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THE PROSPECTS OF AGRICULTURAL BIOTECHNOLOGY TO ENGENDER ECONOMIC GROWTH IN NIGERIA

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ABSTRACT

The Nigerian government has openly publicized its intentions in commercializing agricultural biotechnology as an aid to realize food security in the nation. With a population estimated to be 200 million, the avoidance of food crises is at the core of the efforts of the federal government. One of the solutions to this problem adopted by major economies is agricultural biotechnology. Notwithstanding this truism, the country has not benefited exponentially from this technology. This paper will therefore investigate the issues hindering ample development of agricultural biotechnology in Nigeria while seeking a potential workable improvement to the trajectory in order to impact economic growth positively. The findings show agricultural biotechnology has the capacity to maneuver the underperforming agricultural sector into a viable one that can drive tremendous growth in Nigeria if a culture of Science and Technology on agric-biotechnology is embarked on, budgetary allocations that can fund research and development in this field is made and close monitoring to ensure compliance and quality control by all stake holders is maintained.

Keywords: Biotechnology, Agriculture, Economic Growth, Nigeria.

INTRODUCTION

Science and technology currently drives the world and many economies are contending to get the most of it. Innovation is on an unprecedented increase, with globalization amplifying the space for competition. Therefore, there is a match among nations to ensure technological growth. This growth has impacted so much on the agricultural sector that it is capable of reducing the level of poverty, improving sustainable human development and economic growth. The difficulty fore developing countries arises from a low stock of technological knowledge and inability to internalize the scientific culture. Sustainable economic growth and development is a necessary condition for welfare. Modern biotechnology tools have the potential to significantly raise agricultural productivity in a more environmentally friendly-manner, supply cheaper and more nutritious food, and contribute to poverty alleviation (The World Bank, 2005).

LITERATURE REVIEW

Concept of Agricultural Biotechnology

The role of research as a driver of growth in the agricultural sector and the economy as a whole is widely recognized by economists and a growing number of policy makers. It is imperative to note that, research involves introduction of new technology that leads to reduction of production costs and increase in profit margin or wellbeing of farmers. Research is also beneficial to consumers. Additionally, the industrial sector grows due to increase in demand for agricultural inputs and consumer products by the rural sector. Industrial costs are reduced as food becomes less expensive and labour is released from food production to the industrial sector, a process which is beneficial to the poor (Pray and Naseem, 2003). Biotechnology has been described as a cluster of techniques used to modify and/ or use organisms to produce goods and services (Acharya and Mugabe, 1996; Abideen, 2013). Conversely, United Nations Convention on Biological Diversity defines biotechnology as "any technological application that uses biological systems, living organisms, or derivatives thereof, to make or modify products or processes for specific use." This being the case, present day biotechnology involves the utilization of genetically altered microorganisms for agricultural production of transgenic animals or plants.

Concept of Economic growth

Lukasz (2014) posits that economic growth is one of the most significant concepts in the global economy. Regardless of the criticisms that the level and rate of growth does not always replicate the actual situation of a population's living standards, it remains the primary measure of prosperity. Nonetheless, as a measure describing the dynamics of economic processes in the country it is beset with certain limitations such as:

- It does not incorporate all economic transactions in the total volume of generated output.
- It does not consider changes in the amount of time spent on work, which clearly affects the welfare of society.
- It does not reflect the negative processes associated with economic activities, such as environmental pollution, its progressive degradation, or noise pollution.

Nevertheless, even with all these drawbacks economic growth remains the key determinant of the socio-economic conditions of the citizens of a country (Lukasz, 2014).

Harris (2007) observes that, the Classical economists represented chiefly by Adam Smith, Thomas Malthus and David Ricardo are often regarded as 'pessimistic' in their predictions for

economic growth. Despite the prognosis of earlier economists, they are regarded as the main precursors of modern growth theory. Their ideas were in effect limited, however, to the conditions of a principally agrarian economy, without significant change in methods of production, in which, due to the limited quantity and diminishing fertility of the soil, growth is arrested by increasing costs of production of agricultural commodities. Continuing Harris (2007) posits that their analysis underestimated the far-reaching character of technological change as a powerful and continuing force in transforming the conditions of productivity both in agriculture and in industry. While they clearly perceived the possibilities opened up by international trade and foreign investment, they failed to incorporate these elements as integral components of a systematic theory of the growth process.

Whereas classical economists saw the determinants of economic growth in investments and improving productive capacity, neoclassical economics in the first half of the twentieth century recognized three factors of economic growth: land, capital and labor. In their view, this was enough to elucidate the causes of economic growth in capitalist countries. The more these factors were utilized, the greater was the economic growth (Lukasz, 2014). The twentieth century witnessed major advances on economic growth. In the era of bullionism and mercantilism the problem was unexplored; the wealth of a nation was identified with ores and the volume of what they owned. After mercantilism came the physiocrats who estimated agriculture as the sector of the economy which gave the “pure” product (Cameron 2004, pp. 144-151; Lukasz, 2014,8).

Dynamics of Agricultural Biotechnology and Developing Economies

Agriculture plays a pertinent role in the economic growth of various continents world over including Africa and by extension Nigeria. Agriculture is critical for sustainable development and poverty reduction in addition to being a dominant avenue of attaining economic growth. Regardless of the unduly lower share of investment in the sector in some African nations and benefactors, growth is still being actualized, and the continent’s agriculture still holds much promise and potential. Agricultural productivity as well as rural employment can enhance the income of the poor as well as provide food security and income diversification to susceptible societies. Since agriculture dominates the rural economy in most African countries, improved productivity in the sector will remain a key driver and a critical component of economic growth (Ojukwu and Kayizzi-Mugerwa, Kanu, Salami, Numasawa, 2014). Odetola and Etumnu (2013) reiterate the function of agriculture in Nigerian economy based on its size, potential and prospects.

Agricultural biotechnology research alongside other technological innovation can create dramatic gains in agricultural production and productivity while motivating extensive economic growth that can elevate the poor masses out of poverty. This being the case, there exists well documented evidence on the impact of agricultural research in enhancing agricultural productivity and production. Cereal production world over more than doubled between 1961 and 2001 in addition to developing economies recording triple productivity (Lipton, 2001; Pray and Naseem, 2003).

Considering further the effects of biotechnology in developing economies such as Nigeria, Ozor (2008) observed that genetic engineering (GE) has the highest profile among the new technologies in present day agriculture. Transgenic crops like maize, rice, wheat, soybean and cotton occupy significant positions with regard to agricultural biotechnology industries. Aside

from this, GE also has created the strongest sense of unease and resistance among consumers, developing-country farmers, and environmentalists. Transgenic organisms have several benefits, however, it is pertinent to safeguard that such systems do not cause problems of safety to the general public as well as the environment or create unacceptable economic, social, moral, or ethical issues.

Probable benefits of agricultural biotechnology in developing countries include:

Increase in the productivity of tropical commodities to meet future food needs, new opportunities for the use of marginal lands, and a decrease in the use of agrochemicals. Production efficiencies and bigger yields provided by agricultural biotechnology may lead to reduction of food prices for rural poor and urban consumers in the long run.

Application of GE to many breeding programmes to achieve the same aims as the traditional methods whilst offering two major advantages; the introduction of genes can be controlled with greater prediction and precision than by previous methods, and that the introduction of genes into unrelated species is not possible to achieve by traditional procedures (Ozor, 2008).

Pray and Naseem (2003) observe that the potentials of biotechnology led some governments in both the industrialized and developing nations to see biotechnology as the main drivers of economic growth. This resulted in key government investments in basic biology research, medical biotechnology research, and agricultural biotechnology research in the United States, Europe, China, India, Brazil, and South Africa amongst others. However, governments of certain developing countries are in doubt as regards the profitability of investing in agricultural biotechnology with reference to the huge cost of research and regulation, concerns about patents and the role of multinational corporations, in addition to the growing debate on food safety alongside its antecedent environmental impacts. This will lead us to consider several drawbacks associated with agricultural biotechnology.

Agricultural Biotechnology and Economic Development in Nigeria

Irrespective of several benefits of agriculture in Nigeria, there still exists constraints such as poverty and food shortages which could be ameliorated by introduction of novel procedures such as biotechnology which could bolster food and livestock production in addition to correspondingly enhance economic development. Abideen (2013) opines that biotechnology has the ability to increase the production of agricultural and industrial products for achieving food security and economic development. In his view, biotechnology in agriculture, improves the production of high yielding and disease resistance crops required for achieving food security and industrial development. Zilberman, Yarkin and Heiman (1997) opines that biotechnology which provides new research challenges and opportunities for agricultural economists will allow development of value-added products that will permit substitution of agricultural for industrial processes in the manufacture of pharmaceuticals and fine chemicals.

According to President Buhari, while addressing members of the Council of Saudi Arabian Chambers of Commerce and Industry “With the down turn in the global prices of oil, we now have to prospect our solid minerals. We have to return to agriculture,” (Vanguard, 2017). He went further to assert that; agriculture “must cease from being treated as development programme but be treated as business. Our goal will be to pursue government supported private sector agriculture value chain to make agriculture more productive, efficient and competitive.” With 70% of Nigeria’s populace employed in agricultural sector, economic growth will be almost unmanageable to actualize without putting in place innovative strategies to developing

the sector. Moreover, the importance of agriculture to the Nigerian economy is apparent in the nation's natural endowments in production factors such as wide-ranging arable land, water, human resources, and capital. Harnessing Nigeria's productive advantage in this sector is an expedient approach to stimulate growth in the economy.

A plant breeder with the Institute for Agricultural Research of Usmanu Danfodiyo University, Zaria, Dr. Muhammad Lawan Umar, opines that:

Biotechnology has made possible what was impossible for the traditional methods to make by use of the new techniques. This has become realisable, especially in advanced countries, where such technology has been adopted and it can work wonders for developing countries, like Nigeria (Adballah, 2017).

The Director-General of the National Biotechnology Development Agency (NABDA) of Nigeria, Professor Abdullahi Mustapha, recently reiterated the importance of agricultural biotechnology to enhance the wellbeing of citizens and the economy in general. He lauded some of its values thus:

Modern biotechnology tools have helped other countries of the world turn around their agricultural sector, enhanced food and nutritional security, profited their farmers and attracted the younger generation to farming, Nigeria cannot be an exception. We advocate for a responsible technology deployment that will guarantee high yield, keep pest and diseases away, bring about bumper harvest, increase the income of our farmers and at the same time guarantee safety (Murtala, 2021).

Limitations Associated with Agricultural Biotechnology

Despite the fact that agricultural biotechnology holds enormous advantages for significantly improving food production as well as economic growth, and relieving already strained land and water resources, it is restricted in various capacities which according to Ozo (2008) and Zaan (2011) are as follows:

- Modified seeds are expensive and difficult to regenerate

The cost of access to seeds and unfeasibility to regenerate seeds due to intellectual property rights daunting. Farmers in dire circumstances during periods of drought consume their stock of seeds with the intention of reconstituting them again when situation improves the following planting season. This is difficult to achieve with living modified organism's seeds (LMOs).

- Problems associated with command by players over LMOs usage techniques

Difficulties associated with command by players over LMOs usage techniques and in their access to the factors required to apply the accompanying technical processes. In effect the research and extension structures lack the specialised framework to support producers in the use of products stemming from agricultural biotechnology.

- Fear of loss of biodiversity with gradual disappearance of local gene pool

There exists anxiety of loss of biodiversity with gradual disappearance of local gene pool. Producers indicate that the use of LMOs over time will influence the capacity to diversify which is an essential way of managing risks. Furthermore, ability to diversify on the long run will be affected, in as much as diversification is one of the major ways in which family farms can disperse or minimise risks.

- Lack of effective leadership

The lack of effective leadership in science and technology and the lack of clear priorities, policies and investment strategies in Research and Development (R&D) constrain agricultural

biotechnology development in developing societies. The controversy on Genetically Modified (GM) food aid in Africa for instance, will continue to confuse policy makers and result in public anxiety if scientists and politicians in developing nations do not provide leadership to articulate their aspirations and interests in biotechnological development.

- Poor funding of agricultural biotechnology research and development (R&D)

Biotechnology development is capital intensive and requires much funding which is in short supply in most developing economies. Even in some stable economies, the budgetary allocation to science and technology, and biotechnology R & D in particular is not promising.

- Lack of research focus and infrastructure

Most developing nations have not identified specific areas of modern agricultural biotechnology in which to invest in order to actualize specific objectives. It is difficult to make informed, long-term policies without acknowledging national priorities.

- Inadequate human resources and expertise

Agricultural biotechnology being an intensive research area requires high capacity of human resources to achieve substantial benefits. A lot of developing economies lack this human capacity and where they are available, it is invariably insufficient or they are inadequate opportunities to express themselves. The consequence of this is their migration to the already developed nations where their knowledge is valued – a phenomenon oddly referred to as *brain drain*. The low level of scientific literacy in upcoming economies does imply that majority of the populace will be unable to draw informed conclusions about important agricultural biotechnology issues. Beintema and Ayoola (2004) and Ozor (2008) posit that Nigeria recorded declines in the number of full time equivalent researchers at government research institutes in the late 1980s and early 1990s due partly to lack of funds and the drift to universities with higher wages.

CONCLUSION

The goal of every business is to attain large economies of scale which increases profitability. Biotechnology enables improved seeds and boosts agricultural outputs tremendously; therefore, Nigeria must develop a culture of Science and Technology, make budgetary allocations that can fund research and development in this field and maintain close monitoring to ensure compliance and quality control by all stake holders.

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