

The role of laboratory in promotion export drives of agricultural food products in Nigeria

Abstract

Nigeria is an agrarian country whose large population depends on agriculture to sustain living. However, in Nigeria, Agricultural exports are negligible and represent about 0.5 percent of total exports. The country is currently intending to diversify its economy with a view to increasing her income from non-oil products. This cannot be achieved without having quality infrastructure such as the laboratory that would test and certify the products intended for export. The parts played by laboratory in the promotion of export drive of agricultural food products in Nigeria are examined in this paper with a view to enhance our laboratories to meet the international standards. Laboratories are the backbone of the inspection and certification activity. In order to test to requirements prescribed by the importing countries, the laboratories should have state-of-the-art equipment and manpower that is qualified and trained to operate such equipment. The laboratories used by the export inspection and certification services need to be accredited as per international standard ISO 9000 under officially recognized programs to ensure that adequate quality controls are in place to provide for reliability of test results. Internationally accepted quality assurance techniques should be implemented to ensure reliability of analytical results. Similarly, the number of these laboratories needs to be increased in order to cater for the certification of both domestic and exported agricultural products.

Keywords: agricultural food products, exports, laboratory, Nigeria

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Introduction

Nigeria is considered the giant and most populated country in Africa with an estimated population of more than 170 million persons¹ and a predicted population of more than 400 million in 2020; making it the third most populated country in the world after China and India.² In Nigeria, Agricultural exports are negligible and represent about 0.5 percent of total exports. Since the country is currently trying to diversify its economy with a view to increasing her income from non-oil products, the country demands a courageous export of its agricultural products. Nigeria's major agricultural export commodities were generally depressed in the international commodities market, with the exception of Cocoa.³⁻⁵ The challenges of Agricultural exports in Nigeria within the context of national economic growth could be addressed by diagnosing the constraints preventing them from achieving their potentials. Several workers have analyzed the constraints militating against export of Agricultural products in Nigeria.⁵ According to many economic analysts, the major cause of the decline in Agricultural exports was the oil price shocks of 2015 when the prices of crude oil in the world market roused to 156 US Dollars per barrel (Daily Times, 2015). Similarly, some analysts attributed the poor export of Agricultural Products in Nigeria to policy discrimination, where labor and capital left Agriculture for manufacturing, production, construction and services. However, on a general scene, export of Agricultural products is a multi-disciplinary activity covering a number of aspects. One of the major requirements of export of Agricultural Food Products is the control policy and strategy; which encompasses aspects such as Food Science, Microbiology, Analytical Chemistry, Plant Pathology, Veterinary Sciences etc. All these aspects are embodied in the inspection and certification activity. The aspect of Inspection and certification has one of their major pre-requisites, the "Laboratory" for quality control. Laboratory is a

facility/condition in which all scientific and or technological research, test, experiment, measurements etc. are performed. Laboratory is the backbone of the inspection and certification activity of any agricultural food product. Therefore, before any product(s) is/are thought of being exported, the product (s) must pass through a well-equipped, accredited laboratory for inspection and certification. Hundreds of agricultural food products that were exported were reported to have been rejected because of no accredited laboratory for inspection and certification. This paper examines the importance/role of laboratory in the promotion of export drives of Agricultural Food Products in Nigeria with a view to enhance both the laboratories performances and the export of agricultural products.

Types of laboratory

Laboratories require a deep understanding of the specific needs, purposes and risks associated with each of them. Some of these requirements are specific to an industry (e.g. pharmaceutical, chemical), or to an activity (e.g. small volume manufacture of high potent products, work with biological agents). Therefore, laboratories are classified based on the need and purpose or functions it is designed to perform. Some of the common laboratories in regular use are;

Research and development (R&D) laboratories

This category covers a broad spectrum of laboratories with various risk qualifications and containment requirements such as: Bio Safety Laboratories, laboratories with radio-active risks as well as specialized laboratories for seed, crop, material, and life sciences research are part of this category. Scientific laboratories can be found as research and learning spaces in schools and universities, industry, government, or military facilities, and even aboard ships and spacecraft. Similarly, teaching laboratories in research institutes, universities etc are part of this group.

Production Laboratories

Pilot production or small volume laboratories as a scale-up between R&D and commercial production, or for the production for clinical trials, form a category on their own. Such laboratories can be found in the pharmaceutical, biotech, and the science and technology sectors. Quite often special attention needs to be given towards containment and air quality.

Analytical and quality laboratories

In analytical and quality laboratories products and materials are tested against conformity to specifications and the absence of impurities. These laboratories form an essential component within the production and the supply chain.

Clinical and medical laboratories

These laboratories are equipped for diagnostic tests on tissue, blood and other patient samples. They can be subdivided into various processes such as pathology, serology, histology, virology, bacteriology and molecular biology with PCR-technologies.

Clean rooms

In clean rooms the number of dust particles permitted per volume of air defines the classification of the clean room. All aspects of the people and materials flows, the mechanical systems and the room finishes are to be consistent with each other. The design and engineering needs to follow either "ISO 14644-1" – "FED STD 209E" – "BS 5295" or "GMP EU" classification.

Bio safety laboratories

The purpose of bio safety laboratories and suites is the containment of potentially harmful biological agents. The containment is achieved through a thoughtful combination of methods, facilities and equipment. The levels of containment go from BSL1 to the highest level of BSL4.

Incubator Laboratories

Laboratories conducting microbiological, and cell or tissue culture work require incubators to protect these cultures from the environment. Parameters such as temperature, humidity, and O₂ and CO₂ levels need to be controlled.

Role of laboratory in agricultural production

Agricultural research in Nigeria started more than 100 years ago with the establishment of Botanical garden in Lagos during the late 19th century. By 1903, the Forestry and Botanical Department (renamed as Agricultural Department) for Southern Nigeria was created. By 1912, it was divided into Northern and Southern regions. Jumping to 2006, the Federal Government set up an umbrella body known as Agricultural Research Council of Nigeria (ARCN) which was saddled with the challenges faced by the Agricultural Research System. By 2011, the Nigeria Senate passed a bill on Bio-safety when the Government observed that Agriculture has gone deep into Biotechnology. These trends of progressive development in the Agricultural sector by and large, depends on the progresses that accrued from researches done in the field and the laboratories. The parts played by laboratory towards increasing agricultural productions include but not limited to the following areas;

Soil fertility testing: Routine sample analysis of soil tested for different major (N,P,K), secondary(S, Ca, Mg) and minor plant materials. Others are soil PH or acidity, organic matter content,

electrical conductivity (EC) etc. The results obtained from these analyses determine the type of fertilizer for a specific crop to be used.

Water quality analysis: Analysis of water parameters such as Temperature, conductivity, turbidity, PH, DO, nitrate and hardness etc. This is very useful for irrigation purposes.

Plant quarantine and gene banking: The agricultural policy of Nigeria (2015) recognizes plant quarantine service as an inclusive agricultural organization of the federal government which ensures that only clean, disease-free and pest-free planting material enter the country in accordance with agriculture (control of importation) Act. Similarly, plant gene bank conserves and maintains germplasm of all imported and indigenous crop species⁶

Production of disease/pest free seed/plant: Production of disease or pest free seed or plant otherwise called resistant variety provide a safe, cheap, easy and eco- friendly methods of disease/ pest control in agriculture.

Production of GMOs: Genetically modified organisms (plant and animals) such as cassava, sheep, banana are produced using biotechnology, where gene of interest identified from the same, related, wild relative or even microorganisms are inserted into another organism with a view to producing a new organism with the desired character (s).⁷

Production of improved crop: varieties by cross pollination and cross fertilization with the desired character or trait.

Reduce period of growth: through breeding and biotechnology plant that attain physiologic maturity of say 6 months have been reduced to 3 months or even less.

- a. It provides transfer of research-induced technology to farmers and this serves as a major way to measure research benefits to the society.
- b. Laboratories are the places where immediate problems of the cause of some problems are addressed and solutions proposed.

Role of laboratory in promoting export drives of agricultural products

Nigeria has a potential competitive advantage in many rural Agricultural goods and their export to countries abroad but a major militating problem of the export of these goods is the 'Product Rejection' problem. Product Rejection is a pain in the neck of Manufacturers. Local Products and Services are denied access to international markets simply because they completely lack quality certification and inspection which exports blame on inadequate metrology and test laboratories. In a Facebook⁸ and Twitter shows the Minister of Industry, Trade and Investment announced that one hundred and three (103) Nigerian products exported abroad in the last five years have been rejected for not meeting the international quality standards. He explained that lack of standard testing laboratories is the cause of the products' rejection. This is too embarrassing. Nigeria being the Africa's biggest economy with an average of \$509.9 billion dollars GDP has only 84 laboratories to test locally manufactured products or services for international standards.⁹ South Africa with GDP of 370.3 billion has 340 accredited laboratories.

China, the world second largest economy has more than 35,000 laboratories. Egypt has thousands accredited laboratories while Tunisia, Morocco, Kenya and Algeria have hundreds of laboratories each. Certification from internationally accredited laboratories

builds integrity in manufactured products by ensuring that they are tested just once, and accepted sequentially anywhere in the world. Metrology is the Science of Measurement, that determines the right calibration which is accepted all over the world. According to the Quality Management Practitioner, the need for Metrology Laboratory is seen in many aspects of testing of Agricultural food products. It obtains, conserve, develops and disseminates the basic requirements and highest level of calibration standards.¹⁰ It is easier to interact, collaborate and find out more efficient production processes and new products for the markets. However, recently, the Standard Organization of Nigeria (SON) has obtained a Landmark when it got the approval of the International Laboratory Accreditation Cooperation (ILAC) for its food laboratory. Stakeholders consider it a “drop in the ocean”, because the approval only covers Nigeria. Food export commodities leave out stakeholders in the mineral and mining sector. But, this is a bumper development on the non-oil sector of Nigerian economy.¹¹ Few accredited laboratories in Nigeria are major challenges to Nigeria’s quest to participate in international trade. According to the President, Champions for Development in Nigeria, Mr. Jonas Yomi, the non-existence or grossly inadequate number of accredited laboratories in Nigeria is the major hurdle to Nigerian export. He noted that accredited laboratories are the backbone of valid testing results without which products or services cannot be said to be certified or conforming to requirements. According to experts, the benefits of having such internationally accredited laboratories are numerous and cannot be ignored if Nigeria must take its pride of place in the global markets.¹² Some of the benefits include:

1. Local products will be standardized and certified thereby reducing the preponderances of fake and substandard goods.
2. If Nigeria has its own accredited laboratories, it will save the nation from the situation whereby multiple testing of goods/products are carried out in different countries where they are exported. Goods will not be tested more than once.
3. With local produce being tested locally and sent to all over the world without any hindrances, the export will eventually boost, and the Agricultural sector of Nigeria will develop.

Importance of food export control and certification¹³

The need to have a well-developed Agricultural food quality control system for export is very important for all exporting countries. Some of the benefits of such export control systems are highlighted below:

- a. Minimize impediments to trade by reducing the time for inspection and testing at the importing end.
- b. Minimize and even eliminate rejection or non-compliance at the point of import.
- c. Avoid duplication of inspection, sampling and tests at the exporting and importing ends and lead to usage of collective resources more efficiently and effectively.
- d. Are financially more effective as cost of recall, cost of testing at importing end and cost of destruction of consignments is minimized.
- e. Take care of variation in quality due to production by small farmers, fishermen or enterprises.
- f. Help in building up the image of the country, as ensures that inferior quality products are not exported by unscrupulous one-time or fly-by-night operators. Such problems can be

minimized with mandatory export certification. For example, in the Indian dairy sector, export certification has become mandatory and it is obligatory for exports to take place only from material processed in an approved unit implementing food safety management systems.

- g. Enable official inspection/health certificates to be given as the same are often required by the buyers.
- h. Help in ‘Capacity Building’ in a country with respect to product as well as systems. With a mandatory export certification system, the country identifies the weaknesses and focuses on correcting these.
- i. Decisions on a country’s products that are exported are taken by the country itself rather than by the importing country. For example, if the product does not meet an importing country’s requirement, the exporter can, in consultation with the official certifying body send it to a third country, which permits the same, rather than the importing country deciding that it is not fit for consumption as its requirements are not met and therefore needs to be destroyed.
- j. Facilitate negotiating Agreements for recognition of food control systems and certification by the importing country.
- k. Provide protection to the consumer of the importing country as the broad objective of the exporting country is to ensure that requirements of the importing country are met.
- l. Facilitate implementation of various forms of voluntary certification which address the entire chain from farm to table. This is simplified as a major part of the total chain, namely processing is already covered and only additional areas such as those at farm level need to be certified.¹⁴⁻²³

Conclusion

The significance of laboratory in the export certification systems in the present day scenario of rapidly expanding global trade in food has been emphasized. Certification of agricultural food products in accredited laboratories is very useful for both importing and exporting countries and would help to utilize pooled resources more effectively while ensuring that the food exported is safe and meets the sanitary requirements of the importing country as well as any voluntary requirements, which can also be built into the system. However, care needs to be taken that such export control systems are established based on the Codex Guidelines for the Design, Operation, Assessment and Accreditation of Food Import and Export Inspection and Certification Systems.

Recommendations

1. Capacity Building - Clear areas need identifying for ‘Capacity Building’ of domestic, import and export inspection and certification systems to meet international requirements to include:
 - a. Laboratory strengthening in terms of equipment and training
 - b. Implementation of ISO/IEC 9000 for inspection activity, ISO 9000/IEC Guides 62 and 65 for certification and ISO/IEC 9000 for testing.
2. Human resource empowerment especially inspectors in area of inspection and audits; this eventually will require the involvement of laboratory technologists

3. Adequate facilities including equipment, transportation and communication facilities should be available to ensure delivery of export inspection and certification services.
4. For export, a clear policy needs to be developed taking into account issues like - are all exports to be controlled or specific products, type of parameters (health and safety or quality also), the need to build in any voluntary requirements along with mandatory ones, who would be the authority, what are the systems of inspection and certification to be followed, is the country looking at signing MRAs or equivalence Agreements for recognition of its export certification or is the aim only to ensure that a safe and good quality product is exported.
5. Self-certification by industry needs to be encouraged. Exporting units should be approved based on their total quality management approach. Periodic surveillance of the unit should be done wherein the aspects that need to be specifically checked include sanitation and hygiene of the plant, process control, implementation of HACCP plan, records, observation of testing in the laboratory of the plant, drawing of samples from various stages in the plant for testing. The certification should also take into account the varying requirements of importing countries so that rejections at importing end are reduced. This is one of the issues which have been expressed as being of concern to the exporters.
6. Legislation needs to be simplified to have a single legislation for food quality control preferably to include both export and import. This should contain clear defined roles of various authorities with a view to avoiding overlap.
7. Inspection systems followed by different inspection and certification agencies need to be aligned with ISO 9000/ and standard acceptable Guidelines for the Design, Operation, Assessment and Accreditation of Food Import and Export Inspection and Certification Systems.
8. Guidelines for Exporters/Importers - A guideline document for exporters needs to be developed which gives an overview of the system of exports and imports as well as broadly the role of different organizations as also clearly laid down steps which an exporter would need to follow for exports.
9. In case of rejections, an export control body should enter into dialogue with importing authorities to resolve problems that may arise due to rejection of a consignment in the importing country. Issues due to rejections have been differing standards/conformity assessment procedures, lack of transparency etc. This would be facilitated as due to export certification, the entire data and background is available with the export certification body.
10. More laboratories need to be built and equipped to meet the international standards. This is most importantly needed if really the country wants its agricultural products be smoothly exported.

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Conflicts of interest

The authors declared there is no conflict of interest.

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