

## REVIEW ARTICLE

## SUSTAINABLE AGRICULTURAL INFRASTRUCTURE AND DEVELOPMENT OF RURAL ECONOMY IN NIGERIA

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## ARTICLE DETAILS

## Article History:

Received 14 May 2021

Accepted 17 June 2021

Available online 05 July 2021

## ABSTRACT

More than 50 percent of Nigerian total population resides in the rural areas with farming as their major occupation and means economic sustenance. Hence rural areas in Nigeria have the potentials to contribute significantly to the national socio-economic development through sustainable agriculture. However, unlike in the past when Nigerian agricultural sector used to be a strong sustainer of the economy through provision of food for the population and raw materials for the industries, general infrastructural deficit and neglect of the rural communities have diminished the attractiveness of agriculture, leaving it for the poor in the society. This is due, partly to the advent of crude oil in Nigeria and has led to poverty, hunger, malnutrition, and diseases in the rural communities. Nigerian government had however taken a number of measures towards agricultural development; these include River Basin Development Authority, HANCOR Borrowers, and a number of other initiatives. However, a larger percentage of the beneficiaries of these developmental efforts have always been in the urban and peri-urban centres, with minimum or no effect of the initiatives in the rural communities. This paper therefore review Nigerian agricultural development challenges and issues, and proposes rural economic development through sustainable agricultural infrastructure with focus on integrated approach involving the use of renewable energy, post-harvest processing, and agro-training program. This approach takes beneficiaries integration into consideration from design to execution of the programme, thereby ensuring their total commitment. This would improve agricultural productivity for immediate consumption and for industrial use, as well as prevent post-harvest waste, with improvement in the marketing systems of farm produces and rural farmers' economy and living standards.

## KEYWORDS

Rural economy, Agricultural infrastructure, Post-harvest waste, Food Security, Financial independence

## 1. INTRODUCTION

After the independence, Nigeria's development in the form of rapid economic transformation, poverty alleviation, and food security has been hinged on the rapt attention given to agricultural development. Furthermore, historical records show that agriculture played a vital role in Nigeria's economy via production of adequate food and fiber of good quality mostly from the rural areas of the country (Emmanuel et al., 2016; Dfiri, 1987), thereby contributing the greatest share to the nation's gross domestic product (GDP) and foreign exchange earnings. In the year 2008, agriculture's contributed a total of 42.07% to the nation's GDP, with crop, livestock, forestry and fishery accounting for 37.52%, 2.65%, 1.37% and 0.53%, respectively (Emmanuel et al., 2016). With this, crop sub-sector had a contribution of about 89.2% of the agriculture GDP. In fact, most of the early infrastructural developments in the country were funded by proceeds from agriculture (Arua, 1982). As at then, Nigeria used to be the world's largest exporter of groundnuts, and second world's major cocoa exporter; representing about 36% and 20% of global groundnut and cocoa trade respectively (Ngozi, 2017). Nigerian cotton export was about 18% of the world cotton supply while about 11% share of vegetable oil was contributed to the world's supply. During this period, Nigerian agriculture was able to grow at a sufficient rate to provide adequate food for the increasing population, and raw materials for industrial sector, thereby

increasing public revenue and foreign exchange for government, and employment opportunities for an expanding labour force. In West Africa, and particularly in Nigeria, agriculture accounted for about 60% of the non-oil revenue to the government (Ngozi, 2017; Ogbenga, 2018; Osabohien et al., 2019).

It should be noted that most of the agricultural activities take place in the rural communities. This rural communities are presently faced with problems of inefficient farming systems due to neglect and consequent decay of few facilities ones. Most importantly, rural farmers are facing lack of value addition to farm produce resulting from lack of infrastructure, hence their lower level of income. The cumulative effects have created the existence of wide gap between food demand and supply, leading to large importations of food (Taiwo Oyaniran, 2020), which further erodes Nigeria economy and foreign exchange earnings. The growing food import over the years gave rise to escalating foreign exchange expenditures, having effects on other aspects of the economy. This is not unconnected with the discovery of crude oil which later takes the center stage of the country's exportation; over 80% of the earnings from the foreign exchange comes from the crude oil (Onawumi et al., 2016) with declining share of agriculture in the total export (Uwakonye et al., 2006) as indicated in Fig 1.

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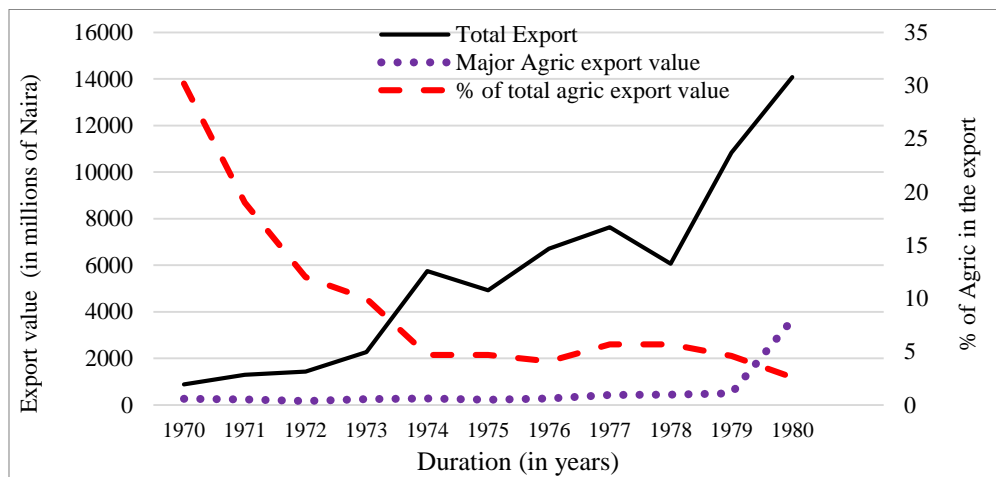


Figure 1: Agric contribution to Nigeria's export earnings; 1970 to 1980 (Akpan, 2012)

However, until lately when government introduced a new policy on food importation, there had been serious economic loss resulting from foodstuff importation (as shown in Table 1). This has resulted in a significant decline in contribution of agriculture to the Gross Domestic

Products (GDP) which is due to infrastructural deficit militating against the rural farmers, limiting them to subsistence farming practices and consequent low productivity with persistence poverty in the rural communities (Osabohien, 2019).

Table 1: Outlook of Nigerian Food Importation and GDP (1960 – 2012)

Year	All sectors	Agriculture		Food import (vegetable oil and animal fats not included)	
	GDP (millions of Naira)	GDP (millions of Naira)	%	Value (millions of Naira)	%
1960-1964	2,568.40	1,579.64	61.65	45.04	2.87
1965-1969	3,088.58	1,640.26	53.27	42.1	2.55
1970-1974	9,314.62	3,268.40	39.69	104.58	3.13
1975-1979	31,233.22	7,328.64	23.80	760.62	9.85
1980-1984	51,809.44	16,426.78	31.30	1,602.04	10.62
1985-1989	119,632.20	44,270.86	38.12	1,575.04	3.69
1990-1994	539,207.30	181,622.32	32.55	9,429.96	5.21
1995-1999	2,668,070.00	920,018.08	34.32	94,025.02	10.52
2000-2004	22,500,196.0	2,734,641.32	37.05	159,706.6	6.80
2005-2009	20,560,630.0	6,929,310.42	33.50	264,868.0	3.83
2010-2012	37,129,386.5	12,368,898.7	37.02	2,057,333.3	25.02

Source (Gabriel et al., 2014)

The discovery of crude oil has in no small measure helped the country's economy but has however been a factor against agricultural development mostly in the rural areas (Oluwatayo and Henrietta, 2015). This happened because farming became a less preferred activity compared to the easy income made from petroleum (Fasanya, 2018), and was displaced as the main driver of economy soon after crude oil was discovered in commercially large quantity (Uwakonye et al., 2006) in 1968 and its subsequent boom in the 1970s due to Arab crisis with the West (NISER, 2015). Since then, Nigeria has been spending hundreds of millions of

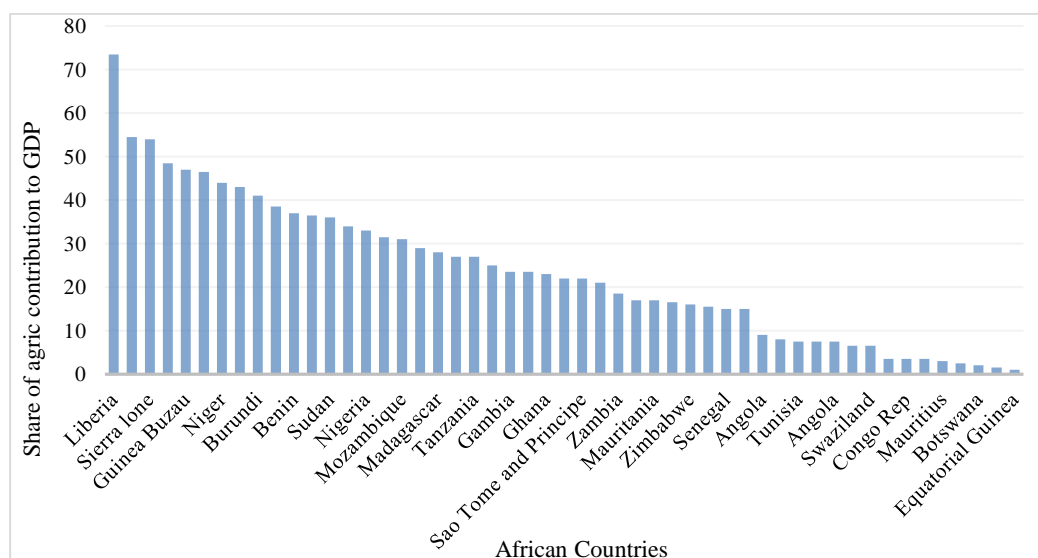
dollars on food importation (Adesina, 2012).

The *affluence* of the oil boom of the 1970s was used to develop a number of social and economic infrastructures in urban areas while the rural areas were given insignificant consideration. This resulted to mass exodus of young people from rural to urban areas with its associated decline in agricultural productivity. Meanwhile, about 90% of Nigeria's total food production comes from small farms, and at least 60% of the country's population earns their living from these small farms with sizes generally

less than 2 hectares (Oluwatayo and Henrietta, 2015). Massive importation of food stuff also imported inflation into the country, leading to increased hunger for both the urban and rural poor. With the effects of the recent volatility in international oil market on government revenue, the nation's foreign reserve has also been experiencing decline since late 2014 (Ngozi, 2017).

## 2. AGRICULTURAL DEVELOPMENT IN NIGERIA

Most of the Sub-Saharan countries in Africa depended largely on the development of agriculture for their economic development. This has however declined (Fig. 2) with many of them focusing on crude oil.



**Figure 2:** Agriculture contribution to national GDP of African countries in 2013 (AfDB, 2016)

Among the sectors that contribute to the total output of Nigeria economy (Table 2), historical records show that, despite the declining performance, agriculture remained the highest contributor to the GDP with an average of 40.1% over the entire period. Agricultural sector was followed closely by the services sector with a combined contribution of 37.7%, out of which the private services sub-sector accounted for about 75.6%. Petroleum sector was in the third position with an average contribution of 14.2%,

despite the largest source of public revenue and foreign exchange earnings for the country (Chikwendu and Arokoyo, 2008). This is not unconnected to the declining government revenue from crude oil in the recent years. The foregoing indicates that in Nigeria, agriculture potentials for economic development and more of the efforts to revive the economy, and to significantly reduce the level of poverty, should be devoted to meaningful revamping of the agricultural sector.

**Table 2:** Five-year average sectorial contribution to GDP (CBN, 2010; Adedipe, 2004)

Year	Agriculture (%)	Manufacturing (%0	Oil (%)	Services (%)		
				Private	Government	Total
1981 - 1985	37.2	9.2	14.9	27.2	11.5	38.7
1986 - 1990	41.0	8.3	13.3	29.7	7.8	37.5
1991 - 1995	38.3	7.5	13.3	31.3	9.6	40.9
1996 - 2000	40.0	6.3	11.9	32.0	9.8	41.8
2001 - 2005	42.4	8.1	13.5	21.4	11.9	36.0
2006 - 2011	41.7	6.2	18.2	29.6	4.3	33.9
Average	40.1	7.6	14.2	28.5	9.2	37.7

Over the years, the federal government of Nigeria had embarked on policies and programs towards revamping and restoration of agricultural sector to its pride place in Nigerian economy. However, the results gotten from the efforts in this direction towards provision of food for human consumption, raw materials to the industries, and for foreign exchange earnings as well as creating employment opportunities for the teeming population have not been impressive. One of the reasons is that Nigeria agricultural system is majorly based on peasant system and this is one of the fundamental constraints against smooth growth of sustainable agriculture in Nigeria; peasant farmers have poor response to new farming methods (Attah, 2012), hence low agricultural productivity and return on investment. It should however be noted that agricultural mechanization and commercialization are key strategies for the promotion of sustainable development and poverty eradication. This requires a serious investment in the agricultural sector and to attract investment, creation of enabling environment is utmost required so that agriculture can become one of the major contributors to Nigerian national economy as it is the case in most

developed countries of the world (Larder et al., 2018; Loizou et al., 2018). However, this is not without a robust regulatory framework (Larder et al., 2018).

The role of agriculture, as perceived in national growth and development process has changed over time. Based on the early theorist on development of dual economy model in the 1950s (Ngozi, 2017), there were generally lack of understanding of the unique features of agriculture, thus modernization of agriculture was not considered to be a strategy to develop the rest of the economy (Timmer, 1988) until 1970s Green Revolution in the Asia (Nwafor et al., 2010). At this point, it was shown that traditional agriculture could be transformed into a modern sector, demonstrating the potentials of agriculture as a growth sector and its role in initiating further development. To develop agricultural policies that will unlock its potentials, some important features need to be considered (Ngozi, 2017).

### 3. NIGERIAN RURAL COMMUNITIES AND AGRICULTURE INFRASTRUCTURAL DEVELOPMENT

Nigerian rural community is blessed with abundant arable land and labour, and this could be advantageously translated into increased productivity, income, and food security, provided enabling policies are put in place and properly implemented. With a high multiplier effects, agriculture has the potentials to generate remarkable economic and social returns, social development as well as enhancement of the diversification of economy. However, at present, lack of good policies and poor implementation of the existing ones are making this a bit difficult in the rural communities (Ngozi, 2017) where the bulk of the agro-produces are coming from. As a result, most Nigerian peasant farmers, whose farmland are usually between 1–3 hectares are faced with very limited or lack of improved farming facilities (Ogunlela and Mukhtar, 2009) and other basic social amenities. Lack of appropriate storage facility results to unimaginable post-harvest waste of both perishable and grains (Gabriel et al., 2014), causing wide price variation of agro-produce and consequent low income inflow to the farmers. World Bank record in 2012 shows that sub-Saharan Africa loose US \$4bn equivalent of grains annually due to lack of post-harvest processing infrastructure (Bank, 2012). This is coupled with lack of necessary infrastructures such as water, electricity, and motor-able roads that are affecting the quality of lives in the rural communities. According to recent study, Nigerian rural dwellers can be characterized as follows (Anazodo, 1982):

- Static and declining standard of living
- Predominantly small holder farmers with traditional hand tools
- Mostly located in areas with lack or no presence of functioning public utility

- Mostly subsistence farmers engaging in bush following systems to improve soil manure.
- Meagre family income; limited to a few tens of naira per year.

Considering the proportion of Nigeria rural community (Anyanwu, 2005), it is evident that successful agricultural development strategy must be tailored towards rural infrastructural development, thereby creating rural employment, food and fibre sufficiency, eliminating the need for food importation, and increasing the export earnings while improving the national economy. In this regard, development of rural areas will in no small measure help in developing a resilient national economy. Series of efforts have however been made by successive administrations towards the development of agriculture. Some of the programmes are presented in Table 2 with each of them targeted towards improving lives in the rural communities and to curb rural-urban migration while improving food security in the country. However, most of these efforts have not yielded expected results despite the deployment of enormous resources. This is due to lack of continuity as each of the succeeding administrations attempts to come-up with a different programme instead of finding out what are the possible challenges (if any) with the existing ones just like other programmes of government (Elum et al., 2020). Sustainability of most of the previous programmes in the rural community is another issue due to lack of basic infrastructure (Osabohien, 2019).

Renewable energy such as solar can be harnessed to provide *point-of-use* solutions to most of the rural areas infrastructural challenges (Zhao et al., 2016). Considering the solar potentials in the country at average of 3.5 – 7.0 kWh/m<sup>2</sup> per day (Oseni, 2012; Shaaban and Petinrin, 2014), quite a number of applications can be explored (Fig. 2) in agricultural sector to boost Nigerian agro-produce productivity and preservation as well as improving the living standards in isolated agrarian communities.

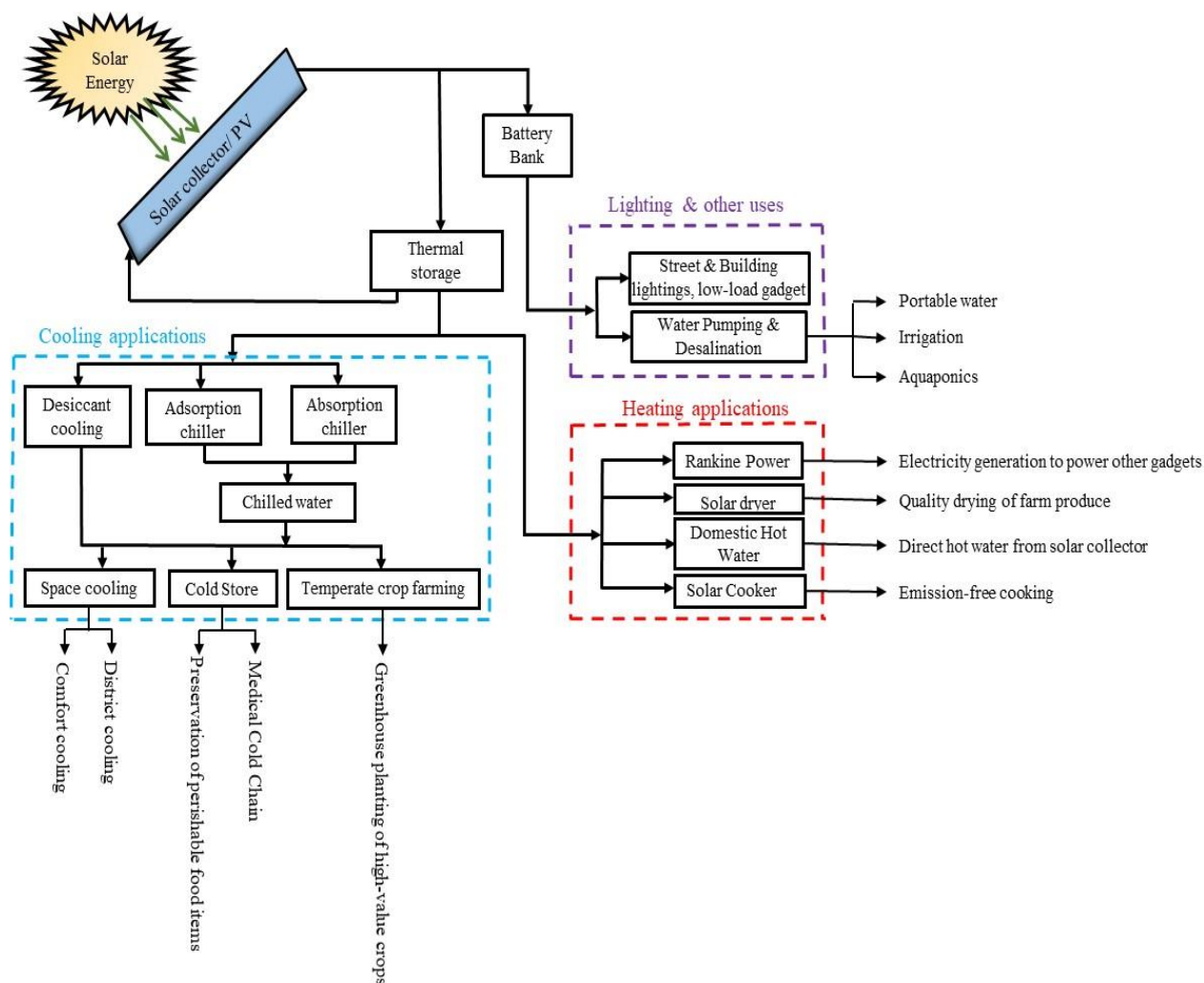


Figure 4: Schematic Representation of solar Energy Applications (Olabomi et al., 2015)

**Table 3: Nigerian government policies and programmes towards sustainable rural agriculture and food security**

Policy/Programme	Some Objectives/Functions	Reference
National Accelerated Food Production Program (NAFPP, 1973)	To make Nigeria self-sufficient in food production through dramatic increases in the production maize, rice, wheat, millet, sorghum, guinea corn, and cassava	(Njoku, 1985)
Agricultural Development Programme (1974)	To increase food production and farm incomes for rural households, thus improving the standard of living and welfare of the farming population, with the hope of reducing abject poverty.	(Dare Ojo, 2014)
River Basin Development Authority (1976)	To undertake comprehensive development of underground water resources for multi-purpose use. To construct and maintaining dams, dykes, wells, boreholes, irrigation and drainage systems and control flood. To develop irrigation schemes for the production of livestock and leasing the irrigated lands to farmers.	(Adeduro, 1982)
Operation Feed the Nation (1976)	To train and encourage the rural farmers in the correct use of these newly acquired inputs and skills. To train community leaders and beginners in farming and other related trades. To achieve self-reliance and sufficiency in food production.	(Arua, 1982)
Rural Banking Scheme (1977)	Mobilization of savings from the rural areas for the purposes of channeling same to profitable ventures Development of agriculture and agro-allied industries in the rural areas Reducing to a comfortable size, the drift of young men and women from the rural to the urban areas.	(Chibuikwe, 1999; Okorie, 1992)
Green Revolution (1980)	To ensure adequate, reliable, and safe supplies for rapidly growing population To become self-sufficient and achieve food security/ To raise and stabilize the nutritional standards of Nigerians.	(Famoriyo and Raza, 1982)
Directorate of Food, Road and Rural Infrastructure (DFRRI - 1987))	To identify and support viable local community organisations for sustained developmental activities. To identify and support areas of high food and fibre production potential for the country. To formulate and support a national rural feeder-road network programme.	(Dfrrri, 1987)
National Agricultural Land Development Authority (1992)	To provide gainful employment opportunities for rural people. To raise rural incomes and improve on the general living standards in rural areas. To expand productive capacity in agriculture and regain export capability in traditional and nontraditional crops and facilitate appropriate cost-effective mechanisation of agriculture	(Act., 1992)
Agricultural Insurance Corporation (1993)	To subsidise the premiums chargeable on selected crops and livestock policies from the grants obtained from the Federal and State Governments and the Federal Capital Territory, Abuja. To encourage institutional lenders to lend more for agricultural production having regard to the added security for their loans provided by the Corporation. To implement and administer the Agricultural Insurance Scheme, established by section 6 of this Act.	(CAP, 1993)
National Poverty Eradication Programme (NAPEP, 2001)	To empower youth and develop rural infrastructure To cater for social welfare and conserve national resources	(Anyebe, 2014)
ANCHOR Borrower Programme (2016)	To increase banks financing to agricultural sector and increase capacity utilization of agricultural firms. To reduce agricultural commodity importation, conserve external reserves, and create new generation of farmers/entrepreneurs and employment. To reduce the level of poverty among rural and smallholder farmers.	(CBN, 2016)

#### 4. THE WAYS FORWARD

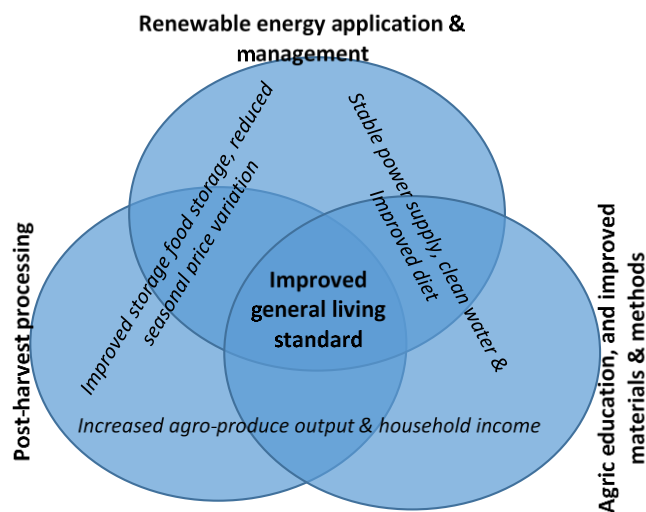
Generally, a number of factors contribute to the total economic output and, based on Nigeria context, these can be majorly grouped into; agricultural, manufacturing, services, solid mineral, and oil & gas. Focusing on agriculture, as a driver of economic development as discussed in the previous sections of this paper, sustainable agricultural system is obviously hampered by a number of factors, all of which could be overcome with formulation and implementation of appropriate framework targeted towards development of sustainable infrastructure to revive rural agriculture, bearing in mind that about 70% of Nigerian direct and indirect labour force is employed by agricultural sector (Ngozi, 2017) that is mostly in the rural areas. Most of the factors affecting the sustainable growth of rural agriculture in Nigeria, such as; lack of capital, low/no affordable credit facility, lack of improved farm implements and inputs, poor attitude of peasant farmers to modern agricultural practice, and many others can be addressed through the 'integrated development strategy'.

According to a recent study, integrated approach to rural development refers to a comprehensive effects of a number of activities and disciplines towards increasing agricultural and industrial output through the provision of infrastructure in both rural and urban areas, thereby improving standards of living for rural and urban dwellers towards social

progress and national economic growth (Qamar, 2014). From its report of the regional conference on 'Integrated Approach to Rural Development in Africa', held in Tanzania in 1969, a studies define integrated approach to rural development as; "an integral approach in the sense that it is a highly structural and systematic exercise in which all components in the system of development can be understood as important and appreciated for the part which they play individually and collectively" (United Nations, 1971). In the same vein (Olatunbosun, 1975; Baride, 2013), it was recommended that for neglected rural communities to have the impact of any government policy and programme, it must be multi-dimensional in nature. It other word, it must incorporate healthcare system, good road, electricity, water supply as well as other non-farm activity like education, and entertainment

From the foregoing, integrated rural development entails integrating various components of development in terms of disciplines materials and technical supplies, services, marketing, and social education together in the planning and execution of projects while the prospective beneficiaries are not left out from the initiation to implementations of such rural development programmes.

Integrated development strategy presented in this paper is a holistic approach for sustainable rural development through the development of all interrelated economic sectors as shown in Fig. 3.



**Figure 3:** Integrated approach to rural economy

Sustainability of development of a place can largely be attributed to the involvement of all stakeholders from different sectors with their commitment. It is also evident that food security and improved living standards can be promoted through an integrated system approach as shown in Fig. 3. With the integrated approach, various sectors of the national economy are linked together, thus the programmes of agriculture, rural infrastructural development and cooperatives are related to each other and are only feasible if not in isolation (Francis et al., 2012).

## 5. CONCLUDING REMARKS

The programs and policies formulated by Nigerian government could be sufficiently enough for the actualization of improved living standards in rural communities and overall better national economy but sustainable implementation of these programs and policies has always been an issue. This is partly due to each successive administration wanting to start its own programme as against continuity in governance. However, with public and private investment in agricultural infrastructures in the rural areas basically in the areas of linkage roads, point-of-use energy solution, agricultural education, assessable and affordable farmers' credit facilities, and favorable marketing corporations, rural farming will be more embraced by the teaming population. Furthermore with the presence of improved healthcare, clean water and stable power supply in the rural communities, rural – urban mass migration could be greatly reduced while food security would be guaranteed and rural household economy becomes improved. On the general scale, sustainable agricultural development would actualize improved standard of living while national economic stability is guaranteed as food importation would be replaced with exportation with consequent increase in foreign exchange earnings to stimulate improvement of national economy.

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