



*The World's Largest Open Access Agricultural & Applied Economics Digital Library*

**This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.**

**Help ensure our sustainability.**

Give to AgEcon Search

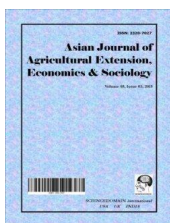
AgEcon Search

<http://ageconsearch.umn.edu>

[aesearch@umn.edu](mailto:aesearch@umn.edu)

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

*No endorsement of AgEcon Search or its fundraising activities by the author(s) of the following work or their employer(s) is intended or implied.*



## **A Decade (2002 – 2012) of Presidential Intervention on Cassava in Nigeria; the Successes and Challenges**

**Elijah I. Ohimain<sup>1\*</sup>**

<sup>1</sup>*Industrial and Food Policy Research Unit, Biological Sciences Department, Faculty of Science,  
Niger Delta University, Wilberforce Island, Bayelsa State, Nigeria.*

### **Author's contribution**

*The sole author designed, analyzed and interpreted and prepared the manuscript.*

### **Article Information**

DOI: 10.9734/AJAEES/2015/16979

#### Editor(s):

(1) Mohamed Hssan M. Abdel Aal, Faculty of Agriculture, Cairo University, Egypt.

#### Reviewers:

(1) Anonymous, USA.

(2) Samara Ernandes, Universidade Tecnológica Federal Do Paraná, Brasil.

(3) Anonymous, Turkey.

(4) Peter O. Kolawole, Agricultural Engineering Department, Federal University of Technology Akure, Nigeria.

(5) Samson Adeoye Oyeyinka, Department of Home Economics and Food Science, University of Ilorin, Ilorin Nigeria.

Complete Peer review History: <http://www.sciencedomain.org/review-history.php?id=1060&id=25&aid=9142>

**Policy Article**

**Received 21<sup>st</sup> February 2015  
Accepted 6<sup>th</sup> April 2015  
Published 8<sup>th</sup> May 2015**

### **ABSTRACT**

Agriculture used to be the mainstay of Nigeria before crude oil was discovered in commercial quantities in 1956. However, Nigeria neglected agriculture in preference to oil due to the oil boom in the early 1970s, resulting in the country to become a major importer of food, particularly of wheat and rice to the detriment of the country's economy. Hence, the government of Nigeria, which wished to reduce the food importation bill of the country, pursued a presidential intervention on cassava (PIC) programme. The government created policies that supported the industrialization of cassava, such as 10% cassava bread policy, 10% bioethanol in gasoline and replacement of paraffin with ethanol gel fuel as the cooking fuel. The paper presented both the success and challenges of the PIC in Nigeria. The PIC brought massive investment and employment in the cassava subsector, reduction in the food import bills of Nigeria and increase in cassava yield from 10.8 t/ha to 20 t/ha. As a result, Nigeria became the largest producer of cassava in the world. However, the PIC led to some problems, such as the expansion of cassava farm into virgin forest, cassava gluts in some areas of the country whereas scarcity in other areas and increased amounts of cassava processing wastes which were among the challenges of the policy.

\*Corresponding author: E-mail: [ehimain@yahoo.com](mailto:ehimain@yahoo.com);

**Keywords:** *Automotive biofuel; cassava bread; cassava industrialization; ethanol gel fuel; food policy.*

## 1. INTRODUCTION

Cassava is the third most important source of calories after rice and maize [1,2] in the tropics. About 60% of the world's cassava production is concentrated in five countries which are Nigeria, Brazil, Thailand, Indonesia and the Democratic Republic of Congo (DRC). Due to the bulkiness and perishable nature of cassava tubers, the bulk of worldwide cassava trade is in the form of pellets and chips which are used for animal feed. About 70% of the global trade in cassava product is in the form of pellets and chips and the rest are mostly processed into starch and flour for food processing and industrial use. The worldwide production of cassava reached 203.3 million metric tonnes (MT) in 2005. Nigeria which is the leading producer with 19% is followed by Brazil with 13 %, Indonesia with 10 %, Thai land with 8% and DRC with 7 % while the rest of the world accounts for the remaining 43 %. China is the leading importer of cassava pellets and chips with imports valued at \$420.83 million which account for nearly 50 % of global cassava imports. China is followed by the USA, South Korea, Spain and the Netherlands. On the other hand, Thailand is the leading exporter of cassava products. While the worldwide export of cassava products was \$623 million in 2005, the export of Thailand accounted for nearly 69% of the global exports. Thailand is followed by Vietnam with 11% and Costa Rica with 10% (FAOSTAT). With respect to the cassava production in African countries, such as Nigeria, DRC and Ghana, the bulk of cassava products is consumed locally [3] Therefore, only one fifth of the total- 242 tonnes-cassava production in 2009 was traded globally [4].

Agriculture used to be the mainstay of Nigeria before the discovery of oil in commercial quantities in the country. Agriculture contributed to about 50% of the Gross Domestic Product (GDP) on the average with an annual growth rate of 4.5% between 1961-1970 [5]. However, the attention of the government was diverted to oil and gas by the oil boom in the early 1970s. Hence, the average agricultural GDP was 25.7% while the annual growth rate declined by 2.6% during the period of 1981-1990 and the agricultural GDP rose to 40.4% with an annual growth rate of 4.1% during 1991-2000 [5]. Nigeria was self sufficient in most food commodities and even exported some food stuff and raw materials, such as palm oil, cocoa,

groundnut and rubber from 1960s to the oil boom of early 1970s. However, Nigeria became a net food importer by 1975 [6].

From the oil boom era of the 1970s until now, the oil and gas sectors have taken over agriculture and have become the major contributors to Nigeria's GDP. Nigeria became solely dependent on oil at the expense of agriculture and other sectors. Nigeria became a net food importer spending ₦ 62.7 billion (1 US Dollar \$ = 160 Nigerian Naira ₦ ) on food importation between 1991-2000. Nigeria's crude oil resources are located in the Niger Delta region. The over 60 years of oil and gas exploration in the Niger Deltahas led to political agitation due to inequitable proceeds sharing and environmental degradation. Ethnic militias who threatened the oil and gas sectors emerged. Militias are involved in community conflicts, kidnapping especially of oil workers and illegal bunkering/stealing of crude oil and petroleum products causing oil pollution in the process [7]. The activities of these militants have led to loss of crude oil and refined petroleum products, loss of revenue due to deferred production and cost of repair of damaged facilities. Sometimes the country is unable to meet the supply target based on OPEC's quota. As a result of the general insecurity, some major multinational oil producing companies have started divestment from the country.

Threatened by the activities of ethnic militias, Nigeria wishes to diversify the economy by returning to agriculture to boost the economy and engage the youths. Unlike petroleum resources that are physically located in Niger Delta, agriculture is widespread. Moreover, the rate of unemployment in Nigeria was 23.9% in 2012 [8,9]. Hence, agriculture was considered as a viable option for the creation of massive employment opportunities. The government of President Olusegun Obasanjo (1999 –2007) launched the Presidential Initiative on Cassava (PIC) which is also called presidential intervention on cassava among other crops in 2002. The PIC aims at generating ₦5 billion annually from the exportation of cassava products (pellets, starch and chips) while diversifying the domestic use of cassava. The strategy is to develop the domestic market and create national policies for cassava development [10]. Cassava is promoted as a poverty fighter. The PIC is designed to develop domestic

industries for the production of value added products including ethanol, glucose syrup and adhesives to encourage rural industrialization and rural job creation [11]. Hence, the aim of this study is to assess the effect of the PIC after 10 years of operation.

## **2. POLICY FRAMEWORKS**

The government actively pursued policies and programmes that could create demand for cassava products. Some of the notable policy interventions and programmes include:

### **2.1 Cassava Bread Policy**

The government mandated the flour milling industries and bakeries to contain 10% cassava flour into all bread produced in Nigeria. Implementation of this policy created a demand of 250,000 tonnes of high quality cassava flour (HQCF) which will require about 1 million tonnes of cassava tuber annually [12-14]. The current government of President Goodluck Jonathan is implementing 40% cassava bread policy which can require 5.2 million tonnes of cassava tubers. Details on the use of cassava and other crops for bread making beside wheat, the opportunities and technological challenges can be found in Ohimain [15].

### **2.2 Automotive Biofuel Policy 2007**

The government mandated the Nigerian National Petroleum Corporation (NNPC) and its subsidiary, a company the Petroleum Product Marketing Company (PPMC) to distribute gasoline containing 10% bioethanol (E10). This policy can create a demand of 1.3 billion litres of fuel grade ethanol annually [16], which will require over 3.6 million MT of cassava if half of the bioethanol will be produced from cassava feedstock. Furthermore, 16.33 million tonnes of cassava, 1.43 million tonnes of sweet sorghum and 15.48 million tonnes of sugarcane which are equal to 33.24 million tonnes of raw materials are required per annum in order to produce the 2.66 billion litres of fuel grade ethanol per annum by the first generation bioethanol projects under construction in Nigeria [16].

### **2.3 Replacement of Paraffin with Ethanol Gel as the Cooking Fuel**

The government of Nigeria planned to replace paraffin with bioethanol as the cooking fuel. This

will create a demand of 3.75 billion litres of ethanol [11,16-18] which can require nearly 21 million MT of cassava tuber since the 'cassakero project' was designed for the production of ethanol gel fuel from cassava feedstock [17,19].

## **2.4 Nigeria Cassava Master Plan 2006**

A strategic action plan for the development of Nigerian cassava industry was developed [20]. The master plan/preplan articulates the plan of the government towards the diversification of cassava subsector.

## **3. MATERIALS AND METHODS**

The study relied heavily on secondary data including published literatures, government publications, pronouncement and official statistics. The report of Central Bank of Nigeria [5] which assessed the PIC from 2001 – 2007 period was reviewed extensively and the findings are summarized in Tables 1 and 2. Information covering the period up to 2012 was obtained from other literature sources. Additional information was obtained from other sources.

## **4. RESULTS AND DISCUSSION**

In addition to the aims listed by the CBN [5] (Table 1), other aims of the PIC include [21]:

- To expand primary processing and utilization of cassava produced in Nigeria to prevent glut.
- To identify and develop new market opportunities for import substitution and export.
- To stimulate increased public sector investment in cassava sector.

One of the major impacts of the PIC is the creation of new interest/attention on cassava. The federal government and many international donor agencies supported the project including the Food and Agricultural Organization (FAO), International Fund for Agricultural and Development (IFAD), UK Department for International Development (DFID), NEPAD and recently the Bill Melinda Gates Foundation. Many of these organizations funded research on improved cassava varieties, processing and strengthening of cassava value chain. Due to the huge publicity that followed the PIC, the interest of all Nigerians including consumers, farmers, processors and marketers was renewed.

**Table 1. Objectives, targets and strategy for implementation of PIC**

Aspects	Issues considered
Objectives	<ul style="list-style-type: none"> <li>• Ensure poverty alleviation;</li> <li>• Promote import substitution through the local production of value-added products like starch, glucose, syrup, etc;</li> <li>• Diversification of the Nigerian economy</li> <li>• Promote rural industrialization; and</li> <li>• Ensure increased income to farmers</li> </ul>
Strategy	<ul style="list-style-type: none"> <li>• Establishment of Federal, State and Local Government Implementation Committees;</li> <li>• Production of 9.2 million bundles of breeder stock by NRCRI* Umudike;</li> <li>• Production of 73.2 million bundles of foundation stock by RTEP*;</li> <li>• Production of 20 million bundles certified stock by state ADPs*;</li> <li>• Training of fabricators of processing machinery;</li> <li>• Conduct of programme facilitation and sensitization workshops for cassava producing states;</li> <li>• Establishment of farm gate processing centres for the production of value-added cassava products;</li> <li>• Collaboration with relevant ministries, parastatals and agencies in the legislation and actualization of 10 percent flour policy;</li> <li>• Advocating interest on loans to be pegged at not more than 8% per annum;</li> <li>• Market development through trade missions, publicity and exhibitions/trade fairs; and</li> <li>• Procurement of tractors/equipment, amongst others, for concessionary access to farmers</li> </ul>
Production targets	It was targeted Nigeria could produce 77.5 million tonnes of cassava tubers in 2003, 90 million tonnes in 2004, 112.5 million tonnes in 2005 and 150 million tonnes in 2006 from 3.1, 3.6, 4.5 and 5.0 million ha of cassava farm respectively
Processing targets	<ul style="list-style-type: none"> <li>• A total of 13,500 small-scale feed mills of 2 tonnes day capacity would be needed to produce 7,811,000 tonnes per annum of compounded cassava-based feed;</li> <li>• To achieve the processing of 18.9 million tones of pellets for export, 547 hard pellet plants of 120 tonnes per day capacity would be needed across the country by 2005;</li> <li>• A total of 5,958 additional fufu flour and garri plants would be required to process cassava into 1,876,000 tonnes of high quality packaged fufu flour and garri for both domestic and export market;</li> <li>• To process 91,243,248 tonnes of fresh cassava into chips to meet the projected domestic and export market requirements, a total of 39,602 units of chipping machines (1 tonne per hour) are required;</li> <li>• The establishment of 23 units of commercial starch plants are required to produce 444,250 tonnes of native and modified starches for the domestic market by 2005;</li> <li>• An additional 40 units of commercial starch plants would be required to produce an additional 800,000 tonnes of native and modified starch for export;</li> <li>• To achieve self-sufficiency in meeting the National ethanol consumption of 312,500litres per day, a total of 156 units of 2000 litres/day plants would be needed by 2005; and</li> <li>• To meet the additional export demand of 270,000,000 litres of ethanol/year, another 469 units of 2000 litres/day plants are needed.</li> </ul>

\*Abbreviations: NRCRI= National Root Crop Research Institute, RTEP = Root and Tuber Expansion Program, ADPs= Agricultural Development Program

Source: Compiled from CBN [5] report with additional information from Shima [21], Philips et al [22], Knipscheer et al [10] and UNIDO/FGN [20]

**Table 2. Action taken, achievements and challenges of PIC**

Aspects	Issues considered
Actions taken	<ul style="list-style-type: none"> <li>• Establishment of the National Cassava Development and Technical Committees;</li> <li>• Establishment of State Implementation Committees by Delta, Edo, Enugu, Kaduna, Kogi, Niger and Osun States;</li> <li>• 3,000 improved cassava planting materials supplied to the Republic of Senegal;</li> <li>• One (1) set of cassava processing machinery supplied to the Republic of Sierra Leone;</li> <li>• Official release of five (5) improved varieties of cassava selected from 43 varieties screened under the Pre-emptive Management of Cassava Mosaic Disease (CMD) to farmers;</li> <li>• Literature/sensitization materials; 15,000 cassava production and 7,500 processing manuals and 15,000 posters produced and distributed to farmers' organizations and NGOs for distribution to their members in the states;</li> <li>• 60 ha planted by NRCRI to produce 24,000 bundles of breeder stock;</li> <li>• 80 ha planted by RTEP to produce 32,000 bundles of foundation stock;</li> <li>• 148 ha planted by state ADPs to produce 59,200 bundles of certified stock;</li> <li>• Programme facilitation and sensitization workshops held at Moore Plantation (Ibadan, Oyo State), Confluence Hotel (Lokoja, Kogi State) and National Water Research Institute (Kaduna, Kaduna State);</li> <li>• 500 Extension agents from the south-west, south-east, and north-central were trained at Akure and Minna;</li> <li>• 21 Artisanal equipment fabricators were trained at the National Centre for Agricultural Mechanization (NCAM) in the fabrication and production of processing machinery such as cassava peelers, chipping machine and manual harvester;</li> <li>• Increased private sector investment in large-scale cassava plantation; and</li> <li>• Trade missions were undertaken to Latin America, Europe, six African countries and China to source for market for cassava products</li> </ul>
Achievements	<ul style="list-style-type: none"> <li>• Increased annual cassava production from 31.7 million tonnes in 2003 to about 49.0 million tonnes in 2006;</li> <li>• Over 5,000 tonnes of cassava flour had been supplied by flour producers to flour millers under the 10 per cent cassava policy as at December 2006;</li> <li>• Prior to the take-off of the initiative on cassava production and export, about 90% of the cassava produced was consumed as food. 2,500 tonnes of cassava chips worth N55 million was exported to China by Ladmok Nigeria Ltd in 2006;</li> <li>• Increased private sector investment in the cassava downstream sector, as exemplified by Ekha Agro Farms (glucose syrup), Ogun State, Nigerian Starch Mills, Ihiala, Anambra State and Vesa Farms (Flour) Benin City, to mention a few;</li> <li>• Two (2) farm gate primary processing cassava centres established in Benue and Oyo States, while six others were being re-allocated to new beneficiaries;</li> <li>• Increased foreign investment typified by the; Dutch Trading Company (DATCO) in Benue State for cassava flour production; and Thai Farm International</li> <li>• Improvement in the design and development of processing equipment by both the mainstream (e.g. Haniga, Nova, Tropical, Peak Products) and institutional fabricators (like NCAM).</li> </ul>
Challenges	<ul style="list-style-type: none"> <li>• There has been an increased production of cassava as a result of the activities of the Initiative without commensurate rise in processing facilities and market outlets, leading to lower prices and glut.</li> <li>• Inadequate market information linking farmers and end-users. This also accounted for the glut being experienced by cassava producers.</li> <li>• Inadequate supply of improved planting materials to meet demand.</li> <li>• Lack of specialization in the cassava chain, consequently, everybody seems to be doing everything at the same time i.e. producing, processing and marketing.</li> <li>• Misconception about the programme, as most farmers were under the impression that the government was going to buy up all produce.</li> <li>• Inadequate access to credit and slow disbursement where credit is available.</li> <li>• Cost of production is high due to low level of mechanization and low yield as a</li> </ul>

Aspects	Issues considered
	result of adherence to cultural practice (plant population) and non-application of modern technology and improved seedlings.
Overcoming the challenges	<ul style="list-style-type: none"> <li>• Massive investment by the State and Local Governments in the establishment of farm gate processing centres, especially at the initial stage.</li> <li>• The private sector in their backward integration efforts should empower outgrower farmers through the provision of processing machinery to produce value-added products e.g. chips, flour, etc.</li> <li>• There is need for improved dissemination of market information to farmers, processors, marketers and end-users. Information should be updated from time to time.</li> <li>• SMEDAN (Small and Medium Scale Enterprise Development Agency) should assist the small-and medium-scale producers and marketers by providing entrepreneurship development training.</li> <li>• There is need for entrepreneurs to specialize in specific aspects of the cassava valuechain either as producers, processors or marketers.</li> <li>• There is need for partnership between Nigerian entrepreneurs and foreign investors in the provision and operation of mobile processing units.</li> <li>• There is need for intensive mechanization to reduce cost of production.</li> </ul>

Source: Compiled from CBN [1] report with additional information from Shima [21], Philips et al [22], Knipscheer et al [10] and UNIDO/FGN [20]

Along with the development partners, the government funded research, development and demonstration projects as well as training on the fabrication of cassava processing equipment including graters, hydraulic press, hammer mills with cyclones, cabinet and flash dryers. The International Institute for Tropical Agriculture (IITA) and the National Root Crop Research Institute (NRCRI) led research in the development of improved cassava varieties. Under the pre-emptive management of cassava mosaic disease (CMD) project, 10 improved cassava varieties which were selected from 43 high yielding cultivars were officially released. These improved cassava varieties were multiplied by several agencies including IITA, NRCRI, Root and Tuber Expansion Program (RTEP) and State Agricultural Development Programmes (ADP) using certified stocks [23]. The PIC provided opportunities for partnerships in the agricultural sector. Moreover, the IITA, NRCRI and Federal Institute for Industrial Research Oshodi (FIRO) led the research on the processing of cassava into various products including chips, pellets, starch, glucose syrup and high quality cassava flour (HQCF) for bread making [8,23]. As a result of the PIC, the low average national yield of cassava (10.8 t/ha) doubled to 25 t/ha even without the use of agrochemicals [5,23,24]. Mokuwonye [6] reported that cassava production rose by 44% between 1999-2006 while Obasanjo [25] reported an increase of 50% for the same period. The area cultivated and total cassava productivity also increased. The production of cassava rose from 32.7 million MT in 1999 to 34.5 million MT in

2002 [26], to 49.0 million in 2006 [25] and to 54.4 million in 2012 [8]. Recent studies suggest that large scale farmers are increasingly adopting the improved cassava varieties [24]. Increased production led to increased private sector investment in the sector [6].

Through research and development, 6 new varieties of cassava having pro-vitamin A ( $\beta$  Carotene) were released for bread making [27], thus the nutritional quality of cassava bread was improved. The PIC generally improved food security because cassava production grew at 6% while the Nigerian population grew at 3% [6]. Due to the PIC, cassava processing to value added products has increased in Nigeria. Apart from traditional fermented food (garri and fufu), various products made from cassava include ethanol, native and modified starch, chips and pellets, cassava flour, adhesives and glucose syrup. Apart from bread [12-14], instant noodles are increasingly being made from cassava [28].

There have been massive investments following the PIC pronouncements. For example, over \$3.86 billion was invested in the construction of 19 large scale bioethanol refineries and 10,000 units of mini-refineries [16]. Unfortunately, some of these projects have not been completed while others have been abandoned altogether perhaps because of less emphasis on bioethanol by the current government.

Before the PIC, there were only 2 flash driers installed in Nigeria for processing cassava tubers into cassava flour. After the PIC, about 156

small-scale (2-4 tonnes cassava flour/day) were installed in Nigeria. Following the collapse of the 10 % cassava bread policy in 2007 due to the reluctance of the flour industry to accept cassava flour for bread making, most of the flash driers folded up. The flash driers, which were locally fabricated, were faced with several challenges including frequent breakdowns, lack of spare parts and inefficient fuel consumption.

Consequently upon the PIC, Nigeria exported 2,500 million MT of chips to China valued at N 55 billion in 2006. Nigerian food importation bills are declining due to increased domestic production. The CBN [5] estimated that Nigerian food import bill, which used to be ₦ 62.7 billion in 1991 – 2006, was N 170 billion in the 2001-2006 period. Recently, Nigerian food importation bill declined from N2.9 trillion in 2011 to N684 billion in 2013 while agricultural export increased by N720 billion between 2011-2012 [29].

Employment in the agricultural sector is increasing and this trend is likely to continue since the current government of President Jonathan is building on the success of his predecessor and is even more ambitious. He has scaled up the percentage of cassava in composite bread from 10% to 40%. Elemo [8] estimates that if 40% cassava bread policy is properly implemented, 3 million jobs can be created within the next 3 years. Awoyinka [11] reports that Ekha Agro farms invested over ₦ 2.4 billion in glucose syrup plant. The company engaged over 300 cassava out growers (local farmers who are supported by farm inputs either by company or the government) for the supply of cassava tubers.

On the other hand, there are some constraints related to the PIC. One of the major challenges is the inconsistency of policy especially between successive governments. President Olusegun Obasanjo (1999 – 2007) backed up the PIC with 10% cassava inclusion in bread policy while President Umaro Yar'Adua (2007 – 2010) reduced the ratio of 10% to 5%. Nowadays, the current administration of President Goodluck Jonathan is pursuing 40% cassava inclusion in bread policy. Another major challenge of the PIC is the price of cassava flour. The factory gate price of wheat was ₦ 50,000 /t while that of cassava was ₦ 75,000/t between 2002-2007. Hence, the flour mills were reluctant to use cassava flour which was considered as more expensive and inferior to wheat for bread making [12]. However, the trend has reversed recently

due to the application of more levies by the current administration and wheat flour now costs ₦ 140,000/t. Even though recent estimates suggest that cassava flour can only be sold profitably at ₦81,250/t [8], studies have shown that cassava products produced in Nigeria are uncompetitive in the world market. As a result, Nigeria could only export these products to China in 2005-2006 since cassava chips were subsidized by the government.

## 5. CONCLUSION

Cassava is the most important tuber crop in Nigeria. It is mostly processed into garri, a fermented roasted granule. The government of President Obasanjo intervened in the cassava sub-sector and promoted the industrialization of cassava by producing policies which are targeted towards the production and diversification of cassava products including cassava flour and chips, cassava ethanol and gel fuel, cassava starch and glucose syrup. As a result, Nigeria became the largest producer of cassava in the last decade due to the presidential initiative on cassava.

## ACKNOWLEDGEMENTS

The author wishes to thank Sylvester C. Izah of the Niger Delta University for the editorial work and the reviewers for their useful suggestions.

## COMPETING INTERESTS

Author has declared that no competing interests exist.

## REFERENCES

1. Nweke FI, Spencer DSC, Lynam JK. The Cassava transformation: Africa's best kept secret. Michigan State University Press, East Lansing, USA; 2002.
2. Nodu MB, Ohimain EI. The effects of crude oil contaminated forage on breeding behavior and reproductive performance of female rabbits. International Journal of Plant, Animal and Environmental Sciences. 2014;4(2):467-472.
3. FAO. Partnership Formed to Improve Cassava, Staple Food for 600 Million people. Available: <http://www.fao.org/english/newsroom/news/2002/10541-en.html>, Food and



- Agriculture Organization of the United Nations, Rome, Italy; 2002
4. Nweke FI. New challenges in the cassava transformation in Nigeria and Ghana. EPTD discussion paper No. 118, International Food Policy Research Institute, Washington, D.C. USA; 2004.
5. Central Bank of Nigeria (CBN). An assessment of the operations of the presidential initiative on agriculture in Nigeria 2001 – 2007. Central Bank of Nigeria (CBN), Abuja, Nigeria; 2010.
6. Mokwunye U. Nigeria: Presidential initiative on cassava. Training workshop on sustainable modernization of agriculture and rural transformation (SMART), Ibadan, Nigeria; 2009.
7. FAO. Food Outlook. November 2009, Food and Agriculture Organization of the United Nations, Rome, Italy; 2009.
8. Elemo GN. The prospects and challenges of cassava bread and confectionaries in Nigeria. A seminar presented during the NISER research seminar series (NRSS) at Premier Hotel, Ibadan, Nigeria. 26 March; 2013.
9. Adebile OA. Employment Generation through Agriculture, a case study of cassava production in Nigeria. Inter. Rev. Bus. Soc. Sci. 2012;1:70–84.
10. Knipscheer H, Ezedinma C, Kormawa P, Asumugha G, Makinde K, Okechukwu R, Dixon A. Opportunities in the industrial cassava market in Nigeria. International Institute for Tropical Agriculture, Ibadan, Nigeria; 2007.
11. Awoyinka YA. Effect of presidential initiatives on cassava production efficiency in Oyo State, Nigeria. Ozean Journal of Applied Sciences. 2009;2(2):185–193.
12. Ohimain EI. The prospects and challenges of cassava inclusion in wheat bread policy in Nigeria. International Journal of Science, Technology and Society. 2014;2(1):6-17.
13. Ohimain EI. Review of cassava bread value chain issues for actualization of the 40% cassava bread production in Nigeria. Journal of Scientific Research and Reports. 2014;3(9):1220-1231.
14. Ohimain EI. The Prospects and Challenges of Composite Flour for Bread Production in Nigeria. Global Journal of Human-Social Science. Global Journal of Human Social Sciences. 2014;14(3):49-52.
15. Ohimain EI. Recent advances in the production of partially substituted wheat and wheat less bread. European Food Research and Technology. 2015;240: 257–271.
16. Ohimain EI. Emerging bio-ethanol projects in Nigeria: Their opportunities and challenges. Energy Policy. 2010;38:7161-7168.
17. Ohimain EI. The benefits and potential impacts of household cooking fuel substitution with bio-ethanol produced from cassava feedstock in Nigeria. Energy for Sustainable Development. 2012;16:352–362
18. Azih I. Biofuels demand: opportunities for rural development in Africa (Nigerian case study). Paper presented at the 2<sup>nd</sup> European Forum on Sustainable Development, Berlin, Germany; 2007.
19. Ohimain EI. Environmental impacts of smallholder ethanol production from cassava feedstock for the replacement of kerosene household cooking fuel in Nigeria. Energy Sources Part A: Recovery, Utilization and Environmental Effects. 2013;35:1-6.
20. UNIDO/FGN. Nigeria Cassava Master Plan (NCMP). United Nations Industrial Development Organization and Federal Government of Nigeria; 2006.
21. Shima MA. The cassava transformation programme, Agro-base industrialization and rural poverty in Nigeria. Africa-Dynamics of social science Research. 2011;1(1):nopcode. Available:<http://aceser.net/journal/articles.php?artid=2&jid=1>
22. Phillips TP, Taylor DS, Sanni L. and Akoroda MO. A cassava industrial revolution in Nigeria; the potential for a new industrial crop. The Global Cassava Development Strategy. IFAD/ FAO, Rome; 2004.
23. Sanni LO, Onadipe OO, Ilona P, Mussagy MD, Abass A, Dixon AGO. Successes and challenges of cassava enterprises in West Africa: a case study of Nigeria, Benin, and Sierra Leone. International Institute of Tropical Agriculture (IITA); 2009.
24. Tarawali G, Iyangbe C, Udensi UE, Ilona P, Osun T, Okater C, Asumugha N. Commercial-scale adoption of improved cassava varieties: A baseline study to highlight constraints of large-scale cassava based agro-processing industries in southern Nigeria. J. Food, Agric. Environ. 2012;10:689–694.

25. Obasanjo O. Food crises and high prices of food: which way Africa. Sir John Crawford Memorial Lecture Maputo; 2008.
26. Echebiri RN, Edaba MEI. Production and utilization of cassava in Nigeria: Prospects for Food Security and infant nutrition. 2008;PAT(4):38–52.
27. Aniedu C, Omodamiro RM. Use of newly bred  $\beta$ -carotene cassava in production of value-added products. Implication for food security in Nigeria. Global Journal of Science Frontier Research. 2012;12(10): 11–16.
28. Sanni LO, Bamgbose CA, Babajide JM, Sanni SA. Production of instant cassava noodles. Proceedings of the ISTRC Symposium. 2007;466–472.
29. FMARD. Agricultural Transformation Agenda: revives hope for national food security. Federal Ministry of Agricultural and Rural Development (FMARD), Abuja; 2014.

© 2015 Ohimain; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

*Peer-review history:*

*The peer review history for this paper can be accessed here:*

<http://www.sciencedomain.org/review-history.php?iid=1060&id=25&aid=9142>