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Indigenous Agricultural Technology in Nigeria: case study of National Centre for Agricultural Mechanisation

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Abstract

Africa is seen as technologically lagging continent. There exists a consensus that Africa is a net technology consumer but it is equally incorrect to say that Africa does not possess her own indigenous technology. Efforts made by several countries in the continent provides an impetus for the technological catch-up with the North. It is the purpose of this paper to highlights one of Africa's indigenous technology efforts in Agriculture which naturally precedes industrial age as noted in Rostow stage theory of development. This paper evaluates the activities of the National Centre for Agricultural Mechanisation in Nigeria. The only agricultural mechanisation centre in sub-Sahara Africa. The centre is an evidence of how a country is showcasing indigenous technology for agricultural development. The paper used descriptive statistics: graphics, pictograms and interview of some staff of the organisation to elicit information that are asymmetry in nature. The results show that the organisation has fabricated home grown agricultural machines and equipment for small and medium scale farming using indigenous technology with local material contents. Although NCAM has performed well in some of its stated objectives, much is still left to be achieved as the organisation currently operates a bureaucratic style which affects its efficiency. The centre is facing gross under funding as R & D expenditure of the Nigeria is meagre compared to most middle income countries. The paper concludes that with better funding and support from international donors and development partners, the fabricated equipment and machines will be less costly for the farming users. Extension linkages that are currently being done will bear the desired outcomes. This is seen to improve market access and utilisation of the machines by small farm holders and commercial farmers towards food security.

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1 Introduction

1.1 Background statement

Africa is often seen and referred to as a technologically lagging continent. This is so because the continent has consistently failed to showcase her home-grown technical prowess in many areas of life. The continent for a long time has been conspicuously missing on the chronicles of technology in spite of the fact that some of the so called inventions have their roots in ancient civilization in which Egypt and Ethiopia are to be reckon with. For example, Egypt contributed to ancient writing technology while Ethiopia has its indigenous method of measuring time before the advent of time measuring instruments of the Arabs, Barbarians, Jews and Romans among others.

Another supporting evidence is the visit of Queen of Sheba (conventionally believed to be located in Ethiopia) to King Solomon to ask him some questions and observed his wisdom during which she gave him gold and spices (Bible: I king Chapter 10:1-13). Gold is an end product of ancient mining technology in Africa and spices talks of the continent agricultural technology of turning green plants, flowers and animal fats into ancient perfume widely acknowledged as important export products from Africa as at that time. In the progression of time, little is heard of Africa technology globally and the sudden disappearance of Africa indigenous technology relegated the continent to the background and placed other continents ahead in global technology incubation.

1.2 Statement of the problem

Africa is a food deficit continent. This is primarily due to the type of agricultural practices that are popularly in used in the continent predominantly for subsistence purpose. With subsistence techniques characterised by manual operations, the farming household cannot produce sufficient amount of food required for the economy since it can barely feeds its household members. For the continent to win the battle against hunger and poverty in the post millennium development goals period, it must not only depend on the north for her agricultural technology but as a matter of necessity, develop her home grown agricultural technology which her large illiterate farmers can easily relate with for the production of food for consumption and export markets. In this connection, this paper provides answer to the question: what is Africa effort at achieving home grown mechanisation for sufficient food production?

1.3 Objective of the paper

The primary purpose of this paper is to highlights one of Africa's indigenous technology efforts in agricultural mechanisation through the exposition of the National Centre for Agricultural Mechanisation (NCAM) located in Nigeria.

2 Literature review

Agricultural mechanisation in Africa is still under-developed with small number of industries that manufacture farm tools and equipment (FAO, 2008). Efforts by many countries in Africa towards mechanised agriculture have continued but yielded few results in negligible number countries which perhaps include South Africa and Zimbabwe. This observed mechanised agriculture in Africa is foreign sourced and did not emanate from indigenous technology and therefore often without local content.

Following various development theories like the Rostow theory of growth, for agricultural mechanisation to be achieved, the transformation would pass through some phases. Ruttan (2013) reports five growth stages in line with Rostow theory as traditional society, the pre-conditions for take-off into self sustaining growth, take off, drive to maturity and age of high mass consumption. In this wise, Africa agricultural mechanisation can be said to be predominantly in the traditional society stage. The drive towards mechanised agriculture involving the use of machine to accomplish a task or any operation in agricultural production (Odigboh, 2000) has continued but without indigenous technology in most African countries.

But according to Ademiuyi et. al. (2013), agricultural modernisation efforts for mass production and consumption by Nigeria has been on through the introduction and development of need-based, home grown agricultural mechanisation technologies. On this basis National Centre for Agricultural Mechanisation (NCAM) was founded in 1974 in Ilorin, Kwara State, Nigeria and no such institution is available in any other African countries since then. NCAM is the only agricultural mechanisation centre in the whole of Sub-Sahara Africa, the other one is in Egypt, North Africa which has not seen the light of the day. The broad objective of NCAM is for the acceleration of mechanisation in the agricultural sector of the Nigerian economy in order to increase the quantity and quality of agricultural products through adaptive and innovative research; extension and commercialisation of proven technologies; organisations of training workshops and seminars; and networking and collaboration with similar institutions within and outside the country. The specific objectives are to encourage and engage in adaptive and innovative research towards the development of indigenous machines for farming and processing techniques; design and develop simple and low-cost equipment which can be manufactured with local materials, skills and facilities; standardize and certify in collaboration with the Standards Organisation of Nigeria (SON), agricultural machines, equipment and engineering practices in use in Nigeria; bring into focus mechanical technologies and equipment developed by various institutions, agencies or bodies and evaluate their suitability for adoption; assist in the commercialisation of proven machines, equipment, tools and techniques; disseminate information on methods and programmes for achieving speedy agricultural mechanisation; provide training facilities by organising course and

seminars specially designed to ensure sufficient trained manpower for appropriate mechanisation; promote cooperation in agricultural mechanisation with similar institutions in and outside Nigeria and the international bodies, connected with agricultural mechanisation (NCAM, 2013). The centre is renowned for having the highest assembly of agricultural engineers in sub-Sahara Africa (Ademiuyi et. al., 2013). The centre has developed technologies that have encouraged the use of mechanised tools and technology through the fabrication of a number of

machines like manual seed planter, manual seed and fertilizer broadcaster, cassava lifter, peeler, grater and groundnut digger among others with the training of numerous fabricators on how to produce these machines with local content (Azogu, 2009).

2.1 Theoretical framework

Agricultural development is an integral part of economic development since it is the desire of every country to achieve food production sufficiency. There are several theories including Rostow stage theory and Neo-colonial Dependence Model that explain economic development. According to Rostow stage theory, development evolves through five stages of as mentioned earlier. The traditional society is a stage that describe the agrarian economy that depends on the subsistence system of farming. This stage is essential for any economy that will move to industrial age but food productivity and sufficiency is assumed away from a country that is classified to be under this development stage. Most African countries have not been able to leave this stage essentially because of the low level of technical progress in the continent. It is imperative for the continent to strive towards industrialisation through the mechanisation of her agricultural practices. With the exception of South Africa, and a few other Southern African Development Community (SADC) countries, the level of technological penetration in the sub-Sahara African countries is quite low.

The neo-colonial dependence model qualifies development as the menace of underdevelopment emanating from highly polarised capital between the developed and underdeveloped countries. The rich nations of the world have developed their agricultural sector with both heavy and light agricultural machines and equipment that guarantee food sufficiency and security and may not be so concern with what happens to agricultural technology in Least Developed Countries (LDCs). If LDCs agricultural technology improves, it will reduce. This is further buttress by the false paradigm which opined that underdevelopment is as a result of faulty and inappropriate advice given by international experts through some well defined international institutions which the LDCs belong.

3 Methodology

The study adopted interview of some staff of NCAM and secondary sources of information. The information was analysed using descriptive statistics: pictograms and graphics and qualitative presentation.

4 Results and discussion

Level of production: The centre produces on commercial level and sells machines and equipment to local and foreign farming users. NCAM has fabricated over 5000 agricultural machines and equipment since its inception in 1974. The local content of the machines varies from 75 to 100 per cent. Three of such equipment are shown in Figures 1 to 3

Figure 1: Cassava Lifter

Figure 2: Cassava manual chipper

Figure 3: Motorized cassava chipper

Figure 1 is NCAM Cassava Lifter which is a device for uprooting cassava tubers. It has a frame to which a foot-board and an immovable gripping-jaw are attached, a handle to which the frame is hinged. The capacity of the device is 2000 plants per man-hour. Figure 2 is Cassava manual chipper with capacity to process 350kg of cassava per hour. Figure 3 is a Motorized cassava chipper developed by NCAM . It has 1.2 tons capacity per hour. The machine may use either automotive gas oil (AGO) or premium motor spirit (PMS). Other selected machines developed by the centre are:

Hand seed planter: a device for planting seeds like maize, soya-beans, guinea-corn consisting of a seed funnel, seed tube, handle, jaw-type of soil opener and seed spacing adjustment. It is designed to drop one or two seeds from the seed funnels at a time.

Vegetable slicer: This slicer is used in slicing carrot, okra, tomatoes and other vegetable crops especially for small scale operators. It is of 30 kg/hr, 20 kg/hr and 15 kg/hr for tomatoes, okra and carrot respectively in terms of capacity. It consists of presser tray, frame and cutting blades.

Tractor mounted groundnut digger: This is a tractor mounted implement for uprooting groundnut plants that are harvest ready. This farm implement can be used on any mechanised groundnut farm to reduce manual labour during harvesting. It is made up of cutting blades that help in cutting the roots of the groundnut vines and loosens the soil. It has a mean capacity of 0.53 ha per hour.

Multi-purpose thresher: It is used for threshing cowpea, guinea-corn, maize, rice and other graincrops. The features are hopper, the threshing unit consisting of beaters welded onto cylinders

and the concave. For cowpea, it has a capacity of 200 kg per hour and good for medium-large scale entrepreneurs.

Triketor- This is a 3-wheeled mini-tractor completed and launched in August 2013 by NCAM. The centre collaborated with Bespoke Design Concept. The tractor is reputed to be the ‘Made in Nigeria'

tractor with almost 100 per cent local content. All the materials used for making the tractor were obtained locally.

Mode of dissemination of information to farmers: The centre gets the farmers to know of its products through its extension staff and seminars. Other means are print media, workshop, conference and training.

Problems of the centre: The identified problems of the centre include gross underfunding, inadequate training for staff which is related to paucity of fund, inadequate power supply and problems relating to bureaucratic set up. The underfunding is connected with low level of investment in research and development (R & D) in Africa generally compared with western countries. The centre also enjoys little or no international funding as subvention from the Nigeria Government is the major source of fund.

Reducing imported agricultural machines: NCAM is in a position to reduce import bills on agricultural machineries through the list of all the machines it has fabricated with the materials used mostly sourced locally. There is no agricultural machineries that enter Nigeria without the approval of the centre for the purpose of ensuring that the advancement of local and indigenous agricultural technology is not jeopardised. The design of some equipment for agricultural purposes in the west sometimes may not have the ecological composition of Sub-Sahara Africa countries in contemplation. This definitely may affect the usefulness or otherwise of such agricultural equipment. This is the reason why the Federal Government of Nigeria made it mandatory to all importers of agricultural machinery and equipment to get approval from the National Centre for Agricultural Mechanisation before such can be allowed into the country.

NCAM as potential hub of Africa agricultural mechanisation: The centre is achieving its objectives and it is considered as a potential centre for the development of home grown agricultural machineries in Africa. The centre as the only one in Africa stands to accommodate interested Africans for training and workshops with facilities for lecture deliveries and accommodation. The post millennium development goals era which indicates a challenge for Africa to fast-track her pursuit of mass production and consumption to reduce the dependence of the continent on the West underscore the importance of NCAM. The short-coming of neo-colonial dependence growth model also indicates the importance of home grown mechanised agriculture in Africa for the continent to pass through the stages of development. It is time for agricultural technology renaissance in the Africa continent and this could be led by Ethiopia, Egypt, Nigeria and South Africa because of their geographic strategic positions in the continent. Ethiopia is the only country in Africa that was never colonised and she is the symbol of the continent strength and Africanism. Egypt is a country with rich history and a major contributor to Africa indigenous technology while South Africa, is a country with history of long stay of colonisation and apartheid regime and Nigeria, the most populous black nation in the world. The first three largest economies in Africa- South Africa, Egypt and Nigeria are among the four mentioned countries. All these countries could serve as the centres of indigenous agricultural technology for their respective sub-regions.

5 Conclusion

The development of indigenous agricultural technology in Africa is on through NCAM, the only agricultural mechanisation centre in Africa. NCAM has developed many machines of local contents varying from 75 to 100 per cent is meeting up with its objectives. The centre has the potential to improve its activities with support and funding from international donors and development partners. With enhanced local and foreign funding the fabricated equipment and machines will be less costly for farmer and the extension linkages that are being done will bear the desired outcomes. This has the inherent advantage of improved market access and utilisation of the machines by small farm holders and commercial farmers towards sufficient food production and security. The study equally recommends the establishment of indigenous agricultural mechanisation centre in other sub-regions of Africa: North, South and East Africa with NCAM as reference. Establishing Agricultural technology incubation centres in Africa will promote exchange of indigenous knowledge required in building formidable agricultural equipment necessary to drive the intended agricultural development of the continent.

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