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Relevant Infrastructure for Improved Food Security in Flood Plains of Anambra State, Nigeria

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Abstract

Access to relevant infrastructure reduces the stress and exposure of farmers to a variety of problems that affect the production of food. These include problems of planting, storage, processing and

harvesting. The study examines how water, irrigation, transport, food processing, storage and marketing infrastructure will improve food security. Comprehensive study of existing infrastructure, their status and functionality were carried out in the state. The existence and need for the physical infrastructure and the locations including tube wells, wash bores, pumps, buildings and roads. Social infrastructure including produce markets and the facilities therein like water facilities, assembly facilities, electricity supply and agro processing infrastructure were reviewed and analysed. The study provides working information and data for efficient planning and implementation of the minor irrigation project and also the emphasis in market access so that the Agro produce could be successfully linked across the different value-adding stages to the farmer. The need for policy intervention that can help in upgrading and expanding these infrastructures is imperative. Presently the World Bank and other donor bodies are assisting with financing rural road rehabilitation, development of agriculture, marketing and storage facilities, provision of rural drinking water and capacity building.

Key words: Infrastructure, food security, Flood plains, Donor agencies

Introduction

Food security is said to exist when all people at all times have physical and economic access to sufficient safe and nutritious food to meet their dietary needs and food preference for an active and healthy life (Nyam 2005). Food security according to Wimberley (2005) food security at household, village, national and international levels require availability of adequate quantity of locally grown agricultural produce, accessibility of supplies for urban and remote area, appreciation of the close link between nutrition and health for work and enjoyment; avoidance of undue risk through livelihood, vulnerability, hazard and shock.

In Nigeria, two-thirds of the population lives below poverty level and household food security is inadequate. This is because the agricultural sector has not been able to deal effectively with the problem of food security for the Nigerian people when viewed from the stand points of the nutritional status of Nigerians household food security and food prices.

As a follow up to the 1996 world food summit, Nigeria, one of the 82 low income food deficit countries (LIFDCS) requested for assistance under the FAO's national special food security programme (NSFSP) a tripartite participatory review of the government's request involving FAO, government and beneficiary communities was held in Nigeria in March 1998, and a pilot phase was approved and took off. Its success lead to establishing same to all the 36 states of the federation and Federal Capital Territory Abuja in 2001 in Anambra state the national special food security programme (NSFSP) is being operated in each of the 4 agricultural zones.

Programme implementation is anchored on community driven development (CDD) approach and capacity building geared towards improving individual skills including supporting the reorientation of implementing agencies to play a demand – led service role.

Objectives of the programme

The objectives of the programme include;

- Improve house hold food security and incomes and reduce poverty through increase in agricultural productivity, enterprise diversification and sustainable use of natural resources.
- Eradicate hunger, Obesity and malnutrition.
- Enhance national food security, improve availability of food and access to a variety of foods and raise income of producers through more efficient marketing.
- Improve food processing, storage and preservation.

- Provide windows for Governments and donor agencies planning and implementation capacity to ensure food security in Anambra State.

The question now relate to the extent these infrastructure, irrigation, wash bore, tube wells, market, accessible roads, processing and storage facilities are available and maintained as to achieve food security in Anambra state Nigeria.

Specifically the study was designed to carry out a comprehensive listing of the existing infrastructures, their status and functionality; with the hope of determining the deficits in proposing areas and projects for rehabilitation and cost implications.

Farmer – managed – irrigation system, emerged, from the long – age traditional lift – irrigation, practiced along flood plain in Anambra major rivers where farmers control virtually everything right from the water source, water delivery and its application, farm input sourcing, distribution and use, as well as crop production and marketing. The farmers sustained this system for over three decades with little or no support from the government, this performance, attracted the attention of not only the Nigerian government but also creditors and donor agencies, notably the world bank who in the early 1980's financed the National Fadama Development Programme (NFDP) implemented in all the 36 states of the federation under state agricultural development project (Mijindadi et al 1993) under this modified system the farmer still own and control the water source (often in form of tube well/wash bore) and the irrigated field, the management activities and decision making are carried out by the farmer, individually or in groups, with the government agency (ADPs) giving periodic technical advisory and support services (Mijidadi & Umar 1991).

The potential for development of small- scale valley bottom irrigation system in Anambra State Nigeria are tremendous, over one million

hectares of flood plains is estimated to be available for irrigation development.

The technologies favoured for irrigation development in the valley bottom include lifting from streams or rivers supplemented with wash bore or shallow tube wells using small or large pumps. The systems are mostly managed by the beneficiary farmers themselves who takes care of the operations, maintenance and management with adequate attention.

Irrigation using tube well or wash bores, good food preservation and storage facilities, marketing infrastructure and access roads to farm contribute to National food security and poverty alleviation by enabling rural dwellers to be profitably employed all year round, resulting in a significant boast in the economy.

Geography, location, soil condition, topography and climate

Anambra State of Nigeria is located between longitudes 60 35'E and 70 21'E and latitudes 50 38'N and 60 47'N. It is bounded on the West by the River Niger which separates her from Delta State. On the North East and South, she has common boundaries with Kogi, Enugu and Imo State respective. It occupies an area of about 5031 km2 and has a population of 2,767,903 according to the 1991 census.

The climate is typically equatorial with two main seasons, very marked differences in rainfall intensities, temperatures and relative humidity's features between the two seasons. The dry season is characterized by the dry harmattan winds of average intensities. Inyang (1975) advanced five climate divisions for the entire Eastern State of Nigeria, in which Anambra State falls into one climate zone having four dry months.

Land form and drainage system

Sympson (1954) and Ofomata (1975) recognized two landform regions in Anambra State, namely, the River Niger Anambra lowlands and the Awka-ldemili uplands. The Niger-Anambra River

lowland occupy the Northern and western portions of the State comprising the Niger-Anambra flood plains, the area has gentle undulating to nearly level topography which is traversed by a network of perennial streams. It is extensively covered by fresh water alluvium and has the tendency to seasonal flooding which could get to heights of two to three meter and between July and early October commonly. Ankpa in Kogi State flows into Anambra State few kilometers South of Ogurugu and continues southwards to join the River Niger at Onitsha. East of the Anambra River, the Ezu/Mamu River is the principal tributary, with numerous other streams flowing into it from the Awka Idemili uplands. The land enclosed between the River Niger and River Anambra has too many streams and Oxbow lakes. The major drainage system is the Urashi River and its tributaries. The Orashi River which starts from the uplands in Orlu, in Imo State, flows horizontally westward till it arrives Okija in Anambra State, where it changed its direction southwards, almost parallel to the River Niger South of Onitsha till it empties into the Ocean. The Western part of Anambra State, South of Onitsha, and bounded by the River Niger and Urashi has numerous Oxbow lakes, with the most prominent being Osiam Lake. These numerous ponds are utilised for fishing.

Rain fed agriculture situation

The total available area for agriculture in Anambra State is estimated at 503,100 hectares with net cultivated area of 350,000 hectares.

The net cultivated area in Anambra State supports current estimate of 400,000 farm families in Anambra State. Most people are rural dwellers and majority of who are farmers. The climate and adapic conditions provide ample opportunities for farming in the State. Crops such as Yam, Cassava, Maize, oil palm and Cocoyam are predominantly cultivated as well as animal breeding like piggery, Livestock, snailing and fishery. In addition to farming and commerce as the major occupation, a number of citizens are civil servants. Few others engage in construction, and weaving. The farming system is

characterized by crop rotation and mix cropping due to population pressure on land and poor soil fertility; subsistence farming is the predominant type of farming system, with the use of hand tools. The soil condition is acidic, organic and inorganic fertilizers are used yearly to upgrade the soil fertility.

There are two main seasons - the dry and wet seasons. Normally the wet season begins towards the end of March and ends towards the end of October. Dry season begins in November and lasts till February, but for global warning the dates becomes inconsistence. The month of January and December are usually cold due to the influence of the North-East trade wind that ushers in harmattan. The vegetation consists of Nigeria rainforest. Other parts consist of wooden savannah and grassland.

Objectives of the survey

The main objective of the Survey is to carry out a Comprehensive listing of the existing infrastructures, their status and functionality; with the hope of determining the deficits. The Survey would also identify the types of infrastructures which fall under the public domain and those which would need to be financed by the private sector. Specifically the study listed:

a. The existing infrastructures and their locations including shallow tube wells, wash bores, water pumps, buildings, roads, rails and poor facilities.

b. Social infrastructure including the main produce and the existing facilities markets and the facilities there; (e.g. water facilities produce grading and selection, assembly facilities and quality control, electricity supply etc).

c. Agro-processing infrastructures related to produce.

Assess the level of utilization and adduce reasons for this; Make recommendations on what is to be done to keep the facilities functional.

Justification for the study

The survey which involves not only the comprehensive listing of existing infrastructure, their status and functionality but also the identification of types of infrastructures which fall under public domain and those which would need to be financed by the private sectors broadly justified by the fact that it will provide invaluable working information and data for efficient planning and implementation in the area of ensuring food security. This is more so because as pointed out earlier, food security is expected to place strong emphasis on market access and marketing infrastructure such that the produce could be successfully linked across the different value-adding stage to the consumer.

Methodology

A review of available information/inventory within the(National Program for Food Security) NPFS operators through meetings was undertaken. Rapid rural appraisals as well as field visits were employed in carrying out this study. Questionnaires to obtain base line information on existing infrastructures, their status and functionality were prepared and used to ferret out and collect the required information/ data from the different locations as desired.

Sources of data

These include both primary and secondary jobs earlier done by consultants. Secondary sources of data come from project reports like ICR while primary sources of data were collected via structured questionnaire designed by APMEU, for all participating ADPS.

Sampling design

A two stage primary data collection procedure was adopted. Firstly the lists of Fadama and NPFS Farmers were compiled. Secondly, the specific grounds interviewed were selected by simple random sampling technique from the compiled list.

A total of 42 Fadama & NPFS farmers co-operatives were randomly selected in the state.

Data analysis

The information and data collected were analyzed both quantitatively and qualitatively. Simple descriptive statistics and parameters were utilized in the analysis.

Status of infrastructures

Physical/ production infrastructure

In this section we shall present a profile of the infrastructures used in the four agricultural zones of Aguata, Anambra, Awka and Onitsha under study.

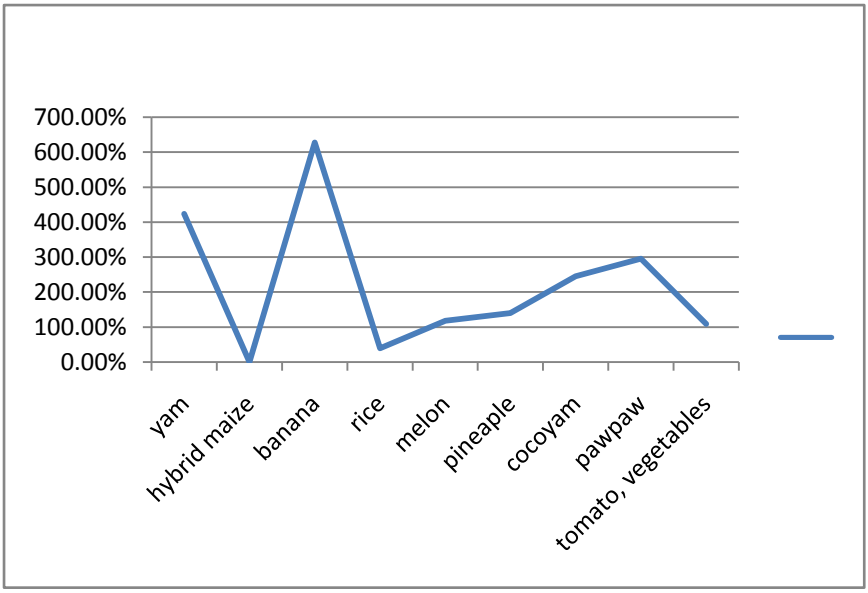
Brief description will be given, together with some illustrative tables and charts which are annexed to this report. Constant reference will be made to the tables as we discuss. Percentage equivalent of the responses are given at the back end of the section.

Major agricultural crops

Fig 1 showed the major agricultural crops cultivated by the four different zones under study. It can be observed that the zones cultivate mainly, TELFARIA (27%), followed by AMARANTHUS (23%), Okro (20%), MAIZE (17%) and MELON (13%) in that order.

Investigation and research carried out by the raw materials research and Development Council 1997 confirmed the profitability of the crop involved in the project as follows;

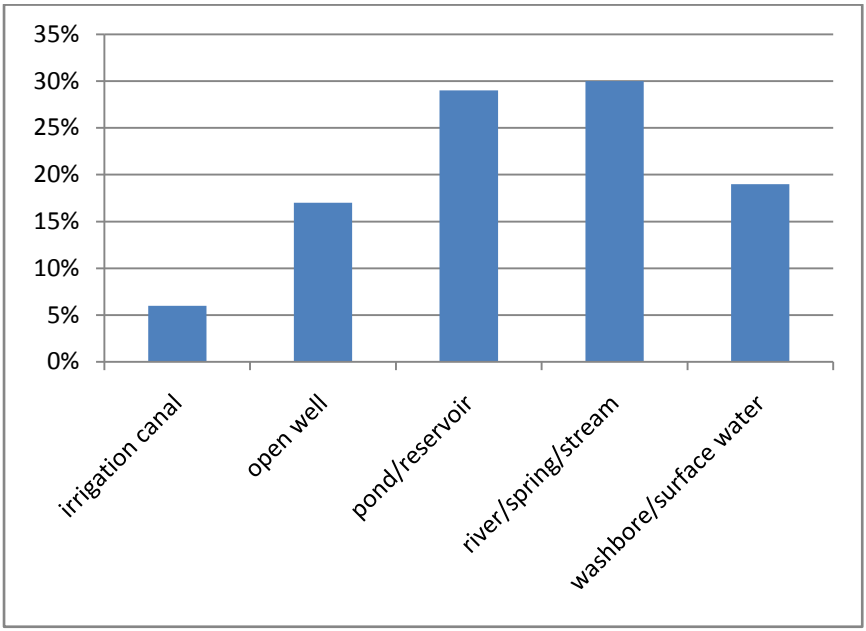
Fig 1: Major crops and % rate of returns



Source of irrigation water

The sources of irrigation water, water lifting mechanism and energy are discussed in fig 2. For instance, River/Spring/Stream constitutes the major source of irrigation water in the four zones. This accounted for 30%. It is closely followed by Pond/Reservoir (29%), and wash bore/surface water (19%). Open well accounted for 17% while irrigation canals are rarely practiced i.e. only (6%).

Fig 2: Source of irrigation water



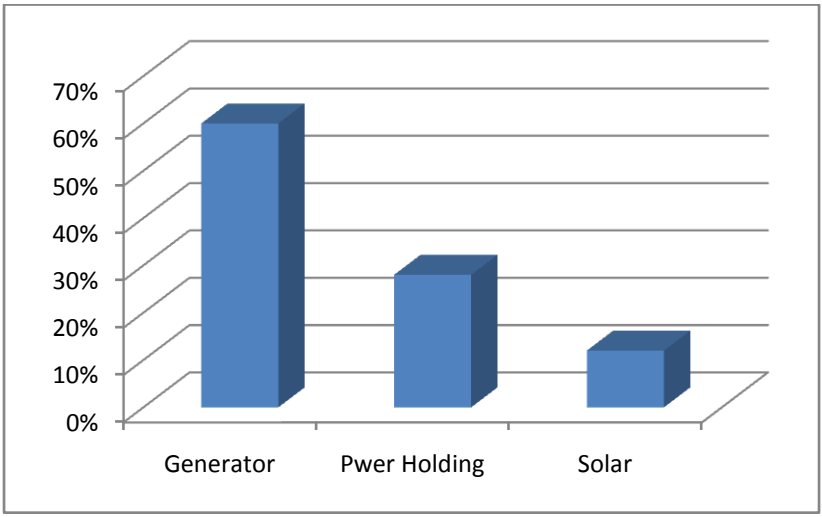
Direct pumping/surface water is likely to be more sustainable, more available as against other water bodies like ground water. Although tube wells are suitable for some areas, there may be maintenance cost challenges due to occasional break downs. However initial heavy investments could be needed for the construction of water conveying channels, high capacity pumps and head works.

More investments are required in introduction of pumps for more efficient, easier and wider application of water. Also more education about operation and minor maintenance of the pumps are important. Obviously pumping is preferred to manual methods.

Sources of energy

It is also discovered that most of the farmers rely on generator as their source of energy supply-accounting for 60% while Power Holding PLC only accounted for 28%. The solar method registered only 12%. This is illustrated in the fig 3 below.

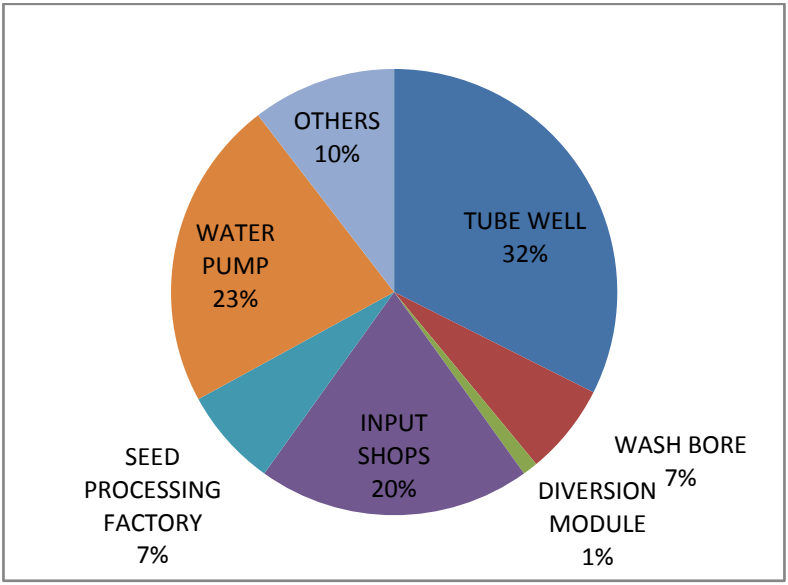
Fig 3: Sources of energy



Type and number of available production infrastructure

On the type of available production infrastructure, it was observed that the farmers have tube wells more than any other. This accounted for about 32%. They also have input shops (i.e. 20%) as well as water pumps (i.e. 23%). Very few farmers have wash bores, diversion module and others (see pie chart below). It is obvious here, that farmers are ready to play leadership roles in owning production infrastructure. A lot of financial assistant could be needed to help them.

Fig 4: Type and number of available infrastructure



In particular, responses from Aguata zone show that the water pumps recorded (31%) are owned by MANR, ANADP and private persons. The ownership of the tube well is shared by the LGA and private person in Anambra Zone, majority of the farmers have water pump (41%) and tube well (28%). These are equally and mainly owned by private individuals Awka zone did not record any difference in the ownership except that equal number of tube well and input shops was recorded (i.e. 39%) each. They are mainly from private persons. The communities also have some contributions.

In Onitsha zone, tube well accounted for 43%, followed by water pump which recorded 33% of the total infrastructures owned by individuals and organizations. Only about 10% of the respondents

claimed that private individuals have and own seed processing factory.

Status of production infrastructure

On the status of production, it is seen that most of the infrastructure registered for Aguata zone are functional, except for one tube well, and three water pumps which will cost a total sum of N80,000.00 to repair.

In Anambra zone, the tube wells and some of the water pumps are functioning. Similarly, of the nine water pumps registered for Awka zone, one required various amounts to put back the unfunctional ones to use. In Onitsha zone, ten water pumps are registered out of which seven are functioning. The remaining three will require about N40,000.00 to be rehabilitated.

Capacity utilization of the production infrastructures

On capacity utilization, the tube wells in Aguata zone have 50% capacity utilization while one of the wash bore and the three input shops have 75% capacity utilization. One of the water pumps has 100% capacity utilization while four each achieved 50% and 25% capacity utilization. In Anambra zone, the nine tube wells in the zone achieved 75% capacity utilization while out of the thirteen water pumps, twelve achieved 75% capacity utilization. The remaining achieved 50% capacity utilization.

In Awka zone, the thirty-three tube wells have 75% capacity utilization, so does the nine water pumps in the zone. The two seed processing factories in Awka zone also have 50% capacity utilization. In Onitsha zone, of the thirteen tube wells, only one achieves 75% capacity utilization while the remaining has 50% capacity utilization. The ten water pumps have 75% capacity utilization while the three seed processing factories have below 25% capacity utilization (i.e. for Onitsha zone).

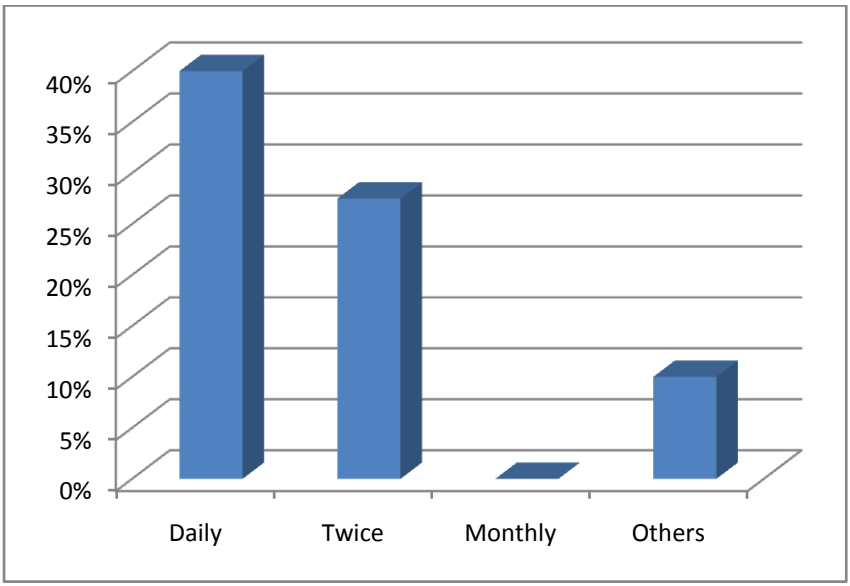
New investment in roads is likely to increase capacity utilization in Seed processing while investment in maintenance and training is also essential. New investments in functional seed processing factories are also important.

Social infrastructures

Marketing infrastructures

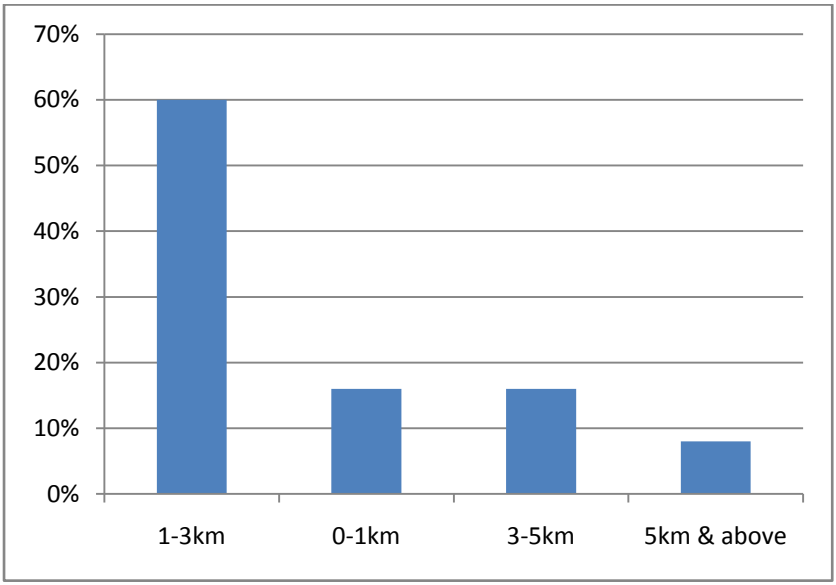
On the existence of markets in the farmer's areas, all the farmers (100%) agreed that there are markets in their areas or base. Out of these responses, 16 people or 40% said that their market is a daily one.11 people 27.5% agreed it is twice in the week, while 4 people or 10 percent said their markets take other forms such as every four days. These are depicted in the chart below.

Fig 5: Frequencies of market days per week/month



From the fig 6, it is seen that most markets lie between 1 and 3km from the farmers. This accounted for 60%. Equal number of markets is between 0 and 1km as well as between 3 and 5km from the farmers. These, accounted for 16% each. Only three markets are more than 5km from them (i.e. 8%). The implication of distance to the market on agricultural produce and the investment is that the further the market the more the farmers produce are disposed on farm sites and the more quality is reduced and damages recorded due to little or no preservation facilities.

Fig 6: Distance of market from the farm

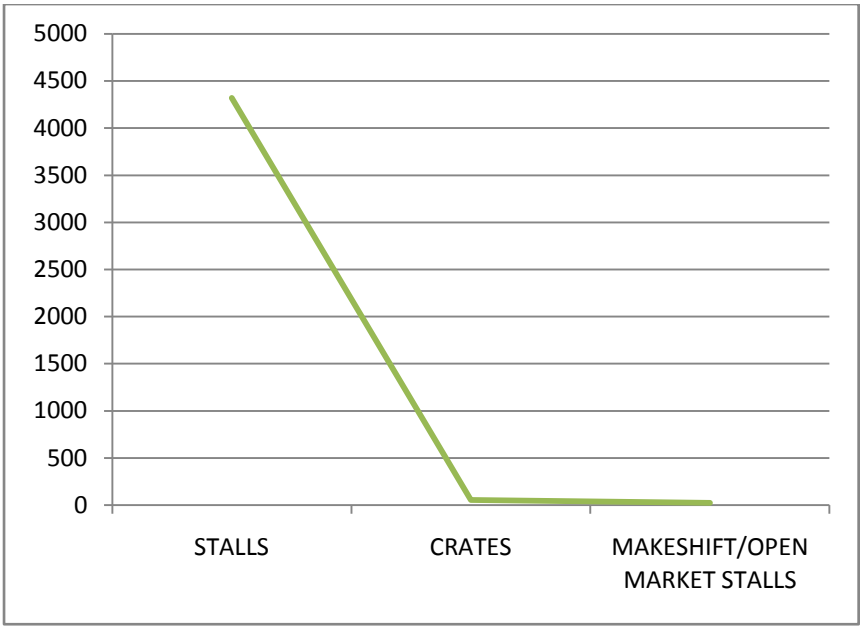


Types and number of marketing infrastructures

Fig 7 showed that there are a total of 4231 stalls (99%) in the four zones under study. Out of this, Onitsha accounted for the largest

number of 2098 or 49%; followed by Awka with 1088 or 25%. The rest is shared by Aguata and Anambra. There are only 54 crates (or 1%).

Fig 7: Type & number of marketing infrastructure



Road/transport infrastructure

On the type and distance of access road to the farm from the main road in Aguata zone it was observed that most of the respondents agreed that the distance are less than 5km. Out of these, only one has good laterite while three were track roads. Five of them are foot paths. The only road having bad laterite is between 5 and 10km long.

In Anambra zone out of the five roads that are less than 5km long, one is a foot path while four are water ways. Two bad laterite roads are

between 5 and 10km long while three roads that are above 10km are track roads. Also in Awka zone, four roads that lie between 5 and 10km are bad tar while five roads which are less than 5km each have bad laterite. The only track road in the zone is more than 10km long.

Finally, in Onitsha zone, two roads less than 5km are bad tar while five of them are water ways. Four roads in the zone that lie between 5 and 10km are bad laterite while the remaining two roads which are above 10km long are foot path. There are no other types of road/transport infrastructure in the four zones of the state.

Storage and processing infrastructure general

There is paucity of storage and processing infrastructure across the zones as shown in table F.1. The only processing infrastructure in Aguata zone is solar dryer. There are addition to solar dyer, cold rooms, silos as well as fish processing factory for Onitsha and Anambra Zones while Awka zone has cold room, solar dryer and silos.

Ownership of storage and processing infrastructure

The few available storage and processing infrastructure in the four zones are owned by private individuals.

Status of storage and processing infrastructure

The only infrastructure in Aguata zone-solar dyers is functional and free of charge, according to the respondents. In Anambra and Awka zones, the infrastructures present is cold room, solar dryer, silos, and are all functional. For Onitsha zone the storage is the same, they have cold rooms, solar dryer, silos, all functional.

Usage capacity of storage and processing infrastructure

From the respondents reactions, majority of them said that storage and processing infrastructure has at least 75% capacity utilization in Aguata and Anambra zones while in Awka and Onitsha zones the respondents said it is up to 100%.

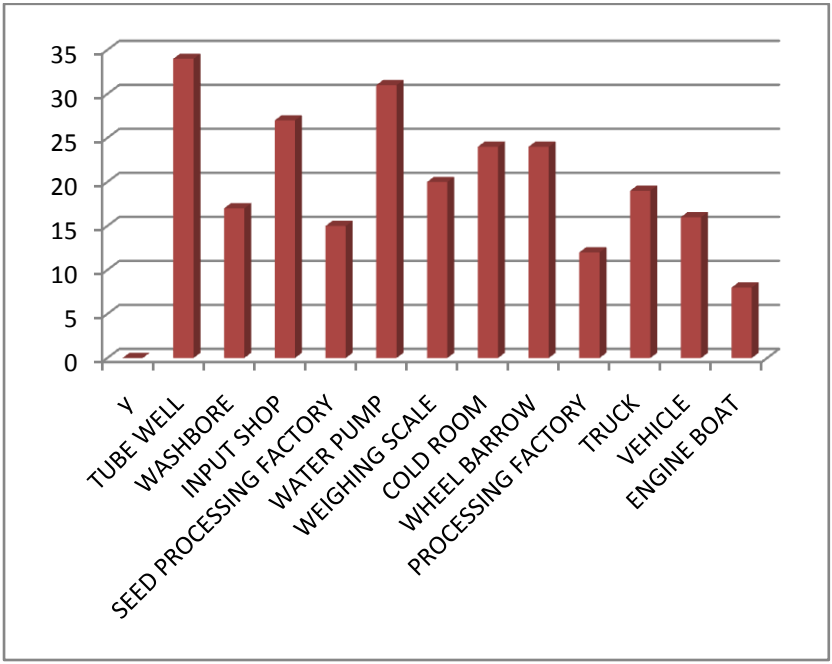
Reasons for not using the infrastructures

On the reasons for not using the infrastructures, most of the farmers in Aguata zone accepted that non availability of the infrastructures was the main reason for not using them. In Anambra zone most of the infrastructures listed are also not available in the desired quantity as evidenced by the respondents (except for, one water pump that is not functioning). In Awka and Onitsha zone, about one or three water pumps have been registered as not functioning, and perhaps need repairs.

Additional infrastructural needs

The respondents were requested to make case for any additional infrastructural needs and possibly their estimated cost. The fig 8 below explains their responses hence, a total of 33 tube wells costing about N2, 310,000.00 would be needed. Similarly, about 17 wash bores costing /`bout N2, 700,000.00 are needed. About 31 water pumps that will cost about N177,000.00 each and 15 seed processing factories costing about N7,500,000.00 would be needed across the zones as additional infrastructure. The additional storage/processing infrastructure and their corresponding costs with the exception of processing factory, cold room, weighing scale are shown in the chart below as provided by the respondents in the four zones. The cost of processing factory is put at N500,000.00 per factory in Aguata, Awka Anambra and Onitsha. The cost of silo is put at N420,000.00 each, in each Anambra LGA. The average costs of cold room and weighing machine in the zones are N800,000.00 and N5000 per unit, respectively, while solar dryer in Anambra zone is put at N10,000.00 per piece.

Fig 8: Additional infrastructure



Reasons for suggesting additional infrastructures

On the reason for suggesting additional infrastructure, most of the farmers in Aguata zone agreed it was for increased production. Very few of them said it was for either seed processing or increased revenue or to beef up existing infrastructure. Similarly, in Anambra zone, equal number of the farmers agreed it was for increased production as well as for increased revenue. This is also the case of Onitsha zone where most farmers also agreed that they needed the additional infrastructure for increased production. Other additional infrastructure include processing infrastructure like fruit, tomato, mangoes, oranges processing and fish processing, cassava, oil equipment. According to

the respondents, these infrastructures are required in order to curtail wastage

List of infrastructures that can be provided by the private or public sector as adjudged by the respondents

The respondents view in the four zones as regards who will provide which are as follows; in Aguata zone the respondents are of the opinion that tube well, wash bores, are better provided by the private sector while cold rooms silos, juice factories, tractors culverts, stalls, crates and access roads are better provided by the public sector. There is a divided opinion as to who is better positioned to provide input shops, or farm storage, tomato paste processing, and solar dryer.

In Anambra zone: It is the respondent's view that seed processing factory, tractors, culverts, fruits processing and access roads be solely provided by the public sector while the private sector should provide tube well cold room and stalls.

In Awka zone: They hold the view that seed processing factory fruit processing, and access roads are better provided by the public sector. On the other hand, they share the view that tube well, wash bore, and farm storage are better left for the private sector. Others can go either way

In Onitsha zone: It is their view that tube well, wash bore, culverts, tomato processing, and access road be provided by the public sector. Again, input shops, cold rooms, farm storage, solar dryer and stalls be provided by the private sector (see table H1.4)

Cost of rehabilitation

By estimation, a total sum of N16.5 million is required to undertake rehabilitation works in sample areas across the four Agric Zone of the State. The rehabilitation works are to be undertaken on Physical/Social infrastructure. However, there was no reaction in respect of storage/processing infrastructure rehabilitation. Be that as it

may, that does not mean that rehabilitation works should not be undertaken on these.

Generally in the four zones studies, technicians that can repair water pumps, tube wells etc are available and other groups of technician involved in the fabrication of storage and processing equipment are also found in reasonable numbers. This obviously would reduce the problems encountered with mentainance and fabrication related problems in the zone.

Conclusion and recommendation

The data obtained from the questionnaires are merely random sample and hence some of the statistics do not actually depict the degree of infrastructural needs of some of the zones nor do they portray the very rich Agriculture potentials existing in the state.

The existing roads are littered with potholes and leads to unpaved ones that are nearly impossible to navigate without proper vehicle. Roads disappear entirely closer to farming communities; this leaves rural areas, which have the potential to feed the more than one billion hungry people cut off and isolated. In Anambra state an average smallholder farmer swims alone. She has no insurance against erratic weather patterns, get little or no subsidies, and has no access to credit. Trek a long distance to get their produce to market However in addition to poor infrastructure, many small holder farmers in Anambra State have insufficient access to productive assets, such as land, water, and new technologies. As a result, yields are generally too low to allow the million of rural households to generate marketable surpluses. Furthermore, their lack of access to downstream activities, such as processing and marketing, prevent them from selling easily if they have surplus at all. If small holder farmers are to be reckoned, link in the value chain, from the smallholder to the local trade agents and agro processors to regional and national markets, needs to be strengthened. We need to link food producers with the people who need their product through viable and well maintained infrastructure.

In addition, we need to provide them with research and technology to ensure that they can grow the best produce and storage so that they can sell at peak prices.

It is also desirable that access roads, storages and processing infrastructure be put in place in order to help curtail wastage and hence stabilize price: both during period s of plenty and scarcity.

There exist many major irrigation schemes in the state which are located in flood plain that are almost abandoned due to lack of fund or operating at a very low capacity utilization on account of paucity of required infrastructural facilities.

There is also the need for intensified and sustained public education and enlightenment in order to increase participation in Agricultural production in the State as some people are yet unaware of the benefits derivable from the scheme.

The field survey revealed that for over 100,000 ha flood plain that were considered in the course of this study, it will cost about N3 billion to develop and tap fully the vast resources that abound in 4 Agric zones of the state, namely: Aguata, Anambra, Awka and Onitsha. The cost elements considered include land preparation and Bush clearing, Pumps, Canals, Roads, Tube Wells, Storage and \processing Infrastructure.

Opportunities for processing for downstream activities are not yet as developed as expected and therefore inherent problems of post harvest losses are still as high as more than 40%. Increased funding for post harvest technology would be needed to minimize losses and stabilize produce prices during post harvest season and lean periods.

References

Agene, France Presse (2001). "Global food security at that from climate change." New York: United Nations Panel, February 13th.

Cooke, B & Robles, M. (2009). *Recent Food prices Movements: A Time series Analysis.* Washington DC: International Food Research Institute.

Fan, S. (2010). *Achieving Sustainable Food Security: New Trends and emerging Agenda*. Washington, DC: International Food policy Research Institute.

FAO (2009) *How to feed the world in 2050*. Rome: Food and Agriculture Organization.

Prinstrup-Andersen, P. & Cohen, M. J. (2002). *Achieving Sustainable Food security for All: The Role Policy, Global public Goods, Property Rights, and Collective action.* Washington, DC: International Food policy Research Institute.

UNDP (2009). *Human development Report 2009*. New York: United Nations Organization.