THE BARRIERS OF SMALL HOLDER FARMERS IN ADOPTING SOLAR POWER IRRIGATION SYSTEM (SPIS) IN NIGERIA.

"Echoing the voices of Small Holder Farmers in advancing livelihoods, securing food and adapting to climate change"

Agriculture has been the mainstay of Nigeria's economy for centuries. During colonial times, the Northern Region produced groundnuts and cotton, the Western Region produced cocoa, and the Eastern and Midwest Regions produced first palm oil and then crude oil. To date, agriculture has been a major contributor to the country's Gross Domestic Product (GDP), with about 24%; and remains the highest employer of labour. The bulk of the agricultural output that is consumed and exported is produced by smallholder farmers, who contribute over 90% of the agricultural output. Sadly, they are unorganised and fragmented. Consequently they have limited or no access to finance, modern farming techniques and credit facilities that can enable them to procure modern farming equipment, fertilizer, herbicides and other chemicals.

The world's climate is witnessing unprecedented changes which manifest in extreme weather events such as delayed or torrential rainfall, drought and extreme temperature; all of which have negative bearing on agricultural production.
Nigeria is not immune to these changes which are exacerbated by population growing at very high rate, and food demand rising faster than production, thus widening the demand and supply gap.

To cope with the rapid population growth, the Federal Government, International Partners and other stakeholders have been investing in the construction of infrastructure to support irrigation activities to ensure year-round food production and enhance food security.

Whilst numerous government agricultural institutions and programs are created, funded and designed to address challenges ranging from limited access to modern technology to inadequate market infrastructure. These initiatives are aimed at improving productivity, increase income and ensure food security with Federal Government taking the lead in

investing in and supporting irrigation activities through River Basin Development Authorities nationwide.

According to the Food and Agriculture Organization (FOA), agriculture contributed 24.17% to the nominal Gross Domestic Product (GDP) in the fourth quarter of 2021, and around 23.69 % in 2022. Likewise, in the second quarter of 2023, the agricultural sector generated about 21% of Nigeria's GDP. The largest contribution was from crop production, which covered nearly 19% of the GDP. Small-holder farmers are the backbone of Nigeria's agricultural sector, producing over 80% of the nation's food supply.

According to research figures, dry season farming communities irrigate only about 220,000 hectares out of 5.04 million hectares of floodplains riverbanks and lowlands available. It is therefore trite to state that Irrigation has the potential to take the lead in boosting the nation's agricultural productivity even in the face of challenges that hinder its development at several fronts.

Such challenges include lack of adequate knowledge of technology as well as inconsistency in policies and financing. Consequently, only a fraction of small holder farmers across the nation have been able to overcome the challenges and prosper.
Petrol and diesel are the dominant fuel for irrigation across the country.

The rise in their price affect irrigation in no small measure. The sudden removal of subsidy on fuel and the rapid devaluation of Naira has led to huge increase in the price of petroleum products, making it difficult for small holder farmers to cope.

The spike in fuel prices not only affects the operational costs of irrigation but also cuts their profit margins. With the agricultural sector already facing numerous challenges that include unpredictable weather patterns, market uncertainties as well as additional burden of higher fuel costs, the economic hardships for small holder farmers are, to say the least, quite enormous.

It is quite encouraging to note that technological advancement and global push for transition to renewable energy sources carries the prospect of raising the quality and affordability of Solar-Powered Irrigation System (SPIS) which mainly use solar energy to

pump water from sources as small as ponds. The system is undiubtedly the most attractive way of supplying water in remote areas with little or no access to electricity. Water pump is easy to install, and it can work directly after connecting the solar panel and water pipe with zero or minimal operating cost. Using solar pump means you can install a pumping system anywhere. There is no need to consider the feasibility of electrical infrastructure and the associated costs. Most importantly they are also largely maintenance free.

As a result, water availability for water-intensive crops such as rice is no longer an issue. Sufficient water supply also has about 45 per cent corresponding impact on yield. Despite the enormous benefits, only a fraction of small holder farmers can afford it, due to financial constraints and lack of a resilient support system.

Data plays a key role in all aspects of life by enabling informed decisions and improving the efficiency of any operation as accurate and reliable data base is key to success of any policy. Unfortunately, building quality data base in agriculture sector is costly as governments at all levels do not pay enough attention to investing in data collection, processing, analysis and storage.

As at the time of writing this report, we are not aware of any organization that has invested in examining and understanding what is happening to smallholder farmers engaged in irrigation activities and dry-season farming. It is this research output that will give insights into several factors such as livelihood changes, climate change adaptation, and food security in families, communities and the country at large.

A climate change Think Tank, YELF Climate Trust Foundation took an initiative to conduct in-depth research in the 19 Northern States of Nigeria. An initial baseline research is in progress in FIVE (5) States that include Kebbi, Niger, Sokoto, Kano and Bauchi. The study in Kebbi State was concluded in Mid-March while the rest are still in progress. YELF Climate Trust Foundation aims to create database of FIVE (5) million smallholder farmers in Northern Nigeria and at the moment 10,500.0 TEN THOUSAND FIVE HUNDRED smallholder farmers are already in the database.

In Kebbi State, the baseline study was conducted across communities in Argungu and Augie Local Government Areas. It was discovered that majority of Solar Powered Irrigation System (SPIS) users reported a substantial increase in income (70.24%). This increase is attributed to higher crop yield (74.07% of SPIS users) and lower operational costs (33.89% of SPIS users). SPIS users also reported increased savings (76.23%) compared to when they used other sources of energy and irrigation methods. An interesting discovery is that 57.37% of the farmers are using their increased income to expand farming activities, which has a direct consequence on food security. Another is that about 40.47% of farmers indicated they used surplus income on their children's education, thus showing the possibility of increased school enrolment for children in these communities as a result. It was discomforting to discover that barriers to SPIS adoption are associated with the initial cost of investment (high upfront costs) 79.57%, and lack of access to financing options 39.29%; thereby corroborating several researches that smallholder farmers have little or no access to finance and credit lines. Awareness on and use of SPIS was found to be remarkably high, 99.51%, yet less than 29.96% of farmers currently use SPIS in the study area.

It would be important to know if smallholder farmers are aware of climate change, climate change adaptation, and its impact on food production. Respondents showed reasonable awareness of climate change, with 62.28% and 50.98% resoectively, having observed increased temperatures and flooding.

Interestingly, 93.71% of respondents believe that SPIS helps in adapting to climate change because it provides steadfast water supply, and it reduces dependence on rain-fed farming. There is generally low awareness of other adaptation approaches, with only 15.13% being aware. Only 14.15% of respondents are aware that crop rotation is a climate-smart practice.

The current administration has indicated, laudably, a strong interest in food security to the extent of expanding the mandate of the Federal Ministry of Agriculture to include Food Security. Given population growth, the impact of climate change on food security, Nigeria must develop deliberate policies, programs, and frameworks to ensure food availability. This can only be achieved through year-round and integrated climate-smart farming. Not surprisingly, SPIS users reported a higher crop yield of 31.53% compared to non-users. Of

the respondents, 16.6% of SPIS users engage in year-round farming, leading to an increase in food production, an increase in personal income, and improved livelihood for the family.

Farmers strongly prioritize financial assistance, with 88.2% indicating interest in government subsidies. While the smallholder farmers contribute substantially to food production in Nigeria, but little or no support gets to them. With the necessary support and assistance, small holder farmers will boost food production, increase prosperity, improve food security and less need for food importation in Nigeria.

Thank you
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