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### **REVIEW OF PROJECT, PORTFOLIO AND PROGRAM MANAGEMENT IN THE AGRICULTURAL SECTOR OF NIGERIA**

The article deals with reviewing project, portfolio and programs in the agricultural sector in Nigeria. It analyzes several problems that is been faced in the agricultural sector. It analyzes how these problems have affected the economy and productivity of the country's agricultural sector. It also suggests some possible ways that can be implemented by farmers and the government in solving these problems and improving the agricultural sector in Nigeria. Fig. 1, tabl. 1, ref. 19.

Key words: agricultural sector, financing, machineries, farmers, Nigeria, funds, research, project, programs, portfolio.

**Problem statement and its connection with scientific task.** Agriculture in Nigeria is a branch of the economy in Nigeria, providing employment for the population. Agriculture remains the base of the Nigerian economy, providing the main source of livelihood for most Nigerians. Before the oil discovery and oil boom era in Nigeria, agriculture accounted for more than 90% of the common wealth and resources of Nigeria; with the country being sufficient in food production and made wealthy by agricultural exports. [1] Approximately 78% of the population engages in agricultural production at a subsistence level. Agriculture is the highest employer of the Nigeria labor force which is about 70% [2].

Agricultural holdings are generally small and scattered. Agriculture provided 41% of Nigeria's total gross domestic product (GDP) in 1999 from contributing of 65.7% to the GDP in 1957. [3] There has been a continuous decrease in this rate. In 2016, agriculture contributed 24.18% to the nation's GDP. Poor agricultural technology is one of the numerous reasons for a continuous decrease. In spite of agriculture been a major source of employment in Nigeria, it is faced with major problems which have resulted in the continuous decrease of the sector.

The sector faces many challenges, limited adoption of research findings and technologies, high cost of farm inputs etc. Lack of adequate equipment has been a major problem in the agricultural sector in Nigeria. The available equipment is rather on a high side (expensive) and they perform single function. Farmers (especially rural

area farmers) have difficulties in acquiring these tools as they have to acquire a lot of them. Also transporting much equipment to their farmlands can be really stressful, expensive means of transportation and could take a lot of time. There is an absence of single equipment that can multi task for the farmers. Lack of this has resulted in consuming lot of time, stress and finance of the farmers. The lack of these necessary equipments has caused a reduction in the production of food production which in turn has reduced the country's international trade and GDP. Nigeria is known for large production of agricultural food production. However the country is not able to maximize this to her maximum potential as this problem and other problem faced in the agricultural sector has reduced and hinder large production that will be sufficient for large export rather the country has resulted to importation of food products to feed her population. According to the report on The Agricultural Development Projects (ADPs) in Nigeria, [4] amongst other problem affecting the agricultural sector in Nigeria the lack of equipment has a rate of 59% which is a high cause of agricultural failure in Nigeria. According to a report on agriculture-Nigeria machinery [5], in 2014 an attempt to fix this problem was made by the Nigerian government. The government developed a scheme called "e-wallet system" whereby the government makes these purchases of the required tool or machinery chemicals and seeds needed by the farmers and distribute them to farmers. The farmers are notified of machinery allocation by getting an alert on their mobile phone and in turn they pay the government at subsidized rates up to 50% in installments. There were also other schemes and programs like "Growth Enhancement Support (GES) scheme", "Agricultural Credit Guarantee Scheme (ACGS)", "Agricultural Development Programme (ADP)" [6] etc and projects that were put in place to support mechanized farming by the government. However, this has not seems to be effective over the years due to corruption and other associated factors. The allocated machineries are rather sold at high rates to commercial and rich private farmers. The problem is still in existence at a very high rate.

Low funding into the agricultural sector is a major challenge faced in the agricultural sector. This problem has prevented the adequate provision of the needed materials for large production of food and crops. According to the report on Journal of agriculture and veterinary sciences [7] the Nigeria government invests only 2% of her national budget into the agricultural sector. This is because the nation has shifted her focus from agriculture to oil production since the discovery of oil. Farmers do not have sufficient financial support from the government, hence, they resolve to the use of local materials and tools which is slow for the production of food in large quantity. Effort has been made by the government for continuous provision of funds to the farmers in terms of giving out loan. The "Nigerian Agricultural and Co-operative bank" was created at the national level [8] where loans can be given out to farmers at low interest rate. Also, the creation of Nigerian Agricultural and Cooperative Bank (NACB) established in 1973 and Agricultural Loans Boards at the various states [8] to help in funding the farmers in the agricultural sector. The government also established the "Agricultural Credit Guaranty Scheme Fund" this is meant to reduce the risk taken when given out loans to farmers. The given out funds is with the aim of providing farmers access to new technologies, machineries, practices that will boost their work and productivity. The loans given are paid back at a low interest rate within an agreed time.[9] Also foreign and national companies has made some contribution in fund provision such as World Bank group [8] been involved in Agricultural Development Projects (ADPs). However, as a result of the fall in the economy of the country, there has not been a full release of these funds. Sometimes, funds get diverted by government officials and this has prevented the farmers in having access to the needed allocated funds which in turn has made the problem still in existence. And

when these farmers get these funds, some of them divert it into other personal use. This has in turn prevented the eradication of this problem in this sector.

Marketing and transportation is also an issue faced in the agricultural sector in Nigeria. For marketing to be made, the crops are to be transported from the farmland to the storage house or to the consumers. [10] However, most farmers cannot afford big machineries or other means to transportation to help them move the cultivated crops. Good road is also needed for easy transportation but that is also a major problem as the country has a major problem of bad roads. Farmers and buyers do not have the dynamic information system that could connect them together. The lack of easy and fast transportation of harvested products for proper storage has resulted to the loss of about 40% of perishable and 15% of grains and cereals. [10] Departments were assigned for road construction. However this has not seemed to be efficient over the years as the process is slow and many road constructions are yet to start.

The illiteracy level of some of the farmers has resulted in the inability to operate the provided machinery which has slowed down food production. Most farmers do not find a need to educate themselves on farming or the new technologies and machinery. This has in turn slowed down agriculture as they still prefer the old farming system. The provided machineries are difficult to operate by these farmers and weeks or months have to be spent to train them on the use of the provided facilities or chemicals. Learning processes is rather slow as most of the farmers lack basic knowledge of technology. Difference in language spoken by the tutor and the farmer is also a major issue.

Other problems include; unstable prices of seeds, chemicals and equipment, Unfavorable government policies, Lack of good infrastructure (this includes storage, light, water), climate change and environmental hazards etc. Nothing significant has been done to improve these problems.

**Goal of the article.** The goal of this review article is to review the meaning of project, portfolio and program, project management, portfolio management, program management in relation to the current situation of the agricultural sector in Nigeria and their different methodologies. In this article, we analyze the existing problem in the agricultural sector of Nigeria. The project, portfolio and program done to in this sector are reviewed. Different tools and instruments for decision making when it comes to projects selection and portfolio and program formation, selection of right sets of projects are also analyzed.

**Introduction of the basic finding.** Project is a set of unique, temporary interrelated tasks which are done in order to gain a product or result within a set cost, time and limitation. A project has a specific direction and objective it aims at achieving. Project is always temporary, which means it has a start and a finish date and it is also set within a certain cost, schedule, resource and quality limit. A project can be a part of a bigger project or a single task that the organization aims at getting a result from. It is necessary to know that a project always has a defined or specific goal and objective. The product or result gotten from a project can either be tangible or intangible. The tasks involved in accomplishing a project are related. Sometimes they involve finishing one before the start of another, while other times they require them to be done simultaneously.

Project management is the application of ideas, skills, technology, tools, techniques, for the initialization, planning, implementation, monitoring, control and closing of project activities in order to achieve a set goal and objective. According to PMBOK, a guide to the project management body of knowledge defines Project management as the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements. [12] Project management helps to set and view a clear and defined goal and objective for the project. When having to execute a

project, effective management is needed to achieve the desired result. Project management helps in balancing scope, quality, cost, schedule and resources of a project. The way a project is managed can affect the product and result by the closing of the project. It will also affect the project success or failure or whether the project will have to stop or be completed.

There are some existent projects in the agricultural sector in Nigeria. Project has been created to help in improving the agricultural sector in Nigeria. Some of the project include:

1. The agricultural development project (ADP). ADP was first launched in 1972 with the aim of increasing food production and helping farmers raise funds especially small scaled farmers [4]. It also aimed at providing new technology machineries to farmers. The project was launched involving World Bank 66%, federal government 20% and state government 14%. It initially started in 3 states, and the success in those states led to expansion to other states. The management of the project was however done by World Bank. During the ADP there were seed and chemical distribution, machinery hiring which made mechanized farming easier for farmers with low funds who could not purchase these machineries. Farmers had the opportunity to hire machineries when needed. This project recorded success rates until 1996. Some problem occurred during the implementation of this project. Like the farmers diverting their given fund into transportation business and any business of their choice [13]. The government officials were also not fair in the distribution of materials and machineries. The large scaled farmers were allocated more than the poor farmers.

2. Agricultural Transformation Agenda (ATA) is another project created by the government to help improve agriculture and solve agricultural problem. ATA started in 2015 and aims to support farmers, reduce rural poverty, drive economic growth, and enhance food security and job creation [14]. ATA aims at reducing the rate of food importation which is presently at 8.5%. The starting center of this project is at the North central (kogi state) before its expansion to other states. The project combines both public and private investment in which 75% is used for infrastructures (which include machineries, transportation, power etc), 15% is allocated to financing the farmers and 10% for land allocation and management procedures.

Project management methodologies used for project in Nigeria is water fall methodology. They use the waterfall methodology to make their execution according to the result of survey and research. However before this is used extensive research and survey is been carried out. The survey is done by the National Agricultural Extension and Research Liaison Services (NAERLS) in collaboration with the National Food Reserve Agency (NFRA), representatives of the Federal Department of Agriculture (FDA), the Planning Research and Statistics Department (PRSD) and the five Zonal Coordinating Research Institutes [4]. The survey was made by visiting farmers at rural areas and other concerned areas. Data was collected through Participatory Rural Appraisal (PRA), complemented with a structured questionnaire. The data gotten are analyzed through descriptive statistics to know the rate at which the problem has affected the farmers. These data are further reviewed through Small Plot Adoption Techniques (SPAT), On-Farm-Adaptive Research (OFAR) and Management Training Plots (MTP) [4] and used for further extension to other areas.

Portfolio is a set of projects, programs, sub-portfolio which are managed to achieve a set goal. According to PMBOK Portfolio refers to a collection of projects, Programs, sub portfolios, and operations managed as a group to achieve strategic objectives [5]. The projects in a portfolio are not necessarily related. They can be separate individual project which are been set to achieve a certain goal. For portfolio, a vision is set, and afterwards several projects and programmes are put in place to achieve the set vision. The achieved vision for each project and programmes are

collected and compared to know if it fit or meet the demand of the initial vision or goal set. Portfolio helps a manager or organization to have a full perspective on their future and current orders based on their key features and help them achieve their goal. Portfolio management is an act of selecting the right project and programs managing, prioritizing, and controlling based on their objective and providing the needed resources. In portfolio management it is necessary to understand the objective, scope, resource, cost and schedule needed for the project or program. Portfolio management helps to review realistic goals, possible deviation and risk and stakeholder's concern. The project and program are sometimes managed together as they are sometimes related and sometimes independent of each other.

There are 2 main and popular portfolios in the agricultural sector that has been created in the agricultural sector in Nigeria. The portfolio includes:

1. FRAGG investment management limited was created with the aim of supporting small and medium scale investments. They help in financing business with needs and this include small and medium scale farmers. FRAGG help farmers and other business with the problem of fund, machineries, training etc. According to FRAGG, *"We Provide Short-term, Mid-term and Long-term Financing in various forms to meet the Specific Business Needs of SMEs and Growing Business"* [15]. They are committed to impacting business to make them as large as they can achieve. They help in fund management services, fund mobilization services, Investment management services, Business advisory services, capacity building and technical assistance [15]. The portfolio of FRAGG contains project that are not related but have one aim, which is to help financing and growing businesses. The portfolio of FRAGG investment includes projects such as:

- FIDA - Fund for integrated development in agriculture. It aims to empower small and commercial farmers with sufficient finance for large crop production. It also aims at providing technical assistance which includes training, farming techniques, marketing, machinery provision and more. With the help of FIDA, farmers are able increase productivity, enhance their operational capacity and generate income to enable them overcome poverty [15].

- FRAGG impact fund – This analysis the areas of need of these business and help in providing the necessary facilities that will help them solving those problems. They identify, train and impact small and medium scale businesses.

- FRAGG educational fund – This program focuses on the educational sector. It has an aim of reducing the level of illiteracy by providing schools with materials that will help facilitate the learning processes. They monitor, evaluate and implement [15] the fund in the educational sector and help to improve the quality of education.

- FRAGG health fund – This focuses on the health sector and help the poor have access to good health services. They help with financing the small health centers and financing the poor for better health services.

2. The second portfolio that has projects and programs that aims at improving and solving problem in the agricultural sector is known as IFAD. IFAD – IFAD started in 1985 and has successfully impacted about 10 different program and is still involved in impacting several programs. IFAD has programs which covers agricultural technology, climate change adaptation, natural resources management, job creation, infrastructural development and many other areas of the Nigeria economy. *"The objectives are to empower poor rural people, especially women, by increasing their access to resources, infrastructure and services; and to promote the management of land, water and common property by local communities, helping to overcome environmental degradation"* [16]. IFAD has so far dedicated 58% to capacity building and rural infrastructure, 6% to agro-input supply, technical support and research, 11% to project management and 25% to climate issues and sensitive measures. IFAD has

recorded some major success which include; supporting about 15,710 farmers, gender inclusion which involved an increase in women participation in the economy from 5% to 35%, increase in agricultural productivity, building of financial institution to support rural farmers by giving out loans. Some programs under IFAD include;

- Community-Based Natural Resource Management Programme – Niger Delta (CBNRM-ND): It aims at improving living standard for at least 400,000 rural families in 9 Niger Delta states. It also aims at building agricultural chain and job creation. Rural Finance Institution Building.

- Programme (RUFIN): It aims at building the finance of microfinance banks, so that they can enhance the receiving of loans by rural farmers. 12 states are the main points of consideration. Value Chain Development.

- Programme (VCDP): It aims at improving agricultural strategy and techniques. Climate Change Adaptation and Agribusiness Support

- Programme in the Savannah Belt (CASP): It aims at improving agricultural productivity.

There is no known or specific methodology used for portfolio management in Nigeria. However, we can conclude that waterfall methodology is been used for each programme or project in a portfolio. The interactive methodology is then been used to manage them together. Every portfolio has a specific goal and interacting them together will help in making sure the main set goal is achieved collectively.

Program is a set of related projects which are managed together to achieve a set aim or objective. Programs have defined goal and objective aimed at achieving. According to PMBOK Programs are grouped within a portfolio and are comprised of subprograms, projects, or other work that are managed in a coordinated fashion in support of the portfolio [5]. Programs give a chance to manage several projects which are either under similar sector or have similar defined goal to be managed together. It helps in effectively control all project and risk can be minimal as all projects can be viewed from the area of the set goal. Programs contain related projects and have to be managed in a coordinated manner to ensure the budget, schedule and scope are been met. A program will always have projects in it, while a singular project cannot be a program. Sometimes, projects in a program depend on each other for effective completion of the program and obtaining maximum benefit.

Program management is the use of coordinated tools, techniques, to program to ensure the cost, scope, cost, schedule and goal are met. Project management ensures the collective achievement of all projects in a program. According to PMBOK Programs management is the application of knowledge, skills, tools, and techniques to a program in order to meet the program requirements and to obtain benefits and control not available by managing projects individually [5]. Program management analysis the project interdependence, ensure each project meet its requirement and collectively meet the program set goal.

According to the Federal ministry of agriculture and rural development (FMARD) in Nigeria, the program “Nigeria Agricultural Transformation Agenda Support Programme” [18] is set up to help in solving agricultural problem has 4 projects under it. The main objective is to develop the agricultural sector, income growth, increase food security, job creation and increase food production into the global food market [17]. The projects under this program include:

- The green alternative: The aim of green alternative is to increase the food production both for domestic consumption and large export.

- Staple crops processing zones (SCPZ): This project aims at attracting the private sector into agriculture by investing which will turn will help rural farmers in acquiring their needed machineries and materials for large production.

- The Nigeria Incentive-Based Risk-Sharing System for Agricultural Lending (NIRSAL): The aim of this project is to reduce possible risk in the agricultural sector in Nigeria both in terms of finance, technique, food chain and other areas of agriculture.

- Growth Enhancement Support Scheme (GESS): The project focuses on improving the provision of fertilizers, provision of agricultural input and equipment at affordable prices and to increase the productivity of the farmers through the use of fertilizers.

Program management methodologies used for portfolio in Nigeria we can conclude that waterfall methodology is been used for each project in a programme. However for the collective achievement of the program objective, the interactive methodology is used to manage them together.

In summary, to understand and know the difference between project, portfolio and program, the table below gives a summary of what they all entail (tabl. 1).

Table 1

**Difference between project, portfolio and program**

	Project	Portfolio	Program
Uniqueness and dependence	Projects are unique to produce a unique result and not necessarily related to another project.	Programs or projects in portfolio are independent of each other and unique.	Contains related projects that are related or dependent on another
Objective	Project have defined objective before the start of implementation which is used throughout the project life cycle.	Portfolio has objectives set but can be changed depending on the condition of the economy or organization.	Program has broad objectives with benefits.
schedule	Has a shorter and temporary schedule compared portfolio and program.	Longer schedule or time frame	Longer schedule or time frame
Sun-units	Project is a singular function set at producing a result	Portfolio contains multiple program or projects.	Portfolio contains multiple projects.
Risk	Risk for project can be easier to identify and manage.	Risks are more difficult to identify, manage and control.	Risks are more difficult to identify, manage and control.
Budget	Budget for project are relatively smaller than portfolio and programs	Larger budget is needed for portfolio	Larger budget is needed for program

Source: developed by author.

In choosing a project, portfolio or program, we consider some tools that can be used while choosing each. Project selection is the process of choosing the appropriate project to implement when there are several projects to be done. A project is selected with the aim of benefitting the organization or economy. Sometimes, selecting the right project to be implemented could be tasking. Project selection is considered when there are constraints in resource, cost or schedule of the organization. Choosing the right project to carry out is important as it determines the benefit of the organization.

In decision making of project selection, there are two main methods of project selection. Each of these methods has tools that are been used to determine what project is better implemented.

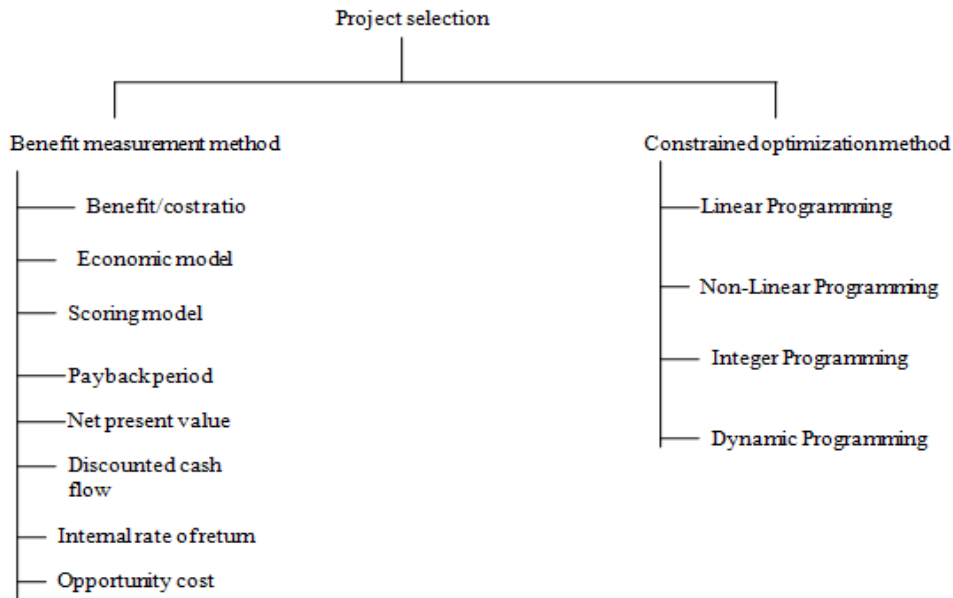


Fig.1 Project selection tools

Source: developed by author.

**Benefit measurement method:** This method is used to select project on the condition of the present value of estimated cash inflow and outflow. The cost and benefit of a project is calculated and compared to the cost and benefit of other projects. The tools used in this method include;

- **Benefit/cost ratio:** This compares the values of cash inflow and cash outflow. It helps the organization to compare possible benefit to the budget of the project. The use of this tool helps in choosing the project with a higher benefit.

- **Economic model:** Economic Value Added (EVA) is a performance metric that calculates the worth creation for the organization, and defines the return on capital (ROC) [19]. It is also known as the net profit after taking out the tax and capital expenditure. Projects with the highest value are always picked.

- **Scoring model:** This requires listing the conditions for the project implementation according to their level of importance. It gives a better view of the condition that can be tackled or maintained by the organization.

- **Payback period:** This is the ratio of the total cash to the average per period cash in. This analyzes the time to get a return or profit from the project. The project with the minimum payback period is usually considered.



- Net present value (NPV): This shows the difference between the current values of cash inflow to the outflow of the project. The project with the highest positive NPV is usually considered.
- Discounted cash flow: This involves calculating the value and worth of the expected profit or benefit in the future.
- Internal rate of return: This is when the net present value is zero. This helps to show the project with the most profitability.
- Opportunity cost: Sometimes it is necessary to choose the project with lesser opportunity. Opportunity cost is the cost involved in giving up other projects.

Constrained optimization method is also known as the mathematical model. They are used in selecting large and complex projects and they involve mathematical calculations. The tools used in this method involve the use and knowledge of mathematical and programming functions. To use these methods, experts in these fields are usually hired to carry out necessary analysis before making the final selection on what project to carry out.

Project portfolio selection is the process whereby an organization or business has to decide what project or program to start, stop, adjust or drop. A portfolio contains numerous projects or program. However, in deciding to choose the projects and programs to be implemented some criteria have to be considered. Some tools are used in project portfolio selections are;

1. Net present value (NPV): This shows the difference between the current values of cash inflow to the outflow of the project. Projects and programs are analyzed to determine the ones that has potential of giving profit to the organization. The project and programs with the highest positive NPV is usually considered.

2. Project Inventory: This outlines all programs and project. It states the value of each project, considers the estimated schedule for the project or program, the estimated and available budget is also estimated, benefits and possible risk, available resource etc are analyzed in the project inventory. The projects and programs that fits into the organizations scope, cost and schedule are mostly considered.

3. Benefit/cost ratio: This compares the values of cash inflow and cash outflow. It helps the organization to compare possible benefit to the budget of each program and project. Organization mostly chooses projects that have a higher chance of bringing them huge profit or benefit.

4. Manually applied criteria: This manually analyses what the project or program entails and consider if the organization can handle the task. All aspects of the project are analyzed, to know what technology and expert are needed and how accessible are they to the organization. Expert are sometimes hired for technical analysis and come up with a conclusion to determine if the projects and programs can be done when the estimated cost, schedule, scope and technology is compared to the available ones.

Program formation is the process of choosing the related projects that will be done together in a program. Programs comprises of related projects and in choosing the appropriate projects for a program, some tools are used in making this choice. Some of the tools used for program formation are;

1. SWOT analysis: SWOT analysis is used to show the strength, weakness, opportunity and threat of various projects. This brings together the final analysis of what to expect from the projects. It helps to know if the identified threat and weakness can be handled.

2. RACI (Responsible, accountable, consulted and informed): For each task some people are response for it, someone need to be consulted, accountable and informed. RACI chart makes sure everyone is informed on what is going on in a project. It also

helps to check if there are available people to be assigned to the needed tasks that are to be done.

3. Cause and effect diagram: Also known as fishbone diagram is a tool used in project for identifying various cause of risk. The Fishbone diagram is an analysis tool that provides a systematic way of looking at effects and the causes that create or contribute to those effects in the project. This help to choose projects with less risk into a program.

4. Decision tree: Since a program consist of related projects, a decision tree is useful in knowing if these projects have similar strategies when implementing them. This is mostly used when there are limited resources.

**Conclusions and prospects of further researches.** The need to understand project, portfolio, program and their respective management cannot be underestimated. It gives an understanding of how large the task involved are and the benefit that should be expected. Understanding these also help in defining the definite goal before the start of project, portfolio or program. Having a top view of project, portfolio and program gives the project manager a better view to see the possible risk or deviation possible and how to handle them better.

After a review of project, portfolio, program and the problem that occurs in the agricultural sector of Nigeria. In an attempt to solving these problems we recommend;

1. Extensive training of farmers both rural and commercial farmers to the latest farming technology starting from the basics with the use of the local language known to these farmers.

2. Building of good storage system close to large farmland which solves transporting crop products over long distance and minimizes losses.

3. Building of good roads to ease transportation of farm products to consumers by appointing special firms to start an immediate work.

4. Agricultural research should be encouraged to detect early risk, outbreaks and possible ways of solving arisen problem.

5. Government should invest in rural farmers by provision of funds for farming by increasing the allocated budget for the agricultural sector.

6. Government should set up agencies to monitor the flow of fund from the government to the farmers.

Environmental management and control of climate change should be taken into consideration and controlled by the government to help manage natural disasters and farming issues that has to do with climate.

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