NIGER DELTA UNIVERSITY
WILBERFORCE ISLAND, BAYELSA STATE.

49th Inaugural Lecture

Musa sapientum and Musa paradisiaca: THE COMPARATIVE BRIDE

BY

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NIGER DELTA UNIVERSITY

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Motto

Creativity, Excellence, Service

Vision

To be a centre of excellence defined by well articulated programme that will produce creative and innovative minds

Mission

To strive to maintain an international reputation for high quality scholarship, research and academic excellence for the promotion of thesocio-cultural and economic well-being of mankind

NIGER DELTA UNIVERSITY ANTHEM (THE BRIGHTEST STAR)

Like the brightest star we are, to lead the way
To good education that is all our due,
The dream of our fathers like the seed has grown;
Niger Delta University if here to stay.

Let us build on this noble foundation
And with love, let our dedication increase,
To rise and uphold this noble vision
Ev'ry passing moment let our zeal never decrease.

In all that we do, let us bring to mind
Our duty as staff and students of N.D.U
Ev'rywhere to promote peace towards mankind.
Creativity, Excellence and Service

CHORUS
Rejoice, great people old and new, rejoice
For the good fruit through us is shown;
Be glad in our worthy contribution
To the growth of humanity (x2)

Dedication

To God Almighty

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Spiritual Fathers,
Royal and Traditional Rulers,
Great Niger Delta University Students,
Gentlemen of the Press,
Distinguished Ladies and Gentlemen

PREAMBLE

The Bride: This simply means an object that is ardently loved. A woman that is escorted by her father or presenter. Among the crops, or rather agro-enterprises in our environment, the banana and plantain are ardently loved, most cherished compared to other crops. Research over the years have shown that they are products more cherished above other products. Many are passionate about virtually their economic roles vis-à-vis domestic and national food security, income generation and source of livelihood.

A Comparative bride because they are presented almost on daily basis in the food equation across Central Niger Delta, Niger Delta as a whole and indeed nationally and internationally.

It is the only enterprise (product) that the left hand is used to handle during consumption.

Vice-Chancellor Sir, I have taken a critical look at the food equation and diet of an average Izon man particularly in Central Niger Delta and never found any other enterprise that is consumed via the left hand. It is only plantain! While the right hand may be busy with the"*eba* or *osun* or *otaran*" the left hand holds the "*beriba* or *beribe"* (plantain) stylishly and both go simultaneously. The Izon man will face a complete diet comprised of "*eba*" or fufu or starch,

soup and of course plantain. Let me say vehemently that no other food product has this comparative advantage! Consciously or unconsciously, this comparative bride is known to be a major source of strength and blood component, say the element of iron in the food equation or diet of the typical Izon man.

Mr Vice Chancellor Sir, permit me to ask if there is any of such person that has never held plantain in that manner which more or less is or was a tradition or cultural heritage. Even the banana, it is not unleaved with the left hand. Rather it is held in most cases with the left hand and unleaved with the right hand.

Vice Chancellor Sir, though my research interest was not limited to ***Musa sapientum*(Banana)and *Musa paradisiaca* (Plantain)**,

Fig *1: Musa sapientum* (Banana) and *Musa paradisiaca* (Plantain)
Source; Own pictures, 2022

My focus on the path of Banana and Plantain was triggered by my meditation on a possible research area in my Doctor of Philosophy (PhD) programme. At my undergraduate and Master of Science (MSc) programme, I delved into Agribusiness activities that were all of comparative advantage and peculiar to the environment, Niger Delta Region in general and Izon (Ijaw) man in particular.

Specific interest was a survey of the arrack industry; by probing into the economics of local gin distillation, input-output models, economic rent and the exploitation and sustainability of the raphia palm which is predominant in our swamps and mangrove areas. Of course, my contributions to knowledge showed profitability, and prospects of income and employment generation; rural and industrial development through the arrack industry in the old Rivers State. My initial ordeal in this area at the Masters level was, my supervisor (Late Dr. Ms. I. Jumbo of blessed memory) who had to give up on me for choosing such a topic— '*Kaikai*' as she put it, since she became born again. However, in fairness to her, she asked me to feel free to choose another supervisor or change the topic. Nevertheless, Prof E.A. Allison-Oguru (then Mr) was there for me and incidentally supervised my undergraduate and MSc projects.

At my Master of Business Administration (MBA), I delved into another area: economics of swamp rice production; determining profitability, economic rent, critical path analysis and resource scheduling of small-scale swamp rice production projects in Bayelsa State. My contributions to knowledge showed that both the arrack and swamp rice industries had comparative advantage as they were major economic activities in the area.

Notwithstanding, my journey into banana and plantain became more fascinating as the revelation of these comparative bride of species was gradually unveiled to me, while I streamlined a research topic for my PhD. First and foremost, it earned me the best PhD; scoring 80% in the 2013 class of the Department of Agricultural Economics, UNN. Again, my ordeal in the PhD programme is worth recounting. Though, graduated in seven (7) years, the delay was pathetic. By 2011, I had successfully defended my results/findings. Thereafter, all submissions to the PG school by the Department in preparation for external defence, was claimed to be lost at the PG school. The Department had to start afresh to package submissions. Then again, this time external examiner nominated by the department was turned down by the PG school on the ground that the nominee was not current (in publication). A

fresh nomination was again made for the last time and you know what that could mean; procedures and time line!

INTRODUCTION

There is an abundance of both human and material resources in Nigeria; yet, the question is: what will happen next? Despite her inability to produce her own food, she has persisted in meeting her nutritional requirements through the consumption of agricultural raw materials that have been imported (NISER, 2000).

Agriculture in Nigeria began to face difficulties in the 1970s, when crude oil began to become a substantial export earner. As a result, agriculture's contribution to the country's GDP began to drop (Aigboktan, 2001). Because of this, Nigeria is now a net importer of food and its manufacturing industry relies on agricultural raw materials that must be imported (NISER, 2000).

Government and non-profit organisations have spent a lot of money on programmes that haven't helped the poor or increased food security. The Nigerian federal government launched the Fadama project to provide funding for the improvement of Fadama lands in states with such potential. With this in mind, the Fadama project set out to accomplish its first objective. The creation of more compact irrigation systems will accomplish this. The World Bank is providing funds for a development initiative known as Fadama III

with the aim of increasing the capacity and income of all people who make sustainable use of the Fadama resources. Most people in rural areas rely on farming for their livelihood, therefore this project sought to alleviate rural poverty, provide access to healthy food, and help fulfil a vital Millennium Development Goal. For this reason, increasing agricultural output within the state is crucial for combating rural poverty. Increasing the income of those in rural areas who subsist on agriculture and fishing was one of Fadama III's PDOs. This was done specifically to ensure that by 2013 (National Fadama Development Project, 1997), participating users would have a minimum 40% increase in average real income and that primary agricultural yield would grow by at least 20% for participating households. Both of these outcomes were flagged as potential outcomes of the National Fadama Development Project in a report published in 1997. The Department of National Fadama Development funded this book's production in 2007.

Business investment in agricultural output in Nigeria's Ogun State has increased significantly as a result of the programme, which Oladunni (2014) claims increased the actual income of at least 80% of participating households by at least 40%. According to Ike's (2012) research, the average

real income of Delta State citizens who benefited from Fadama III rose by 36.67 percent. You can't put a price on the jobs, money, and income generated by the plantain and banana agricultural firms and entrepreneurs who take part in the Fadama III development initiative and other comparable government endeavours. The contributions of these people and organisations are crucial to the achievement of these goals. These efforts could be classified as "similar government programmes," for example. There is potential for improved income production, the creation of new jobs, and the creation of wealth in Nigeria's Fadama III development districts if the resources allocated for the plantain and banana industries are utilised and managed in the appropriate manner. If the effort is successful, that is exactly what will happen.

The cultivation of bananas (Musa sapientum L.) and plantains (Musa paradisiaca L.) has been increasingly important over the course of Nigeria's history. Swennen (1990), Robinson (1996), and Frison (2005) all claim that bananas and plantains, two basic foods, are abundant in the humid forest zone of west and central Africa (1997). The importance of agriculture to both rural and urban economies is highlighted by these and other factors. According to the Food and Agriculture Organization, bananas are the second

most profitable fruit crop in the world, following oil palm (2004). However, plantains are typically consumed within the country and not exported. But recently, bananas have risen to prominence in the global trading market (Faturoti et al., 2007; Babatunde, 1991). Despite the high quality of the crops grown, the vast bulk of the harvest stays inside the borders of the nations where they are produced. These crops provide food for about 300 million people every day, and 90 percent of the harvest in the countries where they are grown is consumed within those countries (Swennen et al., 2004). Growing bananas and plantains is crucial to the national and international food security of these countries.

Fig 2: Plantain Vehicle and trucks loads
Source; Own pictures, 2022

The fact that most plantain and banana producers are subsistence farmers who raise the crops primarily for their own use or to sell on the local market is a major barrier to the widespread commercialization of these products (Faturoti et al., 2007; Esendugue, 1993; BYSG, 2003). Producing plantains and bananas sustainably is crucial for any

agroeconomy that aims to ensure food safety, increase rural income and employment, and propel economic development. For the sake of the economy, this is a must.

It's obvious that Bayelsa State's plantain and banana-based agricultural enterprises have been having trouble with crop production in recent years, and that this situation necessitates a policy shift to better make use of available resources. Since land is at a premium in Bayelsa State, farmers who rely on these products have taken a major financial hit.

After learning from numerous sources that bananas and plantains (Musa Spp) are significant food crops that flourish in Africa's humid tropics, the author plunged headfirst into a number of research areas that produced a wealth of data on topics like policy directions, agro-economic constructions and reconstructions, poverty and livelihood alleviation, resource allocation and utilisation vis-à-vis limiting factors like land, and so on.

Previous studies on plantains and bananas, for the most part, concentrated on developing better varieties (Kainga, 2013). Previous research on plantain and banana improvement programmes in Nigeria focused mostly on improving disease resistance through the use of hybrids, varietals, and

other techniques. This was done specifically in the context of battling Black sigatoka. According to Esendugue (1993), historically, the majority of banana researchers have been agronomists; as a result, agronomic aspects of the fruit have been emphasised. This is due to the fact that agronomists have conducted the majority of the study on bananas. Researchers may have been cautious to conduct economic studies including the determination of resource productivity and allocative efficiency due to the fact that bananas and plantains are not annual crops. As a direct result of this, there was a dearth of information concerning the studies of resource allocation conducted by agricultural businesses centred on bananas and plantains. Because of this, I decided to do some research on the hypothetical comparable bride.

My research on specific socioeconomic and agroecological challenges, limiting variables such as land, etc., led me to investigate a variety of subjects, including resource allocation, utilisation, profitability, and efficiency. According to the findings, bananas and plantains grown in the Niger Delta region and other agroecosystems with characteristics that are equivalent to those in the Niger Delta are in all likelihood comparable.

Specifically, my studies:

a) assessed the degree of resource allocation and use in the production of bananas and plantains:

b) provided a description of the socioeconomic aspects of the production of bananas and plantains, as well as the existing cropping patterns;
c) investigated the connection between socioeconomic factors and the results produced by banana and plantain farming businesses;
d) determined the costs as well as the return on investment for the banana and plantain production businesses;
e) identified factors that determine productivity of small-holderbanana and plantain producers;
f) discovered resource allocation and utilisation patterns in the production of bananas and plantains; and
g) the difficulties that have been discovered as well as the opportunities that lie ahead for banana and plantain production businesses.
h) Effects of post-harvest losses on profitability
i) Economics of value chain of plantain (roasted plantain) (bole)

Findings showed that Banana and Plantain is indeed comparative bride in Central Niger Delta region and similar agroecosystems.

HISTORY AND PRODUCTON TRENDS OF PLANTAIN AND BANANA

It is believed that Southeast Asia is where the plantain known as *Musa paradisiaca*, which is a member of the *Musaceae* family of plants, was first cultivated (Britannica, 2018). When considered from a botanical point of view, bananas and plantains have very few distinguishing characteristics with one another. In certain countries, such as Nigeria, plantains and bananas are not interchangeable terms. One of these countries is Nigeria. One of the countries included is Nigeria. Officially, only "genuine" plantains may be called "plantains," whereas other starchy cultivars that are also used for cooking are called "cooking bananas." Only "real" plantains can be called "plantains." True plantains are the only ones worthy of the name. For many people in West and Central Africa, plantains are as essential to daily life as rice or beans. One advantage of plantains is that they can be used as a reliable source of nutrients all year long (Wikipedia, 2018).

Despite the widespread consumption of bananas and plantains, the former is grown in only 52 countries, while the latter is grown in 130 and has a global production of 33 million metric tonnes (Faturoti et al, 2007; Babatunde, 1991). Plantains and bananas are not only vital to the diet

and economy as cash crops, but also provide essential nourishment and energy to tens of millions, if not hundreds of millions, of people around the world. This is particularly true in less developed nations. This is due to the high levels of carbs and energy found in bananas and plantains (FDA, 2000). It is an essential component in animal feed and is utilised by humans of varying economic standings and racial backgrounds (Babatunde, 1991a; FAO, 2007).

Cauthen, Jones, Gugerty, and Anderson found that West Africa is one of the world's primary plantain-producing regions (2013). Nigeria is the third-largest producer in a region that accounts for about 32% of global output. The southern states of Bayelsa, Delta, and Akwa-Ibom, as well as the southwestern state of Ondo, are Nigeria's primary plantain-growing regions (the state of Oyo). This is due to the favourable climate conditions, abundant forests, and rich laterite soils found in these areas, making them ideal for plantain cultivation (Morris and Kamarulzaman, 2014). Bayelsa State is known for its abundance of valuable cash crops, including plantains and bananas. Plantain consumption appears to be directly related to the economic status of the region (BYSG, 2003). If you're looking for bananas or plantains, look no further than Bayelsa State (Kainga, 2013). Increasing plantain and banana cultivation

in rural Bayelsa State may help alleviate poverty there. Throughout the South-South region of Nigeria, the crop has enormous political and economic significance (Kainga et al, 2016).

Since the turn of the century, it has been painfully obvious that our agricultural productivity per hectare has been steadily falling (FAO, 2011). By way of illustration, between 1990 and 2009, Nigeria saw a dramatic drop in plantain output per hectare, from 7.54 tonnes in 1992 to 4.94 tonnes in 1999. After increasing from 4.90 to 5.10 tonnes per hectare between 2001 and 2008, yields fell from 6.31 to 5.50 tonnes per hectare between 2007 and 2008. Per-acre yield dropped to 5.50 tonnes in 2008, the lowest level since 1992. Between 1990 and 2009, the cultivated and harvested land area rose from 162,000 to 481,000 hectares, an annual growth rate of 4.1%. We will be overwhelmed by the expansion at this rate. From a price of $5,300 per tonne in 1991 to a price of $116,597 per tonne in 2008, the price increased by over 1,100%. In the specified time span, this growth occurred. (FAO, 2011). Banana and plantain prices have also increased consistently over the past few years in Bayelsa State (Alagoa, 1999; BYSG, 2003). Nonetheless, the crops are used as basic foods and as raw materials in the growing at-home food processing business in the damp

forest region of southern Nigeria. The agricultural industry is the focus of both of these programmes (Afro News, 2003; FDA, 2000). Nigeria's plantain harvest increased from 1.417,000 tonnes in 1992 to an estimated 2.8 million tonnes in 2012, a USD 1,850,000,000 increase in value according to the Food and Agriculture Organization (FAO). (FAO, 2014). Despite this, industrial development has not kept pace with the rest of the economy, especially when compared to other West African countries like Ghana, which made a rapid transition from low output to exports. Some of the neighbouring countries include Togo, Mali, and Nigeria. Exports of plantains are currently low, and domestic supplies are also poor. Low yields in the area are mostly a result of smallholder farmers in rural areas still choosing their own production strategy despite having little access to extension services. Poor crops result from this (Kainga and Seiyabo, 2012).

IMPORTANCE OF BANANA AND PLANTAIN

According to Cosca (1992), the importance of plantains in the diet of Africans is particularly great because, during the two decades that followed the majority of African countries' independence, per capita food consumption in Africa fell. As a result, the continent gradually deteriorated into dependence on food imports, with cereal imports filling the

gap left by insufficient growth in domestic staple food production. The projected 150 million hungry individuals in Africa make the declining per capita food consumption and internal financial liquidity all the more concerning.

In all tropical regions, plantains (*Musa paradisiaca L.*) and bananas (*Musa sapientum L.*) are essential crops. More than 25 percent of Africa's estimated 70 million people rely on these crops to meet their demands for carbohydrates and 10 percent of their calorie requirements (Ogungbe, 2005). It is estimated that each resident of Nigeria consumes 8.5 kilogrammes of plantains on a yearly basis on average. In contrast to the consumption of other food crops, its popularity is not tied to any particular race or social group. Over 90% of rural households in Nigeria's southeast cultivate plantains and bananas in their backyard gardens, both for subsistence and for sale. Millions of people all over the world rely heavily on plantains and bananas for their daily nutrition and sustenance. Not only is the crop recognised as a dietary staple and commercial cash crop, but it is also recognised as a driver of economic growth.

Fig 3: Processed Plantain (Bole)

Source; British Broadcasting Corporation (BBC) News Pidgin, (2021). Bole festival 2021: Photos of plantain, fish, and sauce wey 'show' for dis year event. https://www.bbc.com/pidgin/tori-58119276 ,

Bole Festival, (2022). Picture Gallery of Bole Festival, Port-Harcourt, Rivers State, Nigeria. https://www.instagram.com/bolefestival/?hl=en

The fruits provide the vital nutrients and vitamins for proper development. In the producing countries, they provide monetary income and jobs to the rural population. The export values of crops are crucial to the economic growth and development of the producing nations. Common ailments such as diabetes, ulcers, and tonsillitis can be effectively treated with the crops. For human consumption, plantain and banana can be turned into numerous forms. Forms include boiling, roasted, fried, and mashed, as well as chips, flour, cakes, bread, and cookies. As raw ingredients, plantain and banana are used to produce beverages, flavours, and ice cream (FDA, 2000).

The crops are also a significant component of animal feed (Babatunde, 1991a; Uchegbu, Omede, Adimorah, Nwachukwu, Ezeokeke, Obikaonu and Anyanwu, 2008). The majority of Bayelsa State residents place a high cultural value on plantain meals.

BANANA AND PLANTAIN BASED FARMING SYSTEMS

Gilbert, Norman, and Winch (1980) defined the farming system as the interplay of a number of different components that are tied to one another, such as crops, livestock, and activities that take place off the farm. A farming system is defined as a crop combination or enterprise-mix by Conway (1987), Maji (1991), and Collinson (1979). In such a system, the outputs and/or byproducts of one enterprise serve as inputs for the production of another enterprise.

According to Ekong (1988), topography, climatic conditions, socioeconomic activity, traditional land tenure systems, superstition, and religious practises may all have an impact on the unique agricultural practises that a group or region's residents adopt. Reijintjes, Haverkort, and Water-Bayer (1992) claimed that farms that have similarly organised firms run a particular agricultural system. Cropping system, on the other hand, is a subset of farming system because it only pertains to crop-based enterprise combinations on a farm, whereas farming system includes all varieties of enterprise combinations (Allison-Oguru, 2004). The primary agricultural method used in the West African region is mixed cropping (Richard, 1985). African peasant farmers practise multiple cropping and intercropping in Cameroon and other countries (Naji and Nkwain, 1987; Peter and Range-Metzger, 1994). Many

traditional farming methods make use of multiple cropping and intercropping strategies because of the benefits that small-scale farmers have seen from them throughout time. Compared to single planting at the same level of management, smallholder farmers in the tropics who use multiple cropping see an increase in harvestable items per acre (Reijintjes et al., 1992; Norman, 1970). This occurred despite the fact that both cropping methods were administered in the same fashion. In addition to reducing farm risk, multiple cropping and inter cropping have other advantages over single cropping. These include the fact that crops that are spread out among others are less vulnerable to pest attack than single stands, that different rooting systems can take advantage of different soil profiles for moisture and nutrients, and that one crop may create a favourable microclimate for another (Francis, 1986; Beets, 1982).

Both the solitary cropping method and the mixed cropping system are used by farmers in Bayelsa State.

Fig 4: Cropping Systems of Plantain and Banana
Source; Own pictures, 2022

However, the major crop combinations are dominated by cassava, yam and plantain. While farming in Bayelsa State at present is mainly crop based (Allison-Oguru, 2004), the cropping pattern include: sole cropping e.g., swamp rice (sole), plantain (sole), cassava (sole), cocoyam (sole) and yam (sole). In mixed cropping the crop mixtures planted by farmers are mainly cassava or plantain based with the latter predominating. Specific crop mixtures include:

- Plantain/Cassava/vegetable
- Cassava/maize
- Cassava/cocoyam/plantain
- Plantain/sugar-cane/vegetable (Allison-Oguru, 2004)

It has been shown by Frison and Sharrock (1999a) that plantains and bananas can grow in a wide variety of environments and yield fruit constantly throughout the year. They can fill the role of an energy source in the "hunger gap" that occurs between agricultural harvests. They are also suitable for mixed agricultural systems that make use of both livestock and cropping patterns, making them a popular choice among city dwellers. In addition, these crops are in high demand among city people. The cultivation of these plants will not impair the fertility and organic matter of the soil if they are cultivated in perennial production systems and their biomass is employed as mulch. Esekhade and Ugwa (2008) found that smallholders

in Nigerian rubber farming most commonly intercrop rubber with plantain and banana. Plantain and banana are chosen because they are more weatherproof than rubber. To be sure, neither plantains nor bananas are perennials, but the observation still holds.IITA (1996) and FDA state that smallholder farms in Nigeria's southern humid forest zone, derived savannah, and along fadama ecologies produce the vast bulk of the country's bananas and plantains (1999). Indeed, the crops are essential to the tropical humid forest's cropping system (Swennen, 1990).

CONSTRAINTS OF PLANTAIN AND BANANA PRODUCTION

According to Frison and Sharrock (1999a), there have been large increases in pest and disease pressures in the world's producing regions recently, and a number of important diseases are responsible for catastrophic output losses of 30% to 50%. It is believed that Black Sigatoka poses the greatest threat to the production of plantains and bananas around the world. Chemical control of Black Sigatoka, on the other hand, is not only out of reach and pricey for the vast majority of small-scale farmers, but it is also exceedingly damaging to the environment and has a negative impact on biodiversity. Concerns have been raised regarding the potential adverse effects that the usage of chemicals may have on the health of plantain workers. The

production of bananas in Costa Rica for the purpose of export has led to an excessive use of pesticides, which in turn has led to the emergence of disease populations that are resistant to fungicides. Because of the high cost of the fungicides that are required to treat the disease, small-scale plantain production has decreased by forty percent as a direct effect of black sigatoka. Losses in crop production can also be due to a group of worms that are parasitic on plants (*Radopholussimilis, Pratylenchus spp., and Helicotylenchusmulticinctus*). As a result of damage caused by Cyclone Sigatoka, fruit prices have skyrocketed in neighbouring areas like Imo State, despite the fact that many farmers have reported large increases in their crops after the storm. Imo State, a neighbouring state, is also seeing the consequences of Sigatoka (Onuh et al, 2008).

It is possible that the use of chemicals for the control of pests and diseases may be overtaken by the adoption of resistant varieties. These varieties are regarded to be the foundation of ecologically friendly production of plantains and bananas. However, as of this moment in time, practically all natural cultivars have been changed out for more desirable breeding programme materials. Farmers across Africa and Asia are collaborating to develop a diverse range of locally adapted cultivars (Afro News, 2003). According to research that was conducted in 1994 by

Ruhigwa, Gichuru, Spencer, and Swennen, pennisetum mulch produces the highest bunch yield in alley cropping systems. Even though organic mulch helps plantains by preserving soil fertility, halting soil erosion, and suppressing weed growth, it is rarely used. However, the absence of readily available mulch is one of the most severe constraints.

ECONOMICS AND FARM MANAGEMENT CONCEPTS

ALLOCATIVE EFFICIENCY AND RESOURCE USE IN BANANA (Musa sapientum) AND PLANTAIN (Musa paradisiaca) PRODUCTION ENTERPRISES

The farm is said to have efficiently allocated resources when each input is used to the point where its marginal contribution to production equals its marginal factor cost. How should resources be divided up to maximise output? (Yotopoulos & Nuggent, 1976). To increase agricultural output, researchers and politicians have known for a long time that resource efficiency must be improved (Bravo-Ureta & Everson, 1994). If farmers are not making good use of the resources already available to them, it would be more cost-effective to increase agricultural output through the adoption of methods with improved allocative efficiency than to introduce new technologies (Shapiro, 1983). Farmers in sub-Saharan Africa face enormous challenges,

but they are generally judged to be responsible and wise with the limited resources they have. This is true despite the fact that they have to deal with some rather serious challenges. And yet, despite the fact that local farmers face enormous challenges (Anderson, 1992). When it comes to investment, use, and output, Nigeria's agricultural sector makes do with what it has (Olayide& Heady, 1982). Bayelsa State, as well as other agro-ecologies, face significant challenges to agricultural growth and development. These challenges can be mitigated, however, if the state is able to aid small-holder farmers in optimising their use of finite resources like land, labour, and capital.

This is a reference to Bayelsa State, one of the states that make up Nigeria. It is one of Nigeria's many states, and the people of Bayelsa State are no exception. Bayelsa State is the name of one of Nigeria's states as an example. This means that agriculture must maximise its use of available resources. In 2015, only 34% of Nigeria's farmland was being used. (2000) As estimated by "Ajakaiye" and "Akande" NPC, more than 65% of the roughly 140 million people living in Nigeria at the time were involved in farming and cultivating crops on tiny farm holdings distributed across the country (2006). (NPC 2006) To wit: (1988 Federal Government of Nigeria; 1989 World Bank). Like the World Bank, Nigeria's central government can trace its beginnings back to 1988.

It is generally accepted that rising populations and increased urbanisation are to blame for the precipitous decline in plantain production seen over the past few decades. For the simple reason that both of these states hold true at the same time (Faturoti et al., 2007). Olayide and Heady (1982) claim that the primary cause of the current plantain output gap is farmers' inability to make efficient use of available resources. The specialists agree that this is the case. [More sources required] Even while total production fell by 21.0% between 1996 and 2005, the number of acres planted with plantains rose by 24.6%, according to the United Nations Food and Agriculture Organization.

Agribusinesses specialising in plantains and bananas have been more concerned with sustainable production and enhanced crop productivity in recent years. Bayelsa State and the Niger Delta are no exceptions, as land is immensely valuable there as well. Our strategy needs to evolve in light of the new facts so that we can make the most efficient use of the resources at hand. According to Kassie et al. (1999), a drop in agricultural output may be to blame for the region's rising poverty, low crop and animal yield, and significant resource degradation. Both researchers and government officials recognise the importance of continuously raising agricultural output. Multiple variables affect the maximum achievable agricultural production productivity. Everything

you need to know is here since (Beets, 1990). He recommended splitting geology, climate, and geography into three distinct fields: physical, technological, and human (Todaro, 1980; Olomola, 1988). In contrast, better productivity results from expanding the amount of land cultivated, the crop yields that specialised agricultural enterprises achieve per acre farmed, and the number of crops harvested annually (Beets, 1982). Olayide and Heady, writing in 1982, defined "productivity" as the monetary worth of agricultural output expressed as a fraction of the cost of producing it. This sentence is often used today without much thought from the speaker. This metric is commonly used to evaluate the efficiency of day-to-day activities in businesses. They argue that the best way to make the most of one's time and effort is to try to do as much as possible with as few attempts as feasible. Lipsey argues that the output can be increased without rebalancing the components (1983). The availability of a wide range of productivity aids will not alter this reality. Use of new technology, the replacement of capital for labour, the training of people, the adoption of novel management practises, the invention of unique ideas, and the use of unorthodox methods of production are only some of the ways in which input quality can be improved. One such factor could be the possibility of capital substitution.

Allocation and utilisation of agricultural resources are topics that have been studied extensively. Resource efficiency, price sensitivity, and the most effective forms of collaboration between organisations are just some of the topics explored in these analyses. Those are but a few examples of the wide range of research areas that have benefited from these methods. This is due to the well-established fact that demography, economic situations, food costs, and other factors of both the natural and social surroundings are subject to change throughout time.

One reason is that all of humanity's actions have consequences for the natural world. It's hard to argue with the reasoning behind this, especially because these details have been public knowledge for quite some time. Ekong (1988) suggests that the economic status of a town or region may have a role in determining the farming methods that its residents choose to use. This adds more weight to the case for the status quo. Businesses in the Nigerian state of Bayelsa responsible for banana and plantain production had their resource consumption and the efficiency with which those resources were allocated estimated using the data provided.

Farmers Allocative Efficiency of Resources Employed in Banana and Plantain Farm Enterprises

A farmer's allocative efficiency can be theoretically measured by comparing the marginal value productivity (MVP) of an input to its marginal factor cost (MFC) or unit market price (Px). Therefore, the ratio of MVP to MFC provides an index (Aij) for judging resource allocation efficacy. If Aij is less than one, farmers are making unwise use of the input variable in question (Aij 1). So, reducing the amount of the variable input in question could maximise net farm return or profit. If, however, the ratio is more than one (Aij > 1), it means that farmers are employing the input variable at a sub-optimal level, and that doing so would maximise profit or net farm return. Farmers are most efficient with their variable inputs when Aij = 1, or when they have absolute allocative efficiency (Subba, et al, 2004).

Working capital (such as suckers) and an endogenous variable (Yi) are evaluated. Mandays were used to estimate the value of both paid and unpaid work (X2 and X3). Working capital minimum viable product (MVP) values are calculated by multiplying the geometric mean of net farm return (N) by the production elasticity coefficient (bis), and then dividing the resulting number by the relevant input variable (Xis). Tables 1 and 2 detail the relevant measures

that should be used to evaluate the efficiency with which the relevant businesses allocate their resources.

ProductionFunctionModel and Model Specification

Both banana and plantain farming operations were examined using the Cobb-Douglas model of the production function. It was assumed that the proportion of different crops would stay the same. Before the Cobb-Douglas production function could be analysed with the ordinary least squares (OLS) method of regression, it had to be transformed into its logarithmic form. Using these results, we may determine the model's estimated parameters (Olayide& Heady, 1982; Fakayode et al., 2011).

We calculated allocative efficiency, resource consumption efficiency, and the coefficients needed to measure farm output or profit by using a production function for agriculture. The coefficients for agricultural output might then be calculated. Having access to these coefficients was crucial for formulating the agricultural production function. The following is the suggested file format for the application's agricultural production feature:

$Y_i=f(X_1,X_2,X_3,X_4,X_5,X_6)$ ..... (1)

Where,

Y_i= aggregate output produced by each agricultural enterprise, expressed either in kilogrammes or the

value of those kilogrammes in Nigerian naira.

X_1= The size of the farm in hectares;

X_2= Family labour on average, in man days, utilised by each farm

X_3= Number of hired hands working on each farm, measured in man days;

X_4= The average amount of working capital, in Naira, that each farm uses (i.e.,expenditure on suckers, etc);

X_5= Naira fixed capital employed per farm

X_6= Plant's age in months at the time of harvest.

Before the research was done, it was thought that the value of a farm's overall production would have a direct correlation with the following variables: the size of the farm, the amount of family labour, the value of hired labour, the amount of working capital, and the age of the plants. As a result, it was hypothesised that, assuming that all other aspects of the situation remained unchanged, the production coefficients for the various input elements described above would have a positive value. On the other hand, it was hypothesised that there would be a negative correlation between the amount of fixed capital (X5) that was invested in the manufacturing process and the amount of value that was created (Yi). In light of this, it was hypothesised that the final production coefficient would turn out to be negative, all other things being equal.

To evaluate how efficiently resources are used and distributed in multi-producer enterprises, such as the small-holder farmers in the Central Niger Delta, the equi-marginal principle, a neoclassical economic criterion, is applied. Similar to the idea of continuous marginal returns, this. According to neoclassical economic theory, this is the decisive element. For the best resource allocation and consumption in multi-producer businesses, such as the small-holder farmers of the Central Niger Delta, the equi-marginal principle serves as the neoclassical economic standard. Also known as the continuous marginal utility principle or the MC. Neoclassical economists use this criterion to assess how efficiently resources are distributed and utilised.

The principle asserts that for a multi-product firm to be deemed to have efficiently or optimally allocated resources, each variable input's marginal value product (MVP), in addition to being equal to the input's price, must be the same across all companies in which it is utilised. Without this criterion, it would be incorrect to assert that the company maximised the value it generated with the resources at its disposal. Once this need has been satisfied, we can assess the organization's resource management strategy. You'll be able to say with confidence that your company's business operations have been seamless after that has occurred. The

firm is said to have utilised its resources effectively or to the fullest extent possible when a variable input's marginal value product (MVP) is the same for all businesses where it is employed and equal to the input price. Something must be in place for the company's resource allocation to be considered ideal or effective. Based on just one statistic, you can tell if a company has maximised its returns on investment. You can be sure that your company's activities have been successful when you reach that point. That is:
$MVP_{i1} = MVP_{i2} = MVPnm \leq Pi$ - - - — - - - - - - - - - - - - - - -
(2) Where,
Most Valuable Product of the ith Input (X) Used in Enterprise Production (MVPij) =.
Pi = unit cost of Xi, where I = 1, 2,..., n and j = 1, 2,..., m

Index of allocative efficiency

A quantifiable assessment of how successfully a company makes use of its resources. The economic significance of the resource allocation efficiency of plantain-banana growers in the study area was the impetus for the development of Aij, which allowed us to use the production coefficients obtained from equation (1) to draw crucial conclusions. All these deductions were supposed to be based on the production coefficients calculated with equation (1). The equation's generated production coefficients were expected to be used to draw these

inferences (1). These results were obtained by including the calculated production coefficients in the equation (1). These inferences may have an effect on the conclusions that are reached about public policy. Following is the formulation of the allocative efficiency index Aij:

$A_{ij} = MVP_{xi} / P_{xi}$ .....(3)

Where, $MVP_{xi} = d_y P_{y/} d_{xi}$ .....(4) and

$d_{yi/} d_{xi}$ = MPP_x = Marginal physical productivity of input xi.....(5)

The marginal value products are equal to the allocative efficiency index since the dependent variable in this study was assessed on the basis of both its physical production and value. This is because all of the production inputs were assigned monetary values with the exception of land (X1), in-house labour (X2), and outside labour (X3). In this study, the marginal value products were evaluated on their value A_{ij} i.e.;

$A_{ij} = MVP_{xi}$ .....(6)

If Aij is greater than 1, it is possible that increasing the quantity of the variable input could lead to an increase in profit. If Aij is less than one, the owner of the farm would be able to enhance profit by reducing the variable input that is under discussion. When Aij equals 1, allocative efficiency has been maximised to its absolute potential. (Subba, et al.,

2004). According to the equimarginal principle and profit maximisation theory (Koutsoyiannis, 1983), resources are utilised most effectively when their Marginal Value Products (MVPs) equal their Marginal Factor Costs (MFCs) (MFC). An efficient use of a resource is one in which its Marginal Value Product (MVP) exactly equals its Marginal Factor Cost (MFC) (Ajetomobi et al., 1998). Keeping an eye on working capital (such as suckers) and the value of the endogenous variable (Yi) (X4). Man-days were used to quantify both unpaid work done inside the home (X2) and paid work done outside the home (X3). A multiple value proposition for working capital is calculated by multiplying the production elasticity coefficient (bis) by the ratio of geometric mean values of net farm return (N) to each input variable (Xis). The major metrics that should be utilised to evaluate the efficacy of the resource allocation carried out by the organisations in issue are presented in Tables 1 and 2.

Banana and Plantains AllocativeEfficiency of Major Farm Inputs

The results of an allocative efficiency regression using the Cobb Douglas function on bananas and plantains showed that the number of suckers, family labour, and hired labour, all measured in man-days, accounted for 44.44 and 68.75%, respectively, of the variance in overall cost (TC).

It was found that the cost of production was affected by the prices of its constituent parts (P 0.05). Adding one more unit of suckers, one more unit of family labour, and one more unit of hired labour will increase costs by N0.3156, N0.3360, and N0.2654 respectively, as shown by the input price elasticity of demand. This is true even if the overall number of suckers does not change (Table 1).

When using suckers, the price of a bunch of plantains increased by N0.105; when using family members, the price increased by N0.298; and when using outsiders, the price increased by N0.253 (Table 2). The data suggests that these resources were deployed inefficiently. In order to reduce expenses, banana and plantain farmers can use fewer suckers, hire fewer workers, and rely more on family members to do the work.

Relationship between Total Revenue and Main Farm Inputs in Plantain Production

The Cobb Douglas function revealed that there was a 91.12% impact on the variation of total revenue from the number of plantain suckers, family members, and hired labourers (TR). As a corollary, this showed that agricultural inputs are significantly related to overall income (P0.05). The input elasticity study showed that a rise of only 1% in plantain suckers would result in a rise of 9% in total revenue. It turned out that this was the case. While an

addition of one household member and one employee will reduce profits by N0.12 and N0.05, respectively (Table 3). This could be seen as evidence of inefficiency in the division of labour between paid work and chores around the house. It suggests that, without proper oversight, a plantain company's use of both free and paid labour input could reduce the company's profits as a whole.

Resource Allocation and Utilization in Banana Enterprises.

Table 1 shows that, with the exception of banana suckers, the MPP of the key agricultural inputs was negative. One of the contributors was the ratio of banana suckers produced. This indicates that the farmers did a good job of dividing out the banana suckers. This inefficiency in resource utilisation can be seen in the fact that the efficiency ratio of family labour to contractual labour was less than one in the production of bananas by family farmers. Findings suggested that farmers in the area were not yet using family and hired labour at peak allocative efficiency. Business owners in the agriculture sector may be able to reduce costs by cutting back on inputs like family and paid labour, as indicated by the allocative efficiency index. Their labour is now producing a surplus, meaning their marginal product is more than zero (stage III of the production function). This indicates that the cost of labour per acre is high, so any reduction in that figure would boost farm income.

According to the equi-marginal principle, a company is making the most out of a resource while still maximising profits if the MVP of that resource is equal to or slightly more than its marginal factor cost (MFC). As an agricultural input, banana suckers have a greater MVP than their MFC, while both family and paid labour have lower MVPs. Banana suckers have a more valuable best player than other species. In this case, it's evident that banana suckers' efforts have paid off. In this instance, no one's efforts were maximised.

Based on the information at hand, a one-man-day increase in the use of either family labour or paid labour will result in a decline of N11,427.9 and N23,991.4 in revenue, respectively. There would be a 0.278% increase in output and a N110,231.2 increase in revenue for every additional sucker. Since the regression coefficient for family labour was not statistically significant, adding even one more family member to the workforce would not appreciably enhance banana production. The large regression coefficient for hired labour, however, suggests that this may significantly increase banana yield. Further, farmers value maximum profits across a broad scale. In other words, a traditional or small-scale plantain-banana farm's output and revenue are highly dependent on the use of labourers.

Resource Allocation and Utilization in Plantain Enterprises

Except for plantain suckers, both family labour and waged labour have negative marginal physical products (MPPs) when used in plantain farming (Table 2). It was revealed that plantain suckers have an efficiency ratio greater than one. It would appear that growers do not make good use of plantain suckers and distribute them incorrectly. When it comes to growing plantains, the efficiency ratio of family to paid labour was less than one, even if farmers allocated family and hired labour inefficiently.

Based on the results, it was determined that local farmers were not making the most of available resources such plantain suckers, family labour, or paid labour. Farmers may be able to boost plantain suckers while decreasing the number of family and hired labourers if the inputs have a high enough allocative efficiency index. Plantain suckers had a greater MVP than the MFC, whereas both family labour and hired labour had lower MVPs when compared to other agricultural inputs. As a result, it appears that using plantain suckers was more efficient than using either family members or paid workers.

With just a one-unit increase in plantain suckers, production would go from 1.09 metric tonnes to N424,855, and profits would rise accordingly. The statistical significance of the

regression coefficient was additionally established. The unit revenue of a family will decrease by N46,772 if each member works a total of 58 hours per week. Since the model coefficients for family and paid labour were not statistically significant, it was concluded that a one-unit increase in the use of either did not significantly enhance plantain production. This indicates that the cost of labour for growing plantains is quite high there. However, as farm operations grow, farmers enjoy more financial success.

Despite the fact that my findings serve as a baseline, they confirm Nwosu's (1976) observation that peasant farmers in Kwara State, Southwest Nigeria, make inefficient use of land resources. The findings of my investigation corroborated those made by Nwosu. To a similar extent, Fakayode et al. (2011) revealed that smallholder farmers in the state of Rivers underutilised land, plantain suckers, and labour in the production of plantain. According to Adesimi (1990), the marginal value productivity of family labour in agriculture was significantly higher than that of paid labour. As it happened, this proved to be correct. To increase output, he suggested prioritising non-monetary contributions from family members rather than formal employees.

Table 1 Allocative Efficiency Indices of Farm Inputs Employed in Banana production

Variable	MPP (bis)	MVP	MFC	MVP /MFC
Suckers(X_4)	0.278	110231.2	109974.8	1.002
Family labor (X_2)	- 0.028	-11427.9	117075.2	-0.097
Hired labor(X_3)	- 0.061	-23991.4	92474.5	-0.25944

Source: Kainga, 2013

Table 2 Allocative Efficiency indices of Farm inputs Employed in Plantain Production n=180

Variable	MPP (bis)	MVP	MFC	MVP /MFC
Suckers(X_4)	1.09	424853	34319.54	12.37933
Family labor (X_2)	-0.12	-46772.8	97402.12	-0.4802
Hired labor(X_3)	-0.05	-19488.7	82693.75	-0.23567

Source: Kainga, 2013

As noted previously, the Cobb-Douglas production function model was utilised to analyse plantain sole and banana sole farming operations. Consequently, the Cob-Douglas production function model was mathematically described as follows:

$Y_i = AX_1^{b1}X_2^{b2}X_3^{b3}X_4^{b4}X_5^{b5}X_6^{b6}e$..... (7)

Where,

Yi = total output of each agricultural enterprise measured in kilogrammes or the value, in Nigerian naira, of the aggregate output of each farm enterprise; X1, X2, X3, X4, X5, and X6 equal the variables indicated in the equation (1)

b1 is the first term, and e is the error or disturbance term. Production coefficients or elasticities of production b2 are variables X1, X2,..., X6 being described, and the multiplicative constant A is the intercept of the production plane.

For the purpose of evaluating the necessary elasticities of production empirically, the Cobb-Douglas production function, given by equation (7), was translated or linearized in logarithmic form. The revised outcomes are as follows:

$\text{Log}Y_i = \log a + b_1 \log X_1 + b_2 \log X_2 + b_3 \log X_3 + b_4 \log X_4 + b_5 \log X_5 + b_6 \log X_6 + \log e$ - - - - - (8)

Where, Log = log to base10

Y_i = a, X_i's, b_i's, e = as defined in equation (8)

However, the error or disturbance element may be removed from the equation if it were known that the average residual error was zero (Olayemi and Olayide, 1981).

According to Olayemi (1998), the technical link between production inputs and outputs can be expressed mathematically through the use of a "production function." As an analytical tool, the model is widely used in the field of agricultural economics to measure the productiveness of farms in terms of both technical and financial efficiency.

Test For Significant Difference in Output Determinants Between Banana and Plantain Production Enterprises

The regression of banana and plantain output against the deciding factors of plantain and banana farm enterprises was tested using a t-test, which demonstrated a statistically significant difference between the outputs of banana and plantain farm enterprises in the research region. Fields of plantains and bananas were assessed for both prospective and actual yields. Regression analysis was performed using commercial plantain and banana production results as the dependent variable. The difference is caused by the fact that various types of farms specialise in growing plantains and bananas.

Compared to bananas, plantains are frequently cultivated on larger farms. More specifically, plantains and bananas are often grown on different but larger areas. This distinction is made clear by the criteria that are utilised in the determination of the outcome of each scenario. Despite the F-statistic having a 0.00 percent probability, the actual value was 12.3447. (Table 6). The only factor that exhibited statistical significance in the t-test was farm size (P = 0.00; t-test = 5.293212). This equation also included the effects of other factors, such as family labour, hired labour, working capital, and fixed capital. (Table 6). Both plantain and banana yields rise linearly with farm size, therefore

expanding a farm by one unit is equivalent to producing two. In both of these fields, farm profits and productivity are proportional to farm size. This discovery is significant because it reminds farmers to consider the potential yield or profit margin of any farm venture before making any final decisions.

PRODUCTIVITY AND EFFICIENCY OF RESOURCE USE IN BANANA AND PLANTAIN PRODUCTION ENTERPRISES

Determinants of Farm Output

To analyse the elements that affect farm output and, by extension, the profitability or net farm income for small-holder banana and plantain producing firms in the region, an aggregate farm production function was devised and applied to the analysis of input-output interactions. This was done so that causes of low farm output might be isolated. In order to calculate the farm production coefficients necessary for identifying the determinants of farm output and measuring the efficacy of resource application, the farm production function was employed. Regression analysis for banana and plantain farming was calculated using the Cobb-Douglas functional form (Table 3 and 4). The results of the regression analysis are as follows:

Regression Equation for Banana Farm Enterprise:

$LogY_1 = 5.166 + 0.989^* LogX_1 + 0.131 LogX_2 + 0.250^* LogX_3$

(1.142) (0.076) (0.107) (0.127)

$-0.169 LogX_4 + 0.063 LogX_5 + 0.131 LogX_6$; and

(0.239) (0.065) (0.077)N.B: Values in parenthesis in the regression equation are the standard errors and those coefficients with asterisk (i.e) are significant at 5% probability level ($P \leq 0.05$).1 R^2 = 63%

F – Ratio = 46.44 (significant at 5% level).

Regression Equation for Plantain Farm Enterprise

$Log\ Y_2 = 2.223 + 1.097^* LogX_1 - 0.556\ Log\ X_2 + 0.006\ LogX_3$

(1.215) (0.076) (0.060 (0.047)

$+0.305^* Log\ X_4 + 0.005\ LogX_5 + 0.159^* LogX_6$; and

(0.113) (0.034) $(0.080)^2$N.B: Values in parenthesis in the regression equation are standard errors and those coefficients with asterisks (i.e) are significant at 5% probability level ($P \leq 0.05$).$_2$

R = 64%

F – Ratio = 51.72 (significant at 5% level).

The banana production regression findings show that farm size and hired labour were used economically (they were

statistically significant, P 0.05), but that family labour, working capital, fixed capital, and plant age were used inefficiently (P > 0.05). (Table 3). However, according to the F-ratio (46,44), the entire equation was significant at the 5% level, and the regressors explain for almost 63% of the variance in the overall yield of bananas. Additionally, the estimated production coefficients showed that, with the exception of working capital (X4) and fixed capital, all variables thought to have an effect on the output related to banana production in the area have the predicted sign (X5). At the 5% probability level, the production coefficients for hired labour (X3) and farm size (X1) were statistically significant.

The finding shows that banana farm companies could increase farm profitability or returns by increasing all farm resources other than the working capital employed by the farmers whose practises were examined. Therefore, it might be said that farm output in the study area is influenced by farm size (X1) and hired labour (X3). Therefore, if farmers in the area had the financial means to increase the size of their farms and hire more workers, farm productivity would rise overall. However, the R2 and F - ratios showed that 63% of the yield of banana production was influenced by all farm resources.

Table 3 Estimated Production Coefficients of Banana Farm Enterprises Surveyedn=180

Double Log (Cobb-Douglas) Model			
Variable	**Coefficient**	**t-statistic**	**Probability**
Intercept	5.166092*	4.522091	0.0000
	(1.142412)		
Farm size (X_1)	0.989463*	13.08419	0.0000
	(0.075623)		
Family labour (X_2)	0.131147	1.226296	0.2219
	(0.106946)		
Hired labour (X_3)	0.249850*	1.974005	0.0501
	(0.126570)		
Workingcapital (X_4)	-0.168853	- 0.705692	0.4814
	(0.239273)		
Fixed capital (X_5)	0.063325	0.973242	0.3319
	(0.065066)		
Age of plant (X_6)	0.131296	1.701148	0.0908
	(0.077181)		
R^2	0.630934		
F – Statistic	46.44264*		0.0000
Return to scale	1.39		

Source: Kainga, 2013 Note: * Means significant at 5% level.
Figures in parenthesis are standard errors.

In a similar manner, the results of the regression analysis for plantain production show that farm size, working capital, and plant age were utilised effectively (they were statistically significant at P 0.05), whereas family labour, hired labour, and fixed capital were utilised inefficiently (P > 0.05). This was determined by comparing the regression coefficients for each variable to the efficiency threshold. (Table 4). On the other hand, the regression equation showed that the combined effect of farm resources accounted for 64% of the total variation in plantain output

(regressors). The results of the model are considered to be adequate since, according to the F-ratio (51.72), the entire model is statistically significant at a probability level of 5%. This justifies the conclusion that the model's results should be accepted. In addition, the estimated production coefficients revealed that all variables anticipated to influence the output associated with plantain production in the region have the expected sign. The exceptions to this were family labour (X2) and fixed capital (X5). At the 5% probability level, statistical analysis revealed that the production coefficients for farm size (X1), working capital (X4), and plant age at harvest (X6) all had a significant impact on crop yield.

The finding shows that a plantain farm firm might be able to have greater returns or farm profitability by increasing all farm resources employed by farmers other than family labour. This was investigated. Therefore, it is possible to say that the farm output in plantain production in the research region is influenced by variables such as the size of the farm (X1), the amount of working capital (X4), and the age of the plants when they are harvested (X6). Therefore, agricultural production would increase if farmers were given the ability to increase farm size and working capital, in addition to increasing the age of plants in terms of the number of times

plants might regenerate by the deliberate application of external inputs. All of these factors would contribute to an increase in the age of plants. The R2 and F-ratios, however, indicated that all farm resources affect 64% of plantain production output. According to the regression equations, the constant of the regression model for banana production was 5.166, while that for plantain production was 2.223; and both were significant at the 5% probability level; The regression constants suggest that the positive influence of the factors was significantly more significant in banana production than it was in plantain production.

Table 4 Estimated Production Coefficients of Plantain Farm Enterprises Surveyedn=180

Double Log (Cobb-Douglas) Model			
Variable	**Coefficient**	**t-statistic**	**Probability**
Intercept	2.222812* (1.215499)	1.828724	0.0692
Farm size (X_1)	1.096915* (0.075584)	14.51248	0.0000
Family labour (X_2)	-0.055578 (0.060096)	-0.924831	0.3563
Hired labour (X_3)	0.006057 (0.046943)	0.129037	0.8975
Workingcapital (X_4)	0.304982* (0.113031)	2.698219	0.0077
Fixed capital (X_5)	0.005070 (0.033842)	0.149823	0.8811
Age of plant (X_6)	0.159298* (0.079868)	1.994522	0.0477
R^2	0.642047		
F – Statistic	51.71732		0.0000
Return to scale	1.51		

Source: Kainga, 2013 Note:* Means significant at 5% level.
Figures in parenthesis are standard errors.

ELASTICITY OF PRODUCTION AND RETURN TO SCALE

Both banana and plantain had an overall elasticity of production response of 1.39 (Table 3) and 1.51 (Table 4), meaning that if all of the production inputs used by the farmers polled were doubled, output or farm profit would be greater than double. You may find these numbers in the tables below. This suggests that there are positive growing returns to scale in the primary production phase for the analysed banana and plantain plantations. As a result, it is acceptable to conclude that factors like farm size and hired labour (in the case of banana farm enterprises) and working capital and plant age (at harvest time) affect the farm output or farm profit (in the case of plantain farm enterprises) in the research area. If local farmers planted bananas and plantains and had the financial flexibility to use twice as many agricultural inputs or determining factors, they would more than double the amount of food they gathered or the money they made from their fields.

The production elasticity of every single explanatory component for banana plantations is more than one and positive, with the exception of working capital, which has a negative value. Only working capital value is considered an outlier. This indicates that a 1% change in the utilisation of farm size, family labour, hired labour, fixed capital, and

plant age at the time of harvest will not result in a corresponding change in overall banana production. That's because we can't attribute any variation in banana yield to any of these specific elements. When the elasticity of production for working capital is negative, it indicates that the resource is being put to use in the non-rational third stage of its production function. The third and last phase of production is known as "Stage III." Signs of declining banana output include a rise in working capital utilisation. As a result, this is an indicator that banana output has levelled off. Although it was claimed previously in the sentence that farmers are operating in a setting with an increasing return to scale because the total output elasticities of farm inputs added up to 1.39, this is not the case. In terms of total output, this stage of production is not optimal. Many industry experts agree that the production function's second stage is the most efficient part of the overall manufacturing procedure.

Regression study showed that, with the exception of family labour, all other explanatory factors in plantain production are positive, and their production elasticity is less than 1. This was found to be true after investigating the production elasticity of the root causes. So, it went with plantain cultivation. This indicates that there is a low probability of a shift in plantain production that would be equivalent to a 1%

increase in farm size. Furthermore, there is no correlation between an increase of 1% in hired labour, 1% in working capital, 1% in fixed capital, or 1% in the age of the plant at harvest and an increase in plantain output. This is because each of these factors has its own distinct effect on plantain farming. Plantain output will fall if family labour is maintained at its current level because family labour has negative production elasticity. Because if you keep using it, you'll have fewer plantains to choose. It has already been established that underutilizing key agricultural resources such as working capital is reflected in the return to scale (Suckers). If the suckers are to become more effective, they must be used more frequently.

SOCIO ECONOMIC DETERMINANTS OF CROP OUTPUT

Relationship Between Socio-Economic Variables and Output of Crops

When utilising the Double log model to analyse the association between socioeconomic traits and banana production (P1), the coefficient of determination (R2) is only 44.91 percent. This is confirmed when the Double log model is used. The yields of bananas, on the other hand, were found to be inversely related to the farmer's age, education, and household size. Positive relationships were discovered between the farmer's age, the age of the banana

crop, the availability of extension services, the size of the farm, and revenue. There was also a substantial association between farm size and farmer's farm size. Researchers found that the size of the farm, availability to extension services, and farmer education all substantially linked with the yield of the banana crop (P 0.05). These results suggest that factors such as farm size, availability to extension services, and farmer experience all affect banana harvests significantly. The issue of a lack of banana supply could be resolved by increasing farm sizes and funding public extension organisations. Furthermore, a grower's yield is inversely correlated with the amount of time spent tending to their banana plants.

Similarly, in plantain production, socioeconomic characteristics had a modest link with plantain crop yield (P2), with R2 = 51.22 percent. All socioeconomic characteristics are correlated positively with plantain production. However, farmer experience, plantain age, extension access, and farm size had a significant connection with plantain yield (P0.05). It implies that factors such as farm size, extension availability, farmer knowledge, and plant age—which is regularly rejuvenated by the use of external inputs like organic manure or fertilizer—have a substantial impact on plantain yield. The input-output connection in plantain production was shown to be best

suited by the double log form by Kainga and Seiyabo (2012). They also found that the yield of plantains varied depending on factors such as the size of the farm, the number of workers, the number of suckers, the total investment in Nigerian naira, the farmer's age, and his or her level of experience.

BUDGETARY ANALYSIS OF BANANA (Musa sapientumL.) AND PLANTAIN (Musa paradisiaca L.) PRODUCTION

Productivity of Farm Resources

The term "productivity" refers to the efficiency with which one's resources are used. Technical productivity can be measured by looking at a company's output-to-input ratio, while economic productivity can be measured by looking at a company's economic returns. Both measures can be used in conjunction with each other. The costs and returns of agricultural businesses, the findings of regression analysis, and the marginal and mean values of agricultural inputs are all determined and analysed in this study as follows:

Budgetary Analysis

Budgeting models are simple and widely used in the process of agriculture economic analysis. An estimate of both gross revenue and total production expenses for a certain time period is the basis for budgetary analysis. Net income is

calculated by subtracting the first number from the second (Kainga and Seiyabo, 2012). The analyst can determine the profitability of a certain agricultural production system by applying the budgetary model. The model depicts the structure of a production system's expenses and revenues in order to assess the system's ability to create income or to ascertain whether or not it is profitable. The key concept here is that we should keep adding a variable input until there is no longer a difference between total returns and total input costs. To clarify:

Py.Y - Px.X = Max ——————————————————————-

(9) Where Py is the market's current average unit price of output, given in Naira currency value.

Y = "Output Quantity, Kilograms or Tonnes."

Px represents the current market price per unit of the variable input in terms of money.

X = The volume or weight of the variable input in kilogrammes or tonnes

A budget can be an extremely helpful instrument for the administration of agricultural businesses when there are just a few potential possibilities for production. In the realm of production economics, one can conduct empirical research by utilising this method, which is not only simple but also helpful (Thiam and Ong, 1979). In general, when comparing two methods that require the same amount of

management, the harvestable product yield per unit of land from a multiple-cropping system is higher than that from a single-cropping system. This is the case when comparing multiple-cropping systems to single-cropping systems. In addition to other things, this was discovered by farmers living on the periphery of tropical regions (Reijintjes et al., 1992).

Okorji (1986) evaluated the profitability of agriculture in southeast Nigeria using economic and production function models. He found that agricultural production was profitable. It came as no surprise to him that farming would turn out to be a financially unsuccessful endeavour for him.In the Nigerian states of Edo and Abia, plantain production was found to be lucrative by both the budgetary models of Ekunwe and Ajayi (2010). Plantain production was shown to be financially viable in both of these states, leading to this conclusion. Our investigation into the economic potential of the plantain industry in the states of Edo and Abia led us to the same conclusion as that reached by Fakayode et al. (2011), who studied plantain production in Rivers State, plantain farming is beneficial and economically viable.

These researchers found that plantain farming is prevalent in the Niger Delta. The yield of plantains was the primary

subject of their inquiry. The results of the study point to the fact that this is the condition that has to be addressed. Both Kainga (1997) and Kainga (1998) investigated the economics of producing arrack, a regional variety of gin, and swamp rice in the Nigerian states of Rivers and Bayelsa. Rivers and Bayelsa are located in the southeastern region of the country (2002). The vast majority of this research, along with a significant portion of each of these other efforts, will be carried out in Nigeria. He reasoned that there might be valuable cash crops to be discovered there in the shape of local gins such as arrack and swamp rice. Specifically, he believed that this might be the case.

When comparing the yields of yams grown in single cropping systems to those grown in mixed cropping systems, Okorji (1986) employed a cost-benefit analysis to make his comparisons. He found that the yield, output, and output per seed input were all significantly increased when the yam crop was grown on its own as opposed to when it was produced in a rotation with other types of crops. This was the case even though the yam crop was grown for the same amount of time. Okorji (1986) suggests that these findings can be explained by the larger yam crop stands that were observed in yam monocultures in comparison to its counterparts that were grown in mixed-cropping systems. These counterparts were grown in the same conditions as

the yam monocultures. In addition, it was discovered that monocultures were more productive in areas that lacked land, labour, and other resources in general. This was a finding that was made available to the public. It is feasible that the cost of producing yams through the use of a rotating method of cropping will reach as high as N408.79 per hectare. He stated that it is reasonable to employ solo cropping because it needs less hours of labour and less capital investment but results in bigger revenues. Specifically, he argued that this is due to the fact that solo cropping results in larger revenues. This is because one can acquire the same social position through any method of cropping, which is the reason for this phenomenon.

Budgetary Model and Model Specification

The budget for costs and profits from plantain and banana farm businesses was developed using a budgeting approach. The model's goal was to assess the profitability of individual businesses and the returns generated by their investments in the various components of production. The following mathematical formulas were utilised to express the fiscal model used in the data analysis:

FORMULAR

$$TTij = \sum_{} \sum_{} PijYij - TCij \text{ ---------- (10)}$$

j = 1 i = 1

Where

Ttij = The ith farm household's yearly net returns or farm revenue associated with the ith cropping method, expressed in Naira;

Pij = the price in Nigerian Naira for each unit of production from the jth cropping system used by the ith farm household;

Yij = the amount of production produced by the jth agricultural system used by the ith farm household, expressed in tonnes.

TCij = The sum of the costs incurred by the ith farm house to produce the jth Cropping system's output level, expressed in Naira;

i = 1,2, 3…,n

j = 1,2,3…, m

But TCij = $\sum_{j=1}^{m} \sum_{i=1}^{n} dijXij + Fij$ ----------(11)

Where

dij = price per unit in Nigerian naira of the ith input used in the jth farming method

Xij = Measured in kilogrammes or numbers, the amount of the ith input that was used in the jth cropping scheme

Fij = Fixed costs are used by the ith farm home to produce production in the jth cropping system in Naira.

The primary focus of this research is fixed expenses, often known as Fij. Examples of fixed expenses include rent and the depreciation of farming equipment. Another useful example is equity capital's opportunity cost. The return to the company, which is profit, is therefore shown by TTij, as well as the return to the management input that operators contribute. This is why TTij may be thought of as a measure of both (Allison-Oguru, 2004).

COSTS AND RETURN ANALYSIS OF BANANA AND PLANTAIN PRODUCTION ENTERPRISES

Profitability of banana farms

Labour costs in the banana sector were greater than the costs of all other cost variables combined as a percentage of overall production costs. It totaled 253,850.70 naira. The anticipated cost of using hired labour was 126,006.40 naira, whereas the cost of using family labour was estimated to be 127,844.30 naira. Labor accounted for 72.8 percent of the total manufacturing cost. Out of all the areas of variable expenses, we discovered that transportation costs were the easiest to control. The overall cost of transportation was 8,708,35 yen (including all fees and taxes). Because of the

great distances that farmers' products must travel to get to different markets, they must pay hefty transportation costs. The cost of labour input was fairly high due to the high cost of labour in comparison to the remuneration of oil firm employees working in the research region. This problem was what led to labour costs that were too high. Farmers are forced to pay more for labour that is inexpensive elsewhere as a result. Bananas brought in a total of N395,928.10, with a tonne costing N98.982. The total variable cost and the amount that the banana farms were liable for differed by N291,246.10. Banana plantations were able to make a profit of N104,682.20 as a result of this. An examination of net farm income also showed total fixed costs of N57.21.05. Depreciation of fixed assets and rent on land were taken into account. The total cost of the manufacturing was N348,467.15. The findings revealed that banana production contributed to a profit of N47,361.11 for the farm, with a benefit-to-cost ratio of 1.14 and a rate of return on invested capital of 14%. This indicates that the farmer received roughly N1,400 for every dollar he invested. This demonstrates that banana growing was profitable in the area under investigation. However, due to the poor rate of return on investment (14%), banana plantations were not a financially viable option.

Table 5. Costs and return in plantain production per hectare (n = 180).

Costs and return items	**Quantity**	Total value (₦)
Total revenue	6 tons at 94,923.8	569,543.30
Variable costs		
Plantain suckers		25,244.73
Transport		4,171.23
Family labour	208 man	125,555.42
Hired labour	160 man	114,660.34
Total variable cost		269,631.72

Source: Kainga, 2013

Profitability of Plantain Farms

The cost of producing plantains with hired labour was N114,660.34, according to Table 5, while the cost of producing plantains with family labour was 125,555.42. As a result, the total cost of labour came to 240,215.76 naira, or 73.5 percent of the total cost of manufacturing. Additionally, with a total cost of N4,171.23, the variable cost of transportation for the production of plantains was the least expensive. After that, it was announced how much money would be expected to be charged for suckers, which was N25,244.73. The statistics showed that producing plantains had a lower variable cost than producing bananas. The results also showed that even though the total variable costs were 267,631.72, the revenue from plantain production was 569,543.30 naira, with a price of 94,923.8 naira per tonne. As a result, plantain plantations generated a

gross profit of N299,915.88 in total. The manufacturing process ultimately cost N326,852.70. Similar to this, after deducting all fixed costs, the farm's net income was N242,690.53. A recent study has found that plantain growers make an average of N223,420.00 USD per hectare. To wit: (Kainga &Seiyabo, 2012). The results of this study confirmed those of Ekunwe and Ajayi (2010), who had established that growing plantains can be financially advantageous. Despite the fact that plantains alone brought in a total of N223,214.00, it was found that growing plantains alongside other crops resulted in net farm income of 203,139.40 per hectare and a return on investment (RON) of 37.7%. The formula for return on investment (RON) was used to determine this.

Plantain production brought in a total of 223,214.00, This means that there was a profit of 37 kobo for every naira invested in the company. Farmers in the Nigerian Niger Delta who are working with limited resources have shown that growing a variety of crops rather than just one kind of plant can increase returns on investment. The fact that there isn't enough land available for farming presents a problem for agricultural endeavours in this region of the world. The study's conclusions suggest that a single plantain has the ability to produce net returns per hectare that, if all other

variables remain constant, might serve as the basis for agroeconomic growth and development. However, the study's findings indicated that cultivating a single crop might result in better net returns, which might support agroeconomic expansion. For small-holder farmers in the Central Niger Delta of Nigeria who engaged in mixed cropping operations that included plantain, the yearly net return per hectare ranged from N76,662.08 to N112,523.25, while the annual net return per hectare for cropping that consisted purely of plantain was N76,331. A single plantain brought in almost N312,000 from sales, yet it cost N127,422.12 to produce that plantain.

The average net revenue per hectare has consequently increased to 184,577.88 USD. As shown by documentation (Allison-Oguru et al., 2008). The benefit-to-cost ratio was assessed to be 1.74, and the return on investment was estimated to be 74%. This means that for every naira you invest, you should expect to receive 0.74 k in return. The income from the farmers' farms would have been enough to pay the principal, interest, and a small profit for the farmers if a bank loan had been given to them at the current annual interest rate of 21%. This is because the rate of return is determined based on the total amount of money made from the capital's initial investment. A 73% return on investment

was achieved in the production of plantains, per studies done by Fakayode et al. (2011). They conducted research, from which they gathered this knowledge. This study's rate of return on capital invested was 73%, which is comparable to the earlier illustration. You may argue that starting a business growing plantains in the area in issue is a wise financial decision.

The plantain and banana firms helped the people who benefited from Fadama raise their standard of living. It was projected that the plantain producers in question would incur total fixed costs of 757,700.00, and it was determined that this sum was accurate. It was estimated that 158,000.00 would be spent overall on variable costs. The costs of labour, transportation, and banana suckers are all included in this amount. The total amount spent on production was 915,700.00, the total amount of revenue was 1,200,000.00, and the total amount of net profit was 284,300.00, according to the conclusions of the conclusion. The findings of the analysis therefore showed that plantain cultivation was profitable. The return on investment for the plantain farmers was 0.31, indicating that the venture was lucrative for them because they made 0.31 Naira for every 1.00 Naira they invested. Or to put it another way, for every dollar invested, they made 31.1 naira. This outcome is

consistent with a financial analysis of the production of bananas and plantains in the state of Bayelsa, which produced net profits of N47,000 and N242,690.53 respectively. This outcome is consistent with the analysis's conclusions. Additionally, a recent study revealed that plantain producers typically earned N223,420.00 per hectare (Kainga and Seiyabo, 2012). Even though the net income was much larger than the previous finding of 0.74k, the return on investment was significantly lower (Kainga, 2013). The fact that the company received funding from FUG despite having relatively high overall production costs suggests that FUG recipients may not have been sufficiently controlling this variable, even though it is likely that the knowledge of Advisory Service Providers played a role in improving net income. On the other hand, the high overall production costs, which were probably not effectively handled, may have contributed to the low rates of return.

Despite this, Ekunwe and Ajayi's (2010) findings—which also showed that plantain cultivation was profitable—showed that this evaluation was accurate. It was found that growing plantains along with other crops generated a net farm income of 203,139.40 euros per hectare. This produced a return on investment (RON) of 37.7%, meaning that for every naira spent, profit of 37kobo

was realised. While the total revenue from the sale of plantains was N223,214.00.

The survey's banana farmers were expected to bear a total of 757,700.00 yen in fixed costs. It was determined that variables will cost a total of N163,000 in total. The price tag accounts for the expenses of buying banana suckers, shipping them, and paying labour. The cost per hectare was determined to be N920,700.00, with an expected yearly revenue of N1,300,000.00. A N379,000 net income forecast was made. Banana growers in the study region had a return on investment of 0.41, which meant that for every Naira they invested in their business, they made 0.41 Naira. The findings demonstrated that, if appropriate resources are made available and used efficiently, growing plantains and bananas has the potential to generate financial gain and contribute to the labour force in the local area through use of Fadama.

Assessing the economic viability of plantain and banana farms in the Southern Ijaw Local Government Area that were threatened by Fadama III was the main goal of the study. According to the findings of various researches, married men between the ages of 31 and 50 make up the greatest demographic of growers of bananas and plantains.

Most farmers had completed college education at some level. The companies that dealt in plantains and bananas earned an estimated total of N284,300 and N379,300 in net farm revenue, respectively, during the production period. Plantain and banana production may be viable businesses, as demonstrated by Fadama grantees' respective returns on investment of 0.31 and 0.41 for these two commodities. According to the research, plantain and banana farms in the area have the potential to produce money and create new job opportunities if given the right support and funding.

The poll's findings indicate that the three biggest problems facing farmers today are a lack of land that is appropriate for farming, high transportation costs, and disease outbreaks. In light of this, it has been suggested that the federal government and those in charge of the Fadama III project cooperate in order to give growers of plantains and bananas more space. All parties concerned would benefit from an increase in agricultural output and income as a result. It is vital to provide clients with a better experience and more services in order to enhance the project's scope.

Effect of Post-harvest Losses on Profitability of Plantain Farming

According to estimates provided by the World Food Programme (WFP), there will be a global loss or waste of

around 1.29 billion metric tonnes of food that was produced expressly for human consumption in 2018. Post-harvest losses are defined as any lost or ruined food items that occur at any point in the supply chain after harvest. Post-harvest losses can occur anywhere in the supply chain. This is the answer that Hiwe offers regarding postharvest losses (2018). According to Kaiya (2014), "post-harvest loss" refers to the decline in the quality and quantity of food that occurs between the time of harvesting and when it is consumed. He differentiates between "quality losses," which influence a product's nutrient and calorie content, acceptability, and edibility, and "quantity losses," which diminish the amount of the product. "Quality losses" affect a product's nutrient and calorie content, acceptability, and edibility. Morris and Kamarulzaman considered post-harvest losses to be an extra component of economic loss when they observed that better items could only be found in markets with lower prices (2014).

Post harvest losses (PHLs) are losses that occur after harvesting and can happen anywhere along the supply chain as a result of faulty handling, biodegradation by bacteria, insects, rodents, or birds, or any combination of these factors (Hodges, Buzby, & Bennett, 2011). This may occur if the drug is mishandled in some way, or if it is biodegraded over time. According to Tchango, Bikio, Achard, Escalant,

and Ngalani's research, the percentage of plantains that are lost after harvest varies from country to country dependent on the structure of the supply chain as well as the tastes of the end consumers (1999). According to the findings of the study that was supplied, plantain vendors have a negative reputation due to the manner in which they handle and keep the fruits after they have been purchased (Adeniyi &Ayandiji, 2014).

In Bayelsa, a rapid decline in the quality and value of food products as they make their way through the distribution system is caused by a lack of post-harvest infrastructure, poor crop quality, and a short shelf life. All three of these factors contribute to the shortening of the shelf life of food products (FSC). It may be difficult to accurately estimate the amount of loss that occurs after harvest because plantains are consumed in Nigeria at varied stages of maturity. On a range of sizes, including the local, national, and even the international level, efforts to improve post-harvest management have the potential to have a considerable impact on food security. Humanity has grappled with the problem of reducing the amount of food wasted after harvesting crops since the beginning of time. There is a greater pressure to maintain existing food supplies at a time when food is already in low supply and populations are growing quickly in some of the world's

poorest nations. Addressing this demand will be more and more important in the future. Over the course of several years, some forward-thinking people have worked to raise awareness of the issue of post-harvest losses (Atanda, Pessu, Agoda, Isong, and Ikotun, 2011).

Since there is a lack of information on the type and scope of post-harvest losses, it is challenging to effectively address this issue. This makes it challenging. On the other hand, while production is the main concern, minimising post-harvest losses is rarely taken into account. It is very possible that inadequate post-harvest storage procedures and subpar harvest quality are causing the issue to worsen.

According to a survey of the existing literature, there is insufficient understanding on the economic sustainability of postharvest losses in Bayelsa. These facts are guaranteed to be available right now. In order to determine the financial status of plantain farmers, it is necessary to conduct a case study on the profitability analysis of plantain post-harvest losses using the ratio approach and information obtained from respondents in the research region. This will provide the necessary information. To investigate thisphenomena further, a profitability study of plantain post-harvest losses is used. Despite their relevance and the fact that they contribute to the carbohydrate component of the diets of

people living in less developed countries, perishable food crops have received less attention in previous research. Because of their extreme perishability, these important foods are usually produced by low-volume, subsistence-level systems. Furthermore, post-harvest management of these products generally relies on traditional practises that scientists do not give much care to (Tchango, Bikio, Achard, Escalant, and Ngalani 1999)

Growing plantains can be profitable even after subtracting losses that happen after the crop is harvested. Reduced post-harvest waste has the potential to benefit plantain farmers financially and socially, and increased economic output has the potential to benefit the entire economy. It was suggested that more be done to lessen plantain loss after harvest and that farmers be open to utilising cutting-edge plantain preservation techniques. When plantain producers come together to form cooperatives, they are better able to comprehend how they may influence the market.

CROPPING SYSTEMS OF BANANA AND PLANTAIN

Factors influencing Banana and Plantain Production

Banana and plantain yields were affected by a number of variables. Among the recognised factors are land, labour, capital, fertilisers, chemicals, and farm financing. The

aforementioned factor inputs are quantifiable, and their usage by farmers to fulfil their goals is contingent on the managerial skill of farm operators in making optimum use of available resources. Access to extension services and the age of the crop plant are further considerations. Instead of being grouped together as capital, inputs such as fertiliser, chemicals, and farm credit were designated individually. This was required in order not to exaggerate or underestimate the impact of capital on crop yield. Identifying the factor that poses the greatest obstacle to banana and plantain development was crucial. Other documented factors that have influenced the development of banana and plantain crops include climatic change, market conditions, pests and illnesses, and consumer demand. However, some of these are difficult to quantify.

Cropping Pattern and Crop Mixtures

There were two major cropping systems seen on farms that were assessed. These are examples of solo and mixed cropping. In solitary cropping, only one crop is sown on a farm during a given growing season. In mixed cropping, the primary crop, such as plantain or banana, is combined with one or more supplementary crops within a given farming season. The pattern of the farmers' cropping activities revealed that they engage in single as well as mixed

cropping. Approximately 117 farmers, which is equivalent to 65% of all farmers, opt to engage in mixed cropping, whereas 41 farmers, which is equivalent to 22.8% of all farmers, choose to grow bananas and plantains as their principal crops, respectively. On the other hand, there were 22 farmers who practised mixed cropping, which accounts for 12.2% of the total. In spite of the fact that bananas have a more significant historical and sociological role than plantains do, the researchers found that solo cropping was more closely associated with banana cultivation in the region they were studying. In addition, the crop combinations of the region demonstrated that plantain is the predominate crop component. According to Beets (1982) and Allison-Oguru et al (1999), plantain is the most important crop in Sub-Saharan Africa. This finding is consistent with the findings of both of these researchers.

Studies indicate that the fact that cocoyam is nearly extinct in the area can be attributed to the fact that it is going extinct, which explains why there is almost no mixing with cocoyam. Cocoyam is regarded as an endangered species on the farms that are maintained by Nigerian farmers by many different groups (Lyonga and Nzietchueng, 1986). This problem demands urgent response. In addition, the investigation found that mixed cropping is done for a

number of different reasons, including but not limited to the following: increased income; for a variety of agricultural goods; inadequate land; to maximise farm area utilisation; and to fight weeds. To be more specific, the banana crop is added to the mix with the plantain crop so that it can be used as an alley or boundary crop.

Cropping Calendar of Banana and Plantain

In the region that is the focus of this investigation, the initiation of agricultural operations is affected by two significant features. They are the site of both the farm and the flood that occurs every year. For instance, as the water level drops, farmers swiftly prepare the land for planting and begin the planting process on their farms between the months of November and December. Even though plantains and bananas are perennials, it is important to get all of the crops planted and harvested before the next flood season. The goal is to make sure that everything is ready. In addition to this, the majority of the arable land in the area under investigation is located at a low elevation and has a high water table. Between the months of January and March, arid areas or regions with low water levels might be able to maintain farming activities. This would help separate crop harvesting from the annual flood season. Dry terrain was sought after because it was necessary for the cultivation of

bananas and plantains. In spite of this, there are considerable limitations placed on the total acreage that can be devoted to the cultivation of bananas and plantains in these particular regions that make up the research area. Figure 1 depicts the growing season in its entirety. Take, for example: Between the months of November and December, or during the months of January, February, or March, the ground was prepared. The planting process could take place during the months of March and April, November and December, or January. Weeding and slashing should be done during the months of May and June, August, and January and February respectively.

Both bananas and plantains were harvested between the months of January and December and were sold throughout the entire year. While the utilisation of external resources, such as fertiliser, was relatively unusual, this was in part due to the fact that the commodity was not easily accessible. Four farmers, for instance, used the chemical and fertiliser loans made available by Shell Petroleum Development Company. Furthermore, organic manure application was a very unusual practise. Banana and plantain products are sold at a premium during the months of March and April, as these months fall outside of the typical growing season. The reason for this is that bananas and plantains are only

available during certain times of the year. However, they tend to drop out between August and September. According to Allison-Oguru (2004), the months of January and February were used for slashing as well as harvesting and marketing the crop; the months of March and July were used for planting as well as harvesting and marketing the crop; the month of August was used for weeding, staking, harvesting, and marketing the crop; and the month of December was used for harvesting and marketing the crop.

Figure 5 Cropping Calendar of Banana and Plantain in Bayelsa State.

Cropping Activity	Jan.	Feb.	March	Apr.	May	Jun	July	Aug.	Sept	Oct	Nov.	Dec
Land preparation												
Planting												
Weeding/												
Slashing												

Source: Kainga, 2013.

Labour Supply and Utilization

According to the study's findings, the two types of labour that contribute the most are paid labour and labour provided by family members. Paid labour should not be confused with family labour, which refers to the efforts done by family members to meet the household's financial and subsistence needs. Paid labour is distinguished from family labour. The following is a breakdown of the types of labour

that are utilised for agricultural tasks in the process of producing bananas and plantains:

More family labour than hired labour was used in the banana industry. Family labour contributed 80 mandays per hectare, compared to 64 mandays from contracted labour. An hectare required 144 mandays of family labour and contracted labour in total. For both forms of labour, the same amount of total labour was used for preparing the land for planting, weeding and slashing, and harvesting. Each individual made a 16 manday contribution. Sorting and grading processes took 16 mandays of family labour alone, while 18 manhours were needed to finish these procedures.

The production of plantains typically relied on the participation of family members rather than outside labourers. The number of mandays contributed by contracted labour was 160, while the number contributed by family members was 208. Therefore, a total of 368 mandays were necessary to complete both types of labour. 112 mandays were spent preparing the field, 96 mandays were spent weeding and slashing, 80 mandays were spent planting, and 64 mandays were spent harvesting and sorting and grading. In addition, planting required 48 mandays of family labour and 32 mandays of hired labour; weeding and

cutting required 48 mandays of family labour and hired labour; and land preparation required 48 and 64 mandays of family labour and hired labour, respectively. The harvesting process required a total of 48 family labour days in addition to 16 contractual work days, whereas sorting and grading required only 16 family labour days.

The gender breakdown of the farmers in the area under investigation revealed that there were 84 male farmers, representing 46.7% of the total, and 96 female farmers, representing 53.3% of the total. This information pertains to the quantity of labour that is available in the location under consideration. Additional studies on the distribution of labour in the production of bananas and plantains revealed that women make up a greater proportion of workers in these industries (Table6). The findings indicated that land preparation was largely a male activity, in contrast to the activities of planting, weeding/slashing, and harvesting, which were all performed by both males and females.

Table 6 Labour Availability According to Gender

Gender	Frequency	% Frequency
Male	84	46.7
Female	96	53.3
Total	180	100.0

Source: Kainga, 2013

Farm Land Acquisition and Location

The method of land acquisition and geographic location both have a role in determining whether or not farmers have access to land and whether or not they use it for banana and plantain production.

Availability of Farmland

Significantly, land is a limiting element in the studied area. It is in scarce quantity and is acquired primarily through inheritance. Approximately 71.7% of farmers obtained their farmland through inheritance. The percentages of farmers who got their land through purchase and rental were 12.2% and 11.7%, respectively.

Fig 6: Plantain and Banana Farms
Source; Own pictures, 2022

The plantain sole farms were on average 0.89 hectares in size, whereas the banana sole farms were on average 0.12 hectares. In spite of the societal and economic significance of plantain and banana crops, relatively small farm sizes are designated for these types of crops. The size of a plantain farm was between 0.7 and 1 hectare on average (Kainga and Seiyabo, 2012) and 0.8ha (Kainga and Seiyabo, 2012). (Dzomeku et al, 2011)

Distance of Farm to Nearest Home and Market

Fig. 7: Plantain movement to markets with vehicles
Source; Own pictures, 2022

The majority of the farms that were examined were found to be located far from their primary dwellings. The average distance between a farm and the market where its produce is sold is 15.05 kilometres, although only 4.62 kilometres separate a farm from a residence. Rivers and streams could potentially be present in this environment. The fierce competition for properties near to farming communities, as well as the search for quality land outside of the region's farming towns, are the two main causes of the substantial distance between farms and the farm households and marketplaces that those farms supply. Many farmers build structures that are only intended to be used during harvest because of the temporary nature of the work done on farms.

Availability of Capital

Growers of bananas and plantains in the region make use of both fixed and operating capital on their farms. Fixed capital is money that stays put while operating capital is money that fluctuates. Examples of fixed capital include things like land, a farm building or store, racks, various types of farm

implements (such a cutlass, knives, sharpening file, hoe, digger, axe, and shovel), as well as things like a bag, baskets, basins, wheelbarrow, boat, motor-saw, and bicycle. The plant supplies and chemicals make up the other components of working capital, in addition to cash. Table 7 contains an inventory of the farm's various assets. The fact that respondents construct farm structures utilising locally sourced and improvised materials that are easily available in the forest is the primary contributor to the cheap cost of farm assets that was observed in this study. In addition, the majority of the assets or equipment, including things like canoes, chainsaws, and motorcycles, were borrowed rather than purchased. Primarily from their own personal savings, farmers in the region amass the financial resources necessary to purchase both fixed and working capital. Credit and inputs of fertiliser were extremely difficult to come by for farmers.

Table 7 Farm Assets

Asset	Total No.Available	Unitcost ₦
Farm Building	1	1,605.69
Farm Store	1	633.33
Racks	1	491.94
Cutlasses/Knives/ file	5	5,304.44
Hoes/Diggers/Axe	3	2,115.56
Shovels	1	704.19
Bags/Baskets/Basins	2	618.56
Wheel barrow	1	4,741.67
Canoe	1	6,042.46
Motor Saw	1	2,893.85
Motor Cycle	1	833.33
Bicycle	1	444.44

Source: Kainga, 2013.

DISTRIBUTION OF CROP YIELD AND FARM GATE PRICE OF BANANA AND PLANTAIN

The distribution of agricultural items produced by producers of bananas and plantains for a variety of purposes is outlined in Table 8 below. Based on the distribution, it was clear that the farmers only used 11% of their crop themselves while selling 87% of it. The distribution also reveals that 2% of the banana harvest was given away as presents to close friends and relatives.

In a similar vein, the table demonstrated that 87% of the plantains that were harvested were sold, 10% were consumed, and 3% were presented to relatives and close friends. It was determined that bunches of bananas and plantains weigh a total of 12 kilogrammes and 14 kilogrammes, respectively. The average farm gate price for a tonne of bananas was anticipated to be N98,982.08, and the average farm gate price for a tonne of plantains was anticipated to be N94,923.88. Farmers reaffirmed that because plantain is a perennial crop, its production has the potential to expand in the third and fourth year due to greater regeneration if given sufficient time and care. Before beginning to decline, productivity may continue to rise for up to six additional years during certain seasons.

Table 8 Distribution of Farm Produce

Type of Product	Qty Sold Ton/Year	Oty Consumed Ton/Year	Qty Given out as gift Ton/Year	Total Output Ton/Year	Farm gate Unit Price/ Ton (₦)
Banana	87%	11%	2%	4ton/ha	98,982.08
Plantain	87%	10%	3%	6ton/ha	94,923.88

Source: Kainga, 2013

PROBLEMS AND PROSPECTS OF BANANA AND PLANTAIN PRODUCTION ENTERPRISES.

Problems of Banana and Plantain Production Enterprises.

Farmers in the study area faced many challenges when trying to grow bananas and plantains. The severity of difficulties encountered by local banana and plantain producers were rated on a four-point Likert scale. I would rank these as the top three most pressing issue.

(a) Disease, Maggot/nematode attack

(b) Inadequate Capital

(c) The high cost of the inputs needed (such as labour, canoe and suckers)

(d) Traveling vast distances by canoe or on foot to and from the farm.

(e) The effects of climate change, which include increased rainfall, higher temperatures, and the disappearance of the August beak, all of which contribute to lower yields.

(f) A high incidence of robbery and larceny
(g) Attacks by bees and snakes
(h) There is a scarcity of improved varieties and suckers, which drive up their prices.
(I) Heavy storms
(j) High costs of transportation brought on by poor road conditions
(k) The river is choppy because it is used for navigation by fast boats.
(l) Inadequate extension services
(m) The absence of markets that function properly

Banana and plantain yields and profits in the study area are limited by the aforementioned elements: the amount of production, the efficiency with which resources are used, and the direct consequences of these factors. Illness, worm and maggot infestations, costly input costs, and a lack of superior sucker types rank among the most pressing issues. Frison and Sharrock (1999) found similar results; they said that pests and illnesses have been a major problem in recent years, causing output losses of 30–50% in plantain and banana-producing regions around the world. These results are congruent with those found by Frison and Sharrock (1999). (1999). Plantain and banana production has many obstacles, including frequent and extended droughts, marketing hurdles, a lack of storage facilities, the

prevalence of pests and illnesses, and the issue of wind storms, as stated by Nwaiwu, Eze, Amaechi, and Osuagwu (2012). Wind storms, pest infestations, and a dearth of storage space are other problems.

Prospects of Banana and Plantain Production Enterprises

Producing plantains and bananas has very good business prospects. Jobs and employment creation, contributions to the GDP and national revenue, wealth creation, poverty reduction, industrial and economic growth, rural development, market stabilisation, and sustainable agricultural yields are a few examples of these potential. Particularly in sub-Saharan Africa, the aforementioned regions are rapidly drawing near. However, this may be possible if the following parts are optimised for resource utilisation and efficiency. 62.8% of the total was attributable to farm inputs like fertiliser, insecticides, pesticides, nematocides, etc., 31.7% to farm equipment, 26.1% to good motorable rural roads, 22.2% to access to extension services, and 22.2% to the availability of improved varieties of suckers (Table 9). If the government, non-governmental organisations (NGOs), and other stakeholders provide the aforementioned variables, then it stands to reason that banana and plantain outputs and earnings will rise in the region under investigation. Other factors that could improve productivity include well-functioning marketplaces (8.3%),

motorised boats (10%, primarily in riverine settlements), cheaper input prices (9.4%), and flood-free zones (6.1%) for banana and plantain farming (Table 9). Intensity scale: 3 for very strong, 2 for quite strong, 1 for not very powerful. The following factors were considered while evaluating the demand for features that would improve the efficiency of resource allocation and utilisation in banana and plantain producing businesses: Intensity scale: 4 = extremely strong, 3 = rather strong, 2 = fairly strong, 1 = not very strong. The predetermined threshold indicated that a tool that increased resource allocation and utilisation in banana and plantain production businesses had a mean value of 2.50 or higher. A mean value below 2.50 was considered indicative of a weak indicator.

Table 9 Factors that Enhance Efficiency of Resource use in Banana and Plantain Production.

Factors	Freq	% Freq	$\bar{X}$	Decision	% Freq
Provision of credit/loan	137	76.1	4.00	VS	76.1
Provision of farm inputs	113	62.8	4.00	VS	62.8
Provision of farm equipment	57	31.7	3.95	VS	31.7
Better Extension Service	40	22.2	3.90	VS	22.2
Provision of Improved varieties of suckers	37	20.6	3.80	VS	20.6
Provision of good motorable rural Roads	48	26.1	3.90	VS	26.1
Provision of good and functional markets	15	8.3	2.55	VS	8.3
Provision of Engine boats	18	10.0	2.60	VS	10.0
Provision of storage equipment	1	0.6	2.40	VS	0.6
Reduction of input cost	17	9.4	2.55	VS	9.4
Availability of flood free zones	11	6.1	2.50	VS	6.1

* Multiple ResponsesVS= Very Strong, NS= Not Strong
Source: Kainga, 2013

Economics of Processing and Value Chain in Roasted Plantain

The purpose of this study was to examine the economics of processing and the value chain in roasted plantain (bole) business/investment. 98.7% of the business's employees are female, proving that the company is gender-sensitive. The literacy rate is high, with 90% of merchants possessing formal education. The sellers operate in an unregulated financial sector that has zero percent (0%) bank facility (loan). 100% of the vendors employ the crude processing method of charcoal heat and earned N1,563,74k daily and N37,526,66k monthly. It was advised, therefore, that the government and other stakeholders strengthen the enabling environment for the survival of small company ventures such as the roasted plantain (bole) by sufficient legislation and advocacy. Also urged was government and other formal and public financial institution support for sustainable value chain finance and expanded commercial enterprise.

MY CONTRIBUTION TO KNOWLEDGE

Vice Chancellors Sir, you will agree with me that quiet an extensive work has been done on this comparative bride. Studies over the years has shown that indeed banana and plantain is the comparative bride in Niger Delta region and similar agroecology. While initial studies dwelt on agronomic aspects, my studies engaged economic and farm

management concepts as applied to banana and plantain production. Economic models as been developed. Concepts of resource allocation and utilization, efficiency of resource use in banana and plantain enterprises has been established. Findings no doubt will form bases and guide for banana and plantain production and economic research and policy planning and direction.

The focus of this study was to learn how commercial banana and plantain growers in Bayelsa State, Nigeria, divide up and make use of their available resources. Many resources, such as family labour, hired labour, suckers for bananas and plantains, and suckers for other fruits, are underutilised by farmers, according to studies on resource consumption and allocation. If you follow the "law of huge numbers," a 2% increase in sales would result from a 1% rise in plantain suckers. If overall income grows, this will be the case. It was clear from analysis of the allocative efficiency index, profit maximisation, and the equi-marginal principle that both the banana and plantain businesses had allocated their family and hired labour inefficiently. Although, in both businesses, banana suckers were distributed efficiently. Producers have not yet achieved optimal allocative efficiency with respect to these resources, as seen by the heavy reliance on hired labour and the inadequate utilisation of plantain suckers. On the other hand, if they used more plantain suckers while

employing fewer family members and outsiders, they may boost their income. Subsidised farm inputs and equipment are just some of the ways that the government, NGOs, and other institutions with a genuine political will can increase the allocative efficiency and resource utilisation of their operations.

Research of the costs and returns of growing bananas and plantains in the Nigerian state of Bayelsa found that the two crops were highly lucrative for farmers there. On the other hand, plantain growing proved to be significantly more profitable than banana farming. In the area, plantain farms were 0.12 hectares in size, whereas plantations averaged 0.89 hectares. There was an expected annual net return of N47,461.11 and N246,690.53 for the plantain and banana producing firms. On the other hand, plantain farming turned a profit with a benefit-to-cost ratio of 1.74. This means that, on average, an investor can expect a return of 0.74 K Naira for every Naira they put in. The potential for plantain plantations to be highly profitable businesses is underlined by the fact that they generate a return on investment of 74%. Only 14% of the money invested in banana groves returned the expected returns. Banana and plantain monocultures, if established on a sufficiently wide scale, may provide stable income for farmers.

The fundamental contributions to knowledge derived include:

- Researcher has formulated models for capturing resource allocation and utilization among banana and plantain farmers.
- Brought to knowledge of researchers that these resources the farmers use were inefficiently allocated and therefore affected the farmers returns.

CONCLUSION

Vice Chancellor Sir, let me conclude by stating that my contributions no doubt have provided veritable tools for efficient resource allocation and utilization for this Comparative bride banana and plantain in our agricultural zone and similar environments. Policy Planning and direction for research, training and farm business management will be enhanced.

Suggestions for further research

The following areas are suggested among others for further research:

1. Profit function approach in resource allocation and utilization in banana and plantain production enterprises.

2. Effect of climate change adaptation strategies on productivity and profitability of banana and plantain production enterprises.
3. Optimizing farm resources utilization in banana and plantain production enterprises.

ACKNOWLEDGMENTS

Mr. Vice-Chancellor Sir, I cannot end this inaugural lecture without acknowledging the contributions of several persons towards my growth and development in life. Let me first of all appreciate the Almighty God in whom all this fit was achieved. I must not forget my wonderful parents Pa Lifeboat Clephet Kainga and Evelyn Kainga all of blessed memory. Let me also acknowledge my wife, I called her My Grace while others call her Mama Prof. She has indeed been a pillar.

My sincere appreciation goes to our Digital and most efficient Vice-Chancellor and Chairman of Committee of Vice-Chancellors of Nigerian Universities. You will agree with me that my studies over the years were tilted towards efficient allocation and utilization of resources. Thank you for this unique opportunity and enabling this platform for me to showcase this lecture. To our dynamic Registrar I say thank you for giving me the opportunity to present this inaugural lecture.

Vice-Chancellor Sir, time will not permit me to express my appreciation to as many that contributed to my success story. However, permit me to elucidate the following: I appreciate my Head of Department, Dr. (Mrs.) Custodian D. Nnadi for her unflinching support, and to all other Heads of

Department, staff and students of the Faculty of Agriculture for their cooperation even as Dean. My special appreciation goes to all former Deans especially my predecessor, Professor Inetiminebi Arrow Ogidi for appointing me as Sub-Dean to coordinate examinations, results among others where I gained experience in a lot of university administration. Let me also appreciate my brother and friend Mr. Aseimo, Tarimo Joseph for his moral and agro-entrepreneurial support, and in fact for providing me the platform for farm business management and production economics practice in addition to footing some of my bills. Then my friend and brother again Mr. Nelson Perekemebinaengogha Miebi who was there for me throughout my university career.

My Academic Mentors, including all my teachers/lecturers at various levels; first and foremost is Prof Edmond A. Allison-Oguru who supervised both my B.Sc and M.Sc projects was a source of inspiration and motivation. Secondly, Prof (Mrs.) Abiodun O. Adeyemo was the cutting edge that turned around my academic prowess. On this faithful day while I was busy discharging my profound duties as Departmental Examination Officer of the Department of Agricultural Economics and Rural Sociology (then) and Departmental Examination Officer for all other Departments of the Faculty of Agricultural

Technology (then) at the early stage of its existence and again as Faculty Examination Officer; not even bordered neither did it occur to me to go for my PhD or even publish papers for promotion. Worst scenario, was never even knowing whether my CGPA at the MSc could qualify for a PhD until I went to apply for transcript upon collection of a PhD admission form for 2006/2007 session. That faithful day, then Dr. (Mrs.) Abiodun O. Adeyemo walked into my office, I was very busy computing results, you all know it was manual then, highly demanding and very stressful. She looked at me very closely (in few seconds many things went through my thoughts--- what she was up to), while in that mood, she pushed my forehead very hard along with these words---**"when are you going to enroll for your PhD? Dey there you hear, dey do your exam officer work"**.

Then without further utterances, the timely ANGEL God sent left. Of a truth, I then became very sober. Immediately the question now came, where do I start from? And spontaneously, I approached Prof. Douglas I. Ekpebu (then Dr. and Ag. HOD of the Department) on where to go. He outrightly recommended University of Nigeria Nsukka (UNN)-the Premier University, where lions/lionesses are trained and produced to restore the dignity of man. He gave me the contact of Dr. Benjamin Edozie Okpukpara (a lecturer) at the Department of Agricultural Economics

UNN. I called to know when forms will be out and behold, he said forms were already on display and immediately he obtained one for me.

Next are my supervisors, Late Prof. Eugene Chukwuemeka Okorji (Major Supervisor) and Late Prof. Noble Jackson Nweze (Second Supervisor). The later was the HOD at the middle of my programme while the former was the HOD during the last years of my programme. I was highly favoured!

Prof. (Mrs.) Abiodun O. Adeyemo, again triggered my skills in publications. She again one faithful day walked to me, Kainga how many papers have you published? From the time as a lecturer, not yet and my eyes were opened.

Prof. J.A. Mbanasor who was on sabbatical and doubled as HOD also encouraged me to publish. Furthermore, Prof. M.O. Adesope, then Dr. who was an adjunct lecturer encouraged me further on the area of research and publications. Now Prof. John F. Alfred-Ockiya who was my next-door neighbour in office at the lecturers' block will always ask, have you defended? When? With usually very loud voice. At some point I was tempted to dodge his door if opened. Indeed, he was an encourager. My journey specifically in writing my inaugural lecture started on 16th

December 2016 after Prof. (Mrs.) Abiodun O. Adeyemo's presentation of the 21st in the series on the 14th December 2016. I eventually picked up the pen to commence the packaging of this inaugural lecture. They say the journey of a thousand miles starts with the first step.

On mentorship, I cannot ignore my main Academic Mentor, that is, my late father, Pa Lifeboat Clephet Kainga. No doubt was my main academic mentor. He fondly called me Doctor after bagging the PhD and should I say luckily or divinely alive to see his son as an Associate Professor. Now I can hear him call me Professor.

But above all, the start of this academic journey is remarkable because Pa Lifeboat, a primary-two dropout because his mother could not afford his school fees, in search of greener pasture, sojourned to the Gold Coast now Ghana in about 1935. He went to Lagos by hand pulling, trekked from Lagos to Cotonu and then to Ghana. Along the line he got employed at the University of Ghana Legon as Storekeeper, and member among Foreign Lecturers, Professors and Senior Staff of the Common Wealth of the University of Ghana, at which time Prince was born; and I had my nursery and part of my primary education in the University nursery/primary school. After about 65 years from the community he left, a university (NDU) was

established. Again, after a total of about 85 years, his son achieved the fit of a Professor-His life time dream. No doubt my movement to academics at NDU after 10 years in ADP was really Divine.

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NDU 49TH INAUGURAL LECTURER

Prince Ebiowei Kainga, Ph.D

Diploma; Bsc, Msc (RSUST), PhD (UNN), MBA(FUTO),
Diploma Theology (ANFCBII)
Professor of Farm Management and Production Economics
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PROFILE OF PROFESSOR PRINCE EBIOWEI KAINGA

Professor Prince Ebiowei Kainga, was Born on August 6, 1961 in Accra-Ghana to Pa Lifeboat Clephet Kainga of Wapere-Ama and Efeke-Ama of Amassoma and Tambiri Quarters of Agbere and to Mrs Evelyn Kainga (Nee Abadi Naingba) of Okulobo-Ama of Amassoma. Professor Prince Ebiowei Kainga attended the Famous University of Ghana Nursery/Primary School Legon and St Stephen school Amassoma.

He obtained his Bachelor of Science (BSc) Degree in Agricultural Economics andExtension and Master of Science (MSc) Degree in Agricultural Economics from the Rivers State University of Science and Technology, Port Harcourt after obtaining his Diploma in the same field with Distinction, and as the best graduating Student of the Department. By dentof hard work, he bagged a Master of Business Administration (MBA)Degree in Project Management from the Federal University of Technology Owerri. With the desire to distinguish himself in his career, he eventually bagged a Doctor of Philosophy (PhD)Degree in Agricultural Economics, with specialization in Farm Management and Production Economics from the University of Nigeria Nsukka (UNN) again as the best Graduating student of the Department in 2013.

Also to his credit is a Diploma in Theology with Distinction, again as the Best Graduating student from All Nations for Christ Bible Institute International (ANFCBII).
He has acquired vast educational, professional and administrative experience over the years. First, he was employed by the Rivers State Schools Directorate in 1981-1982 as a tutor at C.S.S Ogboinbiri in the Apoi Creek of Southern-ljaw.Thereafter, he was appointed the Director of Mobilization of Students in Agriculture and Industry through Rice project as well as the Coordinator Mass Literacy Campaign Programme in Emene, Enugu from 1989 - 1990 When he was doing his NYSC. After the completion of his Youth Service, he was appointed Extension officer with the Rivers State Agricultural Development Programme, Port Harcourt in 1993-1996.

When Bayelsa State was created in1996, he was lifted to the position of subject matter Specialist in Agronomy of Bayelsa State Agricultural Development Programme (ADP). He was again appointed on secondment the Personal Assistant to the first Commissioner of Finance and Economic Planning of Bayelsa State from 1997- 1999. From 1991, he was appointed as the Head of Crops of the Technical Services Division of Bayelsa State Agricultural Development Programme. He however left the ADP which was an arm of the Ministry of Agriculture as an Agricultural Officer 1.

The academic career of Professor Prince Ebiowei Kainga commenced in earnest when he took up appointment with the Niger Delta University in 2003 by divine direction as Assistant lecturer in the Department of Agricultural Economics and Rural Sociology. He rose to the rank of Lecturer 11 in 2005. Within the period he briefly served as Supervisory Councillor in charge of Agriculture, Environment and Community Development of Ogboin North Local Government Area of Bayelsa State. He further rose through the ranks to become Lecturer 1, Senior Lecturer, Associate Professor and of course Professor in October, 2020 in the Department of Agricultural Economics, Extension and Rural Development of the Faculty of Agriculture, Niger Delta University. Professor Kainga is the First Inaugural Lecturer of the Department of Agricultural Economics, Extension and Rural Development and Third of the Faculty of Agriculture, Niger Delta University.

Owing to his crave for professionalism, Professor Kainga is a member of numerous professional organizations including, Nigerian Association of Agricultural Economists (NAAE), Farm Management Association of Nigeria (FAMAN), and Agricultural Society of Nigeria (ASN). He has been highly involved in organizing national conferences for professional Associations and also involved

in community service and development. Professor Kainga has published widely in reputable peer reviewed local and international journals as well as in some relevant conference proceedings. He is also an editorial board member in reputable peer reviewed journals. He has been an External Assessor to Nigerian University.

Professor Kainga have also demonstrated immensely with high sense of judgement on university administration. He is currently the Dean, Faculty of Agriculture and member Postgraduate Curriculum Committee, after serving as sub-dean, Faculty Postgraduate Coordinator and Head of Department (from 2013 to 2019) of Agricultural Economics, Extension and Rural Development, Niger Delta University. While HOD, Department produced for the first time, six (6) first class students out of which Professor Kainga supervised five (5), among whom was the Overall Best graduating student of the five combined convocations (2014/2015 – 2018/2019 sessions) of Niger Delta University. As Dean, he has again produced five first class students. He has been a Senate member since 2015 till date.

He served as Departmental and Faculty examination officer for several years and has also served in several committees such as faculty prospectus preparation and review, farm management among others. Professor Kainga as a clergy is a Senior Pastor and District Presbyter 2B and currently the

Resident Pastor of Church of God Mission Agudama-Epie Provincial Headquarters Bayelsa Bishopric. He has also contributed to the socio-economic, political, cultural and community development of Amassoma and as well as the emancipation of the Izon nation. Professor Kainga was a member of Bayelsa Forum and Bayelsa State creation movement and Grass root mobilization committee that struggled for the creation of Bayelsa State in 1996. He was coordinator, fund raising committee Ogboin clan for the 3rd INC convention, held at Bonny in 1995.

Currently, he is a member and Organizing Secretary of Bayelsa State Founding Fathers Forum. At the home front, he was member of committee and co-author of Amassoma Development Blue Print 2000. His was instrumental to the development of contemporary social organizations in Amassoma. This fit was achieved through the foremost club in Amassoma, KLOBB 7 where the social, cultural and educational status of Amassoma have been turned around through enlightenment, teaching, scholarship and community development programmes.

Professor Kainga is the author of the book - titled "Amassoma in the core of NigerDelta and Izon culture Historical Perspective, being a tribute to Chief D.S.P Alamieyeseigha 2004" which by no means opened the gate way of documentation in Amassoma. One striking

achievement of Professor Kainga is being a co-translator of the Book "Non-killing GlobalPolitical Science" by an American Professor Emeritus of Political Science, Glenn D. Paige, 2002; the Nigeria English Edition 2006 in ljaw languageprecisely the Amassoma dialect of 112 pages, entitled "Akpo See Kemebagha-(Zozobagha) bra Ibe da tolumoeyi, 2009.

The achievements of this gentleman cannot be exhausted in this citation. His awards include Certificate of Honour by Bayelsa State Founding Fathers in Recognition of his Outstanding Contributions towards the Emancipation of the Ijaw Nation and the Creation of Bayelsa State (30th November, 2006), Klobb 7 of Amassoma Long Service Award 2010, Photon Innovation Award for Inspiration and CuttingEgde Research 2012; Award of Honour for Academic Achievement and Conferment of Professor by Niger Delta University, by the Youth of Efeke and Wapere-Ama of Amassoma on his Academic Achievement 2021; Personal Achievement Award in Recognition of his Individual Career Achievements as a Former Student of G.S.S. Amassoma 2022, being the first Professor as old student of the fifty years of existence of Government Secondary School Amassoma. Beside everysuccessful man, there is a virtuous woman. Professor Kainga is lovelymarried to Mrs. Ebikaboere Prince Kainga with children.

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