

# Ensuring Food Security: A Synergy Of Food Importation And Agricultural Mechanization In Developing Economies

Joe Essien

School of Computing and Technology,  
University of West London, St Mary's Road, Ealing, London  
[joessien@yahoo.com](mailto:joessien@yahoo.com)

**Abstract:** The proliferation of numerous and widespread import agents inhibit the initiative to engage in mass mechanization of agricultural enterprise. With a synergised import and mechanization policy, a competitive relationship can emerge that allows an import-dependent country to hedge strategically against price manipulation and accession. For these reasons and other enabling factors, a synergy of food import with agricultural mechanization policies is recommended both as a flexible measure for remodelling changes in food security and as a means for sustainability in developing economies. This article present ways in which this can be achieved, consequently it is structured as follows; Section one places the current food importation in Nigeria in perspective by discussing extent and dominance of national corporations in global food markets; section two presents the root cause of food insecurity, effects of trade and food aid policies as the underpinning legislation for food importation; section three discusses the benefits of mechanization, use of technology and financial support; section four elaborates on models for implementing mechanization in rural agriculture; section five presents concepts for synthesising importation and mechanization while section six concludes the discourse with suggestions on promoting food security through a synergy of food policies, importation and mechanization.

**Keywords:** Food Security, Food Markets, Mechanization, Import, Agriculture, Developing Economies, Policies.

## 1 INTRODUCTION

Ecumenical changes in the global commodity markets have particularly serious implications to the food security of import-dependent countries. Adapting importation policy to these changes is essential given that many commodities are imported to fulfil domestic demand in many countries. Using Nigeria as an example and according to research, the country spent ₦635 billion on importation of wheat; ₦356 billion on rice, ₦217 billion on sugar and ₦97 billion on fish in 2010 alone in spite of all the endowed marine resources, rivers, extensive cultivatable lands, lakes and creeks in the nation (Issa, et al., 2014). Notwithstanding that Nigeria has massive fertile land that could have been used for agricultural, the country remains a large food importer with millions of its citizens poverty-stricken and atrophied. There has been at all times insufficient food to meet the nation's dietetic needs. Many homes are so indigent and impoverished that they cannot afford to purchase even the locally cultivated food not to speak of imported ones. The cost of foodstuff has continued to escalate regardless of any succour. Nigerian farmers have constrained capacity and use techniques that adversely affect soil fertility, water and biodiversity. The paradox of this is that though 90% of agriculture is carried out in rural areas of Nigeria, approximately seventy-five percent of the poor reside in these rural communities. Coupled with climate change, this problem is compounded. It has been determined that with regards to expenditure elasticity, unless farmers in Nigeria and indeed developing economies are empowered through mechanization policies, the problem might linger for decades. The proliferation of numerous and widespread import agents also inhibits the initiative to engage in mass mechanization of agricultural enterprise. Within a synergised import and mechanization system of control, a competitive relationship can emerge that can allow an import adjuvant nation to hedge strategically against price manipulation and accession. For

these reasons, a synergy of food import with agricultural mechanization policies is recommended both as a flexible measure for remodelling changes in food security and as a means for sustainability in developing economies. An analysis of Nigeria's food importation stratum and policies provides an insight into its proclivity for food importation in the period that marks about a decade up to 2010. Food remains the most significant need for human subsistence. Therefore developing economies strive to meet food requirements for their citizens by promoting agriculture within its confines and complement this as necessary with importation. Consequently, there are policies regulating both components which ensure food security, planning, execution, monitoring and evaluation. Most researchers opine that when a nation proactively plans its food security objectives, the predominance of food consumed will be locally produced by indigenous farmers and complementary food import will be minimal (Vaughan et. al., 2014). There is no nation that has a complete subjugate for the production of all varieties of food consumed within her precincts. However, depending excessively on imports with regards to food consumption by any country is not only reckless but also detrimental to the growth and intensification of production in the agricultural sector of that country. The situation is even more despicable when food commodities which a nation has comparative advantage for their production are being imported. According to International Journal of Economics, Commerce and Management, United Kingdom Licensed under Creative Common, the new objectives of agricultural policy in Nigeria include: (i) to achieve sufficiency in basic food supply and the attainment of food security; (ii) to increase production and processing of export crops, using improved production and processing technologies; (iii) to increase agricultural raw materials for industries; (iv) to generate gainful employment in agriculture; (v) to obtain rational utilization of agricultural resources, improved

protection of agricultural resources from drought, desert encroachment, soil erosion and flood and the general preservation of the environment for the sustainability of agricultural production; (vi) to promote increased application of modern technology to agricultural production and (vii) to improve the quality of life of rural dwellers (Issa et al., 2014). The above policy objectives imply that the agricultural sector should be effervescent enough to support the food security aspiration. This however, cannot be said to be true in a sector that is involved in massive importation of food. Food importation itself is an impediment to sustainable agricultural production and food security. Unrestrained food importation is detrimental to the growth of the economy. The Federal Government of Nigeria's (FGN) position to a successful food security strategy is evident in various agricultural production initiatives and programmes it initiates. However the level of food importation is enormous when compared to the meagre investments on these initiatives. This article examines the extant practices that have contributed to food insecurity in developing countries such as Nigeria, and recommends several mechanization approaches that the rural community can take to improve local food production while reducing food importation.

## 2 ANALYTICAL SOURCES & FRAMEWORKS

The analytical and conceptual frameworks investigated to give credence to this work are based on several published articles, journals and Nigeria as a case for reference. To ascertain the authenticity of these sources, several websites of institutions were also accessed and their reports analysed in order to ground the hypothesis and facts presented. These included information sourced from the National Bureau of Statistics (NBS) website (<http://nigerianstat.gov.ng/>); World Trade Organization (WTO) website (<https://www.wto.org/>); website of the Central Bank of Nigeria (CBN) (<https://www.cbn.gov.ng/>) and the website of International Journal of Economics, Commerce and Management (IJECM), United Kingdom (<http://ijecm.co.uk/>). Publications of Food and Agriculture Organization of the United Nations (FAO) were also accessed. Findings revealed that Nigeria imported an average of ₦1.923 trillion worth of commodities per annum over a period of 10 years as at 2011. Out of this, food importation was ₦361.87 billion. In essence, the nation imported about ₦0.991 billion worth of food per day in the period 1990-2011. Over this period of about ten years, wheat derivatives led with an annual average of ₦164.77 billion, followed by fish at ₦113.63 billion, milk/dairy at ₦62.51 billion, rice at ₦54.24 billion and sugar at ₦38.61 billion (Vaughan et al., 2014). The above listed commodities accounted for over 84% of the total import bills of ten commodities. Over the period, Nigeria also imported oils (₦20.96 billion), oil seeds (₦5.1 billion) and cocoa (₦0.66 billion), prepared vegetables & fruits, Coffee (₦2.6 billion), dairy (₦1.73 billion), prepared cereals (₦1.69 billion), (Vaughan et al., 2014). Findings also revealed that juxtaposing the average values of imports and exports for commodities, it is obvious that Nigeria is a major importer for most food commodities when compared with USA, Canada, France, Argentina, Thailand, India, Syria, Brazil, Iceland, UAE, Norway, China, Chile,

Netherlands and Sweden (Source: NBS). However, comparing the Nigeria farming landscape with some major nations from which food is imported, while Nigeria's population engaged in farming is around 70%, only a meagre 1.6% of USA population is into farming and Brazil 17%. This suggests that there are possibly massive automated and mechanized technologies deployed in those countries. It is also possible that the agricultural and industrial sectors of the two economies cited in this example have matured with food policies that encouraged generation and sourcing of the raw food produce needed for manufacturing. This is in sharp contrast with the Nigerian agricultural sector which is unable to produce enough to feed the nation and the industrialized sector which is still in the primordial stage of development, unable to neither maintain its equipments nor handle even the little raw food produce that it can source. Also, the prices of imported food items like many other imported commodities are not static. On the average they are perpetually ascending. Konandreas (2012) debated extensively trade policy responses to food price instability in poor food importing countries. He opined that since the late 1990s, the world has entered a period of tense food supplies, higher prices and increased price volatility. Also, he noted that the need for global collaboration to promote food is apparent but emphasized that the past several years have seen many examples of supply shocks that have left many less developed countries with an acute lack of basic foodstuffs. The implication of this analysis is that apart from supply uncertainties from the food exporting nations, the rising price culminates in inflation to the importer. If these existing disparities could be addressed through merchandised production among rural farmers and concentric diversification, then aggregate production and supply will increase thereby reducing food importation, all being equal. Statistics from the World Trade Organization affirms that despite the global trend toward urbanization, poverty and under-nourishment remain concerted in rural areas. The majority are petite farmers who produce at least 90% of the food consumption in Nigeria for which they also depend as their source of income. Given the significance of rural communities to national food security, it is important that food mechanisation programmes should be rigorously pursued through food policies to educate and protect the rights of small farmers. Unfortunately, feedbacks from rural farmers have indicated that existing policies have failed to address their challenges and intrinsic causes of food insecurity in the nation, including inequities in the regulations governing international trade, stringent and obstructive economic reforms imposed by national and international financial institutions, and corrupt systems of governance. Unless the fundamental structural causes of persistent food insecurity are recognized and addressed, it is evident that the Millennium Development Goal of halving world hunger by 2015 will not be achieved.

## 3 CAUSES OF FOOD INSECURITY IN NIGERIA

One of the root causes of food insecurity worldwide and particularly Nigeria is the imposition by international institutions through trade, financial aid and structural adjustment programs, a condition for debt restructuring (Gonzalez, 2014). As a corollary of production and trade patterns imposed under colonialism, most developing

countries joined the world economy as producers of natural resources and consumers of imported manufactured goods. Specialization in mechanization of agricultural produce was discouraged as it was economically disadvantageous due to the volatility of world market agricultural prices and to the declining terms of trade for primary commodities especially manufactured goods. In other words, countries that export raw agricultural products cannot count on stable revenue streams for investment, and must sell increasing large amounts of their produce in world markets in order to purchase the same amount of manufactured products. Urbanization, adverse weather, external threats for farmers who depend on exports, risk from change in consumer demand, risk from policy variations, risk from endemic pestilence, risk from desiccation, domestic policy threats and climate change can also affect food production and security inhibiting developing countries from production. Additionally, resources necessary to finance food production and mechanization can impinge on food security. Though agricultural diversification and industrialization can advance food security at the national level by guaranteeing a consistent revenue stream with which to reinvest and purchase food, the inability of Nigeria to implement, monitor and evaluate trade and food policies nationwide exacerbates poverty especially in rural communities and in the urban communities as well. In many developed countries, generous subsidies are provided to agricultural producers including both tariff and non-tariff import barriers to protect them from foreign competition. By contrast, Nigeria imposes taxes instead on agricultural producers to finance political activities with lame and dormant policies that do not facilitate mechanization, resource acquisition, and technological expertise to empower the rural farmers. In response to sustained effect of poverty and pressure from international communities and institutions such as the WHO, amendments of food policies are often made in order to promote greater access to agricultural infrastructure and markets. However, the amendments often laced in non-binding language often prove unwieldy and unworkable, and frequently excludes the produce of utmost interest to the rural farmers who need the aid most. This practice exacerbated food insecurity in the country by escalating rural agricultural commodity prices as the undermined rural farmers react to high economic costs of other imported goods and depreciating currency value. The inability of the national crop breeding institutions to develop new varieties of rice, wheat, and corn that produced higher yields than traditional varieties in response to the application of synthetic fertilizers and controlled irrigation is another cause of food insecurity. In another convalescence attempt, Operation Feed the Nation programme was introduced in Nigeria in the early seventies. While the scheme was widely publicized, it failed to produce tangible success forty year after as a result of the ulterior land grabbing motives that drove the programme. Corrupt individuals seized lands all over the country with false promises that through the scheme, they would provide employment, build industries, roads and guarantee sustainable food supplies. They promised to offset domestic food shortages and to tap into the world growing demand for food exportation. The Operation Feed the Nation disproportionately benefited corrupt individuals in power because many poor farmers relinquished their lands for this purpose. The scheme also

proposed the redistribution and supply of synthetic fertilizers, chemical pesticides and irrigation equipment necessary to achieve high yields which as it turned out, the poor rural farmer could not afford. Being a farce which it was, the scheme deprived the rural farmers of their lands, source of livelihood, decreased food sustainability, exacerbated food insecurity, increased poverty, widened the gap of inequality in the country and ostracised the rural farmers from their own communities. The Operation Feed the Nation also produced devastating environmental degradation in the rural communities as farmers jettisoned the ecologically sustainable low-input agricultural tradition they knew in preference of low income easy paid jobs. Use of chemical fertilizers and synthetic pesticides untested in the applied ecosystem resulted in environmental consequences such as loss of soil fertility, depletion of aquifers, loss of traditional food crops, increased pesticide-related illness, narrowing of the genetic base of the nations food supply, and heightened vulnerability of the global food supply to catastrophic blight. Finally, climate change has coalesced with other factors to constituted risks to food security in Nigeria. In recent times, the temperatures in the northern parts of the country where tubers and nuts thrive have been adversely excessive placing additional pressure on already strained water resources and reducing agricultural yields.

#### 4 MECHANIZATION IN RURAL AGRICULTURE

Mechanization is a term used to depict tools, implements and machinery applied to improve the productivity of farm labour and land. It may consist of either human, animal or motorized power, or a combination of these resources. Mechanization is a crucial requirement in many farming system. Its main objectives include but are not limited to increased productivity, enhanced timeliness of farm operations, facilitates the capability to expand the area under cultivation, achievement of tasks that are strenuous to complete or perform without mechanical aids, enhancement of the quality of work and products and development of skills and professionalism in farming business. Depending on the source of power, the technological categories of mechanization have been generally classified as either hand-tool technology, draught animal technology or mechanical power technology. The role of machineries in mechanized agriculture is tremendous as it enables a paradigm shift from conventional physical work to extensive automation. Some of the mechanical devices deployed include no-till direct seeders, furrow and ridge makers, knife-rollers crimper-rollers, mechanical power technologies, vegetation crusher etc. In manual farming methods where land preparation is carried out using conventional tillage means, farmers face substantial yield reduction due to delayed planting. Delayed planting in rural communities can have dire consequences on yield as the process of planting is carried out with anticipation of natural climatic benevolence. Merchandised farming is usually more appropriate on large scale acreage where the land-to-labour ratio is high. Agriculture in Nigeria has become more intensive with expansion of farmlands and diversification. There has been increasing demand for mechanization in recent years to cope with decreasing manual labour force and competition. The availability of low-cost and fairly-used tractors in the

markets has made this initiative possible, providing a way to ensure viability and profitable in their investments. Medium scale farmers who own tractors also provide hiring services to smallholders in order to promote their business. To collaborate this, recent reports have also indicated that the demand for mechanized farming operations particularly ploughing has increases even among small farm holders, suggesting that supply issues may be a constraint to successful mechanization (Vaughan, et al.,2014).To ameliorate this concern, the development of mechanized service hiring market in which medium and large scale farmers who own tractors hire their machinery and services to small-scale farmers have represented a promising model for sustainable mechanization. The Nigerian government managed tractor hire schemes, though not as efficient as it should be due to reduction in government expenditure have also proven a valuable surrogate for tractor hiring. However, the service model promoted by the government if not properly managed and transparent could encourage predatory and negative behaviours that will impair the efforts of the private sector tractor owners. Continuous implementation of such model will not only increase the financial burden on the government but would be detrimental to food security. Agricultural mechanization has represented the means through which non-human sources of power can be harnessed to undertake agricultural operations such as ploughing, harvesting, shelling, and planting. Adoption of mechanization by farmers is an evolutionary process influenced or induced by a set of country specific agro-climatic factors, economic factors and social conditions for which the government's policy choices have impact (Vaughan, et al., 2014). More benefits of mechanized farming can be found from a number of small-scale surveys or field studies conducted by IFPRI's Ghana Strategy Support Program, including a farm budget survey (Akramov and Malek, 2012), a study of animal traction use (Houssou et al., 2013a), a survey of input use for maize and rice production (Chapoto and Ragasa, 2013), a survey of government-supported mechanization service centers (Diao et al. 2012), and a study of cropping practices and labour requirements for farm operations (Ngeleza et al., 2011), a recent survey of tractor owners and medium and large scale farmers jointly conducted by IFPRI and Ghana's Savannah Agricultural Research Institute (SARI) in October – December 2013.

## 5 SYNTHESISING IMPORTATION AND MECHANIZATION

Synthesising agricultural mechanization and importation in developing countries including Nigeria is a crucial first step toward food security contribution. To achieve this it should be possible to monitoring and evaluation food policies in order to allow proper reorientation of strategies at the rural and national levels. To improve food supply, conservation and redistribution of food, it is pertinent to deploy agricultural machineries and technologies to develop and reform agricultural systems so as to efficiently utilize natural resources, taking into consideration the challenges of food production and importation. This would ensure also equitable redistribution of food supplies in relation to need. Though the following itemization is by no measure exhaustive, it presents ways in which food importation could be synthesised with mechanization. Firstly,

governments should reinvest in the agricultural sector by redirecting resources toward mechanisation with focus on small and medium size farmers. It should also enact more food and environmental policies geared at protecting and preserving natural resource base which are essential for food production. This includes but not limited to natural water sources, deforestation and lumbering, soil excavation, refuse disposal in a way that cause soil degradation and soil pollution in any form. International and indigenous financial institutions should support innovative investment in rural agriculture and mechanization, allotting resources toward small and medium scale farmers for extensive concentric diversification. This recommendation is compliant with opinions of many independent, Food Crisis researchers, agricultural assessment World Bank and the FAO and ratified by fifty-eight governments.( Gonzalez, 2014). Secondly, food policies should give developing countries greater autonomy to apply tariffs and import barriers for the purpose of promoting local production of food as well as the privilege to exclude from trade agreements those agricultural commodities that can be produced domestically for example flour-base produce and fish which Nigeria spends billions of cash to import yearly. Food policy as it applies to developing countries should be reviewed regularly as the government and international food aid institutions inject more money into agriculture. This is because as more funding are provided, change in the levels of production is expected, and therefore those changes should be reflected from time to time as amendments in the food policy. Third, government participation in acquisition of lands should be carefully controlled, regulated and monitored to ensure that these transactions are to the interest of the affected communities. Land acquisition by government, institutions and individuals should be for very specific purposes. It is currently very common for individuals or institutions to apply for acquisition of land for agriculture in Nigeria only to turn around and build private schools. Fourthly, the fundamental human right to food production, and utilization of natural resources in a sustainable manner should be upheld. This would involve reinforcing domestic laws, tax and tariff laws, property and urbanization laws, water and use of chemical substances in agriculture laws, environmental laws, and the laws regulating foreign investments in rural communities. An analysis of potential regulatory approaches to commodity speculation and global warming is important. Finally, since many developing countries are heavy importers of farm machineries and other agricultural tools, import policies imposed by governments on these countries should be relaxed and should not have a direct effect on the quantity of machinery imported. Quality standards of the country should ensure the quality and durability of those machineries with assurance of provision of affordable spare parts on continual basis and means for skills acquisition on the effective use of the machinery.

## 6 CONCLUSIONS AND IMPLICATIONS

Based on several references and existing repository of literature, agricultural mechanization is strongly related with the level of agricultural produce and supportive food policies for sustainable farmland activities. Research and practical evidence has demonstrated without doubts that for sustainable food security to be achieved, agricultural

mechanization must be implemented. This is widely practiced in Brazil, the United States and Australia. These countries are known for their extensive acreage and farmland allotments per farmer. In all cases, the farmers rely on intensive use of machineries for farmland operations. Though the review done in this article is primarily focused on the experiences in Nigeria with large uncultivated farmlands, most of the operational concepts and food policies applied in other countries can still be considered adapted and applied in this context and indeed all developing countries for successful implementation of mechanized farming. The participation of all stakeholders including policy makers, small and medium scale machinery manufacturers, agrochemical dealers, and other technology suppliers, research organizations and institutes for generation of knowledge and dissemination of information is essential for the successful and wider acceptance of mechanized farming. It can therefore be surmised that time is not a statistical index for maturing the reduction of food importation into developing countries. In Nigeria, it is just that importation of food is more or less a routine business that has no time factor for minimization attached. This is expected considering the various precarious trade policies that the country had adopted over the years. However, it is worthy of note that expending foreign reserve on food importation is anti-economical and such funds would better be spent in developing agricultural mechanisation.

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