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AGRICULTURAL EDUCATION, TRAINING AND ATTAINMENT OF ZERO HUNGER IN AFRICA

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Introduction

Agriculture has long been an integral component of developing countries' economies and is vital for poverty alleviation and economic development. The Food and Agriculture Organization of the United Nations (FAO) asserts that "the agricultural sector is at the heart of the economies of the least-developed countries" (2002). The largest sector of the economy in sub-Saharan Africa is agriculture with 52% of total employment working in agriculture, higher than the 39% working in agriculture in low- and middle-income countries (LMIC) worldwide (World Bank, 2020). This percentage represents a staggering 230 million people working in agriculture in sub-Saharan Africa alone (World Bank, 2020). With such large numbers of people in LMICs working in agriculture, an "improvement in agricultural performance has potential to increase rural incomes and purchasing power for large numbers of people" (Vandenbosch, 2006).

However, lack of training and education in the subject has led to the underutilization of agricultural practices that increase productivity in the sector. A 2014 World Bank report on human capital development for agriculture stated "the low level of human capital in Africa's agricultural sector remains a significant constraint to growth, poverty reduction, and food security on the continent". An increase in agricultural education training (AET) and further technical and vocational education training (TVET), can lead to an increase in productivity, in turn reducing poverty in rural areas of LMICs. Sub-Saharan Africa, specifically, has the highest rates of poverty and percentage of the population working in agriculture. In order to increase income in rural areas of LMICs, investment in agricultural education is imperative in order to grow the agricultural sector to be more effective and efficient. Not only does agricultural education serve to reduce poverty, but it also works to create increased food security, and promote sustainability in accordance with Sustainable Development Goal (SDG) 2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture.

Formal agricultural education training is needed to turn farmers and other actors in the agriculture and food system into skilled entrepreneurs who run their farms or businesses as economic and productive sustainable enterprises. This will be essential for farms and companies in the agro-processing sector to sustainably increase the level of productivity and income as well as their competitiveness on domestic and international markets. The Organization for Economic Cooperation and Development (OECD, 2016) identifies that over 50 million young people in Africa are engaged in insecure employment, and that youth unemployment stands at 50 percent. To keep pace with the growing working age population, Africa requires some 20 million new jobs each year (IMF, 2016). Further, there are still far too few training opportunities for young people. Often, the available training does not match the needs of the private sector. Thus, there is a need to expand technical and vocational training opportunities and revamp the training institutions in Africa. The low social status of crafts and trades poses a problem, and technical and vocational education and training must be made available to all in order to improve productivity and make certain sectors more attractive. This is especially true

for the agricultural sector, which is characterized by lack of modern production methods and low productivity, making it an unattractive sector to work in. There is also the need for new ways of developing strategies for small and medium-sized enterprises.

Concept and Scope of Agricultural Education

Agricultural education is a systematic programme of instruction for public school leavers, out-of-school and post-secondary youth, and established farmers, organized for the purpose of improving agricultural methods and rural living. Agricultural education seeks to prepare and develop students' abilities to make a beginning and advance in farming and to produce farm products efficiently.

Osinem (2007) defined agricultural education as a process of imparting knowledge, skills and attitudes in agriculture to the learner at any level. Obibuaku (1983) describes it as including education and training given in agriculture from primary school through secondary and special schools to the university. Agricultural education instruction stresses on skills that learners must use on specific agricultural job, provides technical background that increases the learner's knowledge of the jobs they are doing and develops interest and attitudes needed for the successful execution of such jobs. The subject matters of agricultural education cover not only crops and animal production but also areas relating to soil management, machinery operation, processing, marketing and storage of farm products. Furthermore, maintenance of favourable environment and participating in rural leadership activities constitute vital contents of agricultural education.

Agricultural education is not restricted to farming but also involves related businesses (agri-businesses) such as selling of farm inputs, transporting of farm products and providing such services as crop dusting, soil testing, machine servicing and well-drilling, etc. In a well-organized programme of agricultural education, a citizenship education programme, a consumer's education programme, a special education programme for handicapped and applied education programme, a preparatory programme for students entering schools of agriculture, a teacher education programme in agriculture and education for agriculturally related occupations are often provided.

Philosophy of Agricultural Education

1. **Agricultural education puts much emphasis on pragmatism:** The instruction, the methodology, the programme, and the courses are based on the problems involved in the various tasks in the world of work. Thus, the content is flexible and changing. At least it is often more flexible and changing than it is in many areas of education.
2. **Agricultural education emphasizes learning by doing:** This emphasis is apparent in the attention given to laboratory work, field trips, problem solving, and supervised occupational experience programmes. Often, much less attention is given to learning by doing in many general education courses.
3. **Agricultural education places much emphasis on the individual:** This emphasis is in evidence by the importance placed on home and job visits by the teachers, by the importance placed on supervised study, and by the basing of the content of instruction on the individual problems of the students.
4. **Agricultural education accepts seriously their role in vocational guidance and counseling:** They provide career education through their instructional activities related to agriculture. They emphasize self-awareness, work awareness, career awareness, education awareness, career orientation, career exploitation, and career decision-making in addition to career preparation.
5. **Leadership and citizenship development:** Agricultural education firmly believes that the instructional

programme in agriculture provides an excellent vehicle for teaching regarding leadership, citizenship, and the other values of our society. They believe in the importance of students' organizations such as the young farmers clubs in furthering education in agriculture and in broadening the impact of agricultural education. They see students' organization work as an excellent vehicle for providing agricultural education according to its broadest definition.

6. **Importance of education to the disadvantage and handicapped:** Agricultural education recognized the importance of providing education to the handicapped and disadvantaged in the society. They have acquired the skills in working with the handicapped and disadvantaged by stressing individualization of instruction, emphasis on agricultural problems of the learner and attention to supervised study, laboratory work, field trips, student organization and supervised occupational experience. Also, agricultural educators have discovered that some of the disadvantaged were academically talented and the need for them to be part of agricultural education that will be challenging and satisfying to their aspirations.
7. **Good preparation for further education:** By providing comprehensive and quality instructions, agricultural educators believe that their work at the secondary school level will enhance further education of their clientele. They seriously adopt the approach of problem-solving, which broaden the value of agricultural education to most types of future situation in which the learners may find themselves.
8. **Role in community development:** Agricultural educators are community-oriented workers in the milieu. They believe that they should serve the community in which they work, and the programme should serve the community. They believe that agricultural education should be provided to all adults who want it and can profit from it. Thus, it is necessary for communities to possess good and quality programmes in agriculture for both in-school and out-of-school individuals in the society.

Broad Objectives of Agricultural Education

Vocational education in agriculture is an integral part of the nation's public-school education (general education) and contributes to the general objectives of educational sector of the society. It contributes to the development in students of the ability to think and study and the ability to solve problems efficiently, which requires skill in collecting and interpreting data. General education also aids in the development of desirable attitudes and interests and in the development of social sensitivity and resourcefulness of students. For the purpose of brevity, the public education in agriculture in the society focuses on:

a. To develop the learners as completely as possible. This enables the students to understand their capacities, limitations and abilities and their relationship to other persons, homes and society;
b. To promote personal group relationship with emphasis on home and family life as fundamental to the individual's growth and to the public welfare. Individuals and groups living in a society are dependent upon the family for group interaction and relationships; and
c. To make individuals and groups responsive to the needs of other individuals and groups of communities of governments and of other desirable social agencies. Individuals in a society must be concerned with the welfare of others in the solution of their own problems.

However, apart from contributing to the objectives of all types of education existing in the society, a comprehensive agricultural education programme (Phipps, 1980) should do the followings:

i. Assist the nation's citizens to develop the attitudes, understandings and abilities

regarding agriculture necessary for their future welfare and the welfare of agriculture.

ii. Develop appreciation of the country's rural heritage and its influence on our literature, art, drama and music.
iii. Develop understanding of the influence of research on agriculture and on other aspects of our society, such as medicine, statistics and consumer products.
iv. Develop understanding of the interrelationship of agriculture and other segments of society.
v. Develop understanding and appreciation of agriculture for a vocational and leisure interests.
vi. Develop understanding of the influence of public policy on agriculture.
vii. Promote creative activities of students.
viii. Promote meaning and practical applications of the content of other subject matter areas, such as science.
ix. Provide guidance regarding occupational opportunities in farm and off-farm occupations requiring knowledge and skills in agriculture.
x. Assist in improving the economic efficiency of agriculture and individuals in agriculture.
xi. Promote balance and meaning in the total educational programme of the school and of individuals.
xii. Develop understanding of the contributions of agriculture to society.
xiii. Assist present and prospective farmers in improving their efficiency in farming.
xiv. Assist present and prospective workers in off-farm agricultural jobs in improving their efficiency; and
xv. Promote environmental quality

Types of Vocational Education in Agriculture in Nigeria

In many parts of the world, various types of formal and non-formal approaches have been successfully employed to develop farmers' knowledge, skills and attitudes in the agrarian occupations. Moreover, a combination of these types has been adopted in many developing economies such as Ghana, Gambia, Tanzania, Nigeria and so on (Ochu, 2008).

The followings according to Osinem (2007) are considered as comprehensive programmes for vocational education in agriculture:

Informal Agricultural Education: This is based on observation, including listening, imitation and respective practice. The agencies here are the homes, private and commercial farms. Sons and daughters of farming families accompany their fathers and mothers to farms. They observe all the operations/activities carried out and listened to reasons given why the operations are necessary. With time they try to imitate what they observed and through practice actions are perfected. Also unskilled attendants hired by private or commercial farm operation accumulate skills and knowledge over time to a point of being proficient through the practice of what they saw the master do in crop or livestock production.

Non-Formal Agricultural Education: This is traditionally known as agricultural extension. It is out-of-school system designed to help rural farm people satisfy their farm needs, interests and desires (Obibuaku, 1983). It is an aspect of adult education involving adult learners differing from formal classroom education because it prepares its clientele to tackle the problems of today and helps them to live here and now. It uses adult educators because of the adult clientele and runs along the line of felt needs and immediate farm interest of the people. The term agricultural extension may in this light be seen as an element of agricultural education but dynamic in process, non-formal in nature and directed towards bringing about changes in what people know, changes in how people react to situations and changes in what people can do with their resources. It conducts a worthwhile and acceptable activities utilizing supporting programmes and certain teaching techniques and methodologies to promote the general livelihood of the people.

Community Education/ Outreach Programmes: The target here are the community leaders and development agents through non-formal approaches. Community education is a key variable in raising consciousness, spreading understanding and providing skills by which development can occur. It is a means for arousing and mobilizing the dominant human resources of the community to improve socially, culturally, economically and politically (Osimen, 1998). Besides agricultural, leadership and vocational skill issues, contextual circumstances of the community environment could inform the items of the outreach programmes. Most importantly, they must be hinged on their expressed interest and needs for now.

Formal Agricultural Education: This is hierarchically structured and chronologically graded agricultural education system. The establishments of the first school of agriculture at Moore Plantation, Ibadan in 1914; the second School of Agriculture in Samaru in 1927 and the third School of Agriculture in Umudike in 1955 are significant milestones for the inception and development of formal agricultural education and training in Nigeria (Ojoko, 2000). As agriculture becomes more commercialized and production process more complex, more and better training institutions have been established. Today, formal training in agriculture is given at primary school level, vocational/farm institute level, secondary school level, intermediate and technical level and university level training.

Historical Development of Vocational Agricultural Education and Training in Nigeria

Apprenticeship

Before the coming of European missionaries and merchants to Nigeria, there existed an indigenous non-formal education system through which cultural heritage and work skills within a society were passed from one generation to the next (Agbulu, 2004). What is today known as agricultural education is a mere transformation of indigenous farming practices otherwise known as traditional agriculture. Therefore, it will not be out of place to say the practice of agricultural education is as old as creation. Traditionally, male children learned from their fathers the act of grass clearing, stumping, ridge making, planting of crops, weeding and harvesting. Their female counterparts on the other hand go after their mothers in exhibiting domestic and feminine farm activities such as packing home the harvested farm produce and sales of those produce and products. Gradually, parent saw the need of contracting their able sons out to learn particular trade and skills from tradesmen in the traditional setting. The period was known as apprenticeship system. Male children were placed under the care and supervision of an experienced tradesman who is the master of the trade. After a satisfactory period, the child graduate to stay on his own permanent and personal plot.

Agricultural Education in Colonial Period

From the beginning, the colonial agricultural administration placed more emphasis on agricultural education and training. The training of agricultural cadets' as they were called at that time commenced at the historical Ebute-Metta Botanical Station in 1900. Few people were admitted into the garden to be taught in the practice of tropical horticulture and general cultivation, including garden works and the use of tools. The account in the colonial Annual Reports of Forests Department indicated that these cadets took lessons from Oliver Indians Botany, Nichol's Tropical Agriculture and Silvers Elementary Botany as the basic textbooks. This event was identified as the bold step for formally launching agricultural education as a conscious strategy in Nigeria. Another form of agricultural education existed involving the placement of agricultural pupils under the superintendent of forests and agriculture for some time before they were qualified for positions in government or other services. The creation of the first Agricultural Department in 1910 saw

a number of pupils being included on the staff to be trained on the job at the experimental station. The school curriculum was reorganized with greater practical bias and outdoor activities like field work and farm mapping among others. In 1927 nation-wide scholarship entrance examination was held at three centers Lagos, Ibadan and Calabar which resulted to 135 awards of forty-eight pounds per annum. Available official records shows that low-level literary level delayed the development of agricultural education in the old Northern provinces by 1932; however, a departmental school had existed in Samaru for training the Agricultural Assistants. The year 1918 was a landmark in the development of agricultural education in Nigeria, when the British Colonial government committed itself to the task of improving agricultural resources. Consequent upon this development, the school of agriculture, moor plantation, Ibadan was upgraded to an Agricultural college in 1935, undertaking two/three year's courses. In 1936 a special course was mounted at the college for the elementary rural school teachers by the Education Department. The farm centre in Kafin soli, offered a course of instruction for training the sons of illiterate farmers in practical mixed farming, later commenced at the instance of Emir of Katsina. An Elementary Training Centre was also established in Bauchi where students received training in mixed farming. Following an earlier proposal, a Training School for African forest staff was opened at Ibadan in 1941. The Samaru School became a joint forestry and agricultural school, then a forest hoards school existed at Zaria and another one at Naraguta, Jos.

Agricultural Education in the Post Colonial Period

In large measure, the post-colonial institutions for agricultural education took their roots from the colonial outfit. The influx of western education gave a new look to what is today called agricultural education. At the early part of 1960, primary school pupils were taught the act of raising animals and cultivation of crops in the school garden. That time they still learned through observation and invitation. The same way children learned from parents at the traditional setting. The inclusion of gardening and nature study on the primary school curriculum created the need for adequate supply of qualified teachers to handle courses in gardening and nature study both at primary and elementary teachers' training colleges. To avert the production of historian agriculturists right from the primary school level, the school farm which is the right environment for teaching agricultural skills was introduced to secondary schools in the year 1963 after the independence. Although it existed in the secondary schools before the independent but as a mere hobby and not as a subject hence lacked effective recognition. The teaching of agricultural skills on the school farm was not immediately introduced to higher education as it was done in secondary schools. Instead, special schools were created for training teachers who will teach the grade II teacher in teachers' training colleges. These special schools were called rural science centres. Two rural science colleges were established in the former western Region Akure and Asaba respectively to prepare teachers of agriculture for teacher training colleges. The introduction of agricultural education in the curriculum of the University of Nigeria, Nsukka helped in curbing the problem of manpower to a significant level. This enhances the undergraduate degree programme in vocational agricultural education for the preparation of technically and professionally competent teachers of agriculture to effectively manage agricultural programmes in the secondary and post-secondary institutions. The Ahmadu Bello University, Zaria which tried to take after the University of Nigeria, Nsukka, by introducing an undergraduate degree programme in agricultural education for preparing more agricultural educators for secondary schools and post-secondary institutions in the country started the programme in 1992/93 academic year. Presently there are three universities of

agriculture located at Umudike, Abeokuta and Makurdi and more than 30 universities with faculties of agriculture in Nigeria.

Overview of Agricultural Vocational Education and Training in Africa

Agricultural Vocational Education and Training (AVET) can be defined as the educational process involving the study of technologies and related sciences and the acquisition of practical skills, attitudes, understanding and knowledge relating to occupations in agriculture, in addition to general education (Jones 2013). AVET is a subset of Technical Vocational Education and Training (TVET). TVET can be categorized as formal, non-formal and informal. The definitions of formal, non-formal and informal TVET vary across countries and institutions.

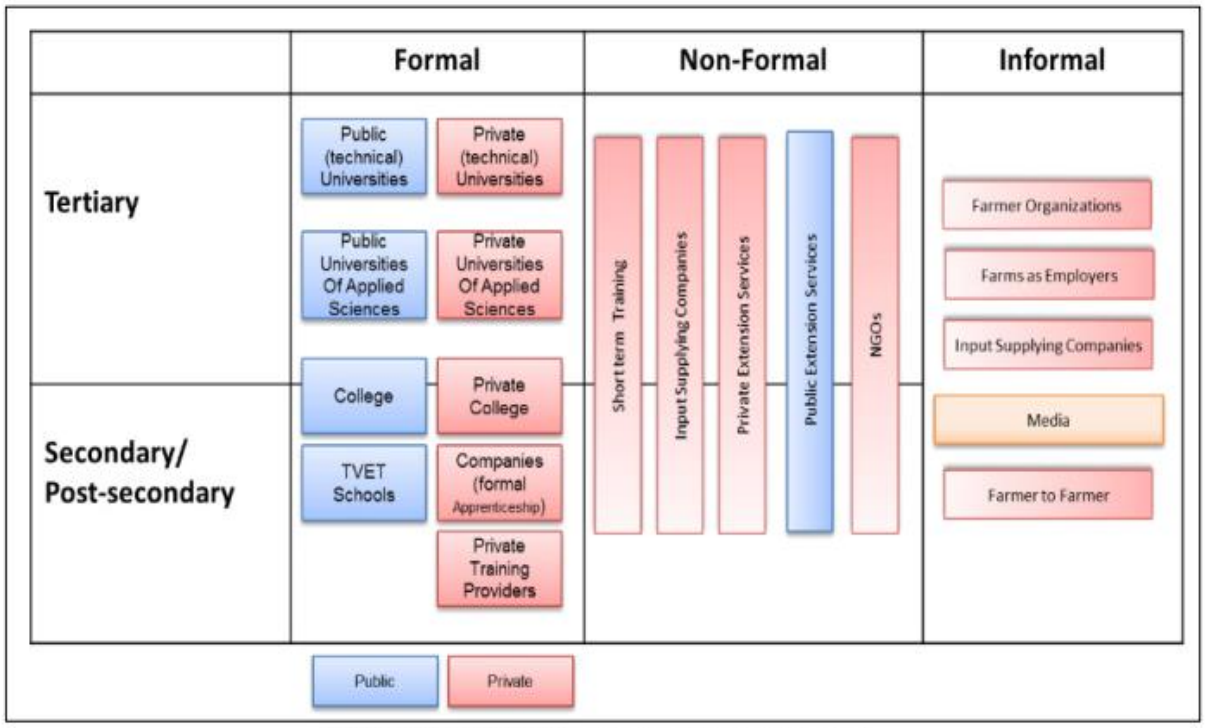
Formal TVET: provided by the state education system and leading to a recognized qualification. The learning processes are intentional and systematic.

Non-formal TVET: delivered by education and training providers, companies, social partnership organizations and public-benefit bodies outside of the state-initiated education and training system. The learning processes are intentional and systematic and may lead to a recognized qualification.

Informal learning: non-structured, non-intentional learning processes that take place at work or through other everyday activities. It does not typically lead to certification and recognition. Actors involved in the VET system include state, students (apprentices), teachers or trainers (farmers, specialists), sponsors and agri-sector companies. TVET in Africa is delivered by both government and private providers, which include for-profit and non-profit institutions, non-governmental organizations (NGOs) and church-based institutions. In almost all countries, the provision of TVET by NGOs is on the increase, both in terms of the number of institutions and students. This trend is partially explained by the fact that the private sector provides training for the informal sector (which is an expanding job market all over Africa), while public institutions mainly provide training for the relatively stagnant industrial sector. Private providers also target "soft" business and service sector skills that do not require huge capital outlays to deliver, such as secretarial practice, cookery, and dressmaking. A limited amount of in-company or enterprise-based training also takes place in some countries. However, this type of training aims to hone some specific skills of company employees (Onderi, *et al*., 2014).

Figure 1 presents all the actors involved and classifies them into formal, non-formal and informal training categories by level of education and distinguishing between private and public agents. The type of TVET provision generally falls into one of the following categories;

i. Public school-based vocational education and training;
ii. Vocational training centers;
iii. Private for-profit institutions; and
iv. NGOs.



Source: Adapted from Walker and Hofstetter, 2016.

Figure 1: Actors in Technical Vocational Education and Training in Africa

While most Agricultural Vocational Education and Training (AVET) systems focus primarily on the farm level and basic processing, it is important that a much broader set of skills is required to transform the agriculture sector in Africa. The relevant professions can be grouped into three categories:

1. **Core Professions** include those professions that are directly related to the agricultural value chain. These may vary in degree of specialization because innovations and the introduction of new technologies may require highly specialized and skilled labor beyond the production level (e.g. processing and storage technology, logistics, retailing industry).
2. **Support Professions** are required to ensure the functioning of the core professions at different stages of the agricultural value chain.
3. **Cross-Sectoral Professions** are not directly related to the agriculture sector, but are required to ensure the functioning of the value chain as a whole.

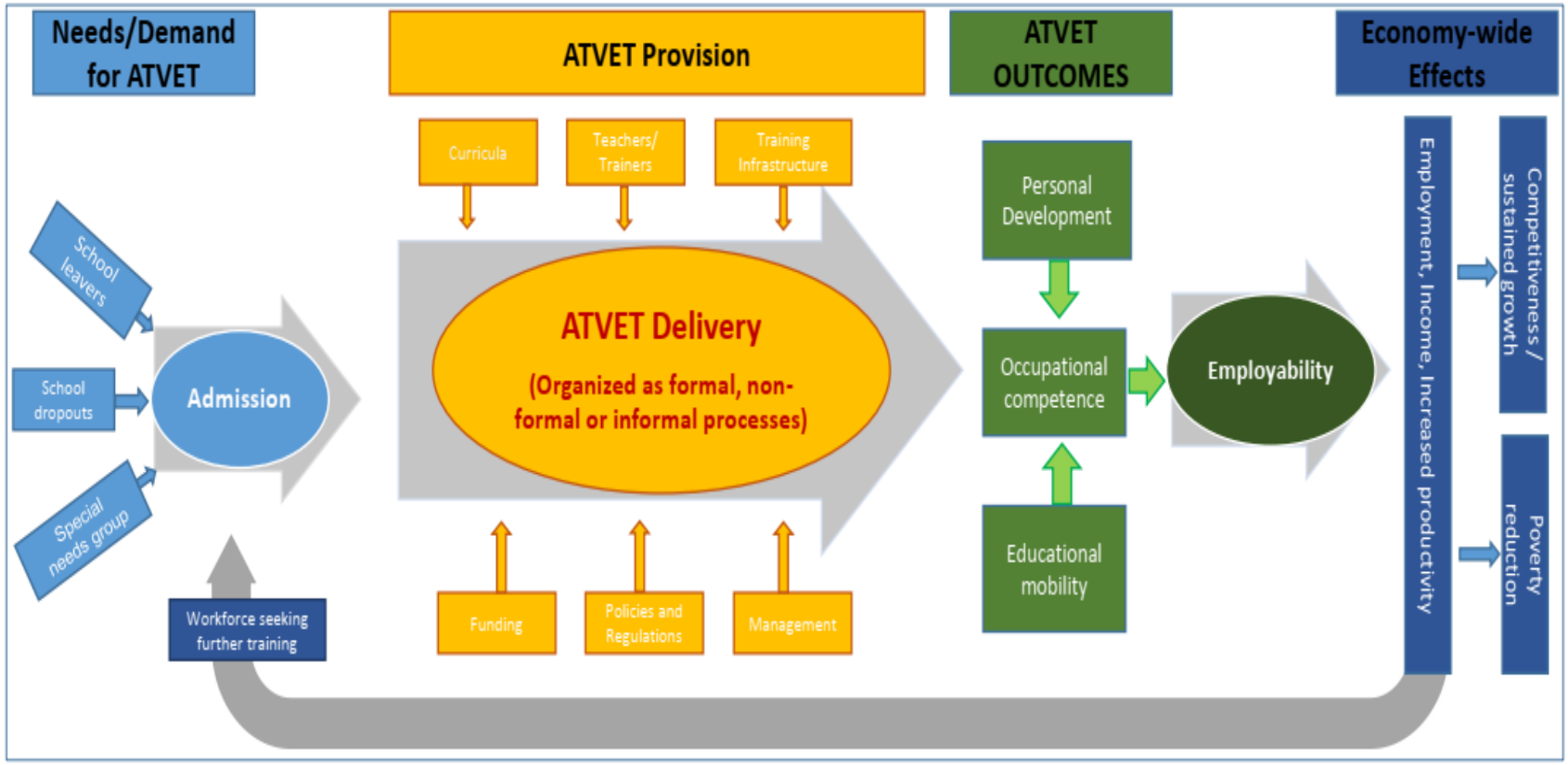
Economic Analysis of Agricultural Vocational Education and Training

The theory underpinning the economic analysis of agricultural vocational education and training (AVET) is based on the concept of human capital (Becker 1975) which treats human knowledge and skills as means of production – an asset that can potentially generate income (Mincer 1958). Human capital can be increased through investment, for example in education, training or health. AVET is one of the most straightforward ways of investing in human capital because it generates productive skills which are traded in labor markets. Consequently, AVET affects an individual by increasing their potential income.

Furthermore, AVET has a potentially large impact beyond the individual level. For example, in the agri-food sector, higher productivity can lead to a higher supply of food, improved food quality, and lower prices due to larger production volumes, less waste, and more efficient use of resources (Kehl, et al. 2013). These outcomes, in turn, affect the food security of a country. Food security along with higher incomes in the agri-food

sector may lead to better nutrition and even higher productivity in the long run. A well-developed curriculum for AVET based on the current needs of the agri-food sector can provide a further boost to the whole economy.

Additionally, this boost to the rural economy and subsequent employment opportunities for rural youth may lead to lower rural-urban migration, an issue that has been linked to socio-demographic and environmental problems (Qin & Liao 2016). Increased income and, consequently, increased demand by the rural populations, along with a more productive workforce would positively contribute to economic growth (Besley & Cord 2006; Ravallion 2004). By building environmental awareness and capacity to apply new technologies, AVET can substantially contribute to sustainable 'green' growth. These impacts of AVET on the individual, agri-food sector and economy-wide level are presented schematically in Figure 2.



Source: Adapted from Kehl. et al.. 2013.

Figure 2: Impacts of AVET on an Individual, Agri-food Sector and the Whole Economy

Challenges of Agricultural Vocational Education and Training in Sub-Saharan Africa

In order to bring about successful reform, it is important to analyze the current problems of existing AVET systems. The African Union report on AVET in Africa (African Union, 2007) is one of many discussing the key issues of AVET in Africa. These reveal complex socio-economic and institutional reasons for the malfunctioning of the TVET system in Africa. For example, TVET has a poor reputation and is perceived as a "dead-end" for students who cannot continue into higher (University) education.

The educational output in most Least Developed Countries favour academic non-technical qualifications (Johanson and Adams, 2004). There are very limited AVET programs that could open up labor market opportunities for the rural communities. Indeed, AVET is considered a second-class career choice for those who have missed all other non-technical educational options (Ratnata, 2013). TVET systems in most Least Developed Countries, including Sub-Saharan Africa, are inherently weak and are ill-equipped to achieve the SDGs. More importantly, AVET in Sub-Saharan Africa is very fragmented and not integrated into an overall technical vocational education system. It is given low importance in many countries and it is insufficiently financed. AVET was immensely affected when many developing country governments cut public spending during the structural adjustment period of the 1980s and 90s (Jones, 2013). Furthermore, the provision of agricultural skills development and AVET in sub-Saharan Africa has been essentially inadequate across the value chain.

Another stigma associated with AVET relates to gender stereotyping, with some trainings being associated with the girls, who are considered less talented. The TVET system as a whole is perceived as inferior to the mainstream higher education system, and runs in parallel with separate institutions, programmes and teachers. Moreover, poor linkage to the labour market and a lack of harmonization of TVET programs and qualifications are issues that need to be addressed. Gender should also be considered in the analysis and design of AVET, since women often face gender-specific barriers. For example, it is very important to consider that in many developing countries, early marriage and child bearing often significantly limit the possibilities of rural young women by severely restricting them in their mobility and limiting them to the domestic sphere.

In general, some core challenges facing TVET – and consequently AVET include poor quality, very high costs, unsuitable training to meet actual socioeconomic conditions, a mismatch with young people's aspirations, a disregard of the needs of the informal sector and the labor market (Biavaschi, *et al*., 2012). According to a study by NEPAD (2013), the specific challenges faced by the AVET systems in Africa are:

1. Unlike TVET systems, AVET has only received marginal attention coupled with lower enrolment rates.
2. AVET has been criticized for having few linkages between private and public efforts and between TVET and agricultural universities and research.
3. The fragmented and scattered technical and vocational training offered does not meet the needs of the fast growing agricultural and food sector.
4. AVET systems suffer from low capacity, inadequate and outdated training materials and equipment, and lack of skilled and qualified trainers in training institutions.
5. Teachers and trainers lack practical, pedagogical and didactic skills, for curriculum development.
6. There is a perception that vocational training is inferior to academic studies.
7. In general, professional work in agriculture has a negative image compared to technical or office professions.

Promising Examples and Initiatives in Agricultural Vocational Education and Training (AVET) Aimed at Attaining Zero Hunger in Africa

Leventis Foundation in Nigeria

The Leventis Foundation was established in 1979 in Ghana and Nigeria with the goal of training young farmers in modern agricultural methods. This goal is in line with governments' emphasis on self-sufficiency in food production. To date, nine schools have been established in Nigeria and Ghana which specialize in innovative ways of training small scale farmers to improve productivity, efficiency and environmental sensitivity, taking advantage of the latest national and international research. The trainees spend a year at the schools and thereafter, upon returning to their farms and communities, are advised and supported by the schools' extension programmes. They transfer their skills to other farmers in their area by way of example, while the schools organize short training courses and farmers' field days for the surrounding communities. Training activities are similar in all Leventis Foundation agricultural training schools and are directed towards skill acquisition and capacity building in agriculture and agro-allied businesses by adopting an integrated approach. To achieve this aim, the training is structured to be 80 percent practical and 20 percent theoretical. There are four technical departments in the schools:

1. Crop production and Agroforestry.
2. Animal production.
3. Rural Enterprise Development.
4. Agricultural Engineering.

This is achieved through yearly recruitment of youths (18 to 35) to participate in training on modern general agriculture. Each of the schools have the capacities to admit 100 to 150 trainees (male and female) per year. All trainees receive board and lodging, school and work uniforms free of charge including monthly stipends. As of 2015, more than 7,000 youths participated in the one-year regular training from the foundation in Nigeria. The eligibility criteria include: be physically fit; ability to read and write in English; 18 to 35 years of age; and pass both written and oral entrance examination. The foundation also provides technical backstopping through:

i. provision of improved seeds;
ii. short courses to address farm problems and acquaint them with new and relevant information;
and technologies;
iii. linkage to input sources and output markets; and
iv. farmers field days

Other African Countries

Competitive African Cotton Initiative (COMPACI) offers training/courses on business management for smallholder cotton farmers in Burkina Faso. The Farmer Business Schools aim to provide farmers with support in making decisions when it comes to managing their farms and empower them with a sense of business. These skills are also transferrable to the private sector. The first courses for smallholder farmers in Burkina Faso began in May 2012 in cooperation with the Faso Cotton Company. The aim was to get at least half of all COMPACI farmers to go to Farmer Business School by 2015.

School of Agriculture for Family Independence (SAFI), is an agricultural school located in the Malawian village of Mtalimanja with the mission to help the people of Malawi learn better agricultural techniques to provide for themselves and their families. The Nu Skin Force for Good Foundation, in partnership with local non-profit organizations and civic groups, built the village in 2007 to house 30-40 farmers and their families. Husbands and wives receive education on fish farming, drip irrigation, sustainable farming, forest conservation, tree farming, animal husbandry, nutrition, among other subjects. The children attend primary school. Farmers and their families spend their second year of training back in their respective homes through an extension programme, where the farmers implement their new skills. They also teach their children and other farmers in their communities, ensuring self-sufficiency

through generations. Since 2009, more than 228 people have been educated at SAFI and the crops yields of alumni have increased by an average of 700 percent.

Women in Agribusiness in Sub-Saharan Africa Alliance (WASAA), is an alliance of women across the entire agricultural value chains in Sub-Saharan African countries. The focus is on wealth creation and economic independence for women and youth through strong and reliable partnership networks within the agricultural sector. WASAA works with smallholder farmers to address the barriers that limit their competitiveness. WASAA offer registered women farmers access to profitable markets using a technology-enabled market linkage model. Farmers register through a mobile platform at a fee. After registration, they can then engage with WASAA. The aim is to increase farm earnings and profitability. Timely updated messages are delivered to smallholder farmers with stepwise action points on how they can increase their yields. Farmers can send their questions through the platform to a help desk, where they will receive a response within 48 hours.

Ethiopia's Agricultural Technical Vocational Education and Training (ATVET) sector is rather advanced compared to other developing Countries'. Ethiopia developed an ambitious plan, the Agricultural Sector Policy and Investment Framework 2010 - 2020, led by the Ministry of Agriculture and Rural Development, and invested considerable resources to build up an ATVET system, which is primarily a public agricultural extension system (FAO 2014). A successful example of the ATVET College in Africa is the Ethiopian Alage ATVET College. Alage College was established in 2002 following government decision to promote the national technical vocational education and training. The knowledge and skills attained by the trainees, specifically in agricultural discipline, would fit into the country's transformation strategy. Alage ATVET college comprises 4,200ha of land and it possesses infrastructure and facilities necessary for practical agricultural training. The college has four departments, namely plant science, animal science, natural resources, and animal health.

Songhai Training Center is the most renowned private agricultural training institution in Benin Republic. It was founded in 1985 to provide training to farmers, skilled farm workers and rural development practitioners. It has a dense collaboration with over 40 public and private organizations and universities. Songhai seeks to train young entrepreneurs who can then contribute to the sustainable development of their communities by creating jobs and thus prevent rural exodus; by ensuring food self-sufficiency of the region and contributing to the well-being of the people who will become more aware of the components of the products they consume; by training other young people willing to work in the field, and who thus contribute to the education of the youth of their village; and by providing services such as electricity and gas for all. The training is open to anyone who wishes to receive or to deepen his/her knowledge in the field of agricultural entrepreneurship. The duration and the cost vary depending on the programme. A framework has also been created to monitor and support some trainees after programme completion, particularly young women, who can benefit from micro-credit to culture and set up their farms. Songhai Centre has expanded its activities not only in Benin Republic but has been replicated in 14 other African countries. It encompasses practical and entrepreneurial curricula.

The Faraja Latia Resource Centre runs an agribusiness apprenticeship in Kenya. The apprenticeship program runs for six months and is structured as a practical training, targeting the youth who have graduated from high school and post-secondary training institutions. The practical training is offered at Latia Model Farm and in a diverse mix of collaborating farms and agribusinesses in Kenya; 70 percent of the time is spent working in the model agribusiness enterprises and 30 percent in classrooms studying theoretical concepts.

Upon completion, apprentices receive a nationally recognized Certificate of Competence. The Centre also provides short courses at Latia Model Farm or onsite at clients' farms and agribusinesses. The courses cover topics in production, marketing, value addition, labour management, farm financial management, agribusiness investments planning and analysis, certification, among others.

Individual Country Experiences with Agricultural Vocational Education and Training (AVET) in Africa

Nigeria

The National Policy on Education (NPE, 2004) and the Universal Basic Education (UBE) Act of 2004 both provide for 6 years of primary school and 3 years of Junior Secondary School. The major difference lies in the structure of the new Curriculum of primary school and junior secondary school, and it is to run for 9 years of continuous schooling.

Agricultural Education in Primary Schools

Agriculture in primary school was formerly taught as rural science and later Agricultural Science. It is the aim of the Federal Government that the teaching of agriculture in the primary schools should be directed towards the achievements of the following objectives:

i. To develop in the school children positive attitude and interest in agriculture and an appreciation of the problems involved;
ii. To expose primary school pupils to modern methods of agriculture;
iii. To develop an understanding and appreciation of agriculture to the economy of the country and the community;
iv. To develop the interest of pupils in creative activities; and
v. To enable the pupils to appreciate and interpret their environment in a scientific way.

Basically, agriculture is included in the primary school curriculum, but actually the teaching of agricultural education in schools is mainly in theory. Under the theory aspect, the children are expected to learn about plants, insects, flowers within the school surroundings, and nothing is done to allow the children a thorough understanding of the main theme of agriculture.

Importantly much emphasis should be placed on pure practical agriculture. This involves what is known as farm gardens where pupils plant crops like groundnuts, maize, cassava, yam etc. Until a few years ago, the federal government of Nigeria established rural education centre/schools which trained teachers in various aspects of practical agriculture. But now, those schools have been phased out and such schools are no longer in existence. At present, there is an acute shortage of teachers to teach agriculture in the primary schools. Also school time-table of most schools, but ironically there is no body to teach the subject.

Contribution of Agriculture in Primary School

One of the greatest contributions in the teaching of primary school agriculture is the building of desirable attitudes towards farming which of course, is possible if only the teachers themselves have favourable attitudes towards agriculture. Primary agriculture as an important educational process should essentially be exploratory for the pupils. At this level it is known that not every primary school child should be a farmer, but the exposure to the fundamentals of agriculture is considered to be beneficial to the children and to the country. Essentially agriculture cannot be left out of good primary school teaching if we are to survive in the future. This is because a well-organized agricultural education programme according to Okorie (1985) will provide pupils the opportunity to learn such things as:

1. How ordinary plant grow;
2. How ordinary plants and animals produce;
3. Soil formation and conservation;
4. Identification and control of diseases;

5. Birds and how they affect farming and farm life;
6. Trees and shrubs for the farm and house.
7. Agricultural geography, agricultural arithmetic, agricultural history of some important crop and livestock in the community etc;
8. Agricultural English – to include correct use and spelling terms, writing and reading about farming and farm life;
9. Farm sanitation and health;
10. Farm animal health as related to feeding;
11. Contributions of agriculture to the society and to the welfare of man; and
12. The work of various agencies in the improvement of agriculture and farm life.

By learning all these, the pupil will tend to develop desirable changes towards agriculture which offer the first employment in the communities after completion of primary education.

Secondary School Agriculture

Agriculture was introduced into secondary school curriculum in 1967. With the commencement of 6-3-3-4 system of education, agriculture was made a core subject at both junior and senior secondary school curriculum. The present 9 years of continuous schooling made agriculture as an elective subject at the junior secondary level. The broad objectives of agricultural education at secondary school level include to:

i. stimulate and sustain students' interest in agriculture;
ii. enable students, acquire basic knowledge and practical skills;
iii. enable students, integrate knowledge with skills;
iv. prepare students for further studies in agriculture;
v. expose students to occupation in agriculture; and
vi. prepare students for opportunities in the field of agriculture.

Contribution of Agricultural Education in Secondary Schools

Learning-by-doing is emphasized in the curriculum so that the students should be able to produce food and other agricultural products for themselves and their communities. The condition however, is that the assessment is not based on laboratory experiment and field practical activities of the student; thus, the teaching or delivery systems are not likely to stress field experiences and skills. This perhaps, is one of the reasons why secondary school graduates do not possess saleable skills in agriculture.

Agricultural education in secondary schools is more elaborate but is not taken seriously until the approach of practical examination. Students live in boarding houses and go home during holidays thereby making it hard for them to have permanent farm plots. No much attention is paid to school plots by students; there is no sense of belonging. There is no real and positive interest in agriculture by the students. With recent emphasis shifting towards the community schools, it may be possible for the students to have permanent farms at home since they attend class from their villages. Perhaps when this happens the students will become more interested in agriculture unlike now where the school farm is no body's farm.

Unfortunately, agricultural education has not made any impact in our secondary school students. Those who take to the study are mainly expected to pass their examination with the subject. The course content of the following-crop science, Animal science, Agricultural farm tools, soil science and General principles of Agriculture. With the inclusion of Animal Science in the curriculum, it has been observed that most schools do not have enough animals. Any knowledge obtained from theoretical aspect of such animal study small farm animals like Rabbits, Sheep, Goat, Chicken etc. are non-existence in our schools; hence, the students depend on theory to gain needed knowledge to pass their examination. There is little or no adequate time for practical work in the secondary school. With the schools now in

the government hand, each government should make funds available for the schools to embark upon practical. It is important to note that the nonchalant attitude of the school in providing farm tools aids in making agriculture only theoretical. For agricultural education to be more meaningful, the theoretical knowledge should be complemented with practical work. However, the science in most schools is that students rarely undertake any field trip which is as a result of poor planning by the ministry, lack of transport and non-provision of adequate fund.

Agricultural Education in Colleges of Education

Almost all colleges of education in Nigeria nowadays offer agricultural education programmes in their curricula. The programme was designed as a three-year full-time course of high academic and professional content. Part-time programmes are now being offered by various institutions. The philosophy of NCE Agricultural Education Programme is tied with the national philosophy on Agriculture for self-reliance based on the provision of teachers endowed with a balanced approach between principles and practice of agriculture for academic and vocational ends. Agricultural Education Programme according to National Commission for Colleges of Education minimum standards (2002) is aimed at achieving the following objectives:

i. To prepare teachers with the right attitudes to, and knowledge/professional competence in vocational agriculture;
ii. To produce teachers who will be capable of motivating pupils to acquire interest in and aptitude from agriculture;
iii. To develop in the student-teacher the appropriate agricultural information to the students in the context of their environment;
iv. To equip the student-teachers with adequate knowledge and ability to establish and manage a model school farm effectively; and
v. To provide a sound background to enhance further academic and professional progression of the student teacher.

The Agricultural Education Programme is comprehensive enough and the minimum credits required for graduation include the followings:

1. General Education Components - 36 credits.
2. Teaching Practice - 6 credits.
3. General Studies - 14 credits
4. Technical and professional Agricultural Components 72credits
5. SIWES – 02Credits

Total = 132

To effectively deliver the Agricultural Education Programme, National Commission Colleges of Education strongly recommended that any institution offering Agricultural Education should provide adequate classrooms, in addition to relevant facilities such as well-equipped laboratories (one for crops and soil and the other for livestock studies). The need for standard school farm is emphasized, workshop, a livestock unit of selected farm animals, fish pond, individual student's plots and experimental plot for research and crop farm. Also, staff offices with relevant equipment and a well-stocked library are all required for effective Agricultural Education Programme Implementation. However, a minimum of Eight Lecturers as well as supporting staff including technologists, technicians, artisans and labour hands are required to minimally implement the programme.

Agricultural Education in Colleges of Agriculture

Colleges of agriculture provide the human resource needs at the junior and senior technical levels which operate different training programmes at National Diploma (ND) and Higher National Diploma (HND). The subject matter emphasis includes crop/animal husbandry, General agriculture, soil and water conservation, Irrigation engineering, agronomy, agricultural mechanization, forestry, fisheries and

wildlife, animal health, home economic/food technology and laboratory technology. Agricultural Education in college of agriculture is aimed at achieving the following objectives:

i. to produce knowledgeable personnel in adequate number to be effective in technology transfer at farm level;
ii. to equip the trainees to function efficiently in the ministries, research institutions and similar organizations;
iii. to equip the trainees with adequate knowledge to understand various technologies so as to be able to adopt, utilize, demonstrate and transfer the technologies; and
iv. to prepare the trainees for farming as a career.

Agricultural Education at the University Level

The university level is charged with the responsibilities of producing the specialist cadre human resource in agriculture. In addition to the three universities of Agriculture located at different ecological zones of the country and more than 27 universities with faculties of agriculture; through their programmes, the following specialists are produced:

1. Agricultural Engineers;
2. Soil Scientists;
3. Animal Scientists;
4. Agronomists;
5. Plant Breeders;
6. Plant Pathologists;
7. Entomologists;
8. Agricultural Economists;
9. Agricultural Policy Makers;
10. Teachers of Agriculture;
11. Home Economists;
12. Food Technologists
13. Rural Sociologists
14. Veterinarians;
15. Specialists in Forestry;
16. Horticulturists;
17. Plant Geneticists;
18. Animal Nutritionists and host of others.

The contribution of these specialists in their various capacities and areas of specialization are expected to enhance development and productivity in Agriculture. As stipulated in National policy on Education document (2004), the universities are expected to pursue their programmes through teaching, research and development, staff development generation and dissemination of knowledge, mounting of variety of programmes, access ITF funds, expose students to students' industrial work experiences, maintenance of minimum educational cooperation and dedicated services. It also states that all teachers shall be required to undergo training in methods and techniques of teaching.

Agricultural Education at Vocational/ Farm Institute Level Training

Facilities for training at vocational level are concentrated at farm institutes, farm training centres and extension work stations. The training emphasis is the acquisition of basic knowledge and the development of skills essential to successful agricultural production. The graduates of this system sometimes referred to as agricultural instructors are expected to be the prime movers and animators of government integrated development programmes at the grassroot level.

Mode of Skill Training in Vocational Agricultural Education

Agricultural education places more emphasis on skill development in individuals to enable them perform and succeed in their chosen agricultural occupations. It believes much on the philosophy of ―learning by doing. Umoh (2002) therefore, recommended ways through which students are prepared in skill acquisition in agriculture as numerated below:

1. **A Work-Study Programme:** This is a programme designed to allow agricultural students who are on full-time enrolment in vocational training in schools to run part-time employment for purpose meeting their financial needs. The students work during part regular school hours in commercial farms for money and

attend school during the remaining hours. A student may choose to attend school in the morning hours and use afternoon hours in the employment. However, there may be no close co-ordination of practical experiences with classroom instruction.

2. **On-The-Job Training Programme:** This is a programme which students are placed on actual jobs and a supervisor or an experienced employee teaches them the skills of a specific occupation. Here, some time is spent on the co-ordination with training given on the job. The instruction is usually given on the job. The instruction is usually given during the normal working hours. However, the minimum or beginning wage may be paid to the students.
3. **A Cooperative Training Programme:** This is a programme which has as its purpose the supervised part-time employment of students with the intention of assisting them to acquire desirable work skills, habits and attitudes in the world of work. An example of this programme in Nigeria is the Students' Industrial Work Experiences Scheme (SIWES). The agricultural teachers and the employers, plan classroom and job so that the students see the relationship between the theory and practice. The cooperative training programme usually gives the students a broader background of vocational knowledge than they could get from work-study or on-the-job training programmes. However, the student-workers may be paid some wages to meet their financial needs.
4. **Youth Organization Programmes:** Through effective participation in youth organization programme activities or projects, members learn by doing and acquire skills in production, leadership and personal development.

Other African Countries

Technical Vocational Education and Training (TVET) in Benin Republic represents 3% of the state education budget and less than 5% of secondary level staff. Benin's AVET institutions have increased significantly in number since 2008. There are three secondary level Colleges of Technical Education, and other private and public high schools that provide AVET training to students. The curriculum of the schools consists of 25% of theoretical courses and 75% of practical teaching. The AVET schools mainly train future farmers, skilled farm workers and rural development practitioners. The country's most renowned private agricultural training institution, the Songhaï Training Centre, was founded in 1985.

In Burkina Faso, study by the Ministry of Youth identified 29 agricultural training centres spread throughout the country in almost all regions, although there is some disparity within regions. For example, the Central West region has seven agricultural vocational training structures, followed by the Central region with four, and Central North and Hauts Bassins regions, each with three structures. The rest of the seven regions have one or two agricultural vocational training structures each. All agricultural vocational training centres are located in the provincial capitals. According to the classification of agricultural training centres, the study revealed four types of agricultural centres; 65.5% of agricultural training structures are vocational training centres. This large proportion could be explained by the flexibility of the conditions of access to these training structures.

Ethiopia's agricultural vocational education and training is considered to have some of the best practices in Africa. Through the Agricultural Sector Policy and Investment Framework 2010-2020, led by the Ministry of Agriculture and Rural Development (MOARD), the country invested significant resources to build an AVET system. Before AVET was introduced, only universities offered training in agriculture. However, by 2000, the Ministry of Agriculture introduced AVET in 27 colleges curriculum. Currently, five federal and 20 regional colleges provide a three-year training program for development agents. The programme admits students that have completed their general

education (up to grade 10) in the national system for two years in school and a year-long apprenticeship. The curriculum is 30% theory and 70% practice. Upon completion of their training, development agents are placed in farmer training centres to support farmers that do not have access to formal learning. The development agents are also assigned to promote modern agricultural practices in rural areas with close technical guidance and to encourage farmers to use location-specific modern agricultural inputs.

Ghana incorporated agricultural education and training into its National Medium-term Agriculture Sector Investment Plan. Within this framework, six agricultural training institutions were selected after a stocktaking exercise for areas of potential in human capacity and organizational development. Based on a need assessment, training for important skills required in the citrus and pineapple value chains were integrated into the new AVET curricula. Private and public stakeholders were closely involved in the process, and training materials were developed with a competence-based training approach. These were introduced at three public and one private pilot institutions. The training institutions are supposed to prepare their trainees to venture into agribusiness and agricultural enterprises along the value chain, from production, processing to marketing. The institution's curricula however have to be recognized by the Ghanaian Council of Technical and Vocational Education and Training in order to align with the National Qualification Framework.

Kenya has been undertaking reforms of TVET in the agricultural-sector and in close cooperation with major stakeholders, such as farmer associations, training providers, development partners, government institutions and the private sector. The AVET training needs assessment considered horticulture, dairy and aquaculture value chains. Capacity building pilot training programmes for trainers were conducted on topics such as contract farming, value chain development, good agricultural practices and aquaculture. The institutions involved in this pilot programme include the Dairy Training Institute, the Bukura Agricultural College, and several polytechnics in the counties, the public Kenya School of Agriculture, Baraka Agricultural College, and the private Faraja Latia Resource Centre.

Repositioning Agricultural Education and Training to Meet the Challenge of Zero Hunger in Nigeria

Nigeria adopted its first national policy on agriculture in 1988. According to the document, formal and informal agricultural education shall be used as a veritable means for evolving strategies that will ensure self-sufficiency and the improvement of the level of technical and economic efficiency in food production, modernize agriculture, and create agricultural and rural employment opportunities and much more (Federal Ministry of Agriculture and Rural Development, 2006). Ultimately, the aim of the policy is improvement in quality of life of farmers and, indeed all Nigerians, in a sustainable fashion. Obviously, very little success has been achieved in this regard. This is not to proclaim that agricultural education or agricultural education curriculum holds the magic wand to solve Nigeria's agricultural and national development problems. But, since 'to be more is to know more', it is imperative that we harness our abundant agricultural and human resources to solve hunger problem facing this present and future generations through proper application of agricultural knowledge and management of the agricultural education system.

The Role of Education and Training in Agriculture and Hunger prevention in Africa

Education alone is not a shield against hunger. It should nevertheless be a key ingredient in any policy that aims to reduce poverty, dependence, environmental degradation, excessive population growth and other factors that are most often the direct causes of hunger. Hunger is a worrying

reality of life for millions of people around the world, especially in Africa. However, one way to address this ongoing global challenge and work toward the goal of zero hunger is through agricultural education and training. Agriculture has proven to be incredibly effective in reducing poverty-related food insecurity and malnutrition, two leading causes of hunger. It is essential to understand that development and economic growth are closely linked with improvements in agricultural productivity. This means that increasing agricultural output – and thus overall yield - profoundly affects food security for vulnerable populations. When used strategically and backed by policies and resources, agricultural education and training can help reduce hunger and malnutrition by engendering income-generating activities across agricultural value chain.

Agricultural Education and training can be a powerful tool in tackling hunger and achieving success in the agricultural sector. With the right knowledge, farmers can stay current with cutting-edge technologies to enhance crop yield and productivity. At the same time, families learn how to access healthy food and make smart dietary choices. For those who have little resources or training, education can provide the necessary skills for smallholder farmers to increase their profitability. It also makes people aware of the environmental and economic damage that could result from food waste and teaches them methods to reduce it in their own lives. Understanding the potential dangers of natural disasters can help communities prepare and create strategies for recovery. Agricultural Education is undoubtedly essential to achieve global sustainability and zero hunger.

Conclusion

Agricultural education plays a vital role in addressing poverty and food security in sub-Saharan Africa, where the majority of the population works in agriculture. However, the sector faces significant challenges, including a lack of training and education, leading to low productivity and limited economic growth. To address these challenges, investing in agricultural vocational education and training (AVET) is essential. This can lead to increased productivity, reduced poverty, and improved food security, aligning with Sustainable Development Goal (SDG) 2: End hunger, achieve food security and improved nutrition, and promote sustainable agriculture.

Formal agricultural education and training programmes can provide individuals with the necessary skills and knowledge to become skilled entrepreneurs and improve the productivity and competitiveness of farms and agro-processing businesses. Additionally, non-formal and informal approaches, such as apprenticeships and community-based programmes, can also play a crucial role in developing farmers' knowledge and skills. Therefore, a comprehensive approach to agricultural vocational education and training is necessary to address the complex challenges facing the sector and promote sustainable agricultural development in sub-Saharan Africa. By investing in agricultural education and training, we can empower individuals, improve productivity, and promote food security and sustainable agriculture in Nigeria and Africa.

Recommendations

1. Investment in Agricultural Vocational Education and Training (AVET); governments, organizations, and stakeholders should prioritize investing in AVET programmes to enhance the skills and knowledge of farmers, agricultural entrepreneurs, and agro-processing professionals. This investment can lead to increased productivity, reduced poverty, and improved food security, aligning with SDG 2.
2. Development of comprehensive Agricultural Education and Training Programmes; formal, non-formal, and informal approaches should be integrated to provide a comprehensive education and training framework. This framework should address the diverse needs of

farmers, agricultural entrepreneurs, and agro-processing professionals, empowering them with the necessary skills and knowledge to promote sustainable agricultural development.

3. Capacity building for Agricultural Educators and Trainers; to ensure the effective delivery of agricultural education and training, it is essential to build the capacity of agricultural educators and trainers. This can be achieved through workshops, training programmes, and professional development opportunities, enabling them to stay updated on best practices, technologies, and innovative approaches in agricultural education and training.
4. Collaboration and partnerships for Sustainable Agricultural Development; stakeholders, including governments, organizations, and communities, should collaborate and form partnerships to promote sustainable agricultural development. This can involve sharing resources, expertise, and knowledge to address the complex challenges facing the sector and ensure that agricultural education and training programmes are responsive to the needs of farmers, agricultural entrepreneurs, and agro-processing professionals.

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