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PRODUCE, INNOVATE OR BE POOR

By

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PRODUCE, INNOVATE OR BE POOR

INTRODUCTION

Mr Vice-Chancellor Sir, distinguished audience, permit me to start this lecture with a quotation from the Holy Bible.

The book of Genesis chapter two, verses 15-19 states:

*“ And the **Lord God took the man**, an d put him into the garden of Eden to **dress it and to keep it**, and the Lord God commanded the man, saying, of every tree of the garden thou mayest freely eat; but of the tree of knowledge of good and evil, thou shalt not eat of it; for in the day that thou eatest thereof thou shalt surely die, and the Lord God said, **it is not good that the man should be alone**, “I will make him a help meet for him” (KJV)*

The above scriptural quote confirms the interest of God - the Almighty not only in agricultural production, but also in agricultural sustainability and development. The instruction God gave the first family to dress and keep the garden, connotes that, He does not want the production process to be a short-term event. He actually wants the man to maintain the resources in a reusable form for eternity. In other words, God wants us to be *prudent and accountable* in the use of *knowledge and innovation* to ensure sustainability. It is in the use of *knowledge and innovation* that we obtain the *power to get wealth!!!*

God also said, “it is not good for man to be alone” which suggests His desire that man’s work in the area of agricultural production should be done in concert with others. His wish is that man works together with others, to secure help and take advantage of positive synergy in working together to make the best outcomes of their labour. This command of God is best operationalised within the concept of the Agricultural Innovation Platforms (IP) to boost

agricultural production for wealth creation. Indeed, the book of Ecclesiastes 4:9 corroborates this by noting that *“two are better than one; because they have a good reward for their labour”*. In a nutshell, God is an **agricultural production economist** who is interested not only in **production** but much more in the **sustainable use of resources through cooperative innovation for wealth generation**.

With this understanding, Mr Vice-Chancellor Sir, distinguished audience, having spent three decades in the field of **agricultural production economics**, I welcome you to the Three Hundred and Twenty Seventh Inaugural Lecture of the Obafemi Awolowo University and the ninth from the Department of Agricultural Economics.

What is Agricultural Production Economics?

Agricultural production economics is concerned with the selection of production patterns to attain resource use efficiency in order to optimize the objective function of the farming community or nation within a framework of limited resources. It involves the analysis of production relationships and principles of rational decisions so as to optimize the use of farm resources on individual farms and to rationalize the use of inputs from the nation's point of view. It is a sub-discipline within the broad subject of agricultural economics and may be defined as an *“applied field of science wherein the principles of economic choice are applied to the use of resources of land, labour, capital and management in the farming industry”* (Debertin, 2012).

Actually, agricultural production economics is a study of resource efficiency, and as such, it is specifically concerned with a clear definition of the conditions under which the ends of objectives of farm operators/managers, farm families and the country's consumers can be attained to the greatest degree possible. The definition also implies an involvement of technical science in the specification of the physical relationships between resources and product. However, the definition connotes that the problem of

choice involved is that of economics, hence, the full definition of production problems, establishes the need for the employment of “normative” optimum procedures, just as it stresses the need for the utilization of “positive” optima (Olayide and Heady, 1988).

Objectives of Agricultural Production Economics

The two major areas of agricultural production economics are that of facilitating the efficient utilisation of farm resources from both the individual farmer and national point of view as well as helping farmers to attain their logical motives of the farming enterprise. In accomplishing these aims, agricultural production economics concerns itself with the basic aspects of production, which include: **first**, an examination of the productivity, use and incomes that may accrue from the use of land for farming activities; **secondly**, the use, productivity, and income from the employment of labour on the farm relative to non-farm employment. In the **third** place, assessment of the use, productivity and income arising from the utilization of management in a farm business. **Fourth**, it addresses the problem of soil conservation in farm production over time and space, and the extent to which the so-called “free goods” of orthodox economic theory, such as water, temperature, wind, among others, limit production and productivity in the farm business, and their effect on conservation. And, **finally**, it constantly assesses the impact of the time element in production, and the extent to which its end-product of the problems of risk and uncertainty in decision-making can be minimized.

As a study of resource productivity, agricultural production economics deal with resource-use efficiency, resource combination, resource allocation, resource management and resource administration. It also covers the problems in agriculture, such as instability of prices in agriculture, risks and uncertainty among others.

From the above, it can be deduced that, the four main objectives of agricultural production economics are to:

- a) Determine and outline those conditions, which give optimum use of capital, labour, land, water, and management in the production of crops and livestock;
- b) Determine the extent to which the existing use of resources deviates from what is considered the optimal use level;
- c) Analyse the forces which condition production patterns, and resource use in relation to the existing opportunities of facilities for product sales operations; and
- d) Explain the means and methods adoptable in moving from the existing levels to the optimum use of farm resources.

Therefore, any problem of farmers that falls under the scope of resource allocation and marginal productivity analysis is the subject matter of agricultural production economics.

Smallholder Farming and Objectives of Agricultural Production Economics

Mr Vice-Chancellor Sir, it will interest you and this august gathering to know that current statistics show that over 80% of Nigerian farmers are smallholder farmers who cultivate less than 5 hectares of farm land (NBS 2016). This smallholder farming enterprise has certain basic features, which distinguishes it from commercial farming. Among the salient features distinguishing smallholder farmers from the commercial oriented farmers include the fact that they not only cultivate relatively small farm sizes, they apply a relatively large dose of labour per hectare of cultivated land; in addition, they do not expend much on farm inputs, while they apply crude tools and traditional equipment. As a result of all these, they obtain relatively low yields per unit of resource inputs; and many of them are not easily disposed to change, unless the new method is very well proven. This makes them rely completely on 'fool proof' socio-cultural practices handed down from one generation to another.

The central hypothesis propelling the goals of smallholder farming is that of Chayanov (1966) which was called the labour-consumer

balance between the satisfaction of family needs and the drudgery of labour. The smallholder family tends to proceed by the subjective evaluation that is based on many years of experience in agriculture. In this process some degree of self-exploitation of family labour is common. This is because smallholder families tend to put in great efforts, with the belief that such extra labour would lead to increased output. Such outputs are often needed for increased level of family consumption or higher level of farm investment or both.

In a nutshell Sir, the consensus is that the two motives of enterprise in smallholder production are: that of family unit striving to satisfy its consumption demands with given levels of resource (labour) and technology; and that of miniature businessman or entrepreneur in a partially monetised market economy. In this case he will have to employ not only the limited resources, but also family labour and hire extra labour when needed. This goal shows that he responds to market situations by varying his activities according to the prices of his inputs and the expected returns from the outputs.

In other words, the smallholder farmer, although producing primarily for family consumption, often produce a marketable surplus of his particular product, so long as the market value is higher than his cost of production (as measured by the hired labour, self-exploitation, and other resources purchased). These two goals of smallholder farming give way to the profit maximization goal once modernization sets into the practice of agriculture. This takes place through the substitution of new capital inputs, for labour and through enlargement of scale of enterprise as well as changes in the organizational structure for production. Invariably, as soon as size of enterprise becomes very large and there is an introduction of a paid executive-manager in the administration process, then complexities in the definition and/or isolation of goals become manifest.

NEXUS BETWEEN AGRICULTURAL PRODUCTION, POVERTY ALLEVIATION AND WEALTH CREATION

Poverty Alleviation

Agriculture is a powerful poverty reduction tool. According to the World Bank (2010), for every one percent growth in agriculture, poverty declines by as much as two percent. Given the fact that the majority of those who are poor live in rural areas and depend on agriculture and natural resources for their livelihoods, investing in agriculture is the most efficient way to target those in need. Investments in the agricultural sector also contribute to overall economic growth by increasing efficiency in the marketing chain, reducing the share of poor people's income spent on food and enabling them to purchase other goods and services, like education, health care, and housing. Most of the world's remaining arable land and agribusinesses will substantially reduce hunger and create a more resilient global food supply for everyone if committed, efficient production of food on a sustainable basis is vigorously pursued.

The rate of scientific and technological development of any nation determines the pace of socioeconomic development. The application of science and technology has contributed significantly to defining an economic divide between rich and poor nations. Therefore, closing the gap between rich and poor nations and ensuring rapid poverty reduction will require deliberate measures to build scientific and technological capabilities of the poor countries. As such, deliberate investment in research and development (R&D) can play a critical role in this.

In 2003, African leaders made a historic pledge to increase their own investments in food security and agriculture-led growth through the Comprehensive Africa Agriculture Development Program (CAADP). Since then, dozens of countries in Africa and beyond have been developing comprehensive agricultural development strategies. There is also increasing engagement by foundations, non-governmental organisations and the private sector. The United Nations High Level Task Force on Food

Security leverages the combined strength of a number of UN organisations and the Bretton Woods Institutions towards accomplishing the lofty goal of attaining food security. In 2009, at the L'Aquila G8 summit, donors committed more than \$20billion to support this renewed global effort. The summit not only catalysed new financial commitments, it also brought a commitment for a new approach. All the efforts recognised the potentials of agriculture to take people of the continent out of poverty, since agriculture remains the source of livelihood for over 70% of people on the continent.

Agriculture, particularly smallholder agriculture, is fundamental to overcoming the problem of poverty, which has perpetuated the rural sector for decades. These general conditions are found in most countries of Sub-Saharan Africa. During the past decades, Africa has also experienced several episodes of acute food insecurity, with tragic loss of lives and livelihoods. Droughts, crop failures and other disasters often trigger these crises. However, the real causes go deeper and they are diverse. Today, almost half of the African population lives in extreme poverty, out of which more than two thirds live in rural area and generally make a living by producing rain-fed crops, livestock, trees and other agricultural activities (World Bank, 2008).

Policymakers and rural development practitioners increasingly recognize that a short-term focus on creating jobs or increasing income is insufficient to generate sustainable rural development or achieve a long-term reduction in rural poverty. A focus on creating and maintaining wealth offers the potential to achieve more lasting rural prosperity. Many rural development researchers, foundations, think tanks, and advocacy groups argue that investing in a broad range of assets is critical for long-term economic growth and prosperity in rural communities (Kretzmann and McKnight, 1993; Castle, 1998; Green and Haines, 2002; Flora and Flora, 2004; Ratner, 2010).

Wealth Creation

Economic development strategies are only a subset of possible approaches to rural wealth creation, though efforts to create wealth benefit greatly if they are part of a coherent strategy based on local comparative advantages and community priorities. Coherence and coordination of investments across different types of assets are particularly important given the frequent need for sequencing: i.e. infrastructure before industry.

Economic collaboration and sustainability are particularly important for rural areas because so many rural communities are sparsely populated, and the closing of one or two key local businesses can hurt the local economy, leading to wealth depletion. To improve local economic resilience, many rural economic development strategies emphasize diversification, integration with the broader (and presumably more stable) regional economy, or establishment of industries with a comparative advantage in the national or global economies.

Since people's income and consumption prospects depend upon their wealth, long-term solutions to poverty require efforts to generate and use wealth effectively. This is where sustainable agricultural production plays a very important role in wealth creation. People with low wealth may get locked in poverty because of their inability to cope with risks or to invest in high-return assets and activities (Carter and Barrett, 2006). Without income support, poor people would undoubtedly be worse off, but wealth accumulation remains critical to achieving long-term reductions in poverty. However, where agricultural production is laced with innovation, it has great potentials in ensuring long-term reduction of poverty, thereby paving way to wealth creation at the rural level where it is greatly lacking presently. Creating wealth in rural communities, therefore, requires not only that decision makers be willing to save and invest, but also that they be able to identify, finance, and implement socially profitable agricultural investments through a continuous learning process. Such learning processes are provided within the Agricultural Innovation

Platforms, which serve as engine rooms for new ideas, and practices that drive development and wealth creation.

Smallholders take pride in agricultural activities, though the sector currently offers limited opportunities to move out of poverty when not practiced with appropriate innovative inclination. However, great enjoyment is derived from agricultural activities, and almost all smallholders would like to expand these activities. Therefore, staying in farming and flourishing will require innovation and entrepreneurship to diversify their income-generating activities, both in the agricultural sector and beyond agriculture. Smallholders also need to use information, good agricultural practices, and better market access to improve their agricultural activities and ensure sustainable income towards wealth creation.

May I end this section with a quote from late President Nelson Mandela that *"Overcoming poverty is not a task of charity, like slavery and apartheid, poverty is not natural. It is man-made and it can be overcome and eradicated by the actions of human beings."*

PRODUCTION ECONOMICS AND INNOVATION

Production and Technical Change

A technical change is a term used to describe a change in the amount of output from the same amount of inputs. A technical change is not necessarily technological, as it might be organizational, or due to a change in a constraint such as regulation, input prices, or quantities of inputs. It is possible to measure technical change as the change in output per unit of factor input. In free-market economies, technological advancement leads to increase in productivity, but at the expense of older, less-efficient means of production, creating a level of subjective risk for which the compensation (in theory) is the return on capital. This rate of return reflects all of the perceived risks associated with the capital financing of the means of production, including technology risks.

Drivers of Change in Agriculture

Any natural or human-induced factor that directly or indirectly brings about change in an agricultural production system can be defined as drivers of agricultural change (Hazell and Wood, 2007). They affect all agriculture around the world, but to varying degrees. These include trade expansion, value chain integration and climate change, as well as international processes established to facilitate or mitigate them. Other drivers include the rapid globalization of science and knowledge access, facilitated by expanding global communications options that can serve to accelerate the flow of information, technology and products relevant to agricultural development.

Agricultural Innovation Platform (IP)

At this juncture, Mr Vice-Chancellor Sir, distinguished audience, given the critical need for engagement of innovation in agricultural production, allow me to introduce the concept of Agricultural Innovation Platform (IP). An Agricultural Innovation Platform is a space for learning, action, and change. It is a group of individuals (who often represent organizations) with different backgrounds, expertise, and interests: farmers, traders, food processors, researchers, government officials, and other stakeholders along the value chain of a commodity, product or service. The members (stakeholders) come together to diagnose problems, identify opportunities, and find ways to achieve their goals. They may design and implement activities as a platform or coordinate activities of individual members (Homann-Kee Tui et al., 2013). Innovation Platforms encourage creativity and learning, and provide a safe environment for multiple actors to experiment and explore solutions to their joint problems (Homann-Kee Tui et al., 2015). Innovation Platform is conceptualised on the hypothesis that successful innovation is essentially about positive change. The innovation concept comprises the “4Ps” model of innovation. The first ‘P’, *Product Innovation*, is that which introduces or improves a product or service that changes what is offered to end-users. A good example of product innovation is the ‘Mamera’ drink produced from sorghum, or the “Kasiksi” (K6) and the “Mutobe”

drinks produced from banana by enterprising actors in the Innovation Platform in Uganda and Democratic Republic of Congo, or plantain into packaged "*plantain flour*" in Nigeria. The second 'P' is the *Process Innovation*, which is about the processes through which the products are created or delivered or the process that brings about increased efficiency in the conduct of agricultural business. It is the application or introduction of a new technology or method for doing something that helps an organization remain competitive and meet customer demands. Process innovation might come in the form of new processes or techniques, new equipment, or software. For example, the Integrated Agricultural Research for Development (IAR4D) that uses the Innovation Platform (IP) is considered as process innovation that enhances the conduct of agricultural research and development activities. Third 'P' is *Position Innovation* which deals with how a specific product or process is perceived and how they are used. It relies more on post-harvest handling, including packaging, advertisement and other activities that enhance the use of commercial opportunities. Today, on the global marketplace, position is everything. What makes the organization profitable is not how good its products or services are, but what their customers perceive about them. Again, it's all about the smiles on the faces of your satisfied customers. When the Plantain farmer processes the plantain into plantain flour, packages it into standard pack and displays it on the shopping mall rack, he has effected a "position innovation" on his product. The final 'P' in innovation is "*Paradigm Innovation*" which defines or redefines the dominant paradigms of an organization or entire sector. Paradigm-based innovations relate to the mental models which shape what an organization or business is about. It concerns the change (sometimes radical) in the way something is done in the organization. It could be anything. For example, in bakery it may be in the way the products are sold, from off the counter, to catering system, or to selling on the Internet. Even, on-line bakery, can you imagine! But, again, to be an innovation, it has to be profitable. The agricultural innovation process is therefore those systems that result in the effective flow of knowledge to bring about efficient and increased food production to enhance food

security and socioeconomic benefits for all the actors involved in the process. The systems often contain institutions/or organizations, individual actors (researchers, extension workers, farmers and other producers) and the resource investments needed to make the innovation happen. Fig. 1 shows the various activities carried out within the typical Agricultural Innovation Platform. Depending on the level at which an Innovation Platform is established (e.g. Village, regional, national), and on those initiating the platform, the objective might be to tackle a specific technological, organizational, or institutional challenge in a value chain (e.g. Access to high quality plantain suckers) or a more generic problem that needs to be addressed across value chains (e.g. Farmers' access to agricultural credit). Fig 2. Shows the various levels of an Agricultural Innovation Platform. Once the IP has achieved its objective, its members may (or may not) decide to take up new challenges. Innovation Platforms can start as informal networks and be forged into more formalized structures, such as public-private partnerships, with the ultimate goal of becoming self-sustaining entities. IPs are ways to bring together different stakeholders. Fig 3 shows the interactive roles of the IP stakeholders. Since IPs go through a dynamic process of challenges and opportunities, learning and change, actors operating in IPs engage to ensure that different interests are considered, and various groups contribute to finding solutions (Adekunle et al. 2012).

Innovation Platforms can support	Description
Knowledge generation	Experimentation, learning, and knowledge development as central elements of innovation, with better integration and synergies among technical, organizational, and institutional options.
Facilitation of multi-directional information flows	Exchange of information and views of those concerned through networks, allowing information to spread.
Creation of an environment for change	Generating solutions in context, on the basis of shared expectations and vision. Creates bonds and unity among Innovation Platform members and sets a stage for the innovation to be generated. It facilitates collective action by all those involved, also enhances learning processes, and generates solutions with multiple benefits.
Guidance of research, policy, and investment priorities	Prioritization of innovation options based on preferences or expectations of informed stakeholders, for targeted resource allocation.
Market formation	Facilitation of the key market creation, in marginal at first, and conflict zones. It is that the market develops, creating trust in market agents, transaction costs, and access to new markets.
Building entrepreneurial skills	Creation of business opportunities by deploying new technologies, markets, learning, and networking.
Policy development	Involving policy advocates and decision makers in an Innovation Platform is a way to sensitize effectively about policy gaps and generate evidence.
Resources mobilization	Assembly of diverse resources (e.g. financial, human, social, and physical resources) required to leverage change.

Figure 1: Innovation Platform activities (adapted from Hekkert et al., 2007)

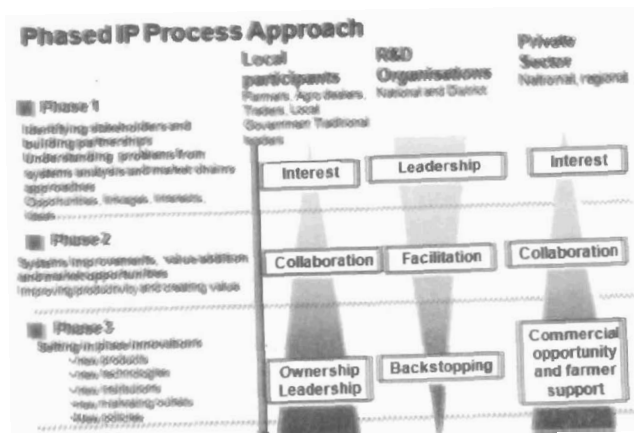


Figure 2: Conceptual Framework for IP establishment and functioning (Source: Devaux, 2005)

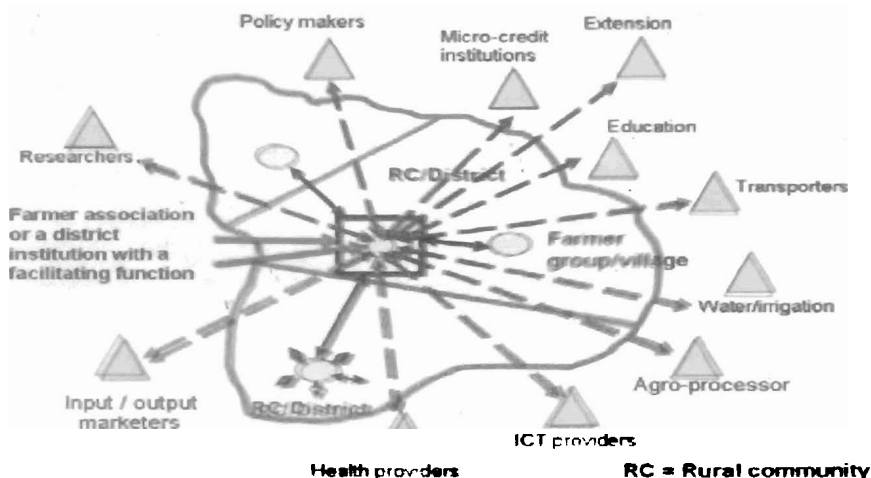


Figure 3: Innovation approaches showing the interacting role of the various players (FARA, 2016)

Having laid the foundation of what agricultural production economics is all about and the role of innovation in shifting the focus of agricultural production from helping to reduce poverty to providing the opportunity for wealth creation. I therefore present my contributions to the field of agricultural production economics based on the four pillars (objectives) earlier highlighted and addressed herein in the following questions.

Do Farming Households Produce Efficiently?

“The road to success is always under construction.” Lily Tomlin (American Actress) The first major pillar of production economics, is about the determination of the level of efficiency of agricultural production. In exploring this pillar, Ayanwale and Oni (1993) using the linear programming model found that the micro-economic policies embedded in the Structural Adjustment Programme (SAP) led to higher gross margin per resource utilized on smallholder farms while commercially oriented farmers obtained less income per resource utilized for farm resources. Ayanwale and Oni (1992), established that cassava tubers were under-utilized for both *Garri* and *Lafun*, thereby suggesting that further expansion of the existing processing scale could increase

the profitability and enhance the efficiency of the cassava processors. Ayanwale and Olaloye (1995) established that substantial inter-commodity substitution effects took place as a response to the SAP. These effects were however more in favour of cash crops whose prices rose as against that of food crops, thus creating problems of food supply. Bamire and Ayanwale (1995) examining the cost and returns in alternative poultry keeping system in southern Nigeria, found that the intensive management poultry system was more profitable than the semi-intensive system. This was because the egg produced per bird in the intensive system was twice that of the semi-intensive system. In the debate about the possible relationship between the size of farms and the efficiency of resource use, Ayanwale and Isijola (1997) showed that there were disequilibria in the use of farm resources by both the small and large sized farms. However, both categories of farms operated below optimum and therefore needed to expand their existing areas of cultivable land to exploit the potential for increased farm and better livelihood.

Exploring the technical efficiency of smallholder women farmers for sustainable production Ajao, et al. (2002), found that fertilizer, labour and land were the key inputs critical to efficient production. Efforts therefore needed to be directed to address the timely provision of these inputs to ensure sustainable agricultural production among the women. On land improvement techniques among smallholder cassava farmers, Bamire, Alimi and Ayanwale (2004), showed that the prevalent land improvement techniques were crop rotation, organic and inorganic fertilizer application. Extension programmes targeted at the appropriate and efficient use of these on-farm techniques are however required for increased farm productivity and improved income levels. Alimi, Ayanwale, Bamire and Akinola (2006), determined the intertemporal trends in maize grain output and found that area cultivated rather than yield was the significant determinant of maize output in Nigeria. Ayanwale and Abiola (2007) examined the efficiency of Fluted Pumpkin production under tropical conditions and found that none of the producers were technically efficient and observed a 25%

potential of increasing technical efficiency. However, the producers were efficient in allocating resources for weeding but underutilized labour. While examining innovative practices in production of Underutilized Indigenous Vegetables (UIV), Ajekiigbe, Ayanwale, Oyedele and Adebooye (2017) estimated an average technical efficiency score of 74% for users of innovative production practices compared to 56% for non-users. This confirms the positive impact of innovative production practices. In 2018, Olugbade, Oluwasola, Ayanwale and Oyedele, examined the role of marketing information on marketing efficiency of underutilized indigenous vegetables and found that the use of information on where to sell leads to increased marketing efficiency. Furthermore, marketing of UIV was efficient with higher gross margin predictive of increased efficiency. Ojo and Ayanwale (2018) while estimating farm level financing gap using the stochastic frontier approach, found that the majority of the farmers operated at low technical efficiencies with a need to improve and produce at the frontier efficiency. Furthermore, the average financing gap of farmers at a set target efficiency of 80% was estimated to be \$263 per season per hectare.

Kassali, Ayanwale and Williams (2012) estimated the effect of rural transportation system on farm productivity in Oyo State and found that the transportation modes used in addition to walking includes bicycle, motorcycle, and car with an increasing trend in the use of motorcycles. The mean Technical Efficiency (TE) of the food farmers was 82% with significant inefficiency effects. The inefficiency analysis indicates a positive effect of distance, crop diversification and un-tarred type of road on farmer's productivity, while the poor level of education among farmers, use of bicycle; trekking and weekly working time negatively affected farmers' efficiency.

In summary, the overwhelming evidence from the results presented so far suggests that generally, farming households cannot be said to be efficient in their production. This is given the fact that the

reported levels of production are lower than the production frontier level in all cases.

Has past Innovations Influenced Outputs?

The second pillar of agricultural production economics is about the estimation of the impact of innovations on the farming households' enterprises. In exploring this issue, Ayanwale (1995) undertook an economic evaluation of the effect of the Structural Adjustment Programme on the performance of the Okitipupa Oil Mill as an agro-allied company. It was established that the implementation of the SAP policy had favourable effects on the performance of the company by turning around the company's experience from that of corporate loss to profit making within the time period. Ajetomobi, Olarinde and Ayanwale (2003) also explored the productivity effect of the Women-In-Agriculture Program of the Oyo State Agricultural Development Program and found that the women contact farmers were more resource-productive than the non-contact farmers, although both groups were inefficient in the use of all the production inputs.

While considering the effect of Foreign Direct Investment (FDI) on Farm Level productivity in Nigeria, Ayanwale (2005) established that there was positive and significant spill over effects of the FDI at the firm level. However, the effect of the spill over might not extend to the sectoral level, possibly due to low level of labour productivity. While considering the economic effect of development aids in Nigeria, Ajetomobi, Ayanwale and Binuomote (2007) found that development aids contributed positively to output growth and that 100% increase in aids will lead to about 1.3% increase in output and that the SAP policy made the aid more effective. Salawu, Ayanwale and Ajobo (2005) studied the nexus between economic growth and poverty reduction among Nigerian workers and found that the growth witnessed in the economy did not translate to improvement in the workers' welfare due to limitations imposed by policy inconsistencies and currency devaluation by which lower basket of goods were available for the same amount of currency before the SAP.

In considering the technical change in Palm-fruit processing in Osun State, Alimi, Bamire and Ayanwale (2006) found that although only two of the stages of processing were mechanized, the modern mechanized method resulted in greater efficiency of palm oil extraction, higher labour productivity, more income to stakeholders and increased volume of operation which resulted in increased income. In the same trend, Ayanwale and Alimi (2006) also assessed the impact of the National FADAMA facility on the technical efficiency of vegetable farmers in Southwest Nigeria and found that farm income obtained from the FADAMA cultivation was about two times the baseline value during the same season. This, implies that the FADAMA program has high potential to lift the participants out of poverty.

It is not only physical resources that can have effects on the output obtained from the farming activities of the farmers. Ayanwale and Adekunle (2006) assessed the influence of the Information and Communication Technology (ICT) on farm income, and, found that as the participants became more knowledgeable through the use of the ICT, it improved their adoption rate, and subsequently enhanced their income and livelihood. Ayanwale, et al. (2018) also explored the effect of the Branded Radio Program on Awareness of Underutilised Indigenous Vegetables (UIV) innovation and found that young, productive females listened to and were more aware of the radio program than males. The respondents listened more to information on UIV value addition and land selection. However, religion and marital status were positively associated with awareness of the radio program. Further investigation into the contribution of children towards the household poultry production by gender enabled Alimi, Ayanwale and Bamire (2006) to establish the fact that children contribute to alleviation of household poverty through their labour. However, the number of hours per week, involvement in domestic activities, and the proportion contribution to the family welfare were significantly higher for girls than for boys. Incidentally, a high proportion of children had unfavourable attitudes towards their involvement in

household poverty alleviation which is significantly higher for boys than for girls.

In order to assess the effect of the adoption of the Integrated Agricultural Research for Development (IAR4D) (IP) concept, Ayanwale, et al. (2010) established the fact that in the Savannah of West Africa an estimated US\$423m - equivalent to US\$12m per year - will be gained from adopting the Innovation Platform approach for maize production. This result confirms that the concept yields a rate of return of 38% and a benefit-cost ratio of 44:1. The estimated rate of return is higher than the prevailing market interest rates and confirms that adoption of the approach generates a stream of benefits in excess of the research and extension expenditures. In the same vein, Ayanwale, et al (2013) also estimated the ex-ante economic impact of the Integrated Agricultural Research for Development (IAR4D) in the Sudan Savannah of Nigeria and found that the economic surplus analysis suggested that the IAR4D research and extension, with respect to maize production, could achieve returns ranging from 30 to 38 per cent and a maximum adoption of 25 to 50 per cent for the conservative and baseline scenario, respectively. The estimated benefits are sensitive to expected adoption rates, but much less so to changes in research and extension costs. However, the estimates indicate that the production of all the crops was socially profitable under the IAR4D option.

From the foregoing, it is obvious that the various agricultural innovations aimed at boosting agricultural production achieved varying levels of positive effects. This suggests that the power of innovation in bringing about change in agricultural outputs that leads to improved livelihood do not guarantee sustainability of the results. For instance, as at 23rd September 2018, news had it that, for many small-scale farmers who do not have the capacity to process cassava into various products, the cultivation of the crop is no longer a money-making enterprise, except for those who have the capacity to convert the tubers into high quality flour, garri, starch and so on (Open Farm, 2018). We can therefore safely assert

that the reason for the prevalent poverty being witnessed among the smallholder farming families is because there is no conscious efforts at generating “cooperative innovations” that could enable them to create wealth that would lift them out of the poverty trap. Indeed, the latest information shows that in spite of the fact that Nigeria is Africa’s biggest economy, with massive wealth and resources; and huge amount spent annually on agricultural related projects and programs, she has an unacceptably high rate of poverty headcount rate put at 53.5% in 2009 by the World Bank. Fig. 4 shows the ranking of Nigeria on poverty rates.

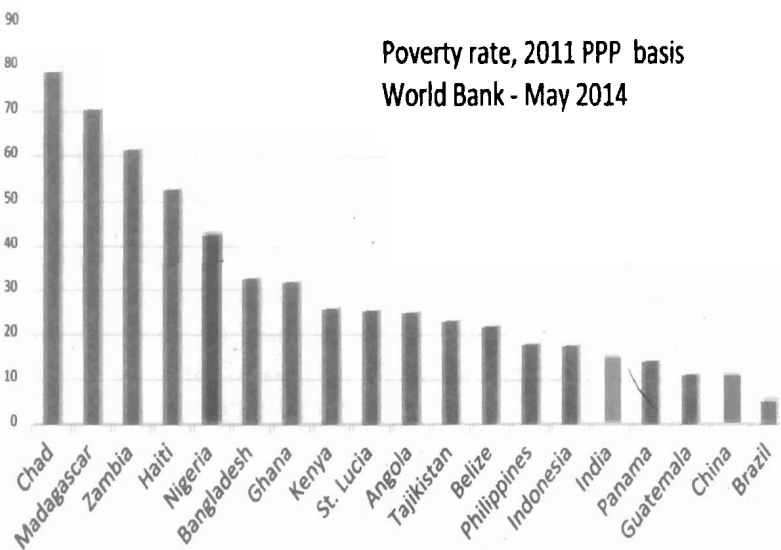


Figure 4: Poverty headcount rate in Nigeria 2014 (World Bank,2016)

What Factors Determine Agricultural Production Levels?

My research efforts on analysis of forces that condition production patterns and resource use in relation to the existing opportunities, focused on social, economic and climatic factors are as follows: Ayanwale (1993) found out that the main determinant of farm size common to rural and urban farm families is farming expenditures whereas mode of land acquisition is the major determinant for urban farming families while years of experience and mode of

acquisition are the major determinants for rural farming families. Also, bearing in mind the importance of farm location, Kassali and Ayanwale (2009), showed that farm distance, farmer's place of residence and gender were major drivers of farm productivity.

Ayanwale (2000) found that demonstration effect of diversified farm holdings as well as limited tenure rights encouraged crop diversity among farming households. Ayanwale and Asaolu (1998) established that producer's perception, global market price and domestic situations were the main determinants of Nigerian Cocoa export. Ayanwale et al., (2014) while examining the determinants of adoption of agricultural innovation in the Sudan Savannah showed that farmer location, family size and awareness encouraged the adoption of innovation. Considering the adoption of Information and Communication Technology (ICT) among smallholder farmers in southwestern Nigeria Ayanwale and Adekunle (2008) stated that marital status, educational status, farm size and farm income were key socioeconomic features of smallholder farmers that encouraged the adoption of ICT use on their farms. Specifically, there was a 21% and 5% probability that married and educated smallholder farmers would adopt the use of ICT technology.

Research reports have continually affirmed that poverty is prevalent among rural farming household. Along this line, Damisa, Sani, Abdullahi, Kamara and Ayanwale (2011) found that, farm income, non-farm income and total farm size were the major determinants of poverty intensity among rural farmers. Also, Ayanwale and Amusan (2014) showed that vegetable production is the most important contributor to the income of female farmers in Osun State. However, the share reduces as the total income of the farmers increases. Looking at poverty reduction from a gender perspective, Alimi and Ayanwale (1998) showed that women were more dominant in palm oil production even though they earned lower returns on investment than their male counterpart. Also, Ayanwale et al. (2006) established that access to micro-credit contributed to poverty reduction among beneficiaries. However, it

is more interesting to note that women had more probability of accessing the micro-credit facility than men.

Considering the importance of savings in wealth accumulation, Ayanwale and Bamire (2000) proved that expenses on socio-cultural activities and farm income were the main determinants of savings while farm size and the amount borrowed determined farm investments amongst rural farm families. In 2001, Ayanwale and Osoimehin found that the concept of 'safety first rule' of small-scale farmers enabled them to save better than low income industrial workers. Knowing that agricultural production is propelled by household food demand, Ayanwale and Ajetomobi (2001) established that household size and age of children encouraged household demand for eggs in the Obafemi Awolowo University community. Ayanwale et al. (2016) further showed that demand for Underutilised Indigenous Vegetable was relatively price inelastic, establishing the fact that vegetables are normal goods which are consumed along with other food items.

From the climatic perspective of agricultural production, Ayanwale and Adeyemo (2011) established that continuous variation in rainfall adversely affected maize production in Osun State, Nigeria, but that proactive technological packaging can be used to take advantage of the variability. Ojo, Ayanwale and Adelegan (2018), while using financing gap approach to determine climate change vulnerability, established that more than two-thirds (84%) of plantain farmers in Southwest Nigeria were vulnerable to climate change risks due to financial constraints.

In summary, it can be seen from my research reports cited so far that the factors that determine agricultural production levels are multifarious, spanning from socioeconomic factors to climatic factors. However, proper understanding of these factors, coupled with optimal mix can result in sustained improved output levels.

Is Innovation a Panacea for moving from Poverty Alleviation to Wealth Creation?

Over the years, the focus of agricultural production improvement has been directed at alleviating or reducing poverty amongst farming households. Empirical evidence has shown that alleviating poverty amongst farming households does not guarantee their continual stay out of poverty. Rather, recent evidence suggests that the use of innovations generated through Innovation Platforms has the potential of not only lifting them out of poverty but also enabling them to create wealth. Ayanwale et al. (2013) explored the potentials of the Innovation Platform to enhance the income and food security status of smallholder farmers and found that belonging to an Innovation Platform enhanced the income of participant by about 139% and their food security status by 229%. Olarinde et al. (2017) established that farmer's participation in Innovation Platforms significantly increased adoption of the demonstrated technology greatly, which improved the livelihood of the farming households. In 2012, I was the team leader of the Core Research Support Team (CRST) that evaluated the impact of the Agricultural Innovation Platform concept in eight (8) countries in three regions of Africa, namely: West Africa, Southern Africa as well as Eastern and Central Africa. Report from the research (Adekunle, Ayanwale, Fatunbi and Olarinde 2013) showed that Agricultural Innovation Platform concept delivers more benefits than the conventional research and development approach. It enhanced the income and food security status of the participants, lifting about 4,400 farming households above poverty level in the Savannah of West Africa; 1,688 farming households in Southern Africa and over 1,412 farm families in East and Central Africa. The report further showed that across the three regions of Africa, the Innovation Platform concept lifted about 7,500 farming households above the poverty level. In terms of gender, the IP concept lifted 4,700 women-led households out of poverty across the three regions.

To further establish the influence of the Innovation Platform on wealth creation, Ayanwale et al (2017) showed that women who

were inferior to men in terms of productive assets at the commencement of the Sub-Saharan African Challenge Programme (SSA CP) in West Africa, accumulated more productive assets at the end of the project due to their participation in the Innovation Platform. Using the Innovation Platform approach to scale up the use of fertilizer micro-dosing innovation among farmers of the MICROVEG project, Adebooye et al. (2018) showed that revenue obtainable from adopting the Innovation Platform in UIV production, increased by about 120% in West Africa over the project period of 36 months. Ojo, Ayanwale and Fatumbi (2018), while examining the Ex-ante Impact of Value Chain Financing (VCF) innovation in Plantain production in Southwest Nigeria found that VCF is a viable and beneficial financing innovation for plantain production in Nigeria.

Mr. Vice-Chancellor Sir, the popular saying has it that *“None of us is as smart as all of us! And that working together ensures success.”* There is overwhelming evidence that the adoption of innovation in the agricultural production process that is driven through the Innovation Platforms not only ensures ownership of the innovations but easier and faster adoption which leads to higher outputs, better asset accumulation and ultimately, greater wealth creation. This wealth created by farming households’ enables their permanent exit from the poverty cycle bedevilling smallholder farming households. Fig. 5 - 7 shows the output of the launch of the Plantain Innovation Cluster launched in 2015 to improve the livelihood of the Plantain value chain actors in Nigeria as part of the Humidtropics Nigeria Action Site activities.

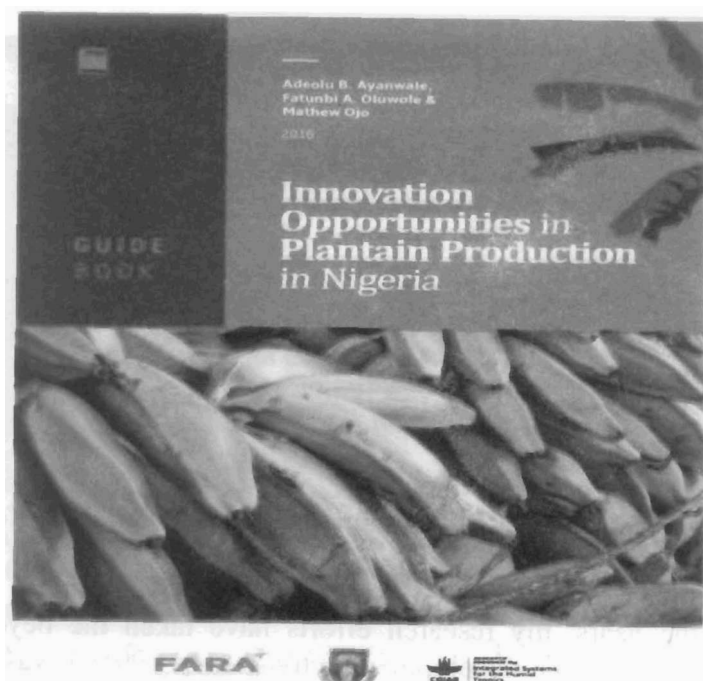


Figure 5: A Guide Book Resulting from Nigeria Plantain Innovation Platform



Figure 6: Inauguration of Nigerian Plantain Innovation Platform Officers in 2015

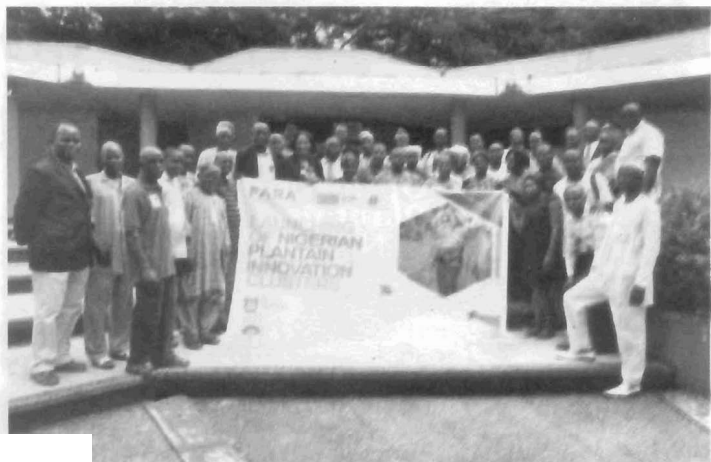


Figure 7. Members of Nigerian Plantain Innovation Platform

My Other Contributions to Research and Development

Over the years, my research efforts have taken me beyond the classroom into the development activities. In 1995, I was part of the IDRC funded multidisciplinary research study on the impact of Agricultural Development Project (ADP) on the health and nutrition of participating households in the Oyo North Area of Oyo state. In 1996, I was involved in a United Nations Children and Education Fund's (UNICEF) national study on gender dimensions of poverty in Nigeria, undertaken by the Centre for Gender and Social Policy Studies of this great University. In 2002, I led the socioeconomic team of the Information and Communication Support for Agricultural Growth Project (ICS) in Nigeria, sponsored by the Leventis Foundation in West Africa, through the International Institute of Tropical Agriculture (IITA). In 2004, I was part of the project on Answering Farmers' Needs and Nigeria Biotechnology at the IITA, also sponsored by the Leventis Foundation in West Africa.

In 2009, I was the impact assessment consultant for the baseline and mid-line studies for Osun State in the World Bank FADAMA III project. I also served on the World Bank supervision mission to Taraba and Bayelsa states on the FADAMA III project. In 2010, I

led the team for the Ex-ante Impact Assessment study of the Sub-Saharan Africa Challenge Programme (SSA CP) covering 8 countries in Africa. I also led the Core Research Support Team (CRST) of the project to conduct the mid-line and end-line studies of the SSA CP project. It is my pleasure Mr. Vice Chancellor Sir, to inform you, that the SSA CP project won the Africa Prize at the University of Leeds in the United Kingdom in 2011. Also, in 2009, I was the country coordinator of the World Bank/FAO study on Large Scale Land Acquisition for Agriculture and Natural Resources in Africa, during which I wrote the Land Governance Assessment Framework Study report for Nigeria.

In the year 2012, I was the lead facilitator of sub-regional workshop of African Rural Agricultural Credit Association (AFRACA) West Africa, held in Abuja Nigeria on *Enhancing Agricultural Value Chain through Innovation*. In 2013, I was part of the team the project that examined the Drivers of Success for Agricultural transformation in the context of the Comprehensive African Agricultural Development Programme (CAADP), commissioned by the African Union (AU). While in 2014, I also facilitated the AFRACA International Conference on *Propelling Economic Development through Functional Agricultural Value Chain Financing Model*, held in Lagos Nigeria. In addition, in 2014, I was the country coordinator of the Forum for Agricultural Research in Africa (FARA) on the IITA/HUMIDTROPICS project in Nigeria, during which I backstopped the project in the establishment of Innovation Platforms in the Nigerian action sites of the project. I also established the *Nigerian Plantain Innovation Platform* for enhancing the livelihood of plantain stakeholders. In 2010, I led the socioeconomic and impact assessment team of the International Development Research Corporation (IDRC)/Division of Foreign Affairs Trade and Development (DFTAD) project on *Sustainable Production and Utilisation of Under-Utilised Nigerian Vegetables to Enhance Food Security*, a project worth \$3.9m and involving four universities in Nigeria and Canada. The project is also known as the NICANVEG project or “Ramo elefo”. The success of the project led the IDRC to fund a second phase/scaling-

up component of the project titled: *Synergizing Fertilizer Micro-dosing and Indigenous Vegetable Production to Enhance Food and Economic Security of West African Farmers*, tagged MICROVEG. This phase of the project involved five universities from Nigeria, Benin Republic and Canada and it was worth \$4.9m. It may interest the Vice-Chancellor and distinguished audience that the MICROVEG project achieved “*impressive results*” in the words of the funding agency-the IDRC.



Figure 8: NICANVEG Project Scientists on the field



Figure 9: UIV marketer under NICANVEG project

In 2015, I was team leader of the project on *Turning Tragedy into Opportunity: Water Management Solutions for Flood Recessions and Dry Season Agriculture in Nigeria* by the International Water Management Institute (IWMI). In 2016, I was a panel leader in the State of Agribusiness in West Africa, sponsored by the China-Europe International Business School in Accra, Ghana. In 2017, I facilitated the national workshop on the validation of the Nigerian Agricultural Investment Plan (NAIP) where a road map towards the articulation of Nigeria's second national agricultural investment plan was developed in line with the revised CAADP framework. Still in 2017, I was part of the impact assessment team for the World Bank supported Commercial Agricultural Development Programme (CADP) in Nigeria.



Figure 10: IWMI Scientists on the field inspecting projects in Kogi State



Figure 11: IWMI scientists on the field for Agricultural Water Solution in Kogi State

Academic Mentorship and Leadership

My contributions are not limited to research and development alone, I have also been a recipient of “divine favour” in that I enjoyed a positive mentoring from my Professor and mentor Prof Yakub Layiwola Fabiyi who supervised both my B. Agric. and M. Phil programs, respectively. He (Prof Fabiyi mentored me to ensure I graduated from this University with a First-Class grade, and also finished my M. Phil programme in 16 months!!! Instead of 18 months.) In returns for this good gesture, God has helped me in that I have also been fortunate that every Session since I joined the service of the University I have always produced a First-Class graduate!!! It will also interest you to know, Mr. Vice Chancellor Sir, that one of my B. Agric. students, Oni Babajide, won the award for the best graduating student of the University in 2015 and is currently a postgraduate student in the University of Manitoba, Winnipeg, Canada!!!. Furthermore, I have successfully supervised not less than 35 postgraduate students, out of which 10 have been awarded Ph.D. degrees. Out of those awarded Ph.D., three are already professors with one currently serving as Dean of Agriculture in a University, while three others are presently

lecturers in this great university. Of those awarded MSc. Degree many of them are excelling in the various sectors of the Nigerian economy and contributing to national growth. In addition, I was able to secure several fellowships and grants for my students. Notable among these are the AWARD, FADAMA II, CIRCLE, NICANVEG, MICROVEG and West African Science Service Centre on Climate Change and Adapted Land (WASCAL) fellowships.

I have successfully served as mentor to several students helping to build and grow their careers in their chosen field of endeavour. I was also an African Women in Agricultural Research and Development (AWARD) mentor as well as a mentor to Climate Impact Research Capacity and Leadership Enhancement Programme (CIRCLE) from January to December 2016. In the area of administration and service, I have, by the grace of God, served as Head of Department in addition to serving on various committees at the Departmental, Faculty and University levels. The Department under my leadership was able to secure a FADAMA facility through Dr Tunji Oredipe with which the Departmental Seminar Room was established and equipped. I also succeeded in coordinating the unique contributions of the IfeAgric82 set to both the Department and Faculty of Agriculture. It is on record that the IfeAgric82 set provided computer sets to the Essentials Agricultural Electronic (TEEAL) Library of the Faculty on three occasions, as well as equipped the Statistics/Biometrics Laboratory of the Department of Agricultural Economics that is worth over N6 million Naira during my tenure as the Head of Department. I currently serve on the editorial boards of a number of impact journals in my field and as external examiner to a number of Universities both within and outside Nigeria.

Conclusion and Recommendations

Mr. Vice Chancellor Sir, distinguished audience, from the contributions highlighted above, it is crystal clear, that agricultural production as currently being practiced, is largely inefficient, and, as such lacks the potential to lift farming families out of poverty in

a sustainable way, in spite of various programs and projects being implemented by various governments and funding agencies. Little wonder, statistics show an increasing trend in the incidence of poverty among many farming households. This further brings to the fore the fact that producers need to embed innovations to increase their income and accumulate productive assets that can be used to sustain the increased level of income. There is therefore an urgent need for stakeholders in agriculture to cultivate the culture of positive collaboration, to generate innovative ideas that will shift production frontiers forward not only to lift farming households out of poverty but to sustainably create wealth.

It is obvious that the vicious cycle of poverty prevalent amongst agricultural households needs to be broken. Arising from the discussion so far, the following recommendations are proposed to address this challenge:

1. In order to address the current observed inefficiency in agricultural production, group (cooperative) action among the various stakeholders along the value chain of agricultural commodities and/or services should be consciously encouraged. If effected, such action would facilitate better and innovative ways to access critical inputs as well as create “niche markets” for outputs.
2. In addition, there should be continuous training for the various stakeholder groups to motivate them towards generation of innovative ways to overcome common challenges confronting them. This would add value to their activities and ultimately improve their livelihoods. Further, these groups should be encouraged to consciously build up their “productive asset base” both individually and corporately; to ensure sustained escape from the poverty trap.
3. It should be made mandatory for the various funding agencies and banks, that one of the conditions for accessing funds should be the generation of at least one form of innovation by the benefiting group. This will discourage

the current “dependency syndrome” and “entitlement mentality” among the producers; and force them to think “outside the box”.

4. The culture of cooperatively working together with other stakeholders to generate mutually beneficial innovation needs to be encouraged and sustained among producers, especially among the youths. Towards this end, the concept should be built into the curriculum of our technical, agricultural and vocational education system.
5. Given the all important role of information in profitable decision-making, it is recommended that an information dissemination platform for farming communities on vital agricultural issues be established. Such platform will provide real time on-line information on market prices, weather and climate, plant and animal disease watch that are locally relevant and useful.
6. The government at the various levels (Federal, State and Local) need to provide enabling macro and micro environment for profitable farm production. These include critical facilities such as access roads, affordable storage facilities, appropriate mechanisation, comfortable interest rates among other that are necessary to facilitate sustained exit from the poverty trap.

At this juncture, therefore, Mr. Vice Chancellor Sir, distinguished audience, I make bold to say to the agricultural farming households, and to others who are desirous of crossing over the line of poverty permanently **Produce, Innovate or Be Poor!!!**

Acknowledgement

It is obvious that it takes more than the effort of one man to succeed. Specifically, there are three major categories of people and institutions whom God used to make this day a reality and they deserve due recognition.

First is the academic and professional platform. I wish to put on record the efforts of my academic mentors in the person of Prof Yakub L. Fabiyi who supervised my B. Agric and M. Phil thesis, as well as Prof Stephen A. Oni who supervised my Ph.D. thesis. I also appreciate Prof Remi Adeyemo who is the only Professor left of the first generation in the Department and initiated my review to Professorial cadre, as well as my colleagues in the Department of Agricultural Economics for the wonderful environment provided to grow my career over the years.

I put on record the support and collaboration of the following Institutions: the International Institute of Tropical Agriculture (IITA) for sponsorship of my Ph.D degree, Prof Wale Adekunle, Dr Yemi Akinbamijo, and Dr Wole Fatunbi of the Forum for Agricultural Research in Africa (FARA); Dr Lekan Williams of the International Water Management Institute (IWMI), The African Economic Research Consortium (AERC), Dr Tunji Oredipe, Dr Wale Adediji and Dr Bimbo Adubi of the FADAMA III family, Prof Dayo Phillips, Prof Mrs Tundun Adelegan and Dr Femi Oladunni.

Of special note is the unparalleled collaboration I enjoyed with the International Development Research Corporation (IDRC) - NICANVEG and MICROVEG families, anchored by Prof Duro Oyedele-the Principal Investigator (PI) for OAU and Prof. Clement Adebooye-the PI for Osun State University Osogbo and Regional Coordinator for MICROVEG. Indeed, *teamwork is dreamwork!!!*

I appreciate the support and contribution of my undergraduate and postgraduate students over the years. One of them Mr. Bode Ayeni – a successful entrepreneur (Young Millionaires Bakery) who supplied us the special bread for this occasion and is here seated. I sincerely appreciate my course-mates - **the IfeAgric82 set (some of whom are here seated!!!)**. I also have members of the Okeho/Iganna Grammar School, Okeho set 1975 (here seated).

Secondly, on the spiritual platform I wish to appreciate and thank the authorities of the Redeemed Christian Church of God for

providing a very good platform for spiritual development. I thank the following spiritual fathers, whom God has used in shaping my life Pastor E.O.B. Ajayi, Pastor G. Lawal, Pastor Paul Awede, Pastor K. Bolanta (late), Pastor Dele Olowookere and Pastor John Temitope the current Regional Pastor (Region 3). I equally recognise the leadership and friendship of Pastor and Pastor (Mrs) Jide Oladoye (the immediate past PICP Osun 2) as well as the current Pastor in Charge of Osun Province 2, our own Pastor (Prof) Femi Osunbitan.

On the home front, I wish to recognise my parents (here seated) Pa Joseph Adeleke Ayanwale and Ma Sarah Jejeola Ayanwale for the sacrifices made to mould me into whom God has made me today. I appreciate the love and cooperation I got from my siblings and their families Pastor Remi Ayanwale, Mrs Yemisi Tunmise, Mrs Bose Oloruninsola, Pastor Akin Ayanwale, Mrs Nike Olubadan, Boade and Biodun Ayanwale as well as Lekan and Nike Oyerinde. I wish to put on record the unquantifiable support of Rev Dr. J. A Adedokun. I appreciate the wonderful support of the "Iganna Patriots" anchored by Prince Dr John Olabisi, Prof Olu Ogunjimi(late), Bro Oluniyi Ogunjimi and Auntie Sola Ayandeji – who nurtured me in the secondary school, Mr Folu Adegbite – who taught me Chemistry in the secondary school and Prof Lanre Bamidele. I appreciate deeply the presence of our Royal Fathers the Shabiganna of Iganna - my home town, the Baale of Kuseela - Baale Oladapo Fakayode – my in-law, and the Oniro of Otu - my classmate in the secondary school.

I want to thank very much my in-laws - the Akintolas especially Auntie Olubunmi and Uncle Wale Akintola. I thank and appreciate warmly members of the Organising Committee of this event.

Finally, I wish to express my deepest appreciation to our children - Adedayo Olusegun, Oluwadara Adewale, Ayooluwa Adebisi, and Praise Adeyemi who usually have to bear the sacrifice of my academic pursuit. I put on record the wonderful support I have from my *"good and wonderful gift from above"* - my **Olubunmi**

Modupeoreoluwa aya Adeolu Ayanwale - I appreciate your love and sacrifices. We shall surely get there in Jesus name.

And unto the only wise God our saviour, be glory and majesty, dominion and power, both now and ever. Amen.

*Olorun to da awon oke igba ni, Eyin ni mo fi opee
mi fun, Tani un o tun gbega o, Bikose Baba loke,
Tani un o tun fi gbigbo ope e mi fun, Olorun to da
awon oke igba ni, Eyin ni mo fi opee mi fun.*

Mr Vice Chancellor Sir, distinguished audience, thank you most sincerely for your attention.

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