlass and hoes for farming activities and the reliance on manual labour by processors often hinders efficiency and output. The use of manual labour makes the farmer to expend more energy in carrying out his/her daily activities in the farm with lesser output achieved. Furthermore, it also limits the farmer's intention to go into large scale farming.

Limited Acceptance of Mechanized Equipment

The exorbitant cost of mechanized equipment is a challenge faced by local farmers because it is expensive for them to acquire such equipment. Also, a lot of local processors have little or no knowledge of mechanized processing equipment, they still use the manual methods of grinding, pounding and these traditional methods hider the ability to scale up their operations, improve the quality of their products and meet their market demands.

Lack of Technical Know-how

Local farmers and processors lack the technical know-how on the operation and maintenance of mechanized equipment which may result in breakdown, expensive repairs and eventually make it difficult for them to totally make use of the immense benefit of mechanization.

Small and Scattered Land Holding

The small portion of land owned by our local farmers hinder them from embarking on mechanization. A small and scattered holding makes it difficult for farmers to invest in mechanized equipment.

Inability to Access Finance and Credit Facilities

The struggle by local farmers to access finance and credit facilities makes it difficult for them to embark in mechanized equipment. The little financial resources at their disposal and the lack of support in policies and programmes of government make it difficult for the local farmers to upset the initial cost that goes with mechanization. Processors are

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also faced with same financial constraints which limit their ability to invest in mechanized processed equipment.

The constraints of infrastructural facilities

Farmers and processors in rural areas are faced with lack of basic infrastructure which includes access to reliable electricity and inadequate water supply. Most often mechanized farming requires adequate water supply and reliable power supply to operate machinery effectively. The absence of these infrastructural facilities pose a big challenge to the implementation of mechanization.

Social and Traditional Factors

The attitude of local farmers and the embracement of the traditional farming techniques influenced by cultural and social factors most often is a barrier to the adoption of mechanization. Too much reliance on manual labour and inclination for traditional and crude methods may deter farmers from embracing mechanized system of farming.

Inadequate Market Linkages

Farmers and processors have limited access to market linkages and face challenges in accessing higher-value market. Processors who lack efficient processing machinery can result in lower quality products that do not meet high market standard or requirements.

Lack of training and technical support

Local farmers and processors are faced with limited access to training programmes and technical support for mechanized processing. Lack of capacity building initiatives and agricultural extension services carefully fashioned for processors reduced their ability to embrace mechanization practices.

5. CHALLENGES OF MECHANIZATION IN THE RURAL AREAS OF NIGERIA

We cannot deny the fact that mechanization brings enormous benefit, however, there are also challenges related to its implementation in the rural areas of the country. These challenges are discussed under this section.

High Startup Cost

The high cost of buying mechanized equipment such as tractors, harvesters and processing machines are making it difficult for small scale farmers and processors to acquire them. Financial options and government support programmes that are open to farmers are of limited scale thus making it very difficult for these farmers to even afford

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the startup cost that are associated with mechanized farming. Acquiring mechanized equipment comes with high cost which most rural processors cannot afford. Access to affordable loan and lack of financial support by the government or private sector hinders the embracement of mechanization by the rural processors.

Inadequate Access to Information and Technological Know-how

Most rural areas in Nigeria has limited access to latest agricultural technologies and the required information to boost their agricultural practices. Inadequate knowledge and lack of awareness on renowned mechanization options, benefits and how to use them can act as a barrier to embrace mechanized equipment.

Lack of Adequate Infrastructural Facilities

Rural areas in various parts of Nigeria are inundated with challenges that are related with insufficient infrastructural facilities such as inadequate water supply meant for irrigation purpose, inadequate electricity supply for the smooth operation of mechanized equipment and poor road networks for transportation of farm produce and machinery to remote rural areas. The large gap pose by these inadequate infrastructural facilities tend to hinder the operational efficiency of mechanized equipment and act as a barrier to both farmers and processors. Massive investment in rural infrastructural facilities is vital to support the acceptance and sustainable use of mechanization.

Lack of Maintenance and Repair Services

For efficient performance and longevity, most mechanized equipment requires timely and frequent maintenance and repair. However, in most rural areas finding skilled personnel and access to qualified technicians and repair services for intricate machinery are most time limited which can lead to delay in equipment repairs and downtime thereby impacting productivity negatively. The setting up of local repair centres and the carrying out training programmes for maintaining the equipment can go a long way in helping to solve these challenges.

Low Technical Know-how of Mechanization

Most Nigerian farmers have a great deal of traditional knowledge and experience which are accumulated over generations but tend to be crude and limited when compared to latest and modern mechanized ways of farming. Furthermore, a large number of rural farmers are illiterates and this pose a real stumbling block in improving agricultural production and productivity as well as all round farm management.

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Uneven and Small Land Holdings

In most parts of Nigeria's rural areas, land holdings are unevenly distributed into small plots among farmers making it very challenging for mechanized farming to take place. The use of small land sizes for farming often limits the economic viability of mechanization when comparing cost of equipment by the scale of operation. Land consolidation through cooperative farming or leasing arrangement should be encouraged to help address this challenge.

Cultural Beliefs and Socio-economic Factors

Cultural beliefs, norms and traditional farming practice have influence in the acceptance and adoption of mechanized farming in rural areas. Most farmers are resistance to change because of cultural preference for manual labour. Most rural farmers have so much embrace the old traditional way of farming as they now see mechanization as a new way of job displacement and eradication of their cultural belief and traditional way of farming.

Mechanization and Environmental Impact

Mechanization tends to have impact on the environment i.e. emission of greenhouse gases, increased fuel consumption and soil compaction. Environmental activist have often protest on greenhouse emission or fossil fuel which calls for balancing the benefits of mechanization with sustainable environmental practices. Promoting the use of environmental friendly technologies can help solve this challenge.

Availability and Problem of Quality Machine/Equipment

Most agricultural machinery are usually imported or made locally. Both have their own associated problem. The locally fabricated ones may not suit the need of processors and farmers, while for the foreign ones, their procurement and distribution network may be insufficient, making it difficult for the farmers and processors to acquire the required equipment in a timely manner.

Low Market Demand and Poor Marketing Channels

Processors in the rural areas often face the challenges of limited market demand for their processed products and inadequate market channels for the sales of their products. The use of mechanized farming often lead to increased processing capacity and when there is no enough market demand or lack of established market channels, processor may find it difficult to sell their products at competitive prices. This scenario can have impact on mechanization.

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6. PROSPECT OF MECHANIZATION IN THE RURAL AREAS OF NIGERIA

The prospect of mechanization in the rural areas of Nigeria holds major potential for bringing about a major turnaround in agricultural practices, improving productivity, and enhancing the general socio-economic development of rural areas. The section discusses key prospects of mechanization.

Increase in Agricultural Yield

Using mechanized equipment such as tractors, planters, harvesters and irrigation systems can boost agricultural yield, improve crop quality and reduce post-harvest loses. With the adoption of mechanization by farmers in rural areas productivity is increased by reducing labour intensive task, improving efficiency and enabling timely farm operations. Mechanization also enables processors to increase their processing capacity, allowing them to handle larger volumes of agricultural commodities thereby meeting the growing demand for processed products.

Consistency and Improvement in Product Quality

The use of mechanize processing equipment ensures greater precision and control over the processing operations, leading to improved product quality and consistency. With the automation of different processing stages, processor can reduce variation in product texture resulting in standardized and high-quality end products. This leads to the competitiveness of the product in the market.

Enhanced Farming Operations

Mechanization ensure speedy and simplified the execution of different farming operations, for example land preparation, planting, harvesting and processing. Farmers in rural areas benefit in form of time savings, improved use of resources, and enhanced precision in farm operations such as uniform seed placement, precise application of fertilizers and pesticides, and efficient irrigation systems, this further improve crop quality, reduce reliance on manual labour and lead to high profitability. With this, farmers can save time and allocate their labour resources more effectively. The resultant effect is that it increase efficiency and allow farmers to undertake more activities or cultivate bigger land areas.

Diversification and Value Added Services

One of the gains of mechanization is that it allows farmers to diversify their agricultural activities and engage in value added processing. With access to processing machinery, farmers can transform their raw agricultural produce into processed goods such as food

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products where for example we have cocoa seed into beverages, pressing oil seeds for oil extraction into oils, milling grains into flour, processing fruits into juices all for preservation thereby increasing the market value of their products which opens up more opportunities for higher profitability.

Creation of Employment and Skill Acquisition

The use of mechanized way of farming in rural areas goes a long way in creating employment opportunities and add to skill development. Although in mechanized farming, traditional manual labour may be reduce, the operation, maintenance, and repair of mechanized equipment require skilled technicians and operators. This stimulates job creation in areas such as equipment servicing, training and farm management, thus improving livelihoods.

Aside from job creation, mechanization also presents opportunities to attract and engage the youth in agricultural activities. By adopting modern farming technologies and equipment, farming becomes more appealing to the younger generation. Their involvement in mechanized agriculture can contribute to rural development, job creation, and the revitalization of rural communities.

Improved Food Security and better Rural Livelihoods

Mechanization plays a very important role in improving food security by increasing agricultural productivity and reducing post-harvest losses. By using mechanized equipment, farmers in rural areas are able to produce more food, achieve high yield crop, and preserve their harvests more effectively. This, also help to improve local food supply, reduces food imports and enhances the livelihood of the rural settlers.

Improve Rural Development and Alleviation of Poverty

Mechanization has the tendency to improve rural development and reduce poverty among rural dwellers by improving productivity in agriculture, increasing income levels, and creating sustainable livelihoods. By improving productivity and diversifying agricultural activities, mechanization enable farmers to generate higher incomes, stimulate local economies and reduce rural-urban migration.

Expansion of the Market and Generation of Income

Mechanization improves the farmers' ability to meet market demands and access higher-value markets. By increasing productivity, farmers can produce surplus agricultural goods for sale beyond subsistence needs. It also helps processors to increase their

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operations and expand their market reach by catering for a larger customer. Increased processing capacity and efficiency enable processors to meet the demands of wholesalers, retailers, and consumers more effectively. This can lead to increased sales, improved market competitiveness and higher profitability for processors.

Climate Resilience and Risk Reduction

Mechanization can support climate-resilient agriculture and sustainable farming practices. Precision farming technologies, efficient irrigation systems, and sustainable land management techniques can be integrated into mechanized farming operations, enabling farmers to optimize resource utilization, conserve water, reduce chemical inputs, and mitigate environmental impacts. Mechanization can help farmers mitigate risks associated with weather variability and climate change. By utilizing mechanized irrigation systems, farmers can better manage water resources, cope with drought conditions, and minimize yield losses. Precision farming technologies also facilitate data-driven decision-making, allowing farmers to respond proactively to climate-related challenges.

Sustainable Processing Practices

Mechanization offers opportunities for processors to adopt sustainable processing practices. Advanced processing technologies can help reduce energy consumption, minimize waste generation, and improve resource efficiency. Processors can integrate environmental considerations into their operations, contributing to sustainable development and meeting consumer expectations for environmentally friendly products.

7. WAYS FORWARD AND CONCLUSION

Ways Forward

The ways forward in solving the mechanization approach to farmers and processors dwelling in the rural areas of Nigeria involve several key strategies and interventions which will be presented in this subsection.

Access to Affordable Financing

Government and financial institutions should provide access to affordable financing options for farmers and processors to acquire mechanized equipment. This can be done through the establishment of specialized loan schemes, grants, or lease-to-own arrangements that enable them to invest in mechanization without significant financial burdens.

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Training and Capacity Building
Training programmes should be developed and implemented to enhance the technical skills and knowledge of farmers and processors in operating, maintaining and repairing mechanized equipment. These programmes can be conducted by agricultural extension services, agricultural research institutes and private sector organizations to ensure that farmers and processors have the necessary skills to effectively utilize mechanization.

Extension Services and Technology Transfer
Strengthening agricultural extension services is crucial for disseminating information about the benefits of mechanization and providing technical guidance to farmers and processors. Extension officers can facilitate technology transfer, promote best practices, and offer ongoing support and advice to ensure the proper adoption and utilization of mechanized equipment.

Collaborative Partnerships
Collaboration among various stakeholders is essential for the successful implementation of mechanization. Governments, private sector actors, research institutions, and farmer cooperatives should work together to create an enabling environment for mechanization. These include establishing public-private partnerships; sharing knowledge and resources; and coordinating efforts to address challenges related to financing, infrastructure and capacity building.

Infrastructure Development
Investments in rural infrastructure, such as reliable electricity supply, water sources and transport networks, are crucial for effective mechanization. Governments should prioritize infrastructure development in rural areas to provide the necessary support for the adoption and sustenance of mechanized equipment by farmers and processors.

Market Linkages and Value Chain Integration
Facilitating market linkages for farmers and processors is essential to ensure the viability and sustainability of mechanization. Strengthening value chains by connecting farmers and processors to markets, agro-processing industries and off-takers will create opportunities for increased income generation and market access for their mechanized products.

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Research and Development

Continued research and development efforts are needed to adapt mechanization technologies to local farming systems and processing activities in the rural areas. Research institutions should collaborate with farmers, processors and manufacturers to develop appropriate and cost-effective mechanization solutions that are tailored to the specific needs and conditions of rural Nigeria. Already, the National Centre for Agricultural Mechanization (NCAM) is in the forefront in helping farmers and processors to access mechanized equipment through numerous schemes thereby promoting food self-sufficiency in the rural areas of Nigeria.

Policy Support and Incentives

The three tiers of government should formulate and implement policies that support the adoption of mechanization in agriculture and processing sectors. These include providing incentives such as tax breaks, subsidies, and import duty waivers on mechanized equipment. Policy frameworks should also address issues of land tenure, cooperative formation and regulatory frameworks to encourage mechanization in the rural areas of Nigeria.

Conclusion

The role played by mechanization towards Nigeria's quest for self-sufficiency in food production and in solving farmers and processors need in the rural areas is very important. Apart from helping farmers and processors to increase their yield it also help in minimizing time and labour, enhancing product quality and consistency, and improving the efficient use of resources which can lead to increase in profit and sustainability, if necessary attention and support is given to mechanization by the government**.** The private financial institutions such as banks and government agricultural development institutions (Agricultural Development Banks) saddled with the responsibility to assist and aid agriculture should provide access to affordable finance options for farmers and processors in the rural areas of the country to acquire mechanized equipment. This can be carried out through the establishment of low interest loan schemes, grants or lease to own arrangement that will enable the farmers and processors to invest in mechanization with minimal risk of financial burden. Concerted effort should be made by the government to strengthen agricultural extension services for the training of farmers and processors to enhance their technical skills and knowledge in operating, maintaining and repairing mechanized equipment. Collaborative partnership among various stakeholders is essential for the successive implementation of mechanization.

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Government and private sector should work hand in hand to create an enabling environment for mechanization to thrive. In the area of research and development, Mechanization Institute such as the National Centre for Agricultural Mechanization (NCAM) should be fully supported and funded adequately to enable the Institute play more important roles towards fulfilling its statutory mandate.

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