MICHIGAN STATE UNIVERSITY

ALLIANCE for AFRICAN PARTNERSHIP

Strengthening Agricultural Extension Training

Process Skills and Competency Gaps in Undergraduate Agricultural Extension Curriculum in Nigeria

By

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ABBREVIATIONS AND ACRONYMS

AAP	Alliance for African Partnership
ADAP	Accelerated Development Area Project
ADP	Agricultural Development Projects
ADPEC	Agricultural Development Project Executive Council
AESON	Agricultural Extension Society of Nigeria
BES	Block Extension Supervisor
CBO	Community Based Organizations
CIA	Central Intelligence Agency
CIG	Common Interest Group
DES	Director of Extension Services
DFRRI	Directorate of Food, Roads and Rural Infrastructure
DLEC	Developing Local Extension Capacity
EA	Extension Agent
EASs	Extension Advisory Services
EO	Extension Officer
FAO	Food and Agriculture Organization
FBO	Farmer Based Organization
FGD	Focus Group Discussion
FMARD	Federal Ministry of Agriculture and Rural Development
GDP	Gross Domestic Product
ICTs	Information and Communication Technologies
IFAD	International Fund for Agricultural Development
IITA	International Institute of Tropical Agriculture
ILRI	International Livestock Research Institute
LGA	Local Government Area
M&E	Monitoring and Evaluation
MOA	Ministry of Agriculture
MSADP	Multi-State Agricultural Development Projects
MSU	Michigan State University
MTRMs	Monthly Technology Review Meetings
NAADS	National Agricultural Advisory Services
NAEASS	National Agricultural Extension and Advisory Services Strategy

NAEP	National Agricultural Extension Policy
NAFPP	National Accelerated Food Production Project
NAIP	National Agriculture Investment Plan
NAIS	Nigeria Agricultural Insurance Scheme
NAP	National Agriculture Policy
NARES	National Agricultural Research and Extension System
NARIs	National Agricultural Research Institutes
NARS	National Agricultural Research System
NBS	National Bureau of Statistics
NDE	National Directorate of Employment
NEEDS	National Economic Empowerment and Development Strategy
NFDP	National Fadama Development Project
NGO	Non-Governmental Organization
NIFAAS	Nigeria Forum for Agricultural Advisory Services
NPEASs	National Policy on Extension and Advisory Services
NSAs	Non-State Actors
OFAR	On-farm Adaptive Research
OFN	Operation Feed the Nation Programme
PAP	Poverty Alleviation Programme
PIRA	Partnerships for Innovative Research in Africa
PMU	Programme Management Unit
QTRM	Quarterly Technology Review Meeting
RBDA	River Basin Development Authority
RDP	Rural Development Projects
SAA	Sasakawa African Association
SDGs	Sustainable Development Goals
SMS	Subject Matter Specialists
T&V	Training and Visit System
UNDP	United Nations Development Programme
UNN	University of Nigeria, Nsukka
USAID	United States Agency for International Development
WIA	Women in Agriculture
ZEO	Zonal Extension Officer

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- **Authors**

EXECUTIVE SUMMARY

Extension professionals are the most valuable assets of successful agricultural development programs and service delivery. To be effective, extension professionals are expected to achieve excellence in carrying out their services and therefore need to possess a set of core process skills and functional competencies upon which the organization bases its primary operation or services.

Process skills and core competencies are basic sets of knowledge, skills, abilities, and behaviors that agricultural extension professionals require to perform their tasks effectively. These capabilities ensures high level of professional competence and enhance extension officers' ability to carry out their functions. Agricultural training institutions are responsible actors in producing agricultural development professionals and administrators who can shoulder the responsibilities of enhancing sustainable food and agricultural systems and reducing poverty for rural populations across the globe. However, most of the undergraduate curricula for training agricultural extensionists within the MSU-AAP Consortium member universities have not changed over the past decade, in terms of content and delivery methods.

Periodic updating of the UG agricultural extension curriculum is necessary for agricultural training institutions to produce graduates with core process skills and competencies that will enable sustainable food security, improved livelihoods, and natural resources conservation.

A systematic assessment of agricultural extension training within MSU-AAP Consortium members would help AAP member universities to develop the broadly competent extension professionals needed for contemporary agricultural development. This report is based on findings from Nigeria.

This study addressed the following research questions:

1. Do extension programs effectively address the needs of current food and agricultural systems?
2. What are the critical job skills and core competencies required of extension workers to effectively plan, implement, and evaluate extension work in today's changing context?
3. Does the undergraduate curriculum in extension education include education and/or training on these job skills or core competencies?
4. What are the barriers to effectively training extension workers with required core competencies, and how can these barriers be removed?

The study was conducted in Nigeria between August 2021 and April 2022. Nigeria is a country in West Africa that covers an area of 923,768 km2 and has an estimated population

of over 200 million people. The population of the study comprises all extension professionals in academia, the public sector, the private sector and non-governmental organizations in Nigeria. A mixed- method research design comprising quantitative and qualitative approaches was employed in collecting data from the study population. Quantitative data was collected through an online survey using the Qualtrics software. Email invitations for the online survey were sent to 349 extension professionals in Nigeria; 198 respondents completed the online survey. It should be noted, however, that a few questions/items were not completed by some of the respondents. Qualitative data for the study was collected through focus group discussions (FGDs). Two FGDs were conducted in the University of Nigeria, Nsukka, on August 31 and December 3, 2021.

Process skills and core competencies in the present study were operationalized as the basic sets of knowledge, skills, abilities, and behaviors that agricultural extension professionals require to perform their tasks well in the following eleven areas: Program planning; Program implementation; Communication; Information and communication technologies (ICTs), Program monitoring and evaluation; Personal and professional development; Diversity and gender; Marketing, brokering, and value chain development; Other extension soft skills; Nutrition and Technical subject matter expertise. The eleven broad areas of competencies required by agricultural extension professionals were identified and included in the online survey instrument.

Qualitative data on the process skills and competency gaps in the undergraduate extension curriculum was collected through focus group discussions (FGDs) in the University of Nigeria, Nsukka. Two FGDs were conducted – the first was an in-person session; the second was a hybrid meeting. Overall, 22 participants attended the FGDs. The participants were drawn from academia, extension professional organizations, private sector agricultural extension employers, and public extension organizations. The discussion was recorded using audio/Zoom and stored in Zoom Cloud. The hyperlink containing the recorded clip was shared to facilitate transcription. At the beginning of each FGD, the moderator explained the study purpose to the respondents and obtained verbal consent, including consent for audio recording. Written informed consent also was obtained from the FGD participants. The notes and audio/Zoom recordings were transcribed shortly after the sessions. The FGDs were conducted in English, which is the official language in Nigeria.

The online survey questionnaire with all the above variables was developed after careful review of literature and past survey instruments. It was formatted using the Qualtrics software and pretested with the 11 team members of the PIRA project. On the basis of the pretesting, the questionnaire was modified and finalized for data collection. The Institutional Review Board (IRB) approval for human subjects' research was obtained from Michigan State University (MSU).

Email lists of agricultural extension professionals in Nigeria were compiled by scanning the websites and directories of research institutions, federal, state and private universities,

Agricultural Development Programmes (ADPs), the Ministry of Agriculture, NGOs, and private sector companies. Emails of agricultural extension professionals were also obtained from professional associations such as Agricultural Extension Society of Nigeria (AESON) and NIFAAS (Nigeria Forum for Agricultural Advisory Services). The mailing lists were merged and duplicate emails were removed. Using the Qualtrics software, the online survey questionnaire was administered to 349 agricultural extension professionals in Nigeria, and five reminders were sent to non-respondents to increase the response rate. The heads of extension departments and faculty members were requested to forward the survey link to their colleagues, research scholars, and postgraduate students. The online survey link was also shared with the participants of all the FGDs. The filled- in questionnaires were checked for completion, and incomplete surveys were excluded from the analysis.

The demographic and institutional characteristics of the respondents were analyzed using frequency, percentage and mean. The process skills and core competencies and appropriate ways to acquire skills and core competencies were analyzed using mean scores and paired sample t-test. Finally, the strategies for improving undergraduate agricultural extension curriculum and major barriers to effective implementation of UG extension curriculum were analyzed using frequency and percentage. The statistical package for service solution (SPSS) version 24 was the software used for the statistical analysis.

Key Findings

Most extension professionals in Nigeria are middle- aged, ranging from 41-50 years, and are mostly men. This implies that most employees are in their middle ages and thus, are a great assets for the required reforms of agricultural extension and advisory services in a changing food and agricultural context. Almost all the extension professionals have a deep knowledge of the university undergraduate curriculum. The extension professionals have over 20 years' experience in extension professions/agriculture- related fields.

In Nigeria, the National Universities Commission (NUC) provides guidelines for undergraduate agricultural extension curricula through Basic Minimum Academic Standard (BMAS) for the entire country. However, each university is allowed to make adjustment to its curriculum, subject to ratification by NUC during accreditation of programmes, traditionally conducted every five years. This makes UG agricultural extension curricula across the country somewhat similar with few variations across the universities offering the degree.

The mean scores on the level of importance of all eleven process skills and core competencies of agricultural extension professionals in Nigeria were significantly higher than the corresponding mean scores on their level of coverage in UG courses. Some subject matter areas/competency domains such as programme implementation, personal and professional development, diversity and gender skills, marketing, brokering, and value

chain, and extension soft skills are either not clearly delineated as a stand- alone course or inadequately covered in other extension courses in the undergraduate curriculum. Similarly, other subject matter areas such as ICTs and nutrition largely depend on ancillary courses for building requisite skills and competencies. The depth of coverage and amount of curriculum transaction seem weak or lacking, which is evident from the results of both curriculum review, the online survey and FGDs data. The courses lack relevant and robust content for building skills and competencies useful for the increasing and diversified roles of today's extension professional; and emerging cross-cutting development issues such as climate change, disaster management, resource mobilization and management, conflict resolution, etc., are not addressed.

The strategies that already exist to make the undergraduate extension curriculum robust and practical, according to the extension professionals, are providing students with broad-based general agricultural courses along with extension training; recruiting highly qualified extension staff or faculty; and including instruction on research and data analytical skills. These strategies specifically focus on developing technical skills and competencies of extension professionals. Achieving this requires a well-focused, practically oriented curriculum, and functional and sustainable resources for its transaction.

The strategies that do not exist but are essential to have are providing practical and contemporary skills (e.g., through mentored internship or attachment to a progressive farmer in a crop season); including various soft skills in the extension curriculum and business management concepts and practices in the extension curriculum; exposing students to market opportunities, linking farmers with service providers, and developing entrepreneurship; offering training of trainer workshops for extension faculty members; developing cutting-edge and practical teaching learning resources – extension textbooks, practical handbooks, training manuals; incorporating youth development, gender issues, urban/suburban agriculture, and climate change concepts in the extension curriculum; and making undergraduate extension curriculum/pedagogy more ICT oriented. This means major reforms of undergraduate agricultural extension curriculum in the universities.

Many factors work against the effective implementation of undergraduate agricultural extension curriculum in Nigeria. The major barriers include budget to support practical learning experiences, classroom and demonstration facilities, teacher motivation to teach required process skills and competencies, student motivation to study extension and engage in practical extension work, development of an effective extension curriculum, quality textbooks and/or manuals, quality faculty to teach extension courses, and accreditation of curriculum. Over the years, universities in Nigeria have struggled with the challenges of poor funding of infrastructure, training resources, and manpower development needs. This has grossly undermined efforts to achieve academic excellence, innovative training, and manpower development in the system and for industry and the world of work. Capacity development

and training opportunities for faculty have received little or no financial support and has far- reaching consequences on the quality of faculty and graduates, who by employment are recycled back to the system.

A well trained, competent workforce in the agricultural education, research, and extension organization is paramount for a sustainable food and agricultural development system. The student-related barriers to implementing extension workers' training curriculum such as lack of motivation to read agriculture and participate in extension work are connected to the general poor image of agriculture, weak curriculum and traditional pedagogy, limited learning resources, and poor learning environment. Innovative, competency- based curriculum holds great potential for attracting highly motivated students to study agricultural extension. However, this is not possible without favourable agricultural policy and active support of the government and actors in the agricultural sector, and a sustainable funding base for the universities.

To strengthen the undergraduate extension policy in Nigeria, the following strategies have been proposed: Improve pre-service education at universities offering agriculture; Strengthen agricultural extension as a field of study; Improve in-service training and professional development; Build capacity of university extension faculties and Revitalize the agricultural extension curriculum.

CHAPTER ONE : INTRODUCTION

1.1 Agriculture in Nigeria

Nigeria is the most populous nation in Africa, with a 2019 population of 201 million (United Nations Data, 2019). According to Camillone et al. (2020), of the country's 911,000 square kilometers of land area, 78 percent is dedicated to agriculture and 36 percent of the labor force is engaged in agriculture (Food and Agriculture Organization of the United Nations [FAO], 2019). This makes agriculture the largest employer of the country's labour force. Nigeria's 853 km coastline along the Gulf of Guinea, together with ample fresh water resources provided by the River Niger and Benue, provide great potential for fisheries and aquaculture/mariculture (FMARD and UNDP, 2015). However, Nigeria's export economy is mainly based on petroleum (95%); cocoa and rubber have the next largest shares (Central Intelligence Agency [CIA], 2019). Despite its export dominance, petroleum accounted for under 9% of national GDP in 2018, compared with agriculture's 21% (National Bureau of Statistics [NBS], 2019). In essence, agriculture plays a major role in the economy of Nigeria.

Nigerian agriculture is broadly divided into four sectors–crop production, fishing, livestock, and forestry. Crop production is the largest segment, and it accounts for about 87.6% of the sector's total output. This is followed by livestock, fishing, and forestry at 8.1%, 3.2% and 1.1%, respectively (Taiwo, 2020). In crop production alone, Nigeria accounts for up to 20% of the world cassava production (and 34% of Africa's), making the country the largest producer of cassava in the world (Adedotun, 2022).

Nigerian agriculture has a high potential for employment generation, food security, and poverty reduction (Olagunje et al., 2019). It is the main source of raw materials for the agro-based industries in the country, and over 75% of the Nigerian population depends on agriculture as a source of livelihood (Suresh et al., 2020). Between January and March 2021, agriculture contributed 22.35% of the total gross domestic product (FAO, 2021).However, domestic agriculture is currently unable to support the growing population's food needs --$3billion to $5billion of food is imported per year, largely comprising staples such as wheat and rice (Federal Ministry of Agriculture and Rural Development [FMARD], 2016). This is even with the Nigeria's awesome National Agricultural Research and Extension System (NARES), which is the largest in Sub-Saharan Africa.

The country has yet to fully harness its vast natural resources for sustainable agricultural development. This has been aptly captured in the National Food Security Program document, which is the most recent and authoritative policy statement by the national government on the state of the nation's agriculture. According to the government (FGN,2008), although agriculture remains a key component of the country's economy, currently contributing about 40% of the GDP and employing about 70% of the active population, the sector has significantly underperformed its potential. This has been clearly manifested in the very high food prices nationwide, food insecurity both at the household and the national level, and malnutrition,

especially in children. Thus, the agricultural production and food situation in the country today is anything but impressive.

Despite these challenges bedeviling the Nigerian agricultural system, potentials and opportunities exist in the Nigerian agricultural system. There is untapped agricultural potential in about 84 million hectares of arable land, of which only 40% is utilized. There are also about 279 billion cubic meters of surface water, beside ground water, and untapped irrigation potential with three of the eight major river systems in Africa. The population of 200 million, including over 110 million youths, provides both manpower and an internal market for agricultural products (Ufiobor, 2017). What is needed are extension workers to understand the underlying issues, and opportunities to enhance the food and agricultural system, who cansource and disseminate information and technology so that Nigerian agriculture can maximize the opportunities for a sustainable food and agricultural system.

1.2 History of Agricultural Extension in Nigeria

Agricultural extension has a long history in Nigeria. During the colonial era under the British, some agricultural development initiatives were undertaken with the purpose of increasing production. The first step was the establishment of the Department of Botanical Research in 1893 with its headquarters at Olokomejiin western Nigeria (Williams, 1978), now Ogun State. Its responsibilities included conducting research in both agriculture and forestry. Agricultural policy focused on the production for export of certain cash crops required in Europe (Naswem and Ejembi, 2017). In 1905, the British Cotton Growers Association acquired 10.35 square kilometers of land at the site now called Moor Plantation, Ibadan, for growing cotton to feed the British textile mills. In 1910, Moor Plantation, Ibadan, became the headquarters of the Department of Agriculture in southern Nigeria, and the Department of Agriculture was established in the north in 1912. During this embryonic phase of extension development, the British government provided free extension services to farmers aimed at feeding Britain's home-based industries with agricultural raw materials (KagbuandIssa, 2017). The extension approach was primarily commodity driven. Extension services were organized and managed through a combination of coercion, manipulation and use of reward to motivate farmers to comply with extension service directives (Nwachukwu, 2013). Farmers were encouraged to grow certain crops -- basically oil palm, cocoa, groundnuts and soybeans -- and were sometimes offered free seeds and advisory services (Naswem and Ejembi, 2017). During this era, research information was almost zero, no scientific information was extended to clientele, conflicting role arising from the adoption of incongruous strategies, and the emphasis was on cash crop development at the expense and neglect of food crops (Nwachukwu, 2013; KagbuandIssa, 2017).

After the amalgamation of northern and southern Nigeria, a unified Department of Agriculture was formed in Nigeria in 1921 (Nwachukwu, 2013). The major policy of the Department of Agriculture was still to increase production of export crops for the British market, which was ready to absorb it for its industrial growth. Extension activities were therefore directed toward increasing efficiency in crop production and marketing of these crops. The colonial

government commenced with the creation of the agricultural research stations in Umudike (1923) and Moor Plantation (1924) together with the Regional Ministries of Agriculture in the north, east and west.

Following Nigeria Independence in 1960, the Federal Government of Nigeria started to get more involved in agriculture. Increasing unemployment among school leavers in the country led to the introduction of farm settlements and the setting up of the school leavers' farm projects in the East, West and Midwest. In addition to generating employment and controlling rural-urban migration, these projects served as the basis for concentrated extension services. The extension strategy established for separate special commodity extension services for export crops such as cocoa, rubber and groundnut was revitalized, while the general extension services for food crops and livestock was not (Nwachukwu, 2013).

After the civil war in 1970, the nation was faced with attendant food insufficiency. The need to solve the problem of food insufficiency led to the proliferation of agricultural interventions, programmes and research institutes with extension components, including the National Accelerated Food Production Project (NAFPP), which was introduced in 1972; Agricultural Development Projects, ADP (1975); the Accelerated Development Area Project, ADAP (1982); and Multi-State Agricultural Development Projects, MSADP (1986). Other programmes were the Operation Feed the Nation Programme, OFN (1976); the River Basin Development Authority, RBDA (1973); the Green Revolution Programme, GRP (1980); the Directorate of Food, Roads and Rural Infrastructure, DFRRI (1986); the National Directorate of Employment, NDE (1986); the Nigeria Agricultural Insurance Scheme, NAIS (1987); and the National Fadama Development Project, NFDP (1992). In recent years, the Poverty Alleviation Programme, PAP (2000), and the National Economic Empowerment and Development Strategy, NEEDS (2004).

Today, extension services in Nigeria is still within the purview of the Federal Government of Nigeria. It gives guidance and coordination to the states in agricultural programmes and implements some agricultural projects. Each of the 36 states has a network of ADPs that are responsible for providing extension delivery in 36 states and Federal Capital Territory (FCT). The ADPs within each state are organized into zones, then subzones and blocks (approximately equal to a Local Government Area or LGA), and then cells (or villages) (Developing Local Extension Capacity [DLEC], 2017). In recent times, multiplicities of private sectors, donor agencies and NGOs have provided extension advisory services. The focus of agricultural extension delivery, with the involvement of several actors, has metamorphosed from a supply- driven approach to a demand, market- oriented value chain approach.

The major stakeholders in extension advisory services are the public sector (state ADP, National Agricultural Research System), private sector, NGOs, and international donor agencies. The ADPs in collaboration with the LGAs in some states are responsible for grass-roots extension delivery nationwide, and the National Agricultural Research System is responsible primarily for technology development. Currently the major provider of public sector agricultural extension services is the Agricultural Development Programmes (ADPs) in each of the 36 states of Nigeria, with a workforce of about 7,000 public agents (28 percent female) (DLEC, 2017). It

is noteworthy that, over the past few decades, changes in the approaches and performance of agricultural extension services in Nigeria have occurred (Lewis and Watts, 2015; Kuz et al., 2018; Nwoye and Nwalieji, 2019). These changes may be attributed to the participation of nongovernmental organizations (NGOs) and donors in funding and providing agricultural extension services (Sinkaiye et al., 2018).

Some private agencies have embarked on agricultural extension services directed largely toward a specific clientele system of their choice. They complement the public sector in providing extension services to farmers for either improving farmer production for off-take or generating demand for agricultural inputs they sell. Quality inputs are in high demand and there is a dearth of seed companies, creating an opportunity for the private sector. The private sector increasingly views extension services as a corporate social responsibility and as a way to increase brand loyalty with the farmers. Successes have been seen in out-grower schemes in which a processing company organizes farmers and provides inputs and training. Some of the agencies are: the Nigerian Tobacco Company, oil companies such as Shell Petroleum Development Company, and religious organizations such as the Catholic and the Anglican churches. Some nongovernmental organizations (NGOs) such as the Leventis Foundation also operate some extension services (Yahaya, 2020).

The participation of NGOs in extension delivery in Nigeria is a major feature in recent time. These NGOs are either charity based or private commercial organizations. The charity- based NGOs are non-profit- oriented organizations; private commercial organizations have a profit motive associated with their activities. These NGOs in the agricultural and rural development sector provide a wide range of extension education and technical support services, including micro-credit financing and supply of essential inputs in several communities in the country (Malabe et al., 2019). Examples of the non-profit NGOs include: the Development Education Centre (DEC), which provides extension support for women to organize themselves into grass-roots- level self-help association in southeastern Nigeria; the Women's Advancement Network (WOFAN) in the northwest, promoting income generation activities among rural women; the Farmer Development Union (FADU) and the faith-based Diocesan Agricultural Development Project (DADP) in southwestern Nigeria, which aim at poverty alleviation among small- scale farmers. Other nongovernmental organizations (NGOs) playing a supportive role in research and extension delivery in Nigeria include: Sasakawa Global 2000 and Women in Agriculture (WIA), Practicing Farmers Association of Nigeria (PFAN), Farmers Agricultural Development Union (FADU), Farmers Agricultural Supply Company (FASCOM) and Evangelical Church of West Africa (ECWA).

Many international organizations have also been involved in agricultural extension and rural developments in Nigeria for decades. Notable among these are the World Bank, International Fund for Agricultural Development (IFAD), United States Agency for International Development (USAID), Technical Centre for Agricultural and Rural Cooperation, and Food and Agriculture Organization (FAO) of the United Nations. Some international research centres and networks have made their presence known and supportive in Nigeria in the area of

research and extension delivery. Some of them have established collaborative efforts with the National Agricultural Research Institutes (NARIs) and other relevant agencies. Some of the international research centres are: International Institute of Tropical Agriculture (IITA), International Fertilizer Development Centre (IFDC), International Livestock Research Institute (ILRI), and International Crops Research Institute for Semi-Arid Tropics, International Fund for Agricultural Development (IFAD), Food and Agriculture Organization (FAO) of the United Nations, and the United Nations Development Programme (Yahaya, 2020).

1.3 Organogram of Extension Advisory Services in Nigeria

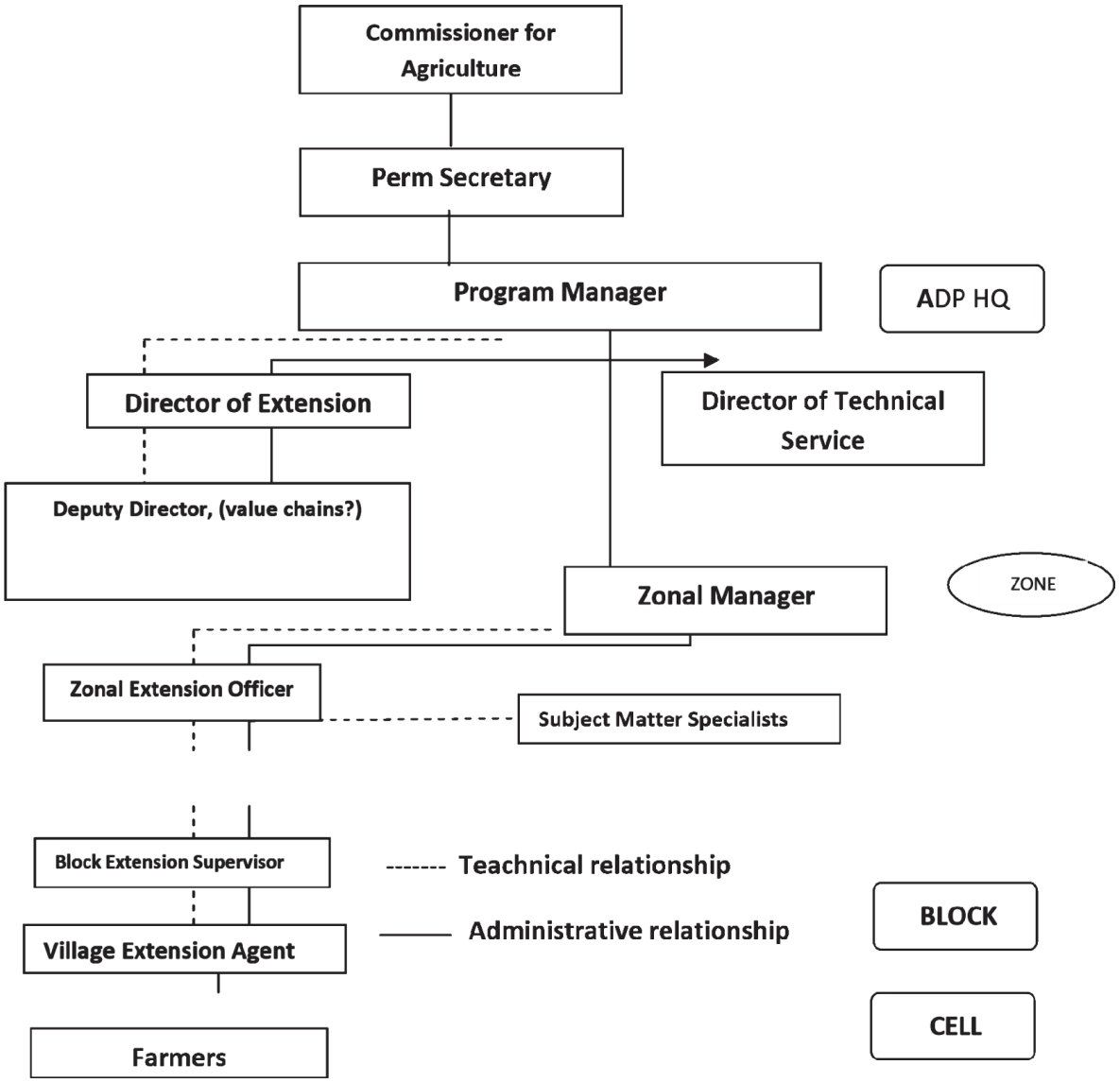
The public extension organization in Nigeria became effective in 1968 under the Ministry of Agriculture (MOA). As a reform of the MOA strategy, the Agricultural Development Projects (ADPs) strategy was initiated under enclave arrangement at Funtua, Ayangba, Ekiti-Akoko, Gombe, Gusau and Lafia towns in 1975. The success of this arrangement led to the introduction of ADP strategy to all the states in Nigeria. Since 1989, public sector extension activities in Nigeria have been concentrated in the Agricultural Development Programmes (ADPs). The ADP was designed to improve the traditional systems of production and raise productivity by transferring relevant and proven production technologies to farmers, easing constraints on inputs/ supplies and providing rural infrastructure (Obasi, 1995). In pursuance of this, the programme employs the training and visit (T & V) system to provide comprehensive agricultural extension services (for crops, livestock, etc.) within a single line of command (Bindlishand Everson, 1997).

The advent of the agricultural development projects (ADPs) in 1972 ushered in a different approach to extension work by bringing several elements that contributed to agricultural development under one semi-autonomous administrative set-up separate from the Ministry of Agriculture. Emphasis was on reorganizing and revitalizing the extension system with a suitable linkage with research. To this end, a National Agricultural Research System (NARS) comprising 18 national agricultural institutes, 16 faculties of agriculture and three universities of agriculture was established for basic and applied research in the country. This was in addition to the presence of the International Institute of Tropical Agriculture (IITA) and substations of other international research institutions (Mijindadi, 1984). Later, more universities of agriculture were established.

This arrangement set the stage for the collaboration of ADPs, research institutes and universities to diagnose prevailing farming problems, test promising technologies for research on the farmers' fields and promote relevant ones for mass adoption. In this connection, Mijindadi (1994) observed that an agricultural research - extension - farmer- university linkage had been established in Nigeria whereby each ADP had an agreement with a research institute or university for getting assistance of scientists in monthly and quarterly technology review meetings (MTRMs) and designing and supervising on-farm adaptive research (OFAR) trials. This two-way communication link between the agencies ensures better quality research for the development of appropriate up-to-date technologies and extension services oriented to farmers' needs.

The ADPs in the various states of Nigeria operate using similar agro-technology transfer organizational structures established in each state by law. Figure 1 shows the features of the bureaucratic set **up** and the linkages that exist within the structure.

Each state ADP is organized in four levels to facilitate supervision and transfer of authority: the headquarters, zonal, block and circle levels. The two broad arms of the ADP are the **core** and the **support** services or sub-programmes. The core programmes include Engineering, Extension, Technical and Rural Institution services. The support programmes are Administration, Finance, Human Resources,and Monitoring and Evaluation services.



Adapted From : FACU, 1991

Fig. 1.1: Organogram of a typical agricultural development project (ADP)

At the headquarters is a policy-making body known as the Agricultural Development Project Executive Council (ADPEC), which is under the chairmanship of the state governor. This committee formulates policies for administrative control, appointments, promotions and

general discipline, supervision and coordination. It also controls all finances and approves the project's annual budget.

The administrative head of the ADP is the project manager (PM), who is next in the hierarchical line of authority. The project manager is the head of a body known as the programme management unit (PMU), made up of all heads of sub-programmes as well as zonal managers. The PMU has responsibility for the execution of the policies and programmes approved by the ADPEC. It also prepares work plans and budget estimates, and handles appointment, promotion and discipline of ADP staff.

Each sub-programme has clearly defined responsibilities. Programme implementation, management and administration are achieved through the activities of these sub-programmes and their components. A meeting point for the sub-programmes is possible only at special review meetings where the activities of each sub- programme may be discussed. The review meetings are expected to provide opportunity for interdisciplinary exchanges and linkages. One key link for all the sub-programmes is the planning, monitoring and evaluation support services. The activities of this unit cut across all the sub-programmes its staff can go straight into the affairs of any programme to obtain information, even before special review meetings are announced.

The second supervisory level is at the zone, which may have from six to eight blocks. Each zone is headed by a zonal manager (ZM), who is assisted in the execution of extension programmes by zonal extension officers (ZGOs) and subject matter specialists (SMSs). The organizational chart under consideration does not, however, provide for any direct linkage of theZMwith the director of extension services (DES). It appears that the only meeting point for both officers is at the level of PMU, since both report directly to the PM. There should be a lateral linkage between the ZM and the DES because both are involved in implementation of the same extension programmes

The third supervisory level is the block, which in some cases may correspond with a local government administrative territory. Blocks represent areas with farming patterns that are similar in technology used and crops and animals kept. Each block is headed by a block extension supervisor (BES). These officers, together with zonal extension officers (ZEOs), maintain lateral technical knowledge with subject matter specialists (SMSs),who may be university researchers or experts from the private sector. A block extension supervisor is in charge of six to eight circles, which make up a block.

The circle, the fourth level, is headed by an extension agent (EA), who makes direct contacts with the farmers, and men's and women's groups. The organizational structure of the ADP, therefore, seems to have satisfied the principles for optimum communication within any organization as outlined in the UNESCO handbook for information system and services (1980) in the following ways:

a. The channels of communication are definitely known -- i.e., the lines of authority have been definitely established with appropriate authority put upon each position.

b. The principle of forward and backward communication has been provided for.

c. Lines of communication are as short as possible to increase the speed of communication and lessen the incidence of errors in transmission of information.

d. There is completeness in the vertical line of communication to ensure that communication such as from the PM to the EAs passes through every line of authority, thereby avoiding incidence of conflicting communication in either direction.

e. There is provision for the placement of competent, well trained heads to man each supervisory position to ensure accurate interpretation of incoming information and dissemination of same.

f. Continuity of sanctions and roles in the system is provided for to ensure that the lines of communication are not broken.

g. All persons in the communication line occupy necessary positions of authority, ensuring that every message or communication being handed down is articulated.

1.4 Challenges in Agricultural Extension

In Nigeria, agricultural extension services are mostly provided by government organizations. However, the existing public agricultural extension service in Nigeria is characterized by many shortfalls, such as grossly inadequate and untimely funding; a very weak research-extension-farmer-inputs linkages system; top-down, supply-driven extension approaches; and poor targeting of women, youths, and vulnerable groups, among others (Osonduet al., 2015; World Bank, 2020). In addition, the poor conditions of service and a non-existent career ladder for the ADP staff, a multiplicity of extension approaches and lack of coordinated/networking among the extension providers, misplacement of subsidy priorities, negative political influences in extension management and lack of low- cost credit facilities that small- scale farmers can easily access and poor loan recovery rates when credit is available are critical challenges. Also, because agricultural extension staff numbers are low compared with the farming population (Banful et al., 2010; Omotayo, 2010), not all farmers' concerns can be addressed concurrently. In attempting to reach the most marginalized farmers, agricultural extension services in rural Nigeria face the compounding challenges of decaying infrastructure (FMARD, 2016), lack of transportation (FMARD, 2016), low farmer education levels (Phillip et al., 2009), retiring staff needing replacement (Banful et al., 2010), and limited staff numbers (Banful et al., 2010). Most Nigerian agricultural extension staff are spread too thinly to adequately serve their intended geographic areas using current strategies. Further, women farmers face unique barriers to integration in agricultural extension systems staffed predominantly by men (Banful et al., 2010; Osaze, 2015). Other major challenges of Nigeria's agricultural extension and advisory services include: lack of a legislated agricultural extension policy, compounded by policy somersaults in the sector; grossly inadequate and untimely funding; poor leadership and coordination; low private sector participation; a very weak research-extension-farmer inputs/linkages system; and ineffective top-down, supply-driven extension approaches. As a result, the public extension system is unable to respond to the increasingly diversified extension needs of rural clients.

1.5 Study Background

The agricultural sector in Nigeria is one of the major drivers of economic growth and poverty reduction. It contributes about 24.1% of the overall real GDP in the country (World Bank, 2020). The sector provides the major source of livelihood to smallholder farmers as well as micro-, small-, and medium - scale enterprises along the numerous agricultural value chains leading to a pathway of long-term food security, poverty eradication, and rural development (Mansour et al., 2022). In spite of the significant role of agriculture in driving the economy, poverty and food insecurity are prevalent among smallholder farmers and other value chain actors, and this has been largely attributed to low agricultural productivity that keeps the agri-food sector locked in underperformance (Fawowe, 2020; Bjornlund et al., 2020). Poor institutional capacity -- i.e., faculty vis-à-vis the agricultural extension curriculum -- has resulted in poor quality training of extension workers, low adoption of agricultural technologies, and worsening productivity of farmers and other food systems actors (Babu et al., 2020).

Agricultural food system transformation and increased productivity in Sub-Saharan Africa are dependent to a large extent on the delivery of agricultural extension services to smallholder farmers and other food system actors (Danson-Abbeam et al., 2018). These are achieved through the provision of research-based educational and informational programs typically to rural populations. Historically, extension workers assisted farmers through educational procedures aimed at improving farming methods and techniques, increasing production efficiency and income, and bettering standards of living. Today, extension workers serve both rural and urban populations with a wide range of programs aimed at helping to improve beneficiaries' quality of life. To effectively respond to the multidimensional challenges facing agriculture and food systems, there has been a paradigm shift of agricultural extension service delivery approach from a public- sector- driven, top-down extension system to pluralistic, demand-driven extension services. In this latter approach, the intended beneficiaries participate in the identification and prioritization of learning needs (SuvediandKaplowitz, 2016), and extension professionals are expected to respond to the needs of farmers and other food system actors rather than deliver predetermined packaged solutions.

Extension professionals are the most valuable assets of successful agricultural development programs and service delivery. They are critical actors who support the improvement of farmers' knowledge, skills, and attitudes through effective and timely communication of up-to-date information useful in making informed decisions (Tesso, 2016). Also, they need to support the numerous other value chain actors involved in food processing and distribution. To be effective, extension professionals are expected to achieve excellence in carrying out their services to give the highest level of satisfaction to the individuals involved. They are expected to remain current with emerging technologies and capable of handling challenges, tapping opportunities, and demonstrating competencies in their services (NwaoguandAkinbile, 2018). They need to possess a set of core process skills and functional competencies upon which the organization bases its primary operation or services.

Process skills and core competencies are basic sets of knowledge, skills, abilities, and behaviors that agricultural extension professionals require to perform their tasks effectively. Thus, extension staff members must be skilled in technical subject-matter areas across several value chains, the administration and operation of extension service delivery mechanisms, gender issues, the dynamics of human resource management and development, project planning and appraisal, program development coordination and process, instructional and knowledge-sharing skills, communication strategies, and evaluation techniques (Suvedi et al., 2018). These capabilities will ensure a high level of professional competence and enhance extension officers' ability to carry out their functions.

Agricultural training institutions are responsible actors in producing agricultural development professionals and administrators who can shoulder the responsibilities of enhancing sustainable food and agricultural systems and reducing poverty for rural populations across the globe (Baker, 2015). In addition to teaching technical skills, these institutions should offer training on process skills and competencies in response to global changes that have influenced agricultural development (Kaynacki and Boz, 2019). However, the agricultural training institutions in Africa have changed little since their inception and remain averse to change (Davis et al., 2007; Fredua-Kwarteng, 2019). In most cases, the training content reflects the influence of Western universities more than 50 to 60 years ago, and the learning methods and materials are out of sync with current agriculture needs in the local contexts (Freer, 2015; Fredua-Kwarteng, 2019). The result is that instructors deliver to students,heavily theoretical knowledge and information that do not meet the needs of employers and smallholder and entrepreneur clients (Freer, 2015). In turn, students have little opportunity to develop critical thinking and problem-solving skills that are necessary to align training content and instruction with employment outcomes. In addition, food systems have transformed rapidly within the increasingly complex contexts of climate change and global trade. This requires increased attention to previously ignored issues such as food safety, supply chain logistics, and national and global market participation strategies.

1.6 Significance of the Study and Research Questions

Periodic updating of the UG agricultural extension curriculum is necessary for agricultural training institutions to produce graduates with core process skills and competencies that will enable sustainable food security, improved livelihoods, and natural resources conservation. Although there have been few studies on core competencies of agricultural extension professionals in sub-Saharan Africa (Davis and Terblanche, 2016; Nwaogu and Akinbile, 2018; Olorunfemi et al., 2020), a systematic assessment of agricultural extension training within MSU-AAP Consortium members is lacking. This study would help AAP member universities to develop the broadly competent extension professionals needed for contemporary agricultural development.

This study addressed the following research questions:

1. Do extension programs effectively address the needs of current food and agricultural systems?
2. What are the critical job skills and core competencies required of extension workers to effectively plan, implement, and evaluate extension work in today's changing context?
3. Does the undergraduate curriculum in extension education include education and/or training on these job skills or core competencies?
4. What are the barriers to effectively training extension workers with required core competencies, and how can these barriers be removed?

1.7 Objectives of the Study

1. Review agricultural extension curricula currently in use at AAP member universities at the undergraduate level.
2. Identify critical process skills and competencies of agricultural extension professionals, process skills gaps, and areas of potential curricular reform.
3. Recommend improvements/reforms of agricultural extension curricula to prepare the next generation of agricultural extension professionals to competently handle extension service delivery.
4. Introduce new/improved curricula among the agricultural extension faculty engaged in training and education in sub-Saharan countries.

1.8 Organization of the Report

Chapter one gives an overview of the agricultural sector and the history of agricultural extension in Nigeria, an organogram of the public extension service, and challenges in agricultural extension, study background, significance of the study, research questions, and objectives of the study. The second chapter, on theoretical orientation, discusses process skills and competency gaps in undergraduate agricultural extension curricula. Chapter three describes methods used and limitations of the study. The fourth chapter focuses on the results and discussion of online survey and focus group discussion. The conclusions and policy implications of the study are highlighted in the fifth chapter. References and the instruments used for quantitative and qualitative data collection are appended at the end.

CHAPTER 2 : THEORETICAL ORIENTATION *PROCESS SKILLS AND COMPETENCY GAPS IN AGRICULTURAL EXTENSION CURRICULA*

2.1 Agricultural Extension and Advisory Services in Nigeria

Agricultural extension has a long history in Nigeria. This history will be discussed here under four time periods:pre-colonial, colonial,post-colonial and current period.

2.1.1 Pre-Colonial era

During this period, there was no centralized system of agricultural extension practice. Farmers selected the best seeds for multiplication. In the same way, farmers introduced to their farms improved seeds and animals from their neighbouring communities and from trans-Saharan traders from neighbouring countries. The farmers themselves experimented upon and projected their production methodologies without the assistance of formally designated extension agents. Extension teaching was largely through apprenticeship. Families taught succeeding generation crop production, animal husbandry, and soil management through observation and participation by learners. Neighbours and friends shared new knowledge of improved farm practices (Salawu et al., 2008).

Box 2.1 : Initiative during the pre-colonial period

- Apprenticeship
- Neighbours and friends
- Trans- Saharan traders

2.1.2 Colonial/Pre – independent era

During this era, some agricultural development initiatives were undertaken to increase production. These efforts began around 1893 with the establishment of a botanical garden at Olokomeji, now Ogun state, by the British colonial administrators. The British government provided free extension services to farmers aimed at feeding their home-based industries with agricultural raw materials (Kagbu and Issa, 2017). The extension approach was primarily commodity driven. Farmers were encouraged to grow certain crops -- basically oil palm, cocoa, groundnuts, and soybeans -- and were sometimes offered free seeds and advisory services (NaswemandEjembi, 2017). Research information was almost zero; there was an absence of scientific information to extend to clientele. In 1921, a unified Department of Agriculture was formed in Nigeria (Nwachukwu, 2013). The major policy of the central Department of Agriculture was to increase production of export crops for the British market, which was ready to absorb it for its industrial growth (Salawuet al., 2008). Extension activities

were therefore directed towards increasing efficiency in crop production and marketing. The colonial government commenced with the creation of the agricultural research stations in Umudike (1923) and Moor Plantation (1924), together with the Regional Ministries of Agriculture in the North, East and West. The colonial government also established some agricultural development schemes to upgrade the skills of farmers and to produce agricultural commodities. In 1926, the Kwara irrigation scheme was established to increase rice yields and provide experimental data on production under severe drought during the dry season and flooding during the rains. In 1949, the Niger Agricultural Project was established with the aims of producing groundnut as export and guinea-corn for local consumption, relieve a world food shortage, and demonstrate better farming techniques and increase productivity of Nigeria's agriculture (Salawuet al., 2008).

Box 2.2 : Extension initiatives during the colonial/pre-independent period

- 1893 - establishment of botanical garden
- 1921 - establishment of Unified Department of Agriculture
- 1923 - establishment of Research Station Umudike
- 1924 - establishment of Moorplantation
- 1926 - establishment of Kware Irrigation Scheme
- 1949 - establishment of Niger Agricultural Project

2.1.3 Post-independence era

During this period, the federal government started to get more involved in agriculture. In 1964, the Federal Ministry of Agriculture and Natural Resources was established. This period also witnessed some reorganizations. For example, regions were established and agricultural extension and rural development became the exclusive responsibility of the regional government. Other organization included the Farm Settlement Scheme (FSS) (Malabe et al., 2019). In 1970, the Federal Department of Agriculture (FDA) field offices were established in the states to supplement the activities of the state ministries of agriculture. Many state governments fought against this arrangement on the ground of job insecurity (Nwachukwu, 2013;Salawu et al., 2008). In 1972, the National Accelerated Food Production Programme (NAFPP) was lunched.According to studies, this was the best extension strategy ever adopted in the country. The programme brought researchers, extension workers and farmers together in a cooperative effort to improve production, thereby making the required linkages between technology/producers, communicators and consumers possible. However, this programme focused on a mono-cropping system, which is alien to Nigerian farming culture. The programme gradually died as an extension strategy. Several other programmes with an extension approach (Box 2.3) were established within the period, including the completion of the pilot phase of the Agricultural Development Project (ADP).

Box 2.3 : Extension initiatives during the post-independent period

- 1960- Farm Settlement Scheme (FSS)
- 1964- Establishment of Federal Ministry of Agriculture and Natural Resources
- 1970- Establishment of Federal Department of Agriculture in states
- 1972- National Accelerated Food Production Programme (NAFPP)
- 1973- River Basin Development Authority (RBDA)
- 1974- Project Performance Budgeting System (PPBS) along with Agro-input Service Units (AISU)
- 1975- Agricultural Development Project (ADP) pilot enclave
- 1976- Operation Feed the Nation (OFN) programme
- 1980- Green Revolution Programme completion ADP

2.1.4 Post-globalization Period (1990 -2000)

Extension Services in Nigeria is still within the purview of the Federal Government of Nigeria. It gives guidance and coordination to the states in agricultural programs and implements some agricultural projects. Each of the 36 states has a network of ADPs that are responsible for providing extension delivery. The ADPs within each state are organized into zones, then subzones, blocks (approximately equal to a Local Government Area or LGA), and cells (or villages) (DLEC, 2017). This period also witnessed the involvement of some private, NGO, and international organization in extension work, such as Sasakawa Global 2000 and the National Fadama Development Project (Malabe et al., 2019). Some of the initiatives in this era were geared toward supporting irrigation management, cost recovery, access to credit, and marketing (Halimatou et al., 2016). Government programmes with extension approaches in this period are shown in Box 2.4.

Box 2.4 : Extension initiatives during the post- globalization period

- 1990-National Fadama Development Project (NFDP) pilot study
- 1992- National Fadama Development Project (NFDP) (FADAMA I)
- 2000- Poverty Alleviation Programme, PAP

2.1.5 Post- 2000 Period

The period witnessed the enactment of some extension policies. The 2001 extension policy was one of the first to tackle the issues of public agricultural extension services in Nigeria (NaswemandEjembi, 2017; Oyelami et al., 2018). The Agricultural Extension Transformation Agenda (AETA) was aimed to transform the Nigerian extension system into a participatory,

demand-responsive, market-oriented, and information- and- communication- technology (ICT)- driven service that provides the extension needs of all the actors along the agricultural commodity value chains of interest. It brought in a more pluralistic approach to agricultural extension and clearly defined the roles and responsibilities of each stakeholder (Suresh et al., 2020). Within this period, the Federal Department of Agricultural Extension was established with the mandate to provide a pragmatic, effective and efficient demand-driven extension service to all categories of farmers, including youths and women, to optimally use resources to promote sustainable agricultural and socioeconomic development of the country; provide channels for service and information delivery to all stakeholders in the commodity value chains, including partners and agencies within the national agricultural extension system; motivate and support farmers in adopting improved production technologies (crops, livestock and fisheries) to increase farmers' productivity and meet national consumption requirements as well as promote export and minimize import of major agricultural products; and facilitate and promote gender mainstreaming and employment of women and youth (FMARD, 2022). The period saw proliferation of government programmeswith extension approaches along with private, NGO and international organization participation in extension service delivery.

Box 2.5 : Extension initiatives during the post- 2000 period

- 2003- National Special Programme for Food Security (NSPFS)
- 2003- FADAMA II Project
- 2004- National Economic Empowerment and Development Strategy (NEEDS)
- 2008- FADAMA III Project
- 2012- Establishment of Federal Department of Agricultural Extension
- 2013- Agricultural Transformation Agenda (ATA)
- 2016- N-Agro of the National Social Investment programme

Agricultural extension and advisory services have gone a long way in Nigeria. From commodity driven to a more demand-responsive, market-oriented, information and communication technology (ICT)-driven service that meets the extension needs of all the actors along the agricultural commodity value chains of interest with a variety of stakeholders other than the public extension service providers.

2.2 Agricultural Extension Curriculum at Undergraduate Level in Nigeria

2.2.1 Overview of agricultural education in Nigeria

The birth and development of the higher education system, including agricultural education in Nigeria, can be traced to the colonial era and the wake of the nation's independence in 1960. The pioneer institutions (University of Nigeria, Nsukka, Amadu Bello University, and

the University of Ibadan) were primarily designed to increase the stock of professionals and civil servants needed for colonial administrative systems and, later, to build independent nations (Clark, 2006). Different colonial regimes left behind different educational approaches, especially with respect to agricultural education and research (Davis et al., 2007). Nigeria welcomed and promoted education as a critical instrument for economic transformation, but with the orientation of education for government civil service employment, there was less emphasis on professionalism, training for capacity to be competitive and relevant to the needs of the industry/ self-employment and changing labour market.Netherlands Universities Foundation for International Cooperation(Nuffic) (2017) reiterates that some of the influences of the British are still visible, particularly in the structure of education in Nigeria. Several restructurings through education policy and adaptation in the structure of education reflecting the influence of the United States' model of land-grant universities and colleges characterize the system. However, the system has not changed much in the philosophy, pedagogy, curriculum, performance assessment, value and attitude of both learners and teachers. According to Davis et al., (2007), many post-colonial African countries borrowed agricultural education and training models or structures from Western systems, but few have borrowed Western approaches to building innovative capabilities and innovation responsiveness into these systems

At the early stage of the development of an education system in Nigeria, it was public sector dominated, having little or no participation by the private sector. More recently, the education landscape in Nigeria has evolved, with rising numbers of private universities, new institutions being accredited, and others upgraded (from colleges to universities) (AmadiandAdejoh, 2020; Hawkins andOlajide, 2020), and consequently, a significant increase in the number of institutions offering agricultural education. Tertiary institutions in the country are categorized into federal, state and private, defined by source of funding and governance. The federal and state governments fund their respective institutions; privately owned tertiary institutions are funded by the promoters. The National Universities Commission (NUC) listing indicates that, out of 171 universities classified under federal (43), state (47), and private (79), 65 had information on their websites showing that they have agriculture- related faculties, schools, or colleges (Hawkins andOlajide, 2020). Among the federal universities, 30 had faculties of agriculture, schools, or colleges, as did seven out of 79 private universities.Of the state universities, 28 had information on their websites indicating existence of faculties of agriculture, colleges, and schools. Hawkins and Olajide (2020) further reported that out of the 11 distance learning centres for higher education at the university level, the National Open University of Nigeria (NOUN), with 78 Study Centres spread across the country, has a faculty of agriculture offering a five-year bachelor of agriculture programme (B.Agric.). There are also many colleges of agriculture established by the states and federal government for the single purpose of enhancing agricultural development, particularly within the operational environment. In addition, the polytechnic schools (three federal, three state and one private) were also reported to have programmes in agriculture. The polytechnics have the mandate to conduct academic

training for extension agents and technicians to Ordinary National Diploma (OND) and Higher National Diploma (HND).

The programmes of the institutions are regulated by the National Universities Commission (NUC), and the colleges and their programmes by the National Board for Technical Education (NBTE). The National Universities Commission is a statutory body established since 1974 under the Federal Ministry of Education and set up by the Federal Government of Nigeria to attain a stable and crisis-free university system, and to work with Nigerian universities to achieve full accreditation status for at least 80% of the academic programmes. According to Okojie (2008), accreditation verifies that programmes meet established standards, provides eligibility for federal assistance, investment of private and public funds, and stimulates improvement of weaker programmes and a general raising of standards in institutions, among others. It is also responsible for upgrading and maintaining physical facilities in the Nigerian university system to deliver quality university education, match university graduate output with national manpower needs, and foster partnerships between the Nigerian university system and the private sector.

Similarly, the National Board for Technical Education (NBTE) has advisory and coordinating functions for all technical and vocational education falling outside the universities. Functions include the establishment and maintenance of minimum standards in polytechnics and other technical institutions in the federation and accreditation of academic programmes in all technical and vocational education (TVE) institutions for the purpose of award of national certificates and diplomas and other similar awards. It sees to the development of curriculum and BNAS for accreditation programmes at OND, HND level. Curricula are usually developed at a national level with consultants (e.g., from UNESCO) and stakeholders (including instructors, industry, private sector).

The country has also recorded a steady annual increase in demand for higher education. The enrolment figures in the Nigerian university system have skyrocketed yearly since independence due to greater awareness of the relevance of education to development and the quest for university education by secondary school graduates. Between 2015 and 2018, the rate of enrolment spiked to about 12% (Nigeria University Statistical Digest, 2018). By 2018, overall enrolment (undergraduate and postgraduate) for 90% of the universities in the system that provided data stood at 2,041,291 (NUC Statistical Digest, 2018). The undergraduate enrolment distribution across the three levels --federal, state, and private -- are shown in Figure.1. The federal universities have about two- thirds of the total enrolment in the system. Similarly, graduate turnout records a total of 236,925 in 2018 from universities that graduated students.

In the same vein, agricultural education has witnessed a considerable positive change in the average enrolment, though not as much in other disciplines. The World Bank (2018) noted that average enrolment in agriculture programmes at tertiary- level institutions in sub-Saharan Africa between 2010 and 2015 is comparatively lower than enrolment in other disciplines such as education, social sciences and humanities.

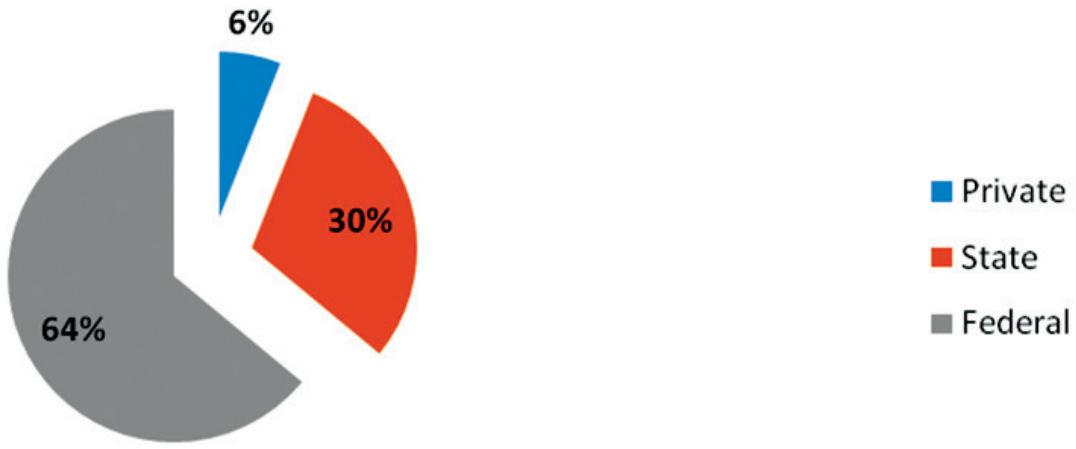


Fig. 2.1 : Percentage undergraduate enrollment in private, state, and federal universities

Source: Nigeria University System Statistical Digest (2018)

2.2.2 University of Nigeria, Nsukka

The University of Nigeria was formally opened in 1960 at the climax of the Nigeria independence celebration with collaborative support of the United Nations Economic, Social, and Cultural Council (UNESCO) and International Cooperation Administration (ICA), now the United States Agency for International Development (USAID). The university adopted the land- grant university model of teaching, research, and outreach/extension to the surrounding population (Gramble et al., 1988). Michigan State University, under the USAID grant/contract, provided advisory services for planning, organizing and administering the university.

The motivation of the founding fathers of the University of Nigeria was the need to train Nigerian youths locally, and in sufficient numbers, for the formidable task of disseminating useful and practical information from the research base to the rural farm families for sustainability in food production. The motto of the university is "To restore the dignity of man". The **mission statement** is to place the University of Nigeria, Nsukka, in the forefront of research and development, innovative knowledge transfer, and human resources development in the global academic terrain, while promoting the core values which will ensure the restoration of the dignity of man. **The vision statement** is to create a functional, globally competitive and research- focused university which is not just an Ivory Tower but responsive to the needs of the society, while delivering world- class education and knowledge.

Academic activities started with creation of four faculties: Faculty of Art, Faculty of Social Sciences, Faculty of Technology and Faculty of Sciences, where the first 220 students of the university were admitted (Iroko from Sapling, 2014). In 1961/1962, the College of Agriculture was established under the Faculty of Sciences. The College of Agriculture was upgraded to the status of a faculty,the Faculty of Agricultural Sciences, in 1964, which became the Faculty of Agriculture following a series of restructuring (Irokofrom Sapling, 2014). The six earliest departments in the Faculty of Agriculture were the Department of Plant/Soil Science, Department of Animal Science, Department of Agricultural Economics, Department of Home

Economics, Department of Agricultural Engineering and Department of Veterinary Sciences. Some of the pioneer departments, such as Veterinary, have been upgraded to facultiesand others separated.

The Faculty of Agriculture of the University of Nigeria awards a bachelor's degree of Agriculture (B. Agric), a five-year programme with specialization in five disciplines -- agricultural economics, agricultural extension, animal science, crop science and soil science. Currently the Faculty of Agriculture has eight departments --Agricultural Economics, Agricultural Extension, Animal Science, Crop Science, Soil Science, Nutrition and Dietetics, Home Science and Management, and Food Science and Technology.

The University of Nigeria, Nsukka, has grown by leaps and bounds since its inception over 50 years ago. The student population has grown from 220 in 1960 to over 40,000, while the academic staff strength has grown from about 100 in 1960 to over 2,000. Similarly, the number of departments has grown from six in 1960 to 106 (in addition to five sub-departmentswithin 18 faculties in contrast to the two faculties that existed at inception. In addition, there are 10 semi-autonomous institutes, 23 research centres, a business school, a school of postgraduate studies and a school of general studies. The number of campuses has also grown from one (Nsukka campus) in 1960 to four - Nsukka, Enugu, Ituku-Ozalla and Aba campuses.

2.2.3 Overview of Department of Agricultural Extension

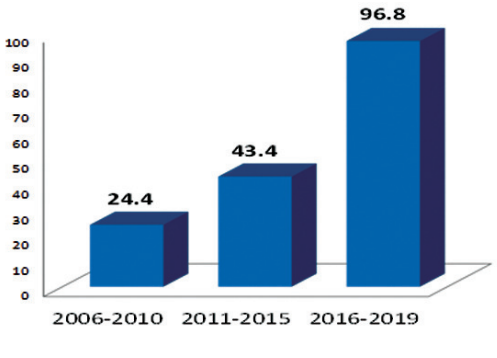
The programme in agricultural extension in the University of Nigeria was initiated in 1965, when United Nations Children's Fund (UNICEF) entered into an agreement with the university to support the programme for five years. This was done on realizing that the programmes of the Faculty of Agriculture needed a programme in agricultural extension to carry out the university philosophy of teaching, research and outreach services.

At the inception of the programme, agricultural extension was organized as part of the Department of Agricultural Economics and Extension because of lack of teaching staff and other logistic supports. However, in 1973/74, the curricula of the Department of Agricultural Economics and Extension were restructured to permit two degree options – agricultural economics and agricultural extension (Student Hand Manual, 2000).

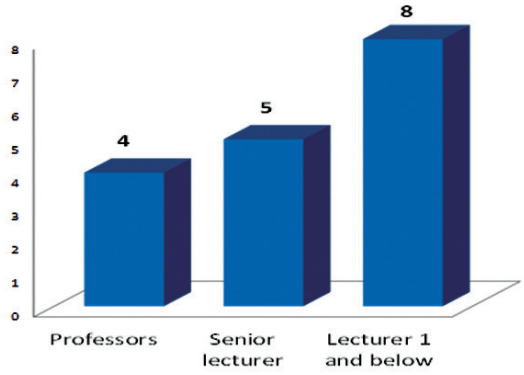
In 1981, as a result of greater national awareness of the importance of agricultural extension, the University Senate approved the creation of the Department of Agricultural Extension. The philosophy of the department is guided by the vision of the university to train Nigerian youths locally, and in sufficient numbers, for the formidable task of disseminating useful and practical information from the research base to the rural farm families for sustainability in food production. The underlying philosophy of the programme is to build high-level, competent agricultural extension manpower for agricultural production and rural life. It is anchored on the principle of working with rural farm families where they are, building on what they have, adding to what they know, and enabling them to develop themselves. The department is organized to achieve the following objectives:

1. Produce graduates who can put into practice the skills and knowledge gained from their practical year by engaging in farming enterprises after leaving school, and demonstrating that farming is a profitable venture, thereby contributing meaningfully to industrial and national development.
2. Produce a set of new future farmers with technical, productive and entrepreneurship skills who can positively influence agricultural and rural development policies.
3. Conduct research and provide a comprehensive and adequate programme of higher education for leaders in the field of agricultural extension and rural development.
4. Improve the quality of rural life of the people in the neighbouring communities through outreach programmes.
5. Create a favourable teaching-learning process that will facilitate mastery of the concepts, principles, theories, positive attitude, aspiration, and skills needed to effectively disseminate innovations (improved technologies, practices and systems) to rural farm families.

The department has recorded a phenomenal growth in undergraduate students' enrolment as well as staff numerical strength Figure 2.2). The student enrolment has progressively increased to about 100%, particularly within the past five years, and the number of teaching staff, particularly at the senior level has increased, though not as much. As is common in most public universities, faculties and colleges,the academic staff population is heavy at the lower levels, with more staff as Lecturer 1 and below (Obadara and Alaka, 2013).



Average enrolment of students between 2006 and 2019 in the department of agricultural extension, University of Nigeria Nsukka



Ratio of teaching staff in the department of agricultural extension, University of Nigeria Nsukka

Fig. 2.2 : Growth in undergraduate student enrolment and staff strength in the Department of Agricultural Extension, University of Nigeria, Nsukka

2.2.4 Undergraduate Agricultural Extension Programme (B. Agriculture)

Based on the Benchmark Minimum Academic Standard (BMAS) approved by the National Universities Commission (NUC), the bachelor's degree programme in agriculture requires that

a student shall undergo five- or four- yearstudy, depending on the entry point (University Tertiary Matriculation Examination [UTME] or direct entry for Higher National Diploma [HND], with a 12- month practical year). The student must earn a minimum of 167 credit units for the five-year programme and 132 for the four-year direct entry programme. The first year of the programme is devoted to exposing students to basic sciences and general studies; the second and third years are spent within the range of courses approved for the programme. The students take courses in crop sciences, soil science, animal science/animal health, one or two introductory courses in food science and technology, home science, nutrition and dietetics, economics and agricultural extension.

At the fourth year of the programme, students engage in 12months' practical work coordinated by the Student Industrial Work Experience Scheme (SIWES),of which not less than 80% should be devoted to practical training on a farm and/or related industries.The scheme was established by the Industrial Training Fund (ITF) in 1993/1994 in response to the increasing concern ofindustrialists and employers of labour that graduates of institutions of higher learning lacked adequate practical background studies preparatory for employment in industries and organizations (ITF, 2002). Hence, it was structured to bridge the existing gap between theory and practice of sciences in agriculture and other professional disciplines in Nigerian tertiary institutions (ITF, 2002). During the practical year, students in agricultural extension are exposed to a series of hands on experience training in all the disciplines in the faculty.The practical trainings are in the areas of crop production techniques (permanent, arable and horticultural crops, etc.), animal husbandry techniques (cattle, sheep, goats, poultry, pigs and rabbits), agricultural products processing and storage, crop protection and pest and disease control, animal health management, soil fertility, soil and water management, farm design, farm survey and land use planning, farm management, farm records and farm accounts, extension practicesand workshop practices, among others.Over time, the practical year has been reviewed, reorganized and expanded to include field tours/trips to strategic places of academic relevance such as research institutes, private agricultural firms, agro - veterinary firms, commercial crop and livestock farms, etc. However, Kumar and Altun (2016) posit that for teachers to be able to build up analytical thinking in new era students, other pedagogical approaches are needed, such as living at the farm all the year, mentoring in the art of agriculture, giving students opportunities to see the seasonal changes in farm ecology, and practicing agriculture on soil, on plants, on animals and also in marketing, among other numerous management practices, all leading to permanent effects in learning. It further collates with Agricvoc (2015), which recommends internship programmes, real- life demonstration of agricultural theories on the farm, engagement of students in field trip work and close supervision of students carrying out practical tasks.

According to NUC (2007),all agricultural degree students run a common curriculum for the first four years of the programme. The fifth (final) year is reserved for different options in the students' area of interest and ability. In addition to prescribed academic courses in the option area, students must carry out a research-oriented project accounting for at least four credit

units. In the option year, 80% of courses come from the option area and 20% from other major areas of agriculture. However, in recent time, students are admitted into the specialty area of interest by UTME or direct- entry admission, but with the similar training curriculum for the first four years. Furthermore, students carry out a research-oriented project, usually in a topical area of student's choice as a requirement for graduation.

Objective of programme

The objectives are to:

a. Produce graduates geared towards self-employment.

b. Produce graduates with sufficient technical, productive, and entrepreneurship skills to be involved in production, research and entrepreneurship in any aspect of agriculture and other related disciplines

c. Produce graduates that are relevant to themselves, the industry and society, and who can contribute effectively to national development goals in agriculture.

Learning Outcomes of the Programme

a. Regime of Subject Matter Knowledge

A broad base of knowledge in general agriculture enables graduates to function as practical farmers. To achieve this, about 50% of the instruction time should be spent on practical and field instructions. As much as possible during their course of study, students should be involved in the practice of agriculture from their first year with a view to learning skills for effective and sustainable entrepreneurship. For effective learning and practice, aspects of agriculture should be developed on the teaching and research farms for hands-on experience. The farm year programme should be conducted on the university farms for effective participation and supervision. In addition, students should be taken on excursions to relevant agricultural enterprises.

b. Competencies and Skills

i. Graduates will have competence in conceptual, management and entrepreneurial skills.

ii. Graduates will acquire practical and analytical competence to enable them to manage sustainable agricultural production schemes.

iii. Graduates will be equipped with data processing skills in all agricultural disciplines and have ability to interpret data to provide solutions to agricultural problems.

iv. Graduates will have competencies in communication skills and be able to present research/field reports with convincing arguments clearly, either in writing or orally.

v. Graduates will be equipped with information technology skills required for global communication.

vi. Graduates will have skills in participatory approaches to conservation and utilization of renewable natural resources with a view to enhancing rural development.

c. Behavioural Attributes

i. Graduates of the programme should appreciate that there is dignity in labour through competence in conception, planning, execution, monitoring, and evaluation of various agricultural production enterprises.

ii. Graduates should be able to adapt to the socioeconomic and cultural situations of rural settings and integrate with rural community dwellers (NUC, 2007).

2.2.5 Curriculum Development and Review Processes for Agricultural Extension Programme at the University of Nigeria

The National Universities Commission (NUC) is mandated to lay down minimum standards for all programmes taught in Nigerian universities (NUC, 2007). The commission, in collaboration with the universities and their staff, developed minimum academic standards for all the programmes taught in Nigerian universities in 1989. The current curriculum was revised in 2007 after more than a decade of using the Minimum Academic Standard (MAS) documents as a major instrument of accreditation. This was necessitated by advancement in frontiers of knowledge, growth in information communication technology, globalization, and need to improve relevance and integrate entrepreneurial, conflict and peace studies. Curriculum development begins with a needs assessment survey of the labour market for Nigerian graduates. This is centrally carried out for all the disciplines taught in Nigerian universities. The exercise involves major stakeholders, particularly employers of Nigerian graduates. The objectives of the need assessment survey include identifying expected knowledge, attitudes and skills for graduates and determining their ability to fit into the requirements of the new national and global economy. The second stage involves the organization of a workshop for academic experts across Nigerian universities, including vicechancellors, with the objective of identifying necessary updates from the survey. At the end of the workshop, draft Basic Minimum Academic Standard (BMAS) documents are produced for the disciplines, including the general studies programme taught in Nigerian universities. The documents are further sent to the universities offering relevant disciplines for comments and inputs. Following the return of their inputs and comments to the commission, a one-day workshop with invited academic experts studies and incorporates the comments and inputs into the draft documents for final endorsement, production and dissemination as BMAS.

To maintain quality and relevance, the commission recommended that a two- way communication strategy involving the universities and employers/professionals should continue to be used for periodic evaluation of competency and /or work output of graduates. Also, at the university level, curriculum review is undertaken every five years by a group of experts of the level of professors/associate professors. Curriculum review at the university takes a simple linear process. Administratively, each university has a committee (Senate Curriculum Committee) charged with the task of reviewing curriculum for programmes.The committee is made up of the chairman, faculty curriculum representatives and representative of the registrar. The process is initiated at the academic unit/department, where a small group of senior teaching staff (professors/readers/senior lecturers), chaired by the departmental

curriculum representative, periodically (every five years) review the curriculum, in consultation with other academic staff for inputs and comments. The curriculum is forwarded to the Senate Curriculum Committee for discussion and approval through the faculty curriculum representative and the Senate Curriculum Committee. the process lacks the participation of the employers of labour/private sector for improved relevance and competitiveness of graduate of agricultural extension.

2.2.6 Changing agriculture and food system: National and global perspective

Agricultural extension is crucial for sustainable growth and performance of the agricultural sector in the world. Traditionally, extension plays critical role in addressing rural poverty and food insecurity through transfer of technology, support of rural adult learning, assisting farmers in problem solving, and getting farmers actively involved in the agricultural knowledge and information system (Danso Abbeam et al., 2018); and providing advisory services (Harry and Abudu, 2022; Msuya et al., 2017). According to Shannonet al. (2020), agricultural extension agents are essential partners in promoting evidence-based farm health and safety in communities. However, in more recent times, agricultural extension and advisory services are transitioning from a focus on technology transfer to a focus on facilitating a range of interventions in complex contexts. The system is being challenged to serve as the connecting actor in complex agricultural innovation systems (Kaynak andBoz, 2019); to go beyond technology transfer to facilitation and beyond training to learning; to assist farmers to form groups, deal with marketing issues, address public interest issues in rural areas such as resource conservation, health, monitoring of food security and agricultural production, food safety, nutrition, family education, and youth development; and to partner with a broad range of service providers and other agencies (Chikaire et al., 2018).

The number and diversity of organizations involved in extension and advisory services has increased over the past few decades and extension is required to play an increasingly important intermediation and facilitation role to support application of new knowledge (GFRAS, 2012; AESA, 2016; GFRAS, 2017). These include organizations in the private sector dealing with agriculture inputs, agribusiness, and finance (international as well as local); producer groups, cooperatives and associations; consultants (independent as well as associated with or employed by agri-business/producer associations); and information and communication technology (ICT)-based services. Scholars have attributed this to diverse changes in the context of agricultural development (Kolawole et al., 2016; ManoherandPooja, 2019). Consequently, the job market for extension professionals has thus changed and now demands quite different competencies than were required many decades ago. Above all, emergent methodological changes such as privatization of extension, cyber extension/e-extension, market-led extension, farmer-led extension, expert systems, social media, and media mix strategies, etc., jointly demand new competencies from extension educators.

Above all, the global and national food systems are currently facing several related cross-cutting issues which further define emerging roles and skills and competence needs of extension educators. These issues include environmental trends, gender inequality, nutrition,

youth and women empowerment, youth unemployment, urbanization, globalization and trade and information communication technology explosion and digitalization. For instance, environmental trends such as soil degradation, climate change, water scarcity, deforestation, and decreasing biodiversity pose threats to the food system and livelihood of farming communities. Climate change exerts adverse effects on agricultural productivity through a wide range of meteorological and hydrological processes, including increases in the atmospheric temperature that affect the rate of precipitation and evaporation result in water scarcity, the increasing unpredictability of weather events such as seasonal rains that require smallholders to plan cultivation, and by increasingly frequent extreme weather events that can cause great soil and crop losses (Dawd et al., 2019). These trends have a significant impact on the functioning of the food systemand increase the need for extension services delivery to build capacity for a sustainable and resilient food system.

The food system is faced with the pressure of feeding a growing population (MatemilolaandElegbede, 2017) with a decreasing rural labour supply and marginal lands; but of greater concern is the challenge of postharvest losses, food safety concerns, and conflicts over resource use and management. A huge and growing demand for affordable food exists among both the rural and the fast-growing urban population, but agricultural productivity remains relatively low and inefficient in many parts of the country (Helena et al., 2021). Contributing causes include poor resource management and pervasive diverse conflicts, particularly between herders and crop farmers. This situation calls for capacitation of extension educators with technical and professional skills for efficient service delivery.

2.2.7 Competence Needed by Extension Educators/Professionals

"Competence" indicates the sufficiency of knowledge and skills that enables a person to act in a wide variety of situations (Vishnu et al., 2017). In other words, competence is the ability to do something efficiently and effectively (i.e., successfully). Several studies have been conducted around the world on the emerging competencies of agricultural extension systems and extension employees. Lindner et al. (2003) reviewed the perceived key competencies of agricultural extension education graduates in 23 countries and reported that the most important competencies vary by country. According to Rasheed et al. (2018), the core competencies relevant to and worthy of consideration by developing countries are communication, program planning, program implementation, personal and professional development, education and informational technology, diversity, program evaluation, and technical subject matter expertise. The authors however, pointed out that the competence needs are subject to change as new situations unfold. Suvedi and Kaplowitz (2016) conducted a survey of extension professionals in Cambodia, India, Malawi, and Nepal to help determine the essential competencies for effective front-line extension workers in those settings. They grouped the competencies under four major extension programming functions – namely, programme planning, programme implementation, programme evaluation,and communication and information communication technology. The authors further classified the competencies of extension worker into two broad categories: process skills or functional competencies, and technical skills. Process skills or functional competencies

include networking with local organizations, facilitating group formation, resolving conflict and engaging stakeholders in program planning. Process skills, also called soft skills, help extension workers perform their tasks well. On the other hand, technical competencies involve such things as identifying the causal organism of maize disease, testing the soil pH and interpreting the results, and conducting a method demonstration on how to perform artificial insemination on dairy cattle.Suvedi and Kaplowitz (2016) offer nine areas of professional core competencies necessary to adequately address the needs of demand-driven, decentralized, pluralistic and participatory extension systems. They are "plan well, coordinate and collaborate to implement, be humble, communicate confidently, build public relations, value diversity, acquire educational and informational technology, evaluate to show the result, and update knowledge."

In another study,Nwaogu and Akinbile (2018) identified thirteen important core competency needs of extension personnel: programme planning, programme implementation, communication skill, extension education and teaching, information communication technology, leadership skill, social value and culture, programme evaluation and research,organizational management, knowledge of organization, professionalism, technical subject matter expertise and group management. In their ranking, professionalism was considered the most important competency, followed by programme planning and knowledge of organization. Information communication technology was considered the least important. The authors opined that the high importance rating of professionalism is not surprising because extension practice is anchored on it. The expectation is that a professional extension officer should demonstrate a positive attitude towards extension service, have a strong work ethic effectively interprets research findings and carries out assignments confidently without guidance. Hence the study concluded that professionalism is one of the essential core competencies that extension professionals should possess to function effectively in their service delivery (Nwaogu and Akinbile, 2018). Further study by Manoher and Pooja (2019) confirmed the core competencies for extension professional to include understanding policies, programmes, and strategies of agricultural development; communication skills; education and communication technology; leadership; diversity, pluralism and multiculturalism; programme evaluation and research; extension and organization management; professionalism and technical subject matter expertise. Lovett (2019) defined two kinds of competencies: individual competencies (technical and behavioral), and organizational competencies.

In 2012, GFRAS developed the "New Extensionist" document, which details the role that extension plays in an agricultural innovation system and the strategies and capacities needed at the individual, organizational, and system levels. Based on this document, the GFRAS Consortium on Extension Education and Training emerged to promote the New Extensionist, mainly through training, curricula review, and research on extension. A learning kit outlines the core competencies required by field staff, managers and lecturers to effectively interact with the various actors in the agricultural innovation system for the betterment of all. They include skills in value chain and farmer organization management, community mobilization, agricultural entrepreneurship, risk mitigation, knowledge management and employability, among others.

The above scenario has led to increasing emphasis on the development of core competencies necessary for extension workers to perform at maximum (ManoherandPooja, 2019). According to Kaynakand Boz (2019), the general conclusion of research carried out in variouscountries isthat the extension worker should always keep up with change in the professional subjects for the organization and the target group, as well as for the security of their careers. Thus, revitalizing curriculum, particularly at the undergraduate level in universities, to strengthen agricultural extension training in Nigeria is an imperative.

2.2.8 Review of undergraduate agricultural extension curriculum at University of Nigeria

2.2.8.1 Proportion of extension courses contained in the curriculum

Extension courses accounted for 19% of all the courses in the five- year agriculture programme, as well the four-year programme in agricultural extension. In the first year, out of the total number of courses (14), only two (2.14%) were extension courses; the remaining were devoted to the study of basic sciences (chemistry, biology) and general studies (Table 2.1). The courses offered in extension are Philosophy and Principles of Agricultural Extension and Psychology in Extension, which are meant to expose students to basic extension concepts and understanding of human behaviour and personality traits relevant for team skill and group management.

In the second year of the five-year programme, students acquire fundamental technical expertise through the introduction of general agriculture and various areas/aspects of agriculture such as soil science, crop science, animal science, agricultural economics, forestry, food science and technology, fisheries, home economics, etc. There was no agricultural extension course, out of eighteen (18) courses developed for the second year. On the contrary, the curriculum for the four -year programme had two extension courses accounting for 2.14% of the total number of courses.

Curriculum for the third year had two extension courses (Introduction to Agricultural Extension and Rural Sociology, and Extension Teaching Methods) out of 18 courses developed. These courses expose students to theoretical concepts, knowledge and technical skills in general agriculture/subject matter; meanings/definition of key concept, rural and social system. The fourth year is a practical year where agricultural extension students are exposed to one agricultural extension course (Extension Practice) out of 12 (8.3%) courses offered (Table 2.1). It is a year that students are fully engaged in practical work, field tours/trips, and community extension outreach structured for capacity building in technical and soft skills. The final year (fifth year) curriculum concentrates on the discipline of choice by the student. Out of the 18 courses developed for the final year, 10 (55.60%) were agricultural extension courses. Generally, extension courses are underrepresented in the curriculum for training undergraduate extension students. The volume of courses in other agricultural disciplines shows undue emphasis on developing technical competence of graduates to the neglect of curriculum contents for addressing other diverse relevant competencies and soft skills.

Table 2.1 : Total number of courses against number of extension courses

Year	Number of	Number of extension courses (five- year programme)	Number of extension courses (four-year programme)
First	14	2 (2.14%)	N/A
Second	18	0	2 (2.14%)
Third	18	2(11.1)	2(11.1)
Fourth	12	1(8.3%)	1(8.3%)
Firth	18	10 (55.6%)	10 (55.6%)
Total	**80**	**15 (18.75%)**	**15 (18.75%)**

2.2.8.2 Categorization of Units Offered in Agricultural Extension Programme

Courses are assigned weights allied credit units. They are used to measure the value of a course based on its level, intensity, and importance, and the number of hours that will be spent to teach it per week. Basically, a one- unit course meets for a one- hour lecture, discussion, or lab work per week; courses with two, three, four, five, or even six units would require two, three, four, five and six hours of lecture, discussion or lab work in a week. In general, the more time and work a course requires or the more advanced study it provides, the more credit units it will be allotted. Relatively easier courses that involve less work or those considered an electives might be assigned oneor two units.

The first agricultural extension courses introduced in the curriculum (Philosophy and Principles of Agricultural Extension and Psychology in Extension) had two units each; some courses in basic sciences and computershad three credit units, the highest unit schedule in the first- year curriculum (Table 2.2). Overall, extension courses accounted for only 12.12% of the total unit (33) load in the first year. There was no extension course for the five-year programme in the second year; the four- year programme had four units. Similarly, out of 37 units stipulated for the third- year programme, only four (10.81%) units were allocated to agricultural extension courses. Table 2.2 further shows that the fourth-year programme had a total of 31 credits, and extension practice was allocated two credit units while courses such as Crop Production Techniques (Permanent, Arable,and Horticultural Crops, etc.), Animal Husbandry Techniques (cattle, sheep, goats, poultry, pigs and rabbits) and report writing had four, three and six credit units, respectively. In the final year, all the courses were two units except some agricultural extension courses. Ten agricultural extension courses were developed for the final year -- eight of them were allocated two, andCommunication and Diffusion of Innovations, and Programme Planning in Extension, three units each. Courses in agricultural extension in the final year, the year of students' specialization in their optional areas, accounted for 25 (62.5%) credit units. Overall, extension courses accounted for 19.33% (35) of the 181 credit units required for the bachelor's degree programme (Table 2.2).

The allotment of credit units shows that agricultural extension courses were not perceived to be labour intensive or did not require a high reading load. The credit unit allotment to courses in crop science, animal science, computer science, and soil science implies that these courses were considered more important and probably more labour intensive. This suggests a greater emphasis in the curriculum on technical skills and minimal concern and provision for acquisition of soft skills and competencies by students in extension education. Even at the practical year (fourth year), the relatively low credit unit allotment to the one extension course further limits opportunity to expose learners to the diverse process skills needed for the evolving world of work in the private sector and industry. Extension educators need both adequate technical skills and soft skills and competencies for the extension system to effectively perform its emerging roles in the changing food system and agricultural development context. The credit unit allotment should reflect industry interests and perspectives.

Table 2.2 : Total number of units against number of units for extension courses

Year	Total units for courses	Total units for extension courses (five-year programme)	Total unit for extension course (four-year programme)
First	33	4 (12.12%)	-
Second	40	0	4 (12.12%)
Third	37	4 (10.81%)	4 (10.81%)
Fourth	31	2 (6.45%)	2 (6.45%)
Fifth	40	25(62.50%)	25(62.50%)
Total unit	**181**	**35(19.33%)**	**35(19.33%)**

2.2.9 Assessment of Curriculum for Bachelor's Degree in Agricultural Extension at UNN

The literature on the changing agricultural food system and competencies required of extension professionals to effectively perform their emerging roles gives the agricultural extension and advisory services curriculum the responsibility to equip extension professionals with skills and competencies in a range of domains (Table 2.3). The undergraduate agricultural extension curriculum in UNN is assessed against this framework. Firstly, the table shows the competence domains and the specific skills and competencies within each domain. It further provides information on the courses (major or ancillary) in the curriculum that are structured to provide the identified skills and competencies, and subsequently, the identified gaps.

The curriculum for the undergraduate agricultural extension programme is largely aligned with the recommended competency domains, except that for some courses, titles and content (rural youths programme, extension educationand psychology in extension) should be restructured to be more inclusive in conceptualization, diversified, and updated.

Some core competency domains are not clearly targeted in the curriculum. These include personal and professional development, soft skills, and environmental extension. Issues on

climate change and environment, disaster preparedness and management, and natural resource management, among other developmental crosscutting issues; and diverse process skills (negotiation, advocacy problem solving, facilitation, lobbying, etc.) were not addressed in the curriculum. These are very topical subjects that should be given priority in the curriculum to enable students to acquire adequate and relevant knowledge and competencies for resilient and sustainable agriculture. The nutrition domain was captured only in two introductory ancillary courses, which may lack content in emerging skills and competency needs of professionals.

Other concerns of greater interest are the repetitive, outdated, and theory- loaded content of the courses in most competency domains in the curriculum, including programme planning, implementation, monitoring and evaluation, communication, ICTs, gender, and diversity, among others. The result is critical gaps in competencies acquired by the graduates. For instance, the courses (core and ancillary courses) in the ICTs domain have not prepared graduates to use current robust digital technologies (mass media, computers/social media platforms, mobile phone services) as tools for collaboration/partnership, etc. (Table 2.3). The curriculum is also insufficient and outdated for imparting competency in various emerging communication skills such as handling and using of audio-visual (AV) equipment, digital cameras and LCD projectors; preparation and use of AV aids; preparation of extension literature – leaflets, booklets, folders, pamphlets; creating news stories and success stories; presentation skills; micro teaching exercises; exposure to mass media through visits to community radio and TV studios to understand the process of programme production; script writing, writing for print and electronic media, developing scripts for radio and television;reading and comprehension of general and technical articles, precise writing, summarizing, abstracting, etc. Although some of the courses in these domains are complemented by a few ancillary courses, their content andappropriateness to extension professionals' needs are uncertain.

The curriculum contains a course in statistics and research methods that exposes students to principles of research design, questionnaire preparation, data collection techniques, etc. However, notably missing is content on qualitative methods of data collection such as focus group discussion (FGD), informant interviews, observation, photography, video, and case studies, online forums, web surveys, chats, etc. Current statistical tools and software that can be used to collect and analyze data -- such as survey map, kobo toolbox, form plus -- and use of camcorders, digital cameras, and audio recorders should be targeted in the curriculum.

Also, the contents of the ancillary courses on entrepreneurship are basic, out of date, andnot sufficiently aligned to build requisite entrepreneurship skills and competence among students or help extension professionals in promoting entrepreneurship among farmers. This is crucial given thedeclining importance of government as the primary employer of graduates, emergence of private sector employers, and emphasis on self-employment as an option after graduation. It is therefore important that the curriculum reflect a major shift in the content of agricultural extension from a production to a market orientation, productivity issues, and principles of market competitiveness. Finally, issues on new trends in agricultural extension -- such as privatization of extension, cyber extension/e-extension, market-led extension, urban

agricultural development, and crosscutting issues (HIV/AIDS, gender roles and international trades) -- are underrepresented.

Table 2.3 : Core competence and skills gaps in curriculum for agricultural extension professionals

Competence domain	Description of skills and competencies needs	Major extension courses	Ancillary courses	Remarks
Programme planning and implementation (Rasheed et al.,2018;Suvedi and Kaplowitz, 2016)	Familiar with vision/ mission of national extension; knowledgeable of agricultural development strategies, programmes and policies, needs assessment, resource mobilization, baseline survey, financial rules & administration, stakeholder engagement, participatory decision making, ability to negotiate, delegate.	Extension teaching method; programme planning in extension; agricultural administration, organization and supervision	Planning and appraisal of agricultural projects; agricultural policy and development	Outdated, limited in coverage and repetitive
Programme monitoring and evaluation (Rasheed et al., 2018;Suvedi and Kaplowitz, 2016)	Knowledge of theories of monitoring and evaluation, conduct online survey, qualitative and quotative data collection, data analysis, report writing and use	Programme planning in extension; statistics and research methods	Planning and appraisal of agricultural projects; agricultural policy and development	Outdated contents theory loaded and narrow scope, not specifically targeted in the curriculum
Information and communication technologies (ICTs) (Sulaiman and Davis, 2012;Rasheed et al., 2018;Suvedi and Kaplowitz, 2016;Nwaogu and Akinbile, 2018;Manoher and Pooja, 2019)	Knowledge/attitude, skills in use of emerging IC technologies, resources, tools for data processing, presentation, access/ share/disseminate information, use online modules, webinar (e.g. mobile phone, kobo toolbox, etc.)	Statistics and research methods; computer programming; extension practice.	Introduction to computer, computer programming	Limited coverage of new ICTs facilities / tools, outdated content

Communication for innovation (Chikaire et al., 2018;Rasheed et al., 2018;Suvedi and Kaplowitz, 2016; Manoher and Pooja, 2019)	Choice and use of communication methods across gender, use new tools, respect for local culture, public speaking, listening skills, share success stories, attitude, ability to use online modules, webinar, report writing	Communication and diffusion of innovation;agricultural extension education, extension practice, extension teaching Methods, Psychology in extension.	General studies	Emerging skills not addressed, content is outdated and narrow.
Personal and professional development (Rasheed et al., 2018;Nwaogu and Akinbile, 2018)	Good governance, professional ethics, career development, participation in lifelong training, conferences, etc.	Not addressed	General Studies	Specific extension skills not addressed
Technical subject matter expertise (Chikaire et al.,2018;Lovett, 2019;Rasheed et al., 2018)	Technical knowledge and skills in agricultural disciplines (e.g., crops, animals fishery); new technologies, farming/ management practices, documentation/ integration of indigenous knowledge	Technological and social change; communication and diffusion of innovation; extension practice	59 ancillary courses (crop sc., animal, soil, economics, etc.)	Theory loaded and issues in pest and disease control, post- harvest loss control, storage of agricultural produce/ products, marketing, value chain addition, silage preparation for farm animals, animal pest and disease control, soil analysis not addressed
Group formation and community mobilization (Nwaogu and Akinbile, 2018)	Knowledge of types of groups, models, facilitate group formation, dynamics and conflict management, leadership models, mobilize communities & resources for extension programme, explore relevant soft skills for inclusive community participation, etc.	Rural community development; advance rural sociology; technological and social change; agricultural extension education	General Studies	Outdated contents and scope
Gender and diversity (Rasheed et al., 2018;Manoher and Pooja, 2019)	Knowledge of diversity, develop programmes for youths and women, vulnerable groups	Rural community development; advanced rural sociology; rural youth programme	General Studies	Limited coverage and outdated content

Innovation system/value chain, marketing, brokering (Sulaiman and Davis, 2012)	Understand concepts(value chain/innovation) and roles, capacities, needs, stakeholders and linkages, knowledge of agribusiness, marketing knowledge/skills, facilitating entrepreneurship development, brokering, etc.	Agricultural administration, organization, and supervision	Business Development and Management; Introduction to Entrepreneurship; Farm Management and Accounting Practice	Outdated contents, limited provision in the curriculum, and lacking content for skills for emerging market- driven production
Nutrition skills (Shimali et al., 2021; IFAD, 2014;Chikaire, et al., 2018)	Basic knowledge of nutrition, nutrition needs, food safety, processing and handling/labelling, etc.	Not addressed	Introduction to Food Science & Technology; Introduction to Home Science, Nutrition & Dietetics	Poor coverage of contents introductory courses.
Soft skills (Davis, et al., 2020; Fanzo, et al., 2013; Chikaire et al., 2018)	Facilitating, networking, group formation, critical thinking, problem solving, teamwork, interpersonal skills, leadership, etc.	Not addressed	General Studies	Not clearly targeted in the curriculum, depend on support courses
Environmental extension	Knowledge/concepts, adaptation capacities/ options, dealing with risks, resilience, precision agriculture, climate-smart agriculture	Extension practice	Not addressed	Lacks wide coverage
Organization management (Davis, et al., 2020; Chikaire et al., 2018;Nwaogu and Akinbile, 2018; Lovett, 2019)	Manpower development and management for extension programmes, develop organization structure, monitor resources, staff motivation/ welfare, conduct appraisal, etc.	Agricultural administration, organization and supervision	Not addressed	Poor coverage

2.2.10 Pedagogy: Instructional Delivery Methods

Agricultural teaching pedagogies have been operationally defined in this study as the processes or methods of attending to agriculture students' needs, experiences, and feelings, both theoretically and practically; and making appropriate interventions to help them develop relevant skills for food security (Njura et al., 2020). From the courses taught in the university, graduates of agricultural extension are expected to have competencies and skills in diverse areas including practical and analytical, data processing and reporting, communication, entrepreneurism and management, and ICTs skills, among many others. However, Figure 2.3 shows that the majority (70%) of the courses are delivered through traditional lecture methods. Obviously, lectures can be informative, especially for communicating conceptual knowledge, and where there is a significant knowledge gap between lecturer and audience (Charlton, 2006). On the other hand, lectures can be boring and overwhelming, depending on the compelling nature of the message, the lecturer's competence, style, and clarity of message. Characteristically, lectures are usually one-way communication that allows for little or no audience participation. This can result in audience passivity, low comprehension, poor creativity, loss of information and poor retention. Thus, teaching and learning efforts support and focus more on the cognitive, than the psychomotor and affective development. Learning has a strong influence on method of teaching, and evidence from a number of disciplines suggests that oral presentation to a large group of passive students contributes very little to real learning. Helen et al. (2020) asserted that this method is the least effective in developing agricultural skills for food security.

Eleven percent (11%) of the course contents are delivered using instructional materials such as textbook and workbook, which helps students to understand certain aspects of a subject matter that cannot easily be put into words. The courses that employed the use of workbooks are not agriculture related but rather courses in the physical sciences offered in the first and second years, such as chemistry, mathematics, computers, etc. The workbook forms part of the continuous assessment for students -- usually 30% or40%. Textbooks are generally recommended and referenced during lectures by the teachers, but ownership of textbooks is not mandatory. Often students end up not purchasing them or consulting them in the library for further studies.

Figure 2.3 further shows that only 5% of the courses combined lecture and practical methods in teaching contents. This is basically seen in the fourth-year program (practical year), when the students are engaged in practical work in all the disciplines in agriculture including extension. The courses are designed to equip students with critical technical skills in crops, animal husbandry, fishery, farm management and recording, and community outreach through experiential leaning. In principle it requires that not less than 80% of the instruction time should be spent on practical and field instructions, but the exercise is heavily dominated with lecture. Also, the practical year involves field trips to agricultural centers, industries, farmlands/establishment, etc., where students get firsthand experiences and practice in the theoretical methods of agriculture. This lasts for one week and is organized to complement

practical experience gained in the university.Students' experience with outreach comes when fourth-year students visit a particular farming community with solutions for an identified need. Ideally, students acquire competencies and soft skills in extension from the outreach programme. However, the students are usually involved in the entire planning and facilitation process, the time dedicated for the outreach is very minimal, and facilities for adequate exposure are sometime lacking.

The use of ICTs in lecture delivery rather than just lecture notes was very low (1%), contrary to the findings of Helen et al. (2020) that, with the emergence of technological advancement, digital learning is on the rise, especially in higher education in the eraof COVID-19. Technology provides the possibility of including multimedia and interactive resources that can make learning more attractive and realistic, encouraging and even inspiring adults to develop their skills (Krouska et al., 2019). Information and communication technology such as videos have a high potential to stimulate social learning because they combine visual and audio elements that facilitate internalization and contextualization of knowledge or information, which enable students to share and learn from experiences. YouTube videos can be incorporated into the classroom setting to enhance the students' learning and promote more in-depth comprehension of subject matter. According to Helen et al. (2020), ICT devices can fast-track skills development in agriculture and be the bait to making youths be more interested in agriculture.

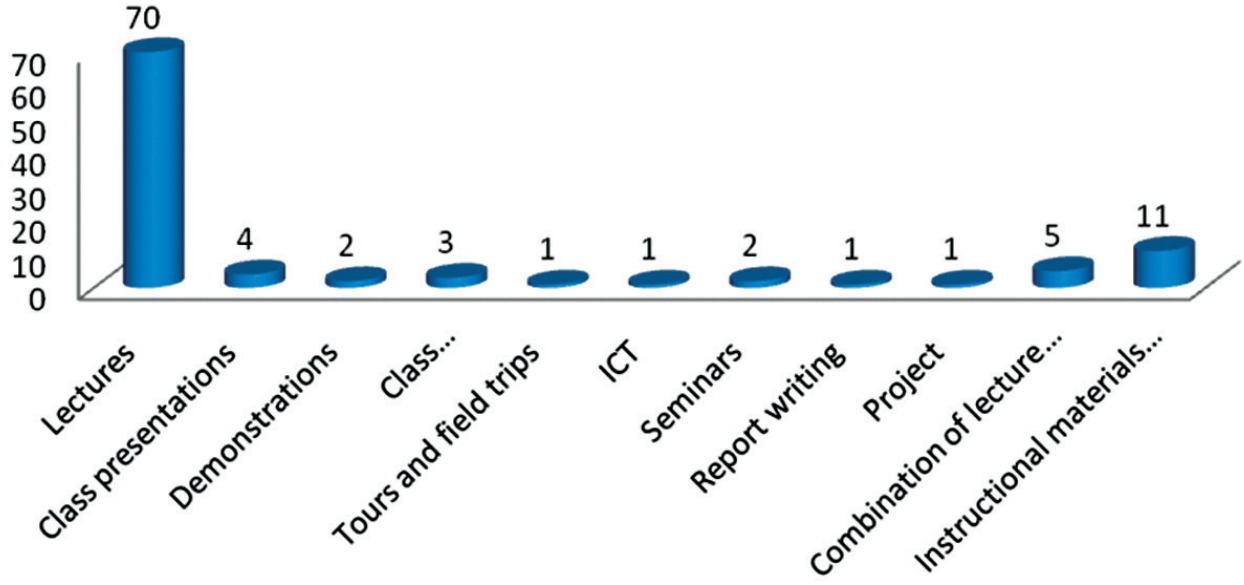


Fig. 2.3 : Instructional and Delivery Methods

2.2.11 Conclusions and the way forward

The curriculum employed for training agricultural extension professionals in the university is expected to support development of critical skills and competencies for relevance in the ever- changing and competitive world of work. However, the agricultural extension curriculum currently followed at the University of Nigeria needs revitalization. Firstly, the current process

employed in revising the extension curriculum needs to change. The procedure for review of curriculum at the national (NUC) and university (senate curriculum/faculty/departmental committees) is not inclusive, lacks private sector participation, and hence has not been able to make the needed changes to the curriculum. There is need to continually update curricula with new subjects/content and courses tounderstand today's agriculture and the competency challenge, and to eliminate repetition of content and outdated content to free up space or credit hours for more relevant content. Apart from the quality of content and courses in new and emerging areas, there is a need to address the issue of appropriate instructional methodology that leads to desired learning outcomes. Information and communication technology- based pedagogies should be encouraged and promoted to support traditional methods for enhanced learning and acquisition of a wide spectrum of knowledge and skills in a highly competitive world of work. Another need is an enabling environment and facilities to teach students. A favourable school environment creates an optimal setting which increases students' interest, attention, and focus; promotes meaningful learning experiences and student performance; and motivates students to practice higher-level critical thinking skills. The other key element, of course, is the teachers. A university needs a deliberate policy of training its lecturers. Innovation in a knowledge system is a continuous process that requires capacity development and updates on the part of the teachers. Encouraging their participation in conferences, seminars, and workshops within and outside the university is a cost-effective method of further developing their capabilities and competence.

CHAPTER THREE : METHODOLOGY

3.1 Study Population and Sampling

The study was conducted in Nigeria between August 2021 and April 2022. Nigeria is a country in West Africa that covers an area of 923,768 km2 and has an estimated population of over 200 million people (Zakariya, 2020). Nigeria is made up of six geopolitical zones (South West, North East, South East, North West, North Central, and South South) which encompass 36 states and the Federal Capital Territory (FCT).

The population of the study comprises all extension professionals in academia, thepublic sector, the private sector and non-governmental organizations in Nigeria. Amixed- method research design comprising quantitative and qualitative approaches was employed in collecting data from the study population. Quantitative data was collected through an online survey using the Qualtrics software. Email invitations for the online survey were sent to 349 extension professionals in Nigeria; 198 respondents completed the online survey. It should be noted, however, that a few questions/items were not completed by some of the respondents. Qualitative data for the study was collected through focus group discussions (FGDs). Two FGDs were conducted in the University of Nigeria, Nsukka, on August 31 and December 3, 2021.

3.2 Operationalization and Measurement of Variables

The core objective of the study is to identify process skills and competency gaps in the undergraduate agricultural extension curriculum in Nigeria, Malawi, Kenya, South Africa, and Uganda. A combination of process skills and competencies enables agricultural extension professionals to be more effective in performing their tasks and responding to contingencies and changes to meet the needs of their clients. The respondents were asked to keep this in mind while completing the online survey questionnaire.

3.2.1 Demographic and institutional characteristics

The respondents were asked to indicate their age (in years), gender (male, female, or prefer not to respond), highest educational level (HND/bachelor's, master's and Ph.D. degrees), current position (extension staff in a university, extension researcher, private sector extension professional, extension graduates working for NGOs and/or private sector companies, postgraduate students in extension, public sector extension professional, NGO extension professional), number of years in extension profession or agriculture- related fields, university(ies) with deep knowledge of undergraduate education in agriculture or allied subjects, and familiarity with current undergraduate- level agricultural extension curriculum (familiar or not familiar).

3.2.2 Process Skills and Core Competencies

Process skills and core competencies in the present study were operationalized as the basic sets of knowledge, skills, abilities, and behaviors that agricultural extension professionals require to perform their tasks well in the following eleven areas:

a. Program planning
b. Program implementation
c. Communication
d. Information and communication technologies (ICTs)
e. Program monitoring and evaluation
f. Personal and professional development
g. Diversity and gender
h. Marketing, brokering, and value chain development
i. Other extension soft skills
j. Nutrition
k. Technical subject matter expertise

Keeping in mind the current extension roles and responsibilities, the above eleven broad areas of competencies required by agricultural extension professionals were identified and included in the online survey instrument.

3.2.2.1 Program planning skills and competencies

"Program planning skills and competencies" was operationalized as the direction and intensity of agricultural extension efforts to bring about desirable change among clients in view of national agricultural development strategies, programs, and policies. Six items in the questionnaire assessed this area of skill and competency.

3.2.2.2 Program implementation skills and competencies

"Extension program implementation skills and competencies" was operationalized as the ability of an agricultural extension professional to coordinate extension programs, demonstrate teamwork and negotiation skills, engage diverse local stakeholders, delegate responsibilities, and follow participatory decision making in extension work, among others. Nine questionnaire items assessed this skill and competency area.

3.2.2.3 Communication skills and competencies

"Communication skills and competencies" was operationalized as ability of agricultural extension professionals to select appropriate communication methods, establish communication with diverse stakeholders, respect local culture while communicating with clients, prepare required progress reports, share success stories and lessons learned with stakeholders through various media, use extension methods to disseminate information about important extension activities and programs, and demonstrate good listening, presentation and public speaking skills. Eight questionnaire statements were administered to assess this area of skill and competency.

3.2.2.4 Information and communication technologies (ICTs) skills and competencies

"ICTsskills and competencies" was operationalized asthe ability of extension professionals to use computers, audiovisual aids, mass media, mobile phones, and social media for

communication, teaching, and learning. The questionnaire used eleven items to assess this skill and competency.

3.2.2.5 Program monitoring and evaluation skills and competencies

"Program monitoring and evaluation skills and competencies" was operationalized as the ability of agricultural extension professionals to understand the theories of monitoring and evaluation, conduct online surveys for monitoring and evaluating extension programs, develop data collection instruments, apply qualitative and quantitative tools to collect evaluation data, analyze data, interpret data, write evaluation reports, and share results with stakeholders. Eleven questionnaire items were administered to assess this skill and competency.

3.2.2.6 Personal and professional development skills and competencies

"Personal and professional development skills and competencies" was operationalized as the ability of agricultural extension professionals to apply principles of good governance, show commitment to career advancement, apply professional ethics in work, follow organizational policies and directives, and demonstrate honesty and positive attitudes toward extension work. Five questionnaire items were administered to assess this skill and competency.

3.2.2.7 Diversity and gender skills and competencies

"Diversity and gender skills and competencies" was operationalized as ability of agricultural extension professionals to understand diversity within and among clients and stakeholders, identify the needs of small-scale farmers, develop extension programs to benefit women and youths, engage marginalized and vulnerable groups in extension programs, and do teamwork with diverse staff members at various levels. The questionnaire included six items to assess this skill and competency.

3.2.2.8 Marketing, brokering, and value chain development skills and competencies

"Marketing, brokering, and value chain development skills and competencies" was operationalized as the ability of extension professionals to have basic knowledge of agri-business development, apply brokering / advisory skills in agri-business development, have knowledge on various agricultural markets and linkages, demonstrate knowledge of value chain logistics and input-output linkages in the value chain, facilitate entrepreneurship development among extension clientele and be able to link farmers/ producers' organizations / cooperatives / agri-business companies with extension. Six questionnaire items were administered to assess this skill and competency.

3.2.2.9 Other extension soft skills and competencies

"Other extension soft skills and competencies" was operationalized as the ability of extension professionals to develop skills and competencies in the areas of critical thinking, problem solving, time management, stress management, leadership, teamwork, flexibility, self-motivation, interpersonal skills, positive work attitude, collaboration, conflict management, group formation and development, negotiation, networking, facilitation, and creativity/innovativeness. The questionnaire included seventeen items to assess this skill and competency.

3.2.2.10 Nutrition skills and competencies

"Nutrition skills and competencies" was operationalized as the ability of extension professionals to demonstrate basic human nutrition knowledge, understand life-cycle nutrition needs of various household members, advise families on what crops and livestock to produce to ensure balanced diets, advise families to improve gender relations for increased agriculture production and nutrition, demonstrate postharvest handling technologies that conserve nutrients and food safety, have basic knowledge about food labeling and advise on healthy diet. Seven questionnaire items were administered to assess this skill and competency.

3.2.2.11 Technical subject matter expertise/skills and competencies

"Technical subject matter expertise / skills and competencies" was operationalized as ability of agricultural extension professionals to demonstrate technical knowledge in their basic discipline, understand adult learning principles and hold practical skills required to teach improved farming practices, understand the new technology being promoted, facilitate farmers to access inputs and services, educate community members about various types of risks and uncertainties, educate community members about climate change and climate- smart agriculture, refer to and make use of publications, generate knowledge or produce research reports / journal publications, harness, document, validate and integrate local / indigenous knowledge, and understand social system under which farming takes place. Ten questionnaire items assessed this skill and competency.

Keeping in mind their experience in agricultural extension work and undergraduate extension curriculum, the respondents were asked to rate the importance of the above eleven process skills or competencies on a five- point Likert scale with options of 1 = not important; 2 = somewhat important; 3 = moderately important; 4 = important; and 5 = very important. The respondents were also required to rate how well their undergraduate extension curriculum addresses/covers the various skills or competencies on a five- point Likert scale with options of 1 = not at all covered; 2 = minimally covered; 3 = moderately covered; 4 = well covered; and 5 = very well covered.

3.3 Strategies for improving undergraduate agricultural extension curriculum

This was operationalized as the perceptions of extension professionals on strategies for improving undergraduate agricultural extension curriculum training. They include providing practical and contemporary skills, including various soft skills,in the extension curriculum; including business management concepts and practices in the extension curriculum; exposing students to market opportunities; linking farmers with service providers and developing entrepreneurship; grooming students with broad-based general agriculture courses, etc. The respondents were required to indicate if each strategy already exists, does not exist but is essential to have, or does not exist but is fine to leave out.

3.4 Appropriate ways to acquire process skills or core competencies

This was operationalized as the perceptions of agricultural extension professionals on acquiring the skills or competencies through pre-service training by revising or updating

the UG curricula; internship in various work environments during the UG programs; basic induction training at the beginning of a job; in-service training; and opportunities to attend trainings, seminars, workshops, webinars, etc. The respondents were asked to rate them on a four-point Likert-type scale -- i.e., not appropriate, somewhat appropriate, appropriate, and very appropriate, with scores of 1, 2, 3, and 4, respectively.

3.5 Major barriers to effective implementation of undergraduate extension curriculum

This was operationalized as the perceptions of extension professionals on the major barriers to effective implementation of their training curriculum and includes development of an effective extension curriculum, quality faculty to teach extension courses, quality textbooks and/or manuals, classroom and demonstration farms or facilities, accreditation of curriculum, time constraints, etc. The respondents were required to indicate their responses by ticking their perceived barriers to effective implementation of undergraduate extension curriculum.

3.6 Focus Group Discussions: Process and Outcomes

Qualitative data on the process skills and competency gaps in the undergraduate extension curriculum was collected through focus group discussions (FGDs) in the University of Nigeria, Nsukka. Two FGDs were conducted – the first was an in-person session; the second was a hybrid meeting. Overall, 22 participants attended the FGDs. The participants were drawn from academia, extension professional organizations, private sector agricultural extension employers, and public extension organizations. The discussion was recorded using audio/Zoom and stored in Zoom Cloud. The hyperlink containing the recorded clip was shared to facilitate transcription. At the beginning of each FGD, the moderator explained the study purpose to the respondents and obtained verbal consent, including consent for audio recording. Written informed consent also was obtained from the FGD participants. The notes and audio/Zoom recordings were transcribed shortly after the sessions. The FGDs were conducted in English, which is the official language in Nigeria.

The objectives of the FGDs were to gather qualitative information on the current gaps in the undergraduate agricultural extension curriculum and critical job skills or core competencies required by agricultural extension workers in their jobs, and to solicit participants' recommendations for the modification of the undergraduate agricultural extension curriculum.

3.7 Design and Development of the Survey Instrument

The online survey questionnaire with all the above variables was developed after careful review of literature and past survey instruments. It was formatted using the Qualtrics software and pretested with the 12 team members of the PIRA project. On the basis of the pretesting, the questionnaire was modified and finalized for data collection. The Institutional Review Board (IRB) approval for human subjects' research was obtained from Michigan State University (MSU).

3.8 Data Collection and Analysis

Email lists of agricultural extension professionals in Nigeria were compiled by scanning the websites and directories of research institutions, federal, state and private universities, Agricultural Development Programmes (ADPs), the Ministry of Agriculture, NGOs, and private sector companies. Emails of agricultural extension professionals were also obtained from professional associations such as Agricultural Extension Society of Nigeria (AESON) and NIFAAS (Nigeria Forum for Agricultural Advisory Services). The mailing lists were merged and duplicate emails were removed. Using the Qualtrics software, the online survey questionnaire was administered to 349 agricultural extension professionals in Nigeria, and five reminders were sent to non-respondents to increase the response rate. The heads of extension departments and faculty members were requested to forward the survey link to their colleagues, research scholars, and postgraduate students. The online survey link was also shared with the participants of all the FGDs. The filled- in questionnaires were checked for completion, and incomplete surveys were excluded from the analysis.

The demographic and institutional characteristics of the respondents were analyzed using frequency, percentage and mean. The process skills and core competencies and appropriate ways to acquire skills and core competencies were analyzed using mean scores and paired sample t-test. Finally, the strategies for improving undergraduate agricultural extension curriculum and major barriers to effective implementation of UG extension curriculum were analyzed using frequency and percentage. The statistical package for service solution (SPSS) version 24 was the software used for the statistical analysis.

3.9 Limitations of the Study

Our small sample size of 198 respondents poses some limitation to the external validity of our results. However, our data collection approach of collecting information from a variety of stakeholders within the agricultural extension system and verification of their opinions through the qualitative data helps to mitigate this risk. Thus, our result is externally valid, and the approach we utilized can be applied in the broader context to other countries in Africa where similar conditions prevail.

CHAPTER 4 : RESULTS AND DISCUSSION

4.1 Demographics of Agricultural Extension Professionals in Nigeria

The most represented age group was 41-50 years old (30.81%), followed by 51-60 years old (27.33%), and 31-40 years old (25.58%). Few (5.81%and 10.47%) respondents were between the ages of 21-30 years and above 60 years, respectively. Most (66.10%) of the respondents who participated in this study were males; females, 33.90%. The results on the education of respondents showed that the majority (61.58%) had doctoral (Ph.D.) degrees, followed by extension master's degrees (33.33%), and bachelor's degree/HND (5.08%).

Table 4.1 : Demographics of Agricultural Extension Professionals in Nigeria

Category	*Frequency*	*Percent*
1. Age (in years) (N = 172)		
21-30	10	5.81
31-40	44	25.58
41-50	53	30.81
51-60	47	27.33
Above 60	18	10.47
2. Gender (N=177)		
Male	117	66.10
Female	60	33.90
3. Education (N=177)		
Bachelor's degree/HND	9	5.08
Master's degree	59	33.33
Doctoral (Ph.D.) degree	109	61.58

4.2 Institutional Characteristics of Agricultural Extension Professionals in Nigeria

Table 4.2 indicates that 93.43% of the respondents were familiar with the undergraduate extension curriculum. The majority (85.49%) of the respondents had deep knowledge of the undergraduate agriculture extension curriculum of only one university;12.96% had deep knowledge of the undergraduate agriculture extension curricula of two to three universities, and only 1.55% had deep knowledge of the undergraduate agriculture extension curriculum of for or more universities. The results on current positions of respondents showed that the majority (63.27%) were serving as extension staff in a university, followed by extension researchers (21.47%), and public sector extension professional (9.04%). Others were private

sector extension professionals (3.95%) and NGO extension professionals (2.26%). Table 4.2 also reveals that 29.14% of the respondents had extension profession/agriculture- related field experience of above 20 years, 22.86% and 20%% had experience ranges of 6 to 10 years and 11 to 15 years, respectively. Only about 15% and 13% of the respondents had extension profession/ agriculture- related field experience ranges of 16to 20 years and less than 5 years, respectively.

Table 4.2 : Institutional Characteristics of Agricultural Extension Professionals in Nigeria

Category	Frequency	Percent
1. Familiarity with undergraduate agricultural extension curriculum (N=198)		
Familiar	185	93.43
Unfamiliar	13	6.57
2. Number of universities with deep knowledge of undergraduate agriculture extension curriculum (N=193)		
1	165	85.49
2-3	25	12.96
4 or more	3	1.55
3. Current position (N=177)		
Private Sector Extension Professional	7	3.95
Extension Staff in a University	112	63.27
Extension Researcher	38	21.47
Public Sector Extension Professional	16	9.04
NGO Extension Professional	4	2.26
4. Experience in Extension Profession / Agriculture- Related Fields (In Years) (N=175)		
0-5	22	12.57
6-10	40	22.86
11-15	35	20.00
16-20	27	15.43
Above 20	51	29.14

4.3 Process Skills and Core Competencies

4.3.1 Program Planning Skills and Competencies

The mean scores of all six program planning skills and competencies on “How important is this skill or competency?” were higher than their corresponding mean scores on “How well does our UG extension curriculum address this competency?” (Table 4.3).

Table 4.3 : Program Planning Skills and Competencies among Agricultural Extension Professionals in Nigeria

Extension professionals should be:	How important is this skill or competency for an extension worker? (N=185)* Mean (SD)	How well does the undergraduate extension curriculum cover this skill or competency? (N=151)** Mean (SD)	Mean Difference
Familiar with the vision, mission, and goals of national /state (sub-national) extension service and agricultural development strategies, programs, and policies.	4.55 (0.71)	3.31 (0.97)	1.24
Able to conduct needs assessment and engage stakeholders to prioritize local needs.	4.56 (0.78)	3.13 (1.03)	1.43
Able to conduct baseline or benchmark studies.	4.52 (0.74)	3.07 (1.07)	1.45
Able to mobilize resources/funds to address priority needs.	4.19 (0.97)	2.59 (1.12)	1.6
Able to engage local stakeholders (e.g., NGOs, cooperatives, local agro-dealers) in extension program planning.	4.54 (0.75)	3.03 (1.15)	1.51
Familiar with administrative and financial rules of their respective organizations (to utilize human and financial resources in extension programs).	4.33 (0.88)	2.85 (1.08)	1.48

* *Scale for importance: 1 = Not important, 2 = Somewhat important, 3 = Average, 4 = Important, 5 = Essential.*

** *Scale for coverage in UG courses: 1 = Not at all covered, 2 = Minimally covered, 3 = Moderately well covered, 4 = Very well covered, 5 = Extremely well covered.*

4.3.2 Program Implementation Skills and Competencies

The mean scores on "How important is this skill or competency" for all nine program implementation skills and competencies were higher than their corresponding mean scores on "How well does our UG extension curriculum address this competency?"in all nine aspects (Table 4.4).

Table 4.4 : Program Implementation Skills and Competencies among Agricultural Extension Professionals in Nigeria

	How important is this skill or competency for an extension worker? (N=182)*	How well does the undergraduate extension curriculum cover this skill or competency? (N=154)**	
Extension professionals should be:	**Mean (SD)**	**Mean (SD)**	**Mean difference**
Coordinate local extension programs and activities.	4.64 (0.70)	3.29 (1.08)	1.35
Demonstrate teamwork skills to achieve extension results.	4.66 (0.62)	3.39 (0.98)	1.27
Able to form farmers' groups and support them.	4.59 (0.70)	3.20 (1.16)	1.39
Engage local stakeholders (e.g., NGOs, self-help groups, and cooperatives) in implementing extension programs.	4.53 (0.78)	3.07 (1.19)	1.46
Demonstrate negotiation skills to reach consensus and resolve conflicts.	4.47 (0.83)	2.89 (1.22)	1.58
Follow participatory decision making in extension work.	4.59 (0.74)	3.34 (1.12)	1.25
Delegate responsibilities to staff as needed.	4.41 (0.83)	3.44 (1.00)	0.97
Be able to engage minority groups (e.g., female farmers and youth development groups) in extension work.	4.56 (0.71)	3.20 (1.14)	1.36
Integrate private or public-private partnerships in extension service provision.	4.43 (0.85)	2.83 (1.19)	1.6

* *Scale for importance: 1 = Not important, 2 = Somewhat important, 3 = Average, 4 = Important, 5 = Essential.*

** *Scale for coverage in UG courses: 1 = Not at all covered, 2 = Minimally covered, 3 = Moderately well covered, 4 = Very well covered, 5 = Extremely well covered.*

4.3.3 Communication Skills and Competencies

The mean scores of all eight communication skills and competencies on “How important is this skill or competency?” were higher than their corresponding mean scores on “How well does our UG extension curriculum address this competency?” (Table 4.5).

Table 4.5 : Communication Skills and Competencies among Agricultural Extension Professionals in Nigeria

Extension professionals should be able to:	How important is this skill or competency for an extension worker? (N=181)* Mean (SD)	How well does the undergraduate extension curriculum cover this skill or competency? (N=153)** Mean (SD)	Mean difference
Select appropriate communication methods.	4.74 (0.63)	3.77 (1.00)	0.97
Establish communication with various stakeholders.	4.64 (0.60)	3.38 (1.06)	1.26
Respect local culture while communicating with clients.	4.77 (0.53)	3.81 (1.05)	0.96
Prepare required progress reports.	4.59 (0.66)	3.26 (1.13)	1.33
Share success stories and lessonslearned with stakeholders through various media.	4.61 (0.60)	3.06 (1.19)	1.55
Use extension methods (e.g., individual, group and mass contact methods) to disseminate information about extension activities and programs.	4.77 (0.54)	3.82 (0.93)	0.95
Demonstrate good listening skills and listen to all clients and stakeholders.	4.69 (0.62)	3.55 (1.01)	1.14
Demonstrate good public speaking and presentation skills.	4.68 (0.64)	3.50 (1.03)	1.18

* *Scale for importance: 1 = Not important, 2 = Somewhat important, 3 = Average, 4 = Important, 5 = Essential.*

** *Scale for coverage in UG courses: 1 = Not at all covered, 2 = Minimally covered, 3 = Moderately well covered, 4 = Very well covered, 5 = Extremely well covered.*

4.3.4 Information and Communication Technologies (ICTs) Skills and Competencies

The mean scores of all the eleven ICTs skills and competencies on “How Important is this skill or competency” were higher than their corresponding mean scores on “How well does our UG extension curriculum address this competency?” (Table 4.6).

Table 4.6 : ICTs Skills and Competencies among Agricultural Extension Professionals in Nigeria

Extension professionals should be able to:	How important is this skill or competency for an extension worker? (N=177)* Mean (SD)	How well does the undergraduate extension curriculum cover this skill or competency? (N=151)** Mean (SD)	Mean difference
Microsoft Word for word processing (e.g., typing, editing, printing) and designing graphics.	4.55 (0.74)	3.26 (1.17)	1.29
Data entry and analysis software such as Excel, SPSS, etc.	4.52 (0.77)	3.22 (1.24)	1.3
Microsoft Power Point for making presentations.	4.63 (0.72)	3.46 (1.19)	1.17
Audio-visual aids such as charts, graphs, and puppet shows for teaching and learning.	4.69 (0.56)	3.40 (1.04)	1.29
Mass media such as FM radio stations and television channels for communication.	4.52 (0.73)	3.06 (1.25)	1.46
Computers (email, Internet) for communication.	4.56 (0.81)	3.32 (1.20)	1.24
Mobile phone services (e.g., texting, SMS service) for communication.	4.67 (0.61)	3.59 (1.17)	1.08
Social media (WhatsApp, Facebook, Twitter, Instagram, etc.) for communication.	4.51 (0.79)	3.31 (1.23)	1.2
ICT tools to improve access to information, knowledge, technologies, and other innovations.	4.62 (0.65)	3.16 (1.13)	1.46
ICT tools to enhance collaboration and partnerships.	4.58 (0.69)	2.94 (1.22)	1.64
ICT tools for collecting data, monitoring, and evaluating extension programs.	4.62 (0.63)	2.94 (1.26)	1.68

* *Scale for importance: 1 = Not important, 2 = Somewhat important, 3 = Average, 4 = Important, 5 = Essential.*

** *Scale for coverage in UG courses: 1 = Not at all covered, 2 = Minimally covered, 3 = Moderately well covered, 4 = Very well covered, 5 = Extremely well covered.*

4.3.5 Program Monitoring and Evaluation Skills and Competencies

The mean scores on "How important is this skill or competency?" for all eleven program monitoring and evaluation skills and competencies were higher than their corresponding mean scores on "How well does our UG extension curriculum address this competency?" (Table 4.7).

Table 4.7 : Program Monitoring and Evaluation Skills and Competencies among Agricultural Extension Professionals in Nigeria

Extension professionals should:	How important is this skill or competency for an extension worker? (N=177)* Mean (SD)	How well does the undergraduate extension curriculum cover this skill or competency? (N=153)** Mean (SD)	Mean difference
Understand theories and principles of monitoring and evaluation.	4.63 (0.70)	3.60 (1.01)	1.03
Conduct monitoring and evaluation of extension programs.	4.71 (0.59)	3.47 (1.10)	1.24
Develop data collection instruments- interview schedules / questionnaires - for monitoring and evaluating extension programs.	4.72 (0.55)	3.75 (1.04)	0.97
Conduct online surveys for monitoring and evaluating extension programs.	4.46 (0.79)	2.85 (1.33)	1.61
Apply qualitative tools and techniques (e.g., focus group discussion, case study, etc.) to collect evaluation data.	4.68 (0.60)	3.63 (1.08)	1.05
Apply quantitative tools and techniques (e.g., survey, interview, farm data, etc.) to collect evaluation data.	4.67 (0.59)	3.72 (1.09)	0.95
Analyze data (qualitative and quantitative).	4.66 (0.64)	3.62 (1.07)	1.04
Interpret data (qualitative and quantitative).	4.69 (0.56)	3.66 (1.07)	1.03
Write evaluation report.	4.70 (0.58)	3.45 (1.13)	1.25
Share evaluation reports within their organizations and with stakeholders.	4.61 (0.66)	3.20 (1.18)	1.41

Apply the evaluation findings in replicating/ scaling-up of extension programs.	4.61 (0.65)	3.06 (1.16)	1.55

* *Scale for importance: 1 = Not important, 2 = Somewhat important, 3 = Average, 4 = Important, 5 = Essential.*

** *Scale for coverage in UG courses: 1 = Not at all covered, 2 = Minimally covered, 3 = Moderately well covered, 4 = Very well covered, 5 = Extremely well covered.*

4.3.6 Personal and Professional Development Skills and Competencies

The mean scores on "How important is this skill or competency?" for all five personal and professional development skills and competencies were higher than their corresponding mean scores on "How well does our UG extension curriculum address this competency?" (Table 4.8).

Table 4.8 : Personal and Professional Development Skills and Competencies among Agricultural Extension Professionals in Nigeria

	How important is this skill or competency for an extension worker? (N=178)*	**How well does the undergraduate extension curriculum cover this skill or competency? (N=156)****	
Extension professionals should:	**Mean (SD)**	**Mean (SD)**	**Mean difference**
Apply principles of good governance (e.g., client's participation, accountability and transparency) in extension work.	4.53 (0.70)	3.21 (1.11)	1.32
Show commitment to career advancement (participate in lifelong learning, in-service training, professional development events and conferences).	4.57 (0.69)	3.27 (1.09)	1.3
Apply professional ethics in extension work - i.e., promote research-based recommendations or technology.	4.63 (0.64)	3.40 (1.09)	1.23
Follow organizational policies and directives for professional development.	4.49 (0.75)	3.26 (1.05)	1.23
Demonstrate honesty and positive attitude towards extension work.	4.79 (0.53)	3.53 (1.06)	1.26

* *Scale for importance: 1 = Not important, 2 = Somewhat important, 3 = Average, 4 = Important, 5 = Essential.*

** *Scale for coverage in UG courses: 1 = Not at all covered, 2 = Minimally covered, 3 = Moderately well covered, 4 = Very well covered, 5 = Extremely well covered.*

4.3.7 Diversity and Gender Skills and Competencies

The mean scores on "How important is this skill or competency?" for all seven diversity and gender skills and competencies were higher than their corresponding mean scores on "How well does our UG extension curriculum address this competency?" (Table 4.9).

Table 4.9 : Diversity and Gender Skills and Competencies among Agricultural Extension Professionals in Nigeria

Extension professionals should:	How important is this skill or competency for an extension worker? (N=176)* Mean (SD)	How well does the undergraduate extension curriculum cover this skill or competency? (N=153)** Mean (SD)	Mean difference
Understand that diversity exists within and among clients and stakeholders.	4.62 (0.65)	3.48 (1.05)	1.14
Identify the needs of small-scale farmers.	4.76 (0.51)	3.73 (0.94)	1.03
Identify the needs of minority groups.	4.66 (0.68)	3.46 (1.05)	1.2
Develop extension programs to benefit women farmers.	4.70 (0.55)	3.48 (1.07)	1.22
Develop extension programs to benefit youth.	4.71 (0.57)	3.46 (1.02)	1.25
Engage marginalized and vulnerable groups in extension programs (e.g., disabled, resource- poor farmers).	4.66 (0.59)	3.13 (1.16)	1.53
Do teamwork with diverse staff.	4.69 (0.60)	3.37 (1.06)	1.32

* *Scale for importance: 1 = Not important, 2 = Somewhat important, 3 = Average, 4 = Important, 5 = Essential.*

** *Scale for coverage in UG courses: 1 = Not at all covered, 2 = Minimally covered, 3 = Moderately well covered, 4 = Very well covered, 5 = Extremely well covered.*

4.3.8 Marketing, Brokering, and Value Chain Development Skills and Competencies

The mean scores on "How important is this skill or competency?" for all six marketing, brokering, and value chain development skills and competencies were higher than their corresponding mean scores on "How well does our UG extension curriculum address this competency?" (Table 4.10).

Table 4.10 : Marketing, Brokering, and Value Chain Development Skills and Competencies among Agricultural Extension Professionals in Nigeria

Extension professionals should:	How important is this skill or competency for an extension worker? (N=177)* Mean (SD)	How well does the undergraduate extension curriculum cover this skill or competency? (N=153)** Mean (SD)	Mean difference
Have basic knowledge of agribusiness development.	4.50 (0.78)	3.06 (1.04)	1.44
Apply brokering / advisory skills in agribusiness development.	4.41 (0.81)	2.83 (1.17)	1.58
Have knowledge on various agricultural markets and linkages.	4.55 (0.70)	2.99 (1.08)	1.56
Demonstrate knowledge of value chain logistics and input-output linkages in the value chain.	4.56 (0.65)	2.95 (1.11)	1.61
Facilitate entrepreneurship development among extension clientele.	4.59 (0.65)	3.05 (1.07)	1.54
Be able to link farmers, producers' organizations/cooperatives/agribusiness companies with market.	4.62 (0.60)	2.93 (1.12)	1.69

* *Scale for importance: 1 = Not important, 2 = Somewhat important, 3 = Average, 4 = Important, 5 = Essential.*

** *Scale for coverage in UG courses: 1 = Not at all covered, 2 = Minimally covered, 3 = Moderately well covered, 4 = Very well covered, 5 = Extremely well covered*

4.3.9 Extension Soft Skills

The mean scores on "How important is this skill or competency?" for all seventeen extension soft skills were higher than their corresponding mean scores on "How well does our UG extension curriculum address this competency?" (Table 4.11).

Table 4.11 : Extension Soft Skills among Agricultural Extension Professionals in Nigeria

Extension professionals should possess other soft skills such as:	How important is this skill or competency for an extension worker? (N=173)* Mean (SD)	How well does the undergraduate extension curriculum cover this skill or competency? (N=149)** Mean (SD)	Mean difference
Critical thinking	4.69 (0.56)	3.13 (1.15)	1.56
Problem solving	4.75 (0.52)	3.29 (1.05)	1.46
Time management	4.73 (0.55)	3.23 (1.08)	1.5
Stress management	4.64 (0.59)	2.96 (1.11)	1.68
Leadership	4.75 (0.55)	3.51 (0.95)	1.24
Teamwork	4.76 (0.49)	3.42 (1.00)	1.34
Flexibility	4.65 (0.59)	3.31 (1.03)	1.34
Self-motivation	4.66 (0.55)	3.27 (1.05)	1.39
Interpersonal skills	4.65 (0.56)	3.36 (1.03)	1.29
Positive work attitude	4.80 (0.47)	3.38 (1.05)	1.42
Collaboration	4.67 (0.56)	3.25 (1.05)	1.42
Conflict management	4.74 (0.48)	3.20 (1.09)	1.54
Group formation and development	4.69 (0.54)	3.40 (1.11)	1.29
Negotiation skills	4.57 (0.64)	3.02 (1.15)	1.55
Networking skills	4.61 (0.63)	3.03 (1.13)	1.58
Facilitation skills	4.72 (0.53)	3.07 (1.08)	1.65
Creativity / innovativeness	4.79 (0.42)	3.24 (1.05)	1.55

* *Scale for importance: 1 = Not important, 2 = Somewhat important, 3 = Average, 4 = Important, 5 = Essential.*

** *Scale for coverage in UG courses: 1 = Not at all covered, 2 = Minimally covered, 3 = Moderately well covered, 4 = Very well covered, 5 = Extremely well covered.*

4.3.10 Nutrition Skills and Competencies

The mean scores on “How important is this skill or competency?” for all seven nutrition skills and competencies were higher than their corresponding mean scores on “How well does our UG extension curriculum address this competency?” (Table 4.12).

Table 4.12 : Nutrition Skills and Competencies among Agricultural Extension Professionals in Nigeria

Extension professionals should:	How important is this skill or competency for an extension worker? (N=171)* Mean (SD)	How well does the undergraduate extension curriculum cover this skill or competency? (N=148)** Mean (SD)	Mean difference
Demonstrate basic human nutrition knowledge (e.g., food composition, balanced diet, supplements, nutritional composition of various foods, nutrition deficiency symptoms, etc.).	4.29 (0.77)	2.96 (1.11)	1.33
Understand life-cycle nutrition needs of various household members (e.g., children of various age groups, pregnant and breast-feeding mothers, and elderly).	4.21 (0.84)	2.89 (1.16)	1.32
Able to advise families on what crops and livestock to produce to ensure balanced diets.	4.43 (0.76)	3.05 (1.09)	1.38
Advise families to improve gender relations for increased agriculture production and nutrition.	4.41 (0.75)	2.99 (1.15)	1.42
Demonstrate postharvest handling technologies that conserve nutrients and food safety (e.g., food storage, freezing fruits and vegetables, making pickles, jams, jellies).	4.46 (0.74)	3.09 (1.09)	1.37
Have basic knowledge about food labeling (e.g., organic foods).	4.23 (0.86)	2.69 (1.15)	1.54
Able to advise on healthy diet (e.g., for fitness and sports, diabetes, cancer, and AIDS/HIV, heart health, kidney disease, osteoporosis; weight loss and obesity).	4.32 (0.84)	2.72 (1.17)	1.6

* *Scale for importance: 1 = Not important, 2 = Somewhat important, 3 = Average, 4 = Important, 5 = Essential.*

** *Scale for coverage in UG courses: 1 = Not at all covered, 2 = Minimally covered, 3 = Moderately well covered, 4 = Very well covered, 5 = Extremely well covered.*

4.3.11 Technical Subject Matter Expertise/Skills and Competencies

The mean scores on "How important is this skill or competency?" for all ten technical subject matter expertise/skills and competencies were higher than their corresponding mean scores on "How well does our UG extension curriculum address this competency?" (Table 4.13).

Table 4.13 : Technical Subject Matter Expertise among Agricultural Extension Professionals in Nigeria

Extension professionals should:	How important is this skill or competency for an extension worker? (N=174)* Mean (SD)	How well does the undergraduate extension curriculum cover this skill or competency? (N=150)** Mean (SD)	Mean difference
Demonstrate technical knowledge in their basic discipline (e.g., field crops/livestock/ fishery/horticulture, etc.).	4.70 (0.64)	3.57 (0.94)	1.13
Understand adult learning principles and hold practical skills required to teach improved farming practices.	4.71 (0.58)	3.62 (0.96)	1.09
Understand the new technology being promoted- i.e., what it is, why, and how it works.	4.71 (0.59)	3.44 (1.06)	1.27
Facilitate farmers to access inputs and services (e.g., credit, seed, fertilizers, feed, artificial insemination, etc.)	4.63 (0.66)	3.30 (1.07)	1.33
Be able to educate community members about various types of risks and uncertainties (e.g., due to market fluctuations, natural disasters, etc.).	4.60 (0.66)	3.25 (1.10)	1.35
Be able to educate community members about climate change and climate- smart agriculture.	4.65 (0.64)	3.34 (1.09)	1.31
Refer to and make use of publications-- journals, research reports, etc.	4.57 (0.67)	3.44 (1.06)	1.13

Generate knowledge or produce research reports / journal publications.	4.53 (0.72)	3.39 (1.06)	1.14
Able to harness, document, validate, and integrate local / indigenous knowledge.	4.55 (0.71)	3.23 (1.12)	1.32
Understand social system under which farming takes place (e.g., rural sociology knowledge).	4.71 (0.61)	3.62 (1.05)	1.09

* *Scale for importance: 1 = Not important, 2 = Somewhat important, 3 = Average, 4 = Important, 5 = Essential.*

** *Scale for coverage in UG courses: 1 = Not at all covered, 2 = Minimally covered, 3 = Moderately well covered, 4 = Very well covered, 5 = Extremely well covered.*

4.4 Additional Process Skills or Competencies that Extension Professionals Need

In addition to the above process skills or competencies assessed in the study, the other process skills or competencies that extension professionals need as indicated by the respondents are summarized in Box 4.1.

Box 4.1 : Additional process skills or competencies that extension professionals need

1. Participatory learning and action research
2. Basic knowledge on environmental pollution especially with respect to soil and water
3. Hardworking and outspoken
4. Using mobile survey applications like kobo collect, cspro
5. Extension professionals should be able to relate with clienteles in local languages where so necessary, this creates good relationships
6. Pedagogical and anagogical learning skills
7. The extension worker should have knowledge of act of knowledge capture and sharing (KM)
8. In-depth knowledge on participatory extension methodology, e. g., Farmer field school
9. The use of digital agricultural extension technologies and software
10. Advocacy skill
11. Community entry skills
12. Knowledge of formation and application of innovation platforms to provide solutions to many farming problems
13. Democratic and flexibility skill
14. Graphics designs

15. Record keeping and financial management
16. Spatial analysis using GIS
17. Extension practice
18. Climate change and adaptation knowledge
19. Use of entertainment education media and methodologies
20. Value packaging (designing and labeling)
21. Self-motivation skill
22. Administration aspect of extension
23. Should have the knowledge of electronic Extension and how to use it in the dissemination of agricultural technologies
24. Issues on agricultural journalism
25. Interpersonal skills
26. Participatory needs analysis and triangulation using qualitative methods
27. Safety consciousness in the face of any pandemic outbreak
28. Organizational skill, cultural skill, goal achievement skill, and role modeling skill
29. Critical path method in planning extension
30. Farmer groups optimization skill, commodity value chain analysis, patency and commercialization skill
31. Decision- making skills
32. Concept of food security as baseline for extension productivity
33. Ability to identify the felt need of the community and facilitate resources towards it
34. Be able to conduct technology review meetings for extension field staff, extension trainings on current improved farming technologies, and organize demonstration farms on new technologies in farmers farm
35. Competency on value chains of various enterprises
36. Have interdisciplinary knowledge of agricultural commodities in the farming systems for the sake of the value chain actors
37. Capacity- building skills
38. Capacity in operational research techniques, predictive modeling particularly decision making under deep uncertainty to risks in financing, environmental change, technical and social change, etc.
39. Be able to educate household on importance of gender and development
40. Extension policies and policy in technology development and transfer

4.5 Strategies to Make Agricultural Extension Curriculum Robust and Practical

On the strategies to make the undergraduate extension curriculum robust and practical, Table 4.14 shows that most of the strategies do not exist but are essential to have. Only four of the strategies already exist.

Table 4.14 : Strategies to Make Agricultural Extension Curriculum Robust and Practical

Strategies for improvement	N	Already exists F (%)	Does not exist but essential to have F (%)	Does not exist but fine to leave out F (%)
Provide practical and contemporary skills (e.g., through mentored internship or attachment to a progressive farmer in a crop season).	166	61 (36.75%)	104 (62.65%)	1 (0.60%)
Include various soft skills in extension curriculum.	160	53 (33.13%)	106 (66.25%)	1 (0.63%)
Include business management concepts and practices in extension curriculum.	160	59 (36.88%)	97 (60.63%)	4 (2.50%)
Expose students to market opportunities, linking farmers with service providers, and developing entrepreneurship.	161	38 (23.60%)	120 (74.53%)	3 (1.86%)
Grooming students with broad-based general agricultural courses (e.g., crop and animal production, postharvest, marketing, and joint ventures) along with extension training.	164	118 (71.95%)	44 (26.83%)	2 (1.22%)
Incorporate youth development, gender issues, urban/suburban agriculture, and climate change concepts in extension curriculum.	163	89 (54.60%)	70 (42.94%)	4 (2.45%)
Recruit highly qualified extension staff or faculty.	159	98 (61.64%)	57 (35.85%)	4 (2.52%)
Include research and data analytical skills.	160	100 (62.50%)	57 (35.63%)	3 (1.88%)
Offer training of trainer workshops for extension faculty members.	162	63 (38.89%)	98 (60.49%)	1 (0.62%)
Develop cutting-edge and practical teaching learning resources – extension textbooks, practical handbooks, training manual, etc.	162	78 (48.15%)	82 (50.62%)	2 (1.23%)
Undergraduate extension curriculum/ pedagogy should be more ICT oriented	160	32 (20.00%)	123 (76.88%)	5 (3.13%)

4.6 Ways to Acquire the Process Skills and Competencies in Nigeria

The appropriate ways to acquire core competencies were measured on a four-point Likert scale: not appropriate, somewhat appropriate, appropriate, and very appropriate, with scores of 1, 2, 3, and 4, respectively. Most of the ways to acquire core competencies were rated appropriate by the respondents (Table 4.15).

Table 4.15 : Ways to Acquire the Process Skills and Competencies in Nigeria

Ways	Total	Not appropriate	Somewhat appropriate F (%)	Appropriate F (%)	Very appropriate F (%)
Through pre-service training by revising or updating the curriculum.	171	2 (1.17%)	16 (9.36%)	111 (64.91%)	42 (24.56%)
Requiring internship at various work environments (i.e., public institutions, NGOs, private companies, farmer organizations, cooperatives, etc.) during undergraduate programs.	167	1 (0.60%)	14 (8.38%)	104 (62.28%)	48 (28.74%)
Through basic induction training (e.g., job orientation training at the beginning of job)	168	4 (2.38%)	20 (11.90%)	101 (60.12%)	43 (25.60%)
Through in-service training (e.g., training offered during the employment at universities, training institutes/centers, etc.)	168	4 (2.38%)	12 (7.14%)	101 (60.12%)	51 (30.36%)
Providing opportunities to attend trainings, seminars, workshops, webinars, etc.	169	1 (0.59%)	6 (3.55%)	83 (49.11%)	79 (46.75%)

*Note:*Scale for appropriateness: 1 = Not appropriate, 2 = Somewhat appropriate, 3 = appropriate, 4 = very appropriate.*

4.7 Additional Ways to Acquire Process Skills or Competencies in Nigeria

In addition to the above ways to acquire process skills or competencies assessed in the study, other additional ways indicated by extension professionals are summarized in Box 4.2.

Box 4.2 : Additional appropriate ways to acquire process skills or competencies in Nigeria

1. Promote staff and student exchange programmes with other academic institutions offering similar programmes.
2. Organize field schools where students have to be taught by farmers themselves in their own languages and in their fields.
3. Include more practical activities in the curriculum to expose students to real situations. Every unit offered should be accompanied by a practical activity.
4. Support for students to develop personal skills and run their own project enterprises
5. Provide good remuneration and incentives to extension officers.
6. Facilitate peer-to-peer learning sessions between extension workers and farmers.
7. Use of flow charts and group discussions to disseminate and facilitate extension teaching and learning.
8. Collaboration with private extension professionals and research institutes.
9. Mentorship.
10. Use of adopted outreach villages or communities.
11. Frequent monitoring and evaluation of all the processes to ensure competence.
12. Promote robust e-learning and certification based competency as means of work progression requirement.
13. Attending seminars and workshop.

4.8 Major Barriers to Effective Implementation of Extension Worker Training Curriculum in Nigeria

The major barriers to effective implementation of extension curriculum include "budget to support practical learning experience", which was perceived by 163 of respondents, followed by "classroom and demonstration facilities" (131), "teacher motivation to teach required process skills and competencies" (122), "student motivation to study extension and in practical extension work" (120), "development of an effective extension curriculum" (110), "quality textbooks and/or manuals" (86), "quality faculty to teach extension courses" (76), "time constraint" (58), and "accreditation of curriculum" (47) (Table 4.16).

Table 4.16 : Major Barriers to Effective Implementation of Extension Worker Training Curriculum in Nigeria

Major barriers	N=198
Development of an effective extension curriculum	110
Quality faculty to teach extension courses	76
Quality textbooks and/or manuals	86
Classroom and demonstration farms or facilities	131

Accreditation of curriculum	47
Time constraint	58
Budget to support practical learning experience (e.g., field visits and demonstrations)	163
Student motivation to study extension and in practical extension work	120
Teacher motivation to teach required process skills and competencies	122
Others	21

**Multiple answers were allowed.*

The other barriers to effective implementation of extension worker training curriculum are summarized in Box 4.3.

Box 4.3 : Other barriers to effective implementation of extension worker training curriculum in Nigeria

1. Poor government policies and support of extension services
2. Lack of funds
3. Unstable academic system due to industrial actions
4. Recruitment of extension lecturers without background in extension specialization
5. Lack of ICT/media facilities and poor ICT capability of faculties
6. Poor motivation for both students and lecturers
7. Political appointments and barriers
8. Poor remuneration or reward system (poor salary, lack of incentive and transportation; and zero budgeting estimate for extension services and lack of clear- cut policy on extension works and services)
9. The programme has too many units and may not accommodate additional units.

4.9 Findings from Focus Group Discussions

The major findings of the FGDs are briefly summarized under the following headings:

a. General perceptions of community about agricultural extension.

b. One activity that extension service is doing particularly well.

c. Major recommendations to improve agricultural extension services.

d. Critical job skills / core competencies required of agricultural extension workers.

e. Coverage of job skills / core competencies in UG curriculum.

f. Barriers to effectively train UG students with required competencies.

g. Suggestions on how to overcome the barriers.

h. Broad modifications in agricultural extension curriculum's transaction.

4.9.1 General Perceptions of Community about Agricultural Extension

Box 4.4 highlights the various perspectives on agricultural extension by the different groups of the FGD participants. The findings of the focus group discussions indicated that agricultural development experts throughout the country had similar views on the scenario of agricultural extension. They all agreed that the agricultural extension system in Nigeria is a mirage, dead and inefficient.

Box 4.4 : General perceptions of agricultural extension by extension professionals

Extension faculty	Private sector extension practitioners	Public sector extension practitioners
• The extension system is almost dead and generally non-functional in Nigeria. • Extension agents are not motivated to function due to poor remuneration. • Students get negative feedback about extension service delivery from farmers. • Poor interaction between students, extension workers and farmers. • Farmers believe that the knowledge base for extension staff to perform is weak. • The training of extension personnel is biased towards crop production. • Extension workers in the private organizations and even the public sectors are not core extension graduates. • NGOs and private sector extension systems that are not coordinated	• Extension is dead and very poor in Nigeria. • Farmers see extension services as a mirage. • Very few farmers indicate being visited by extension agents. • Students are not recruited as extension workers. • Extension services are not demand driven. • Private extension professionals employ 'extension workers' who have little or no knowledge about extension service delivery.	• Farmer to extension ratio is low. • Lack of training facilities and incompetence on the part of extension workers • Political elites do not understand what extension service is all about. • There are poor funds available to provide extension service delivery in the ADPs.

4.9.2 One Activity That Extension Service is doing particularly well

The responses of the FGD participants on areas where extension service is doing particularly well in their university, state, or region are indicated in Box 4.5. The extension faculty participants noted that agricultural extension has resulted in an increase in crop and livestock production as the number and quality of literate people going into farming have increased. The private sector participants rated extension services provision a little commendable in spite of the challenges experienced. The public sector extension practitioner asserted that agricultural extension agents disseminate information beyond agriculture to include social issues, infrastructure, and health-related issues (HIV/AIDS, Ebola, COVID-19 pandemic) with the help of donor agencies.

Box 4.5 : Areas that extension service is doing particularly well

Extension faculty	Private sector practitioners	Public sector practitioners
• Extension has resulted in an increase in crop and livestock production. • More people involved in value chain activities. • More farmers are using inputs that they were not using before. • By virtue of the training given to students, lecturers in extension have gone into different agribusinesses.	• Ensures that adequate information is disseminated to farmers or end users. • Encouraged more women to engage in processing. • Organize seminars and training programs for women. • Trained more farmers through training of trainers program. • Helped to increase agricultural development and agribusiness.	• Extension agents disseminate information beyond agriculture to include social issues, infrastructure, and health- related issues. • Help to increase the value chain activities of women farmers. • Extension agents carry out market-driven extension services, and this has helped agricultural production activities to thrive.

4.9.3 Major Recommendations to Improve Agricultural Extension Services

The results of FGDs on one major recommendation to improve agricultural extension services and program delivery are summarized in Box 4.6. Generally, the respondents recommended the resuscitation of the Research Extension Farmer Input Linkage System (REFILS) program for effective extension delivery in Nigeria.

Box 4.6 : Major recommendations to improve agricultural extension services

Extension faculty	Private sector practitioners	Public sector practitioner
• Review the curriculum to be more practical-oriented than theory-based. • There should be field trips for each course. • Strengthen REFILS for effective extension service delivery. • There is a need for constant training of extension personnel. • Enhanced conditions of service for staff and logistic support should be provided to extension workers. • Make it compulsory that each student in extension owns a mini farm for practical. • Organize more training of trainers program for the elites and farmers.	• The government should hire more extension personnel. • REFILS should be reactivated for more effective results.	• Resuscitate farm system research and extension. • It is important to revive fortnightly training (FNT) and monthly training review meeting (MTRM). • Extension should be integrated into available federal policies.

4.9.4 Critical Job Skills / Core Competencies Required of Agricultural Extension

Box 4.7 highlights the groups' responses on the critical job skills or core competencies required of agricultural extension workers in the changing agricultural and rural development context as well as suggestions for curriculum reforms. The majority of the respondents identified communication/ICT skills as required areas of core competencies needed by extension graduates.

Box 4.7 : Critical job skills / core competencies required of agricultural extension workers			
Extension faculty	**Private sector extension practitioners**	**Graduate students**	**Public sector extension practitioner**
• Communication and interpersonal skills • ICT skills • Facilitation skills • Practical knowledge of farming • Community mapping • Program planning and evaluation • Extension administration • Needs assessment • Program implementation skills • Teamwork • Negotiation skills • Research skills • Public relations/ awareness skill • Competence in the area of writing case studies and success stories and also storytelling • Analytical skills • Documentation skills • Persuasion skills	• Communication/ ICT skills • Competency in the practical demonstration of technologies to be disseminated • Research/ analytical skills • Interpersonal skills • Networking skills	• Report writing skills (from the inception of a program to the end of the program) • Data management • Diplomacy • Conflict management • Negotiation skills	• Skills/ competence on where to source relevant information • Students should learn how to upload information received from farmers into ICT devices.

4.9.5 Coverage of Job Skills / Core Competencies in UG Curriculum

Table 4.17 shows the frequency of responses of the extension faculty participants on the gaps in the current undergraduate extension curriculum. The extension faculty participants remarked that students need practical experience in extension service delivery and therefore it is important to engage them in consultancy work, community outreach, and as field enumerators and facilitators.

Table 4.17 : Coverage of Job Skills / Core Competencies in UG Curriculum

Coverage of job skills	Frequency
Core extension competencies are not adequately covered in the curriculum and it lacks practical courses	10
Poor teaching and learning facilities	6
Low interest in extension at the federal, state, and university level	4
Experts are not involved in the review of the extension curriculum and insincere accreditation process	3

4.9.6 Barriers to effectively train UG students with the required skills/competencies

The barriers to effectively train undergraduate extension students in the required core competencies as identified by the extension faculty participants are summarized under the following themes in Box 4.8.

Box 4.8 : Barriers to effectively train UG students in required core competencies

- Poor facilities
- Issue of nomenclature
- Public financing of extension
- Lack of practical approach in teaching the students
- Poor capacity of teaching staff to impart new knowledge
- Students'apathy to learning agricultural extension

4.9.7 Suggestions to Overcome the Barriers

The suggestions for curriculum review made by the FGD participants are outlined in Box 4.9. The extension faculty participants suggested that, due to changing agricultural situations, farmers are encountering new issues, hence, extension workers need new capacities to solve these challenges. Also, new labor market trends are emerging, and achievements made in the area of extension mean that lecturers urgently need updated training.

Box 4.9 : Suggestions for curriculum reforms

Extension faculty	Private sector extension practitioners	Public sector extension practitioners
• Training of lecturers due to changing conditions.	• Students should be involved in industrial training.	• Universities should integrate training with research.

• Extension should stand alone in each institution so that core extension courses can be taught. • The curriculum for teaching should be more ICT-oriented.	• Due to the increased rate of youth unemployment, students should be trained to practice agriculture upon graduation. • There should be a synergy between universities and research institutions.	• Extension courses should be made to be more professional.

4.9.8 Broad Modifications in the Agricultural Extension Curriculum

Data in Box 4.10 reveal the responses of the FGD participants on the modifications needed in the undergraduate agricultural extension curriculum. Both the private sector and extension faculty participants agreed that the undergraduate extension curriculum should be modified to incorporate emerging issues in agriculture such as climate change, food systems, renewable energy, food safety, development, health-related issues, and gender issues to suit the changing agricultural scenarios and new challenges in farming. The extension faculty participants mentioned incorporating emerging issues such as climate change, food systems, renewable energy, food safety, development, health-related issues, and gender issues, and merge courses that are overlapping.

Box 4.10 : Broad modifications in the agricultural extension curriculum

Extension faculty	Private sector extension practitioners	Public sector extension practitioners
• Incorporate emerging issues such as climate change, food systems, food safety, gender issues, and merge courses that are overlapping. • Adopt rural community experience for about one week and drop the current fourth year practical experience, which is more general. • Expose students early to extension courses because of the credit unit load.	• There is a need for more courses on value chain activities • Courses taught in years one and two should be theoretically based, whereas courses taught in years three, four and five should be practical based. • Entrenchment of ICTs into extension curriculum • Farmer's helpline	• Drop courses on rural youth and women programs and include entrepreneurial courses.

• Nutrition is an important area that should be included in the curriculum. • Other areas are renewable energy, food security, extension development and health-related issues. • In order to improve students' interest in agricultural extension, go to secondary schools and sensitize students on the need to study agricultural extension. Students should learn how to incorporate ICTs and introduce innovation. Students should learn how to develop apps. Practical issues should be incorporated in the curriculum. • In designing the new curriculum, it is important to incorporate extension courses from the first year.	• Community mapping, • Students' community relations for two weeks • Website development • Introduction of emerging issues such as climate change, gender, food safety, environment, and strategic partnership.	

4.10 Discussion of Findings

The aim of the study was to measure the perceptions of extension professionals in Nigeria on gaps in process skills and competencies in the UG agricultural extension curriculum, with the key questions on:

i. Demographic and institutional characteristics of agricultural extension professionals.

ii. Process skills and core competencies: How important is the skill or competency for an extension worker? How well does the UG extension curriculum address this competency?

iii. Strategies to make agricultural extension curriculum robust and practical.

iv. Appropriate ways to acquire core competencies.

v. Major barriers to effective implementation of the extension worker training curriculum.

Accordingly, the results are briefly discussed under the following headings:

4.10.1 Demographics of Agricultural Extension Professionals

Most extension professionals in Nigeria are middle- aged, ranging from 41-50 years, and are mostly men. This implies that most employees are in their middle ages and thus, area great

assets for the required reforms of agricultural extension and advisory services in a changing food and agricultural context. The dominance of men in agricultural extension profession has been severally reported by scholars, despite the increase in women's involvement in agricultural production and value chain activities. This supports wide advocacy and promotion by stakeholders to encourage and increase women's interest and participation in agricultural education and extension services as faculty and manpower recruitments for extension education. There is the need to encourage more women to enroll and specialize in agricultural extension at undergraduate and postgraduate levels. In addition, employment of extension professionals in the public, private and non -governmental extension organizations should be gender sensitive for equitable representation both for capacity building and delivery of extension services. The review of the distribution of academic qualification indicated that most of the respondents are well educated and had been exposed to adequate training for effective extension and advisory services. However, this does not necessarily mean corresponding skills and competence among professionals for development of the agricultural and food system. According to Mugisha and Nkwasibwe (2014), students from agricultural colleges and universities graduate with excellent academic grades but find it difficult to influence processes of development in rural farming communities. This could be attributed to several factors, including poor curriculum development and transaction, traditional teaching and learning approach, and student- related factors.

Almost all the extension professionals have a deep knowledge of the university undergraduate curriculum. The key stakeholders of the UG curriculum are extension staff in a university, extension researchers, public sector extension professionals, private sector extension professionals, and NGO extension professionals. The extension professionals have over 20 years' experience in extension professions/agriculture- related fields. This suggests the need for updated training, especially in farming innovations and development concepts introduced in the past decade or so. Moreover, the system needs injection of new blood and creative, innovative minds to deal with the increasing capacity challenges and roles of extension professionals in the 21st century.

4.10.2 Process Skills and Core Competencies

In Nigeria, the National Universities Commission (NUC) provides guidelines for undergraduate agricultural extension curricula through Basic Minimum Academic Standard (BMAS) for the entire country. However, each university is allowed to make adjustment to its curriculum, subject to ratification by NUC during accreditation of programmes, traditionally conducted every five years. This makes UG agricultural extension curricula across the country somewhat similar with few variations across the universities offering the degree.

The skills and competencies-program planning, program implementation, communication, ICTs, program monitoring and evaluation, personal and professional development, diversity and gender skills, marketing, brokering, and value chain, extension soft skills, nutrition skills, and technical subject matter expertise - have been identified by many researchers as basic extension skills that are needed and useful for any extension professional at the individual

level (Cooper and Graham, 2001; Scheer et al., 2006; Sulaiman and Davis,2012; Davis and Sulaiman,2014; Davis, 2015; Prasad et al., 2015; Centre for Research on Innovation and Science Policy (CRISP), 2015; Suvedi and Kaplowitz, 2016; Sasidhar and Suvedi, 2016: Ayansina and Adeogun, 2017). In the present study, the mean scores on the level of importance of all eleven process skills and core competencies of agricultural extension professionals in Nigeria were significantly higher than the corresponding mean scores on their level of coverage in UG courses. In the UNN undergraduate agricultural extension curriculum, core extension skills are not adequately covered because the curriculum is overburdened with other agriculture-related courses, which focus primarily on development of technical skills and competencies of extension professionals. This is evident from the small number of extension courses and the low credit unit allocated to extension courses, compared with other ancillary courses (see Tables 2.1 and2.2). Some subject matter areas/competency domains such as programme implementation, personal and professional development, diversity and gender skills, marketing, brokering, and value chain, and extension soft skills are either not clearly delineated as a stand- alone course or inadequately covered in other extension courses in the undergraduate curriculum. Similarly, other subject matter areas such as ICTs andnutrition largely depend on ancillary courses for building requisite skills and competencies. This could lead to lack of balance in the technical and process skills and competencies of professionals and invariably to poor performance of extension in carrying out education roles. Suvedi and Kaplowitz (2016) identified lack of a proper balance between technical and professional competencies in staff as a common problem in the extension services of developing countries.

A perusal of Tables 4.3 to 4.13 makes it clear that extension process skills and competencies are essential but minimally covered in the undergraduate curriculum. The depth of coverage and amount of curriculum transaction seem weak or lacking, which is evident from the results of both curriculum review, the online survey and FGDs data. The courses lack relevant, updated, and robust content for building skills and competencies useful for the increasing and diversified roles of today's extension professional; and emerging cross-cutting development issues such as climate change, disaster management, resource mobilization and management, conflict resolution, etc., are not addressed. Therefore, the core issue of concern is curriculum reform to ensure proper recognition of the above eleven process skills and competencies and their inclusion in content and as subject matter in UG extension curricula.

For program planning skills and competencies, the results reveal that agricultural extension professionals need to be familiar with the vision, mission, and goals of national /state (sub-national) extension service and agricultural development strategies, programs, and policies; possess the ability to conduct needs assessment and engage stakeholders to prioritize local needs; conduct baseline or benchmark studies; engage local stakeholders (e.g., NGOs, cooperatives, local agro-dealers) in extension program planning; familiar with administrative and financial rules of their respective organizations and able to mobilize resources/funds to address priority needs. Skills and competencies in programme planning are critical for today's extension professionals.Given the evolving agricultural context and their diverse roles.Nwaogu and Akinbile (2018) rated programme planning second to professionalism in importance

among competencies required for effective extension and advisory services. Also, Suvedi and Kaplowitz (2016) reiterated that to address the need fora demand-driven, decentralized, pluralistic, and participatory extension system, extension workers need to first plan well. This essentially means that extension workers need to demonstrate good knowledge of what extension stands for in vision, mission, and goals, understand policies and rules, and have ability to coordinate and harness human and material resources to address identified needs of diverse clients. The current curriculum for undergraduate training in UNN lacks some key contents for imparting appropriate skills and competencies in this area.

Study results indicate that it is important to ensure that the undergraduate extension curriculum covers program implementation skills and competencies in the following areas: delegation of responsibilities to staff as needed; demonstration of teamwork skills to achieve extension results; follow participatory decision making in extension work; coordinate local extension programs and activities; form farmers' groups and support them; engage minority groups (e.g., female farmers and youth development groups) in extension work; engage local stakeholders (e.g., NGOs, self-help groups, and cooperatives) in implementing extension programs; demonstrate negotiation skills to reach consensus and resolve conflicts; and integrate private or public-private partnerships in extension service provision. As earlier pointed out, the programme implementation competence domain is not a prescribed course in the undergraduate curriculum, though the skills and competencies are minimally touched onin a few extension courses. Some important skills and competencies, however, such as negotiation, resolving conflict, and team skills are not clearly addressed. Globally, extension and advisory services are increasingly evolving from a top-down to bottom-up approach, from public-dominated to pluralistic with diverse clients - rural, urban, and vulnerable groups - in a scarce- resource- driven agrarian environment. Therefore, extension professionals need to be competent in participatory decision making to encourage wide participation of relevant stakeholders (farming communities) and foster ownership and sustainability of the extension programme. Also, the challenges of resource management and inclusiveness of extension services demand implementation skills and competencies in group mobilization and management. Extension professionals should be able to coordinate and facilitate public-private partnership to minimize replication, waste of resources, confusion, and information overload for the clients; and promote synergy and alliances for effective extension delivery among diverse stakeholders.

The results here indicate that agricultural extension professionals in Nigeria need to acquire more communication skills and competencies to perform their tasks effectively. Extension workers have to be good communicators and should be able to select appropriate communication methods, establish communication with a variety of stakeholders, respect local culture while communicating with clients, prepare required progress reports, share success stories and lessons learned with stakeholders through various media, use extension methods (e.g., individual, group and mass contact methods) to disseminate information about extension activities and programs, demonstrate good listening skills and listen to all clients and stakeholders, and demonstrate good public speaking and presentation skills. There is a

need for a communications studio in agricultural extension departments of universities so that extension workers may create films/documentaries based on their contacts with farmers, learn how to map communities, get information online, utilize gadgets, and create applications. These skills will also enable them to organize and conduct interviews, particularly with members of the farming community, improve presentation skills, present research/field reports with convincing arguments clearly in writing or orally, and be equipped with information technology skills required for global communication. Communication skills and competencies form the major backbone for effective extension and advisory services in the present knowledge-driven economy. Good communication skillsenable extension professionals to reach out to a wider spectrum of clients from diverse cultures; explore various communication channels to bring about desired behaviour change in extension clients, and provide feedback. However, the coverage in the undergraduate curriculum is limited and outdated with theory-loaded content focusing on innovation diffusion and communication process. The curriculum is insufficient and outdated contents for imparting competencies in various emerging communication skills such as handling and using audio-visual (AV) equipment, digital cameras and LCD projectors; preparation and use of AV aids; preparation of extension literature – leaflets, booklets, folders, pamphlets; news stories and success stories; presentation skills; micro teaching exercises; exposure to mass media, such as visits to community radio and TV studios to understand the process of programme production; script writing, writing for print and electronic media, developing scripts for radio and television;reading and comprehension of general and technical articles, precise writing, summarizing, abstracting, etc. Although a few ancillary courses may touch on some of the skills in these domains, their content and appropriateness in relation to extension professionals' needs cannot beguaranteed.

The required skills for ICT as noted by the extension professionals include Microsoft Word for word processing (e.g., typing, editing, printing) and designing graphics; data entry and analysis software such as Excel, SPSS, etc.; Microsoft Power Point for making presentations; audio-visual aids such as charts, graphs, and puppet shows for teaching and learning; mass media such as FM radio stations and television channels for communication; computers (email, Internet), mobile phones (texting, SMS service), and social media (WhatsApp, Facebook, Twitter, Instagram, etc.), for communication; ICT tools to improve access to information, knowledge, technologies, and other innovations, to enhance collaboration and partnerships, and to collect data, monitor, and evaluate extension programs. The extension faculty participants also recommended that the curriculum for teaching undergraduate extension students should be more ICT-oriented. This would enable students to take advantage of new opportunities and acquire worldwide access to knowledge and information. Students should also be appropriately trained to obtain the requisite skills that are required by employers. According to Munienge et al. (2013), incorporating ICTs into an agricultural education curriculum provides numerous benefits, including improving learners' learning capacities, enhancing problem-solving abilities, and enabling learners' critical thinking, among others. It also helps students acquire new skills, which helps to solve the problem of skill mismatch (Ejiofor et al., 2021). Information and communication technologies allow students to learn

outside of the classroom, put what they have learned in class into practice, and communicate with their peers outside of the school setting, among other benefits. Extension professionals should be able to use ICT tools and facilities to collect, process, and document data, access useful information/innovations, conduct workshops or training, and disseminate information; and for overall knowledge and information management. Use of ICTs in extension is cost effective, and it promotes timely delivery and wider dissemination of messages than the traditional face-to-face methods of communication. Opportunities to acquire ICTs skills and competencies are not adequately provided in the undergraduate agricultural extension curriculum. There are limited contents spread across one or two major extension courses and ancillary courses, but coverage of emerging ICTs tools is lacking.

Agricultural extension workers must be able to understand theories and principles of monitoring and evaluation, including the models of evaluation, timelines, relevance, accuracy, and participatory and action- oriented principles. They should be able to identify key stakeholders and their diverse interests, and the purpose of evaluation -improvement in efficiency/ effectiveness or accountability.They need to be able to conduct systematic monitoring and evaluation of extension programmes: develop data collection instruments such as interview schedules / questionnaires, conduct online surveys and apply qualitative tools and techniques such as focus group discussions and case studies to collect evaluation data, apply quantitative tools and techniques (e.g., survey, interview, farm data, etc.) to collect evaluation data, and analyze and interpret qualitative and quantitative data. Extension professionals should be able to accurately write and share evaluation reports, and effectively apply findings in replicating / scaling-up extension programsand providing accountability and feedback to relevant stakeholders. King et al. (2006) and Ghere, et al. (2001) further categorized the competencies required by professionals for evaluation of extension programmes as systematic inquiry (such as data source, analysis, interpretation, and meta evaluation), reflective practice (being aware of self and building professional relations), project management (identifying needed resources, budgeting well and supervising), situational analysis (identifying stakeholders' interests, and being open to inputs from others), professional practice (applying evaluation standards), and interpersonal competence (facilitating constructive interpersonal interactions using listening, verbal, and written skills). The undergraduate agricultural extension curriculum should exhaustively cover and reflect fundamental and basic skills and competencies at the level of pre-service training. In the current undergraduate curriculum in UNN, however, monitoring and evaluation is a single subject inthe programme planning extensioncourse.

Thestudy results further reveal that agricultural extension professionals in Nigeria need to acquire more personal and professional development competencies. Traditionally, it is the responsibility of employers of extension professionals to provide opportunities and support for extension staff to acquire professional development competencies through organizing in-service training or sponsoring development opportunities (local, advanced, overseas trainings). Extension professionals themselves, however, need to show commitment to career advancement (participate in lifelong learning, in-service training, professional development events and conferences) and apply principles of good governance (e.g., clients' participation,

accountability, and transparency) in extension work. Extension professionals should have capacity to apply professional ethics in extension work - i.e., promote research-based recommendation or technology, follow organizational policies and directives for professional development, and demonstrate honesty and a positive attitude towards extension work. AsNwaogu and Akinbile (2018) put it,the expectation is that a professional extension officer should demonstrate a positive attitude towards extension service, have a strong work ethic, effectively interpret research findings, and carry out assignments confidently minimal supervision.

For diversity and gender skills and competencies, it is necessary that agricultural extension professionals in Nigeria understand that diversity exists within and among clients and stakeholders. Thisunderstanding enables extension workers to plan and implement inclusive programs and educational activities using participatory approaches. They should be able to identify the needs of small-scale farmers and minority groups, develop gender-sensitive extension programs to benefit women farmers and youths, engage marginalized and vulnerable groups in extension programs (e.g., disabled, resource- poor farmers), and take part in teamwork with diverse staff. The importance of these skills and competencies was also reported in the FGDs and curriculum review. The current undergraduate agricultural extension training in UNN, however, is weak in addressing this competency need. It needs to address gender-sensitive concepts, issues, goals, and gender analysis, among others, to prepare extension professionals to work in an increasingly women-dominated agriculture and food system.

Marketing, brokering, and value chain development skills and competencies are essential for extension professionals as agriculture shiftsfrom a supply/production orientation to a market/ demand-driven system. It is not enough for extension merely to transfer technology to boost production- it is also necessary to train farmers on business management, link themto markets for their products, and update them with relevant market information. The clients for extension services are diverse - small-scale famers, new actors in the agricultural value chains, urban farmers and commercial farmers, among others. Shifts in consumer preferences and demand for quality and safe products also influence markets. Chikaire et al. (2018) observed that the traditional subsistence agriculture is gradually being replaced by market-oriented or commercial agriculture. Thus, extension professionals are faced with the challenges of building clients' capacity for entrepreneurship and market-oriented agriculture. They need to acquire skills and competencies including basic knowledge of agribusiness development and ability to apply brokering / advisory skills in agribusiness development. This also serves to prepare extension professionals for the world of work, given the declining importance of government as the primary employer of graduates, the emergence of the private sector throughout the value chain, and self-employment, increasingly sought as an option after graduation. To provide appropriate and useful extension and advisory services, professionals need adequate knowledge on various agricultural markets and linkages, value chain logistics, and input-output linkages in the value chain, and ability to facilitate entrepreneurship development among extension clients and link producers' organizations /cooperatives/

agribusiness companies with markets. This need is supported by the responses from the FGDs and curriculum review. In the UNN curriculum, however, these skills and competencies are only addressed under ancillary general studycourses that are not oriented and designed for agricultural extension students. The courses are theory loaded and content is outdated, they lack practical orientation, and they may not cover key competency needs of agricultural extension professionals. The curriculum shouldshift in focus from a production agriculture orientation to a market orientation, value addition, and principles of market competitiveness.

The seventeen soft skills that respondents indicated are important to be covered extensively in the undergraduate agricultural extension curriculum (Table 4.11) are critical thinking, problem solving, time management, stress management, leadership, teamwork, flexibility, self-motivation, interpersonal skills, positive work attitude, collaboration, conflict management, group formation and development, negotiation skills, networking skills, facilitation skills and creativity / innovativeness. In-depth facilitation training and practice is necessary to equip extension professionals to assist people and groups in achieving positive change. Professionals need these soft skills and competencies to play an increasingly important intermediation and facilitation role to support application of new knowledge among the diversity of organizations (agro-businesses, farmers associations, NGOs etc.), involved in extension and advisory services (GFRAS, 2012; AESA, 2016; GFRAS, 2017). The agricultural policy structure and project approach to extension and advisory services in most developing countries, including Nigeria, place agricultural extension professionals in roles requiring skills in facilitation, group formation, teamwork, and problem solving, among others. Above all, the increasing issues and problems over scarce resources, conservation of natural resources, and environmental sustainability demand that extension professionals should be able to manage conflict, and practice networking, negotiation, and facilitation for a safe and sustainable ecosystem. Also, requisite soft skills are imperative to enable extension professionals to drive the participatory approach and community engagement in rural and agricultural development being promoted and emphasized in the development arena and by NGOs. These soft skills and competencies are not adequately addressed in the undergraduate extension curriculum in UNN. There is no specific course on the subject matter, and they are not explicitly covered in other courses. The FGD report further emphasized their importance and the need to includethem in the curriculum for training extension professionals.

The undergraduate agricultural extension curriculum in Nigeria also needs to build nutrition skills and competencies among agricultural extension workers. As an element in key components of food security, nutrition has become a global concern, and rural farming households and vulnerable groups are the worst affected.Extension professionals should be able to demonstrate basic human nutrition knowledge (e.g., food composition, balanced diet, supplements, nutritional composition of various foods, nutrition deficiency symptoms, etc.), and understand life-cycle nutrition needs of household members (e.g., children of various age groups, pregnant and breast-feeding mothers, elderly). They should possess skills and competencies to advise families on what crops and livestock to produce to ensure balanced diets, and how to improve gender relations for increased agricultural production

and improved nutrition. To perform their roles, professionals are to be abreast of knowledge of storage and preservation practices that undermine food safety and food security, and able to demonstrate postharvest handling technologies that conserve nutrients and food safety (e.g., food storage, freezing fruits and vegetables, making pickles, jams, jellies), have basic knowledge about food labelling, value addition (e.g., organic foods), and be able to advise on healthy diet (e.g., for fitness and sports, diabetes, cancer and AIDS/HIV, heart health, kidney disease, osteoporosis, weight loss and obesity).

The study results on competencies related to technical subject matter expertise revealed that agricultural extension professionals need more practical, hands-on training on how to demonstrate technical knowledge in their basic discipline (e.g., field crops/ livestock/ fishery/ horticulture, etc.). As adult educators, extension professionals need to understand adult learning principles and have the practical skills required to teach improved farming practices, understand new technology being promoted- i.e., what it is, why and how it works- and facilitate farmers' access to inputs and services. The increasing climate and environmental challenges require that extension professionals should be able to increase awareness and educate community members about various types of risks and uncertainties, climate change, and climate- smart agriculture; refer to and make use of publications such as journals, research reports for relevant updates; and generate knowledge or produce research reports /journal publications; harness, document, validate, and integrate local / indigenous knowledge; and understand the social system under which farming takes place (e.g., rural sociology knowledge) to improvethese competencies.

4.10.3 Strategies to Make the Agricultural Extension Curriculum Robust and Practical

The strategies that already exist to make the undergraduate extension curriculum robust and practical, according to the extension professionals, are providing students with broad-based general agricultural courses (e.g., crop and animal production, postharvest, marketing, and joint ventures) along with extension training; recruiting highly qualified extension staff or faculty; and including instruction on research and data analytical skills. These strategies specifically focus on developing technical skills and competencies of extension professionals. Achieving this requires a well-focused, practically oriented curriculum, and functional and sustainable resources for its transaction. Because the ratio of student to faculty is high and the majority of faculty in most universities are at lower levels, recruitment of highly qualified faculty should be emphasized.

The strategies that do not exist but are essential to have are providing practical and contemporary skills (e.g., through mentored internship or attachment to a progressive farmer in a crop season); includingvarious soft skills in the extension curriculum; including business management concepts and practices in the extension curriculum; exposing students to market opportunities, linking farmers with service providers, and developing entrepreneurship; offering training of trainer workshops for extension faculty members; developing cutting-edge and practical teaching learning resources – extension textbooks, practical handbooks, training manuals; incorporating youth development, gender issues, urban/suburban agriculture, and

climate change concepts in the extension curriculum; and making undergraduate extension curriculum/pedagogy more ICT oriented. This means major reforms and revitalization of undergraduate agricultural extension curriculum in the universities. The curriculum for pre-service training should be inclusive, balanced for required skills and competencies (process/soft and technical skills and competencies); and transacted using ICTs and practical and student-oriented pedagogies. Whether this is possible highly depends on the learning / teaching infrastructure/resources, funding, and quality and quantity of human resources in the universities. Building competent and well-prepared human capital (quantity and quality) in the university is essential for developing and implementing desired curriculum for training the workforce for extension services and, agricultural and rural development. Suvedi and Sasidhar (2020) affirmed this when they recommended that universities offering agriculture improve the quality of the workforce for agricultural and rural development by restructuring the curriculum to include broad issues facing our society today, such as women and agriculture, food safety and marketing, nutrition, and the environment, including climate change, water, and land use issues, rather than focus narrowly on production agriculture.

4.10.4 Appropriate Ways to Acquire Core Competencies

The study results indicated that appropriate methods to acquire process skills and competencies and enhance the skills and core competencies of agricultural extension professionals are through pre-service training by revising or updating the UG curriculum, internship/industrial training at various work environments (i.e., public institutions, NGOs, private companies, etc.) during the UG program, basic induction training (e.g., job orientation training at the beginning of job), in-service training (training offered during the employment period), and providing opportunities to attend trainings, seminars, workshops, webinars, etc. There is a need for more training on practical-oriented aspects of extension service delivery. Students should attend internships for at least two weeks in an agricultural-based institution or in rural communities to give them the required exposure and experience of the real world and rural system. This would not only prepare them for jobs in future but also help them continually develop skills while in school. As interns in public/private extension firms, they can get hands- on experience of what it entails to be an extension agent.This was confirmed by Ojomo and Ogbemi (2018), when they asserted that industrial training offers the students a chance to put what they have learned at the university to work in the kinds of real-life situations they will come up against when they start their careers. Also, Ifeanyi-Obi et al. (2013) posit that industrial training affords students the opportunity of familiarizing with and getting needed experience in handling equipment and machinery that are usually not available in their institution. Also, commitment to involving technical experts from agricultural institutions and firms and lead farmers has potential to increase students' skills and experience as they practically learn from others' experiences and knowledge garnered over the years. The current approach of depending solely on the university farm, given the poor state of infrastructure and funding, is not adequate or learner friendly, and it discourages students from acquiring essential skills and competencies. Agricultural extension professionals are expected to acquire core skills and competencies through pre-service training.The integration

of scientific research training into undergraduate education courses is becoming increasingly popular. It has been argued that research-based learning should be the standard for any undergraduate education (Obwegeser and Papadopoulos, 2016) to provide a diverse range of high-quality, well-mentored undergraduate research opportunities as well as extensive knowledge of evidence-based agriculture and effective agricultural practice. Students can then use that specialized, up-to-date knowledge base, along with other skills and competencies, to assist smallholder farmers' productivity, improve sustainability and access to markets, etc., by identifying and addressing the complexities of problems affecting these issues (Agunga et al., 2017).

Also, extension professionals acquire important skills and competencies through in-service/ induction training organizedin the work environment (federal, state ministries of agriculture, Federal Department of Extension, private sector employers, and NGOs), but as reported by scholars most of their focus has been on technical issues such as crop production, plant protection, and animal health management, which are also offered in classroom settings (Suvedi and Sasidhar, 2020). In a public extension organization such as the Agricultural Development Programme (the agency with policy mandate for extension and advisory services in the 36 state of the federation, including the state capital), such trainings are organized fortnightly (frontline extension workers), monthly, and quarterly (extension administrators and subject matter specialists), but because of poor funding and logistic support problems, some of such meetings are rarely organized or poorly coordinated. The non-governmental organizations (national and international) and few private sector firms are more committed to organizing such training on the needed competencies, both technical and soft competencies, though with greater emphasize on technical skills and competencies. Public-private partnerships being promoted and used in Nigeria appear to be one of the major opportunities explored by public extension workers for acquiring updated competencies and skills. Opportunities for participation of professionals in development opportunities such as conferences, workshops, and webinarsare very limited by lack of budget for such trainings. The cumulative effect of this lack of professional development opportunities is low motivation among extension workers and poor performance of the agricultural extension system.

4.10.5 Major Barriers to Effective Implementation of the Extension Worker Training Curriculum

Many factors work against the effective implementation of undergraduate agricultural extension curriculum in Nigeria (Table 4.16). The major barriers include budget to support practical learning experiences, classroom and demonstration facilities, teacher motivation to teach required process skills and competencies, student motivation to study extension and engage in practical extension work, development of an effective extension curriculum, quality textbooks and/or manuals, quality faculty to teach extension courses, and accreditation of curriculum. This view is consistent with the findings of Ayansina and Adeogun (2017) that insufficient funds, poor access to information, increased workload and lack of personal motivation, unfair evaluation system, and lack of incentives, inadequate training opportunities,

and ineffective training delivery methods were the pressing barriers. This agrees with the view of Harder et al. (2010) that the barriers preventing extension personnel from developing cross-cultural competencies were financial costs, limited time, and job commitments. This corresponds with the findings of Ifeanyi-Obiet al. (2013), who noted that the universities and polytechnics in less developed countries, where agricultural extension officers are trained, do not have the required facilities for preparing agricultural extension graduates and imparting necessary information and communication technology skills to them. Finally, they noted that experts are not involved in the review of the undergraduate extension curriculum at the national level, and as a result, little room is created for core and important extension courses. The above assertions correspond with the findings of Suvedi and Sasidhar (2016), who noted that the main obstacles to effective deployment of extension curricula include inadequate budget to support practical learning, limited quality faculty to teach extension courses, a lack of student motivation in practical work, a lack of teacher motivation to teach required process skills and competencies, poor classroom and demonstration facilities, and a lack of quality textbooks and/or training manuals. In addition, Darko et al. (2016) and Diise et al. (2018) observed that inefficient teaching and learning of practical agriculture, incompetent agricultural instructors and teachers, and a lack of fundamental teaching and learning resources are responsible for the phenomenon of unskilled agricultural graduates. The above barriers are directly or indirectly related to funding of universities, particularly the public universities. Over the years, universities in Nigeria have struggled with the challenges of poor funding of infrastructure, training resources, and manpower development needs. This has grossly undermined efforts to achieve academic excellence, innovative training, and manpower development in the system and for industry andthe world of work. Capacity development and training opportunities for faculty have received little or no financial support and has far- reaching consequences on the quality of faculty and graduates, who by employment are recycled back to the system. A well trained,competent workforce in the agricultural education, research, and extension organization is paramount for a sustainable food and agricultural development system. Equally, extension cannot sustain itself unless it has technically and professionally competent people from the grassroots to the national leadership level (Suvedi and Sasidhar, 2020).

The student-related barriers to implementing extension workers' training curriculum such as lack of motivation to read agriculture and participate in extension work are connected to the general poor image of agriculture, weak curriculum and traditional pedagogy, limited learning resources, and poor learning environment. Innovative, competency- based curriculum holds great potentialfor attracting highly motivated students to study agricultural extension. However, this is not possible without favourable agricultural policy and active supportof the government and actors in the agricultural sector, and a sustainable funding base for the universities.

CHAPTER 5 : CONCLUSIONS AND IMPLICATIONS FOR POLICY

5.1 Implications for Policy

To strengthen the undergraduate extension policy in Nigeria, the following strategies have been proposed:

a. Improve pre-service education at universities offering agriculture.

b. Strengthen agricultural extension as a field of study.

c. Improve in-service training and professional development.

d. Build capacity of university extension faculties.

e. Revitalize the agricultural extension curriculum.

5.1.1 Improve Pre-service Education at Universities offering Agriculture

Agricultural extension education is necessary to enable students to acquire the necessary skills and knowledge in extension education with a view to imparting this knowledge and these skills to farmers and other stakeholders for better productivity. Universities offering agriculture in Nigeria are considered as centres of excellence for training extension professionals, who should be competent in improving the sustainable food and agricultural systems of the growing population. Thus, these universities should offer training on process skills and core competencies that are contemporary and fundamental to improving the effectiveness of extension professionals.

The undergraduate extension program, which is a pre-service training program in the universities, should be improved to incorporate practical-oriented courses that address the identified process skills and core competencies. Specifically, the UG extension curriculum should be continually updated and modified to reflect these areas of competencies needed by extension professionals in the context of changing agricultural and food systems. For example, the course contents should be updated to incorporate contemporary issues such as digital extension, entrepreneurship, market-led extension, nutrition, privatization of extension, gender issues, health-related issues, urban agriculture, and cross-cutting issues (climate change, HIV/AIDS, food security, and international trade, among others). Also, the UG curriculum needs to allocatemore time to the acquisition of practical-oriented skills. The curriculum should be demand-driven and based on the opinions of people in the field, companies, NGOs, etc., and all stakeholders in extension should make their inputs in the revitalized curriculum.

Additionally, it is important for students to be exposed to more internship programs in agricultural industries. Such industrial training affords students the opportunity of familiarizing with and exposing themselves to needed experience in areas of agriculture that may not be available in their institution. It is quite commendable that students of agricultural extension are exposed to a series of hands-on-experience training on farm and related industries in their fourth year of the program. However, there is a need for more training on practical-oriented

aspects of extension service delivery during other years of the program, and students should have at least two weeks of practical exposure in rural communities during each semester. Also, the adopted village concept should be revisited and incorporated into the curriculum.

The majority of the courses are taught using traditional lecture methods. There is a need to address the issue of a more appropriate instructional methodology that leads to desired learning outcomes. Information and communication technology-based pedagogies should be encouraged and promoted to enhance learning and acquisition ofthe wide spectrum of knowledge and skills required in a highly competitive world of work. This would enable students to take advantage of new opportunities and acquire worldwide access to knowledge and information. There is also need to provide enabling environments and facilities to teach students. A favourable school environment increases students' interest, attention and focus, promotes meaningful learning experiences, improves student performance, and motivates students to practice higherlevel critical thinking skills.

5.1.2 Strengthen Agricultural Extension as a Field of Study

Generally, the agricultural extension system in Nigeria is inefficient because the limited number of extension agents have poor skills. This has made it increasingly difficult for the public extension system to adequately respond to the diversified extension needs of the rural clients. It would be quite encouraging to see an increased enrollment of students in agricultural extension in the past few years if results from the FGDs had not revealed that the increased enrollment of students is basically due to their rejection from other preferred fields of study. Most students are not encouraged or motivated to pursue a career in agricultural extension, perhaps because they are not sufficiently aware of the benefits of studying agricultural extension and appear to regard a career in agricultural extension as an alternative option when other preferred career paths fail. They see the course as completely devoted to production and farming, which they believe is a low-paying, low-status, male-oriented, and field-oriented career that is tedious and arduous. Hence, it is important to strengthen the undergraduate extension curriculum to make it more attractive to students.

Agricultural extension as a field of study needs to be transformed, and the instructional delivery system needs to incorporate a team-based, experiential, and learner-centered approach. Universities offering agriculture could improve the quality of the workforce for agricultural and rural development by restructuring the curriculum to include broader and emerging issues such as climate change, food systems, renewable energy, food safety, development, health-related issues, and gender issues to equip graduates to deal with the changing agricultural scenarios and new agricultural challenges. In designing the new curriculum, it is important to incorporate extension courses from the first year, and to deemphasize theoretical teaching (which currently dominates the curriculum) and emphasize practical teaching.Seeking partnerships with all key stakeholders, particularly policymakers and those in the private sector, could provide the needed assistance in developing and implementing the revised and updated curriculum.

Furthermore, it is also important to integrate scientific research training into the undergraduate extension courses to provide a diverse range of high-quality, well-mentored undergraduate

research opportunities as well as knowledge of proper evidence-based agriculture and effective agricultural practices. These will prepare students to assist smallholder farmers and other extension clients.

5.1.3 Improve In-service Training and Professional Development

Pre-service training cannot of itself be expected to prepare extension agents fully to meet rising expectations, especially against the background of a rapidly changing social, economic, and educational environment. It has to be supplemented by on-going in-service training and professional development if the ideal of lifelong learning is to be realized for members of the agricultural extension profession.In-service training is offered by the employing organization from time to time for the development of skills and knowledge that will contributetoward more effective, efficient, and competent rendering of service in various fields and to diverse groups of people. It promotes the professional growth of individuals. “It is a program designed to strengthen the competencies of extension workers while they are on the job” (Malone, 1984). In-service training is a problem-centered, learner-oriented, and time-bound series of activities which provide the opportunity to develop a sense of purpose, broaden perception of the clientele, and increase capacity to gain knowledge and mastery of techniques.

The results from the focus group discussionsrevealed that the government generally hires people with little or no expertise in agricultural extension who lack the necessary skills to pass on knowledge to farmers. The public extension practitioners noted that there are few experts with the requisite pre-service extension training among extension workers in Nigeria. This points to the need to hire employees with a background in agricultural extension and to continually train and update them on new challenges in the field. Also one of the graduate student participants affirmed that the majority of the skills and information they use at work was as a result of the in-service training received at the place of work and not necessarily what they learned from school at the undergraduate level.

The extension faculty participants suggested that, because of changing agricultural situations, new issues encountered by farmers, new capacities needed among extension employees to solve these challenges, new labor market trends, and achievements made in the area of extension,university lecturers urgently need training and updating, particularly refresher training on decentralized, demand-driven, and pluralistic extension services design, execution and assessment.Given that learning is a lifelong journey, encouraging lecturers to participate in intra- and extra- university conferences, seminars, and workshops would be a cost-effective technique for enhancing their capacities and expertise.

A good in-service training should focus on:

1. Improving the quality of programming for the development of extension professionals in service.
2. Promoting the professional growth of individuals.
3. Providing the opportunity to develop a sense of purpose.

4. Broadening the perception of the clientele.

5. Increasing capacity to gain knowledge and mastery of techniques.

In addition to the factors described above, new technologies are other reasons for paying attention to extension workers' professional development. For instance, ICT is not merely another subject to be added to the curriculum. Changing the way in which knowledge can be accessed can alter every aspect of teaching and learning. Therefore, it must be accompanied by adequate in-service training for extension workers.

5.1.4 Capacity Building of University Extension Faculty Members

The results of the online survey and FGDs reported that upgrading and updating the knowledge and skills of extension faculty members is an urgent need. Therefore, a resource book needs to be developed to provide extension faculty members with a guide to teaching the proposed revised undergraduate curriculum.The resource book would cover all the identified process skills and competencies and should be available online. Also, an extension education centre should be established in the universities. The centre should serve as a dynamic research and capacity-building hub of innovative learning and research with resource materials such as Internet-based technologies, teaching guides and manuals, audio- and videotapes, and digital and print media.

Agricultural extension faculty members particularly require refresher training on decentralized, demand-driven, and pluralistic extension services design, execution, and assessment. A deliberate policy of training the lecturers should be enforced in the universities to continually update teachers' capacity. Encouraging their participation in intra- and extra- university conferences, seminars, and workshops is a cost-effective method of further developing their capabilities and competence.

5.1.5 Curriculum Revitalization

The curriculum employed for training agricultural extension professionals in the university is expected to support development of critical skills and competencies for relevance in the ever-changing and competitive world of work. The bachelor's degree programme in agriculture is regulated by the National Universities Commission. The NUC recommendation requires that curriculum for training agricultural extension professionals should be revised every five years and a two- way communication strategy be used for periodic evaluation of competency and work output of graduates. In the university, the procedure for achieving that is centralized, top- down, not inclusive, and lacking in private sector/industry participation and partnership. Therefore, it is not responsive to evolving competency needs of extension professionals. The university lacks functional linkages and alliance with relevant industry, despite their widely recognized involvement in extension and advisory services. Therefore, the process should be participatory, involving stakeholders including the private sector, NGOs, industry, graduates, extension practitioners, and clients, and it should reflect key concerns and needs for which competencies and skills are developed.

Generally, the curriculum is largely aligned with the recommended competence domains but biased towards technical skills and competencies, both by the number of courses, credit unit assigned and course contents. Some emerging and relevant subject areas of skills and competency needs - such as uncertainty, climate change, gender and diversity, personal and professional development, soft skills- are not well covered. Also, the skills and competencies targeted in some courses (such as Rural Youth Programme, Extension Education and Psychology in Extension)are either not specified, limited, or outdated. The course contents of the core prescribed extension courses are largely outdated, theory loaded, and repetitive, and courses lack specific guide for practical and hands-on experience. Therefore, we recommend revitalizing the university undergraduate curriculum for training agricultural extension professionals with new subjects/contents and courses to meet the needs of today's agriculture and the competency challenge. The curriculum should be designed to equitably impart technical and soft skills and competencies required for today's extension and advisory services. The course contents need to be reviewed and enhanced by incorporating emerging subject matter areas, and structured to impart requisite skills and competencies demanded by the evolving agriculture and food system, global trends, and labour market. Universities should dedicate the credit hours allocated to outdated, irrelevant courses with unspecified competency domain to newly developed courses and restructure or expanded existing ones. In revising curriculum, the expected skills and competencies for each course should be clearly stated to guide contents, credit hour allocation, and transaction of the curriculum. In addition to aligning course contents to the targeted competency domains, curriculum development should include practical/ activities sections and appropriate pedagogy to facilitate realization of the intended learning outcome and competency development by the learners. The use of the university farm, a one- week tour to agricultural institutions and commercial farms, and the one- day extension outreach in the practical year is inadequate for the required hands-on training and experience, particularly with limited infrastructure/facilities, time, and inadequate logistic support to of lecturers. The field visit and rural experience should not be limited to only the fourth year butbe organized at least once every year for exploration and outside learning. It should engage experts or lead farmers to impart skills from their wealth of experience and attach students to farms to develop critical skills for extension education, planning, implementation, etc.

Apart from the quality of content and courses in new and emerging areas, there is a need to address the issue of having an appropriate instructional methodology that leads to desired learning outcomes. Information and communication technology-based pedagogies should be encouraged and promoted to support traditional methods for enhanced learning and acquisition of the wide spectrum of knowledge and skills required in a highly competitive world of work. There is also need for the university to provide an enabling environment and facilities to teach students. A favourable school environment creates an optimal setting that increases students' interest, attention and focus; promotes meaningful learning experiencesand student performance; and motivates students to practice higher level critical thinking skills. A deliberate policy of training the lecturers should be enforced in the universities since innovation and knowledge system is a continuous process that required capacity update on the part of the teachers.

REFERENCES

Adams, I. (2014). Perceived competencies of agriculture extension workers in extension services delivery in northern region of Ghana: Perspective from literature. *Developing Country Studies*, 4 (15), 107 – 114.

Adedotun, A. (2022). *Agriculture in Nigeria: 7 Interesting Facts &Statistics*. Retrieved from https://babbangona.com/agriculture-in-nigeria-7-interesting-facts-statistics/

Adegebo, S., Olutegbe, N., & Akinbile, L. (2017). Effect of privatization of agricultural extension services on productivity of fadama III beneficiaries in Oyo State, Nigeria. *Journal of Agricultural Extension, 21*(3), 152-161.

Adisa, T.A., Akut, K.,&Haruna, V. (2016). Enhancing capacity building in agricultural extension service delivery in Nigeria: A review of challenges and prospects. *International Journal of Science Academic Research*, 2 (1), 29 – 32.

African Development Fund, ADF (2020). *Fadama development project appraisal report*. Retrieved from https://projectsportal.afdb.org/dataportal/VProject

AgriVoc. (2015). *Handbook on teaching methods in agricultural studies. The experience of higher education institutions from Serbia and Bosnia and Herzegovina*. Laktasi, Grafomark.

Agunga, R., Sleshi, R., &Hassen, R. (2017). Towards a professionalism of agricultural extension: Key to promoting extension effectiveness in Africa. *Sustainable Agriculture Research*, 6(2), 81 – 92.DOI:10.5539/sar.v6n2p81

Agunloye, A.O., Fasina, O.O., &Akinnagbe, O.M. (2017). Effects of national fadama III programme on the scope and scale of beneficiaries' farming activities in South West Nigeria. *Journal of Agricultural Extension, 21* (2), 79 – 90.

Aker, J. C. (2011). Dial "A" for agriculture: A review of information and communication technologies for agricultural extension in developing countries. *Agricultural Economics, 42* (6), 631-47. DOI: https://doi.org/10.1111/j.1574-0862.2011.00545.x.

Altalb, A.A.T., Filipek, T., &Skowron, P. (2016). The role of agricultural extension in the transfer and adoption of agricultural technologies. *Asian Journal of Agriculture and Food Sciences*, 3 (5), 500-507.

Amadi, N. S., &Adejoh, G. (2020). Strategies for re-orienting agricultural education towards hands on experience in Rivers State Universities. GSC Advanced Research and Reviews 2007, 1-136.https://docplayer.net/18242637-Benchmark-minimum-academic-standards-for- undergraduate-programmes-in-nigerian-universities.html

Ayansina S.O., &Adeogun S.O. (2017). Professional competency needs of agricultural extension agents of Ogun state agricultural development programme (OGADEP). *Ife Journal of Agriculture, 29*(2), 28-38. https://ija.oauife.edu.ng/index.php/ija/article/download/67/54/144

Babu, S.C., Ogunniyi, A., Balana, B., &Andam, K.S. (2020). National extension policy and state level implementation: The case of Niger State, Nigeria. *IFPRI Discussion Paper 01942*, June 2020.

Badiru, I. (2015). Sustainability of the benefits derived from fadama II critical ecosystem management project in Eriti Watershed of Ogun State. *Journal of Agricultural Extension, 19*(2), 136-146.

Baker, M. (2015). Developing the capacity of middle-level tertiary education in preparing and nurturing young entrepreneurs in Sub-Saharan Africa. Innovation for Agricultural Training and Education (InnovATE). USAID/BFS/ARP-Funded Project Award Number: AID-OAA-L-12-00002.https://innovate.cired.vt.edu/wp-content/uploads/2015/09/BakerEntreprenEdFINAL.pdf

Banful, A. B., Nkonya, E., &Oboh, V. (2010). *Constraints to fertilizer use in Nigeria: Insights from agricultural extension service*. International Food Policy Research Institute. https://www.ifpri.org/publication/constraints-fertilizer-use-nigeria-0

Berthe, A. (2015). *Extension and advisory services rural extension services for agricultural transformation*. Background Technical Paper: Feeding Africa, 21-23 October 2015. https://www.afdb.org/fileadmin/uploads/afdb/Documents/Events/Dak Agri2015/Extension_and_Advisory_Services_

Bjornlund, V., Bjorlund, H., &Rooyen, A.F.V. (2020). Why agricultural production in sub-Saharan Africa remains low compared to the rest of the world – a historical perspective. *International Journal of Water Resources Development, 36* (1), 20 – 53.

Bindlish, V., &Evenson, R. E. (1997). The impact of T&V extension in Africa: The experience of Kenya and Burkina Faso. *The World Bank Research Observer 12,* (2), 183-201.

Camillone, N., Duiker, S., Bruns, M. A., Onyibe, J.,&Omotayo, A. (2020). Context, challenges, and prospects for agricultural extension in Nigeria. *Journal of International Agricultural and Extension Education, 27* (4),144 – 156. doi: 10.5191/jiaee.2020.274144

Catherine, P., et al. (2022). The role of agricultural extension in Africa's development: the importance of extension workers and the need for change. *International Journal of Agricultural Extension. 05* (01) 59-70.

Clark, N. (2006). *Application of the innovation systems perspective in the African higher education sector: Experiences and challenges*. Paper presented at the Innovation Africa Symposium, Kampala, Uganda. 21–23 November.

Central Intelligence Agency. (2019). Nigeria. *In The world fact book*. https://www.cia.gov/library/publications/the-world-factbook/geos/ni.html

Centre for Research on Innovation and Science Policy (CRISP). (2015). *Report on the capacity needs assessment of extension and advisory service (EAS) providers in India*. Hyderabad, India: CRISP.

Charlton, B. G. (2006). Lectures are such an effective teaching method because they exploit evolved human psychology to improve learning. *Med Hypotheses, 67* (6), 1261-5. doi: 10.1016/j.mehy.2006.08.001

Chikaire, J. U., Emerhirhi, E., Anyoha, N. P., &Onoh, P. A. (2018).Perceived competencies of agricultural extension and advisory services providers in building rural farmer capability in Imo State Nigeria. *International Journal of Research in Agriculture and Forestry, 5*(6), 25 – 32.

Cooper, A. W., & Graham, D. L. (2001). Competencies needed to be successful county agents and county supervisors. *Journal of Extension, 39* (1), 1-11.

Danladi, K. (2015). *A study of the use of mobile phones for participatory extension services in Gombe State Fadama Project.* Master's thesis,Ahmadu Bello University, Zaria. Retrieved on 16/7/2016 from: kubanni.abu.edu.ng

Danson-Abbeam, G., Ehiakpor, D.S., &Aidoo, R. (2018). Agricultural extension and its effect on farm productivity and income: insight from Northern Ghana. *Agriculture and Food Security, 7* (74), 1-10. DOI: https://doi.org/10.1186/s40066-018-0225-x

Darko, O., Yuan, S., Okyere, D., Ansah, C. O.,& Liu, J. (2016). Agricultural science as a component of the curriculum of senior high school integrated science in Ghana: Its effects and the way forward. *Journal of Agriculture and Research, 2* (6), 20-48.

Davis, K. (2015). *The New Extensionist: Core Competencies for Individuals. GFRAS Brief 3*. Lindau, Switzerland: The Global Forum for Rural Advisory Services.

Davis, K., &Sulaiman, R. (2014). The new extensionist: Roles and capacities to strengthen extension and advisory services. *Journal of International Agriculture and Extension Education, 21*(3), 6 – 18. doi:10.5191/jiaee.2014.21301

Davis, K., &Terblanche, S. (2016). Challenges facing the agricultural extension landscape in South Africa, Quo Vadis? *South African Journal of Agricultural Extension, 44* (2), 231 – 247.

Davis, K., Ekboir, J., Mekasha, W., Ochieng, C. M. O., Spielman, D. J.,&Zerfu, E. (2007). Strengthening agricultural education and training in sub-Saharan Africa from an innovation systems perspective: Case studies of Ethiopia and Mozambique. *IFPRI Discussion Paper 00736*, 1-80.

Dawd, G., Montague, W. D., & Barbara, J. S. (2019). Challenges and opportunities to the African agriculture and food systems. *African Journal of Food, Agriculture, Nutrition and Development 19* (1), 14190-14217.

Developing Local Extension Capacity (DLEC) Project. (2017). *Nigeria: In-depth assessment of extension and advisory services.* Feed the Future, USAID.

Diesel, V., &Miná, D. (2016). The Brazilian experience with agro-ecological extension: A critical analysis of reform in a pluralistic extension system. *The Journal of Agricultural Education and Extension, 22* (5), 415–433. Doi: 10.1080/1389224X.2016.1227058

Diise, A. I., Zakaria, H., & Mohammed, A. A. (2018). Challenges of teaching and learning of agricultural practical skills: The case of deploying project method of teaching among students of Awe senior high school in the Upper East Region, Ghana. *International Journal of Agricultural Education and Extension, 4* (2), 167-179.

Dockès, A. C. S., Chauvat, P., Correa, A., Turlot, A., & Nettle, R. (2019). Advice and advisory roles about work on farms. A review. *Agronomy for Sustainable Development 39* (2), 1 -14. https://doi.org/10.1007/s13593-018-0547-x

Eastwood, C., Ayre, M., Nettle, R., and Rue, D. B. (2019). Making sense in the cloud: Farm advisory services in a smart farming future. NJAS - *Wageningen Journal of Life Sciences* 90–91: 100298. doi: 10.1016/j.njas.2019.04.004

Ejiofor, T., Bassey, N., Onu, F., Okechukwu, C. F.,&Nwoke, R. C. (2021). *Integration of ICT tools in agricultural education curriculum for quality instructional delivery*. Retrieved from https://www.researchgate.net/publication/351249268_INTEGRATION_OF_ICT_TOOLS_IN_AGRICULTURAL_EDUCATION_CURRICULUM_FOR_QUALITY_INSTRUCTIONAL_DELIVERY

Fanzo, J., Marshall , Q., Wong, J., Jaber, M., Souza, A., & Verjee, N. (2013). *The integration of Nutrition into Extension and Advisory Services: A synthesis of Experiences, Lessons and Recommendations*. Lindau: Global Forum for Rural Advisory Services. Retrieved from http://www.fsnnetwork.org/sites/default/files/gfras_nutrition_report.pdf.

Fawowe, B. (2020). The effects of financial inclusion on agricultural productivity in Nigeria. *Journal of Economics and Development, 22* (1), 61 – 79.

Federal Government of Nigeria (FGN). (2008). *National Food Security Program*. Federal Ministry of Agriculture andWater Resources, Abuja, Nigeria.

Federal Ministry of Agriculture and Rural Development. (2016). *The agriculture promotion policy (2016 – 2020)*. http://nssp.ifpri.info/files/2017/12/2016-Nigeria-Agric-Sector-Policy-Roadmap_June-15-2016_Final.pdf

Federal Ministry of Agriculture and Rural Development. (2022).Mandate retrieved 12/07/2022 fromhttps://ext.fmard.gov.ng/mandate/

Federal Ministry of Agriculture and Rural Development, Food and Agricultural Organization and Global Alliance for Improved Nutrition. (2017). *Agricultural Sector Food Security and Nutrition Strategy 2016 – 2025*. The Federal Republic of Nigeria.

FMARD and UNDP (2015). Knowledge Management Framework for Stakeholders in the Agricultural Sector in Nigeria.

Food and Agriculture Organization of the United Nations (FAO). (2019). Nigeria. *In FAOSTAT*. http://www.fao.org/faostat/en/#country/159

Food and Agriculture Organization. (2021). *Nigeria agriculture at a glance*. Retrieved from http://www.fao.org/nigeria/fao-in-nigeria/nigeria-at-a-glance/en/

Fredua-Kwarteng, E. (2019). *African Universities – imitation or adaptation?* University World News: The Global Window on Higher Education. Retrieved from: https://www.universityworldnews.com/post.php?story=20191210152711186

Freer, T.J. (2015). *Modernizing the agricultural education and training curriculum. Innovation for agricultural training and education*. Retrieved from: https://innovate.cired.vt.edu /wp-content/uploads/2015/09/Thematic-Study-Modernizing-AET-Curriculum_ 112415 -FINAL.pdf

Gamble, W. K., Blumberg, R. L., Johnson, V. C., &Raun, N. S. (1988). *Three Nigerian Universities and their roles in Agricultural Development*. U.S. Agency for international Development.

GFRAS. (2012). *The new Extensionist: Roles, strategies, and capacities to strengthen extension and advisory services*. (Sulaiman, R.V., and Davis, K., Eds.).Global Forum for Rural Advisory Services, Switzerland. http://www.g-fras.org/en/knowledge/gfras-publications. html? Download=126: the-new-extensionist-position-paper

GFRAS. (2017). *The new extensionist learning kit. Global Forum for Rural Advisory Services*, Switzerland. http://www.g-fras.org/en/knowledge/new-extensionist-learning-kit-nelk.html 5

Halimatou, H., Claudio, S., Sabrina, R., & Roland, L. (2016) Nigeria's National Fadama Development Project Series: How to Build a Pilot into a National Program through Learning and Adaptation. *Global Delivery Initiative*, 1-29

Harder, A., Lamm, A., &Vergot, P. I. (2010). Explore your world: Professional development in an international context. *Journal of Extension*, 48(2). http://www.joe.org/joe/2010april/a3.phpKnowles

Harry, A., & Abudu, S. (2022). Challenges of effective agricultural extension service delivery in Nigeria. *Bush Wealth Academic Journal,* 1(1). 13-17. Retrieved from https://bwjournal.org/index.php/bsjournal/article/view/174

Hawkins, R.,&Olajide, S. (2020). *Insight into agricultural education in Nigeria: a scoping study to identify potential areas of NL support*. Netherland Enterprise Agency: 1-87www.icra.globalhttps://www.gsconlinepress.com/journals/gscarrDOI: https://doi.org /10.30574/gscarr.2020.5.3.0114

Helena, P., Just, D., Mona, D., Christine, P., & Gerard, B. (2019) *Enhancing Food Systems in Nigeria Scope and Perspective for Dutch Policy Interventions*. Wageningen University & Research. https://edepot.wur.nl/478505

Hima, H., Santibanez, C., Roshan, S., &Lomme, R. (2016). *The Nigeria Fadama National Development Series: How to build a pilot into a national program through learning and adaptation*. World Bank, Washington, DC. https://openknowledge.worldbank.org/handle/10986/24413.

Ifeanyi-Obi, C., Agumagu, A., Adesope, O., Etuk, U.,&Nwakwasi, R. (2013). Assessment of SIWES programmes of agricultural extension students in Nigeria. *Agricultural Economics and Extension Research Studies, 2* (1), 17-24.

Industrial Training Fund (ITF) (2002). *Students Industrial Work Experience Scheme: Information and Guidelinefor Students Industrial Work Experience Scheme*. Nigeria: Jos.

Iroko from Sapling (2014). *History of the Faculty of Agriculture, University of Nigeria Nsukka*(1961-2014).Ugwu, S. O. C., Igbokwe E. M., Nwosu, C. C., Unaegbu, J.& Udeh, F., (Eds.). Enugu: Timex Enterprises: 1-88.

Johanson, R.,& Saint, W. (2007). *Cultivating knowledge and skills to grow African agriculture: A synthesis of research commissioned by the World Bank*. Draft paper.

Kagbu, J. H.,& Issa, F. O. (2017). Challenges of extension delivery in improving agricultural productivity in Nigerian rural economy: Critical issues. *Nigerian Journal of Agricultural Extension,* 18(3), 53-60

Kaynacki, C.,&Boz, S. (2019). Roles, responsibilities and competencies needed by extension agents in extension system. Harun, U. (ed.).*Proceedings of the Third International Conference on Food and Agricultural Economics*, 357-362.

Knierim, A., Boenning, K., Caggiano, M., Cristóvão, A., Dirimanova, V., Koehnen, T....&Prager, K. (2015). The AKIS concept and its relevance in selected EU member states. *Outlook on Agriculture*,44, 29–36. Doi: 10.5367/oa.2015.0194.

Kolawole, E.A., Isitor, S.U., &Owolabi, A. O. (2016). Determinants of training needs of extension personnel of agricultural development programme (ADP) Ekiti State, Nigeria. *Agro-Science Journal of Tropical Agriculture, Food, Environment and Extension*, 15 (3), 13 - 17

Krouska, A., Troussas, C., &Virvou, M. (2019). A literature review of social networking- based learning systems using a novel ISO-based framework. *Intelligent Decision Technologies*, 13(1), 23–39.

Kuehne, G., Llewellyn, R., Pannell, D. J., Wilkinson, R., Dolling, P., Ouzman, J., & Ewing, M.(2017). Predicting farmer uptake of new agricultural practices: A tool for research, extension and policy. *Agricultural Systems*, 156, 115–125. doi: 10.1016/j.agsy.2017.06.007.

Kuz, Y., Okwoche, V.A., & Age, A.I. (2018). The impact of national fadama III development project intervention on annual income generation among beneficiaries in Nasarawa State, Nigeria. *Pyrex Journal of Plant and Agricultural Research, 3* (2), 6 – 10.

Laurens, K. (2020). Advisory services and transformation, plurality and disruption of agriculture and food systems: towards a new research agenda for agricultural education and extension studies. *The Journal of Agricultural Education and Extension, 26* (2), 131- 140. DOI: 10.1080/1389224X.2020.1738046

Lewis, P.,& Watts, M. (2015). *Nigeria: The political economy of governance*. Washington, DC: World Bank.

Lindner, J., Dooley, K.,&Wingenbach, G. (2003). A cross national study of agricultural education competencies. *Journal of International Agricultural and Extension Education*, 10. 51-59. 10.5191/jiaee.2003.10107.

Lovett, M. (2019). *HRD strategies*. http://www.hrdstrategies.com/individual-and-organizationalcompetencies

Malabe, K. M., Wakawa, R. C., &Gwary, M. M. (2019). A Review of agricultural intervention programs and their extension delivery system in Nigeria. *Journal of Agricultural Economics*, Environment and Social Sciences,5(1&2), 72–79

Malone, V. M. (1984). In-service training and staff development. In B. E. Swanson (ed.), Agricultural extension: *A reference manual. Rome*: FAO.

Mahbuba, M. (2021). *Farmers' satisfaction on the advisory services of department of agricultural extension*.(Ph.D.Dissertation) Sher-e-Bangla Agricultural University, Dhaka.

Manoher, S., &Pooja, J. (2019). Importance of professional competency of extension personnel. *International Journal of Current Microbiology and Applied Sciences*,8(10): 1563-1573. doi: https://doi.org/10.20546/ijcmas.2019.810.182

Mansour, T.G.I., Abdelazez, M.A., &Eleshmawiy, K. H. (2022). Challenges and constraints facing the agricultural extension system in Egypt. *Journal of Agricultural Sciences – Sri Lanka, 17*(2), 241–257. DOI: http://doi.org/10.4038/jas.v17i2.9740.

Matemilola, S., &Elegbede, I. (2017). The challenges of food security in Nigeria. *Open Access Library Journal*, 4, e4185.

Mijindadi, N. B. (1994). Sustainability issues in agricultural technology transfer in Nigeria. *Proceedings of the inaugural conference of the Agricultural Extension Society of Nigeria*, 47 -56.

Mittal N., Sulaiman, R.V.,& Prasad, R. M. (2016). Assessing capacity needs of extension and advisory services: A guide for facilitators. *Agricultural Extension in South Asia (AESA).* Retrieved fromhttp://crispindia.org/wpcontent/uploads/2015/09/Facilitators-Guide-Final-LR.pdf

Movahedi, R.,& Nagel, U.J. (2012). *Identifying required competencies for agricultural extension and education undergraduates*. Retrieved from https://www.researchgate.net/profile /RezMovahedi /publication/266052204_Identifying_Required_Competencies_for_the_ Agricultural _Extension_and_Education_Undergraduates/links/5870ea0308ae329d621714 3e/ Identifying-Required-Competenciesfor-the-Agricultural-Extension-and-Education-Undergraduates.pdf

Msuya, P. C.,Annor-Frempong, F. K., Magheni, M. N., Agunga, R., Igodan C. O., Ladele, A. A., ...& Zwane, E. (2017).The role of agricultural extension in Africa's development, the importance of extension workers and the need for change. *International Journal of Agricultural Extension*, 5 (1), 59-70.

Munienge, M., Telisa, J., &Kikunga, M. (2013). Integration of ICT in education: Key challenges. International Journal of Advanced Engineering, 3(11), 515-519

Mywish, M. K. (2011). *Curriculum enhancement and reform to meet the needs of smallholder farmers in developing countries: Survey of literature*. Staff Paper Series 105395, Michigan

State University, Department of Agricultural, Food, and Resource Economics. RePEc: ags: midasp: 105395. DOI: 10.22004/ag.econ.105395.

Naswem, A. A., &Ejembi, S. A. (2017). Reviving agricultural extension for effective transition from subsistence to commercial agriculture in Nigeria. *Journal of Rural Social Sciences*, 32(1), 3 -20. Available at: https://egrove.olemiss.edu/jrss/vol32/iss1/2

National Bureau of Statistics. (2019). *Nigerian gross domestic product report (Q4 & full year 2018). National Bureau of Statistics*. https://africacheck.org/wpcontent/uploads/2019/02/GDP_Report_Q4_Full_Year_2018-1.pdf

National Fadama Coordination Office (NFCO). (2015). *Third national Fadama development project- additional financing (Fadama III AF)*. Fadama III AF 3rd Quarter Progress Report. NFCO - Abuja.

National Fadama Coordination Office. (2017).*The Federal Government of Nigeria Third National Fadama Development Project* (Fadama III) Additional Financing (AF) Credit No.: 52930-NG.NFCO - Abuja.

National Universities Commission. (2007). *Benchmark Minimum Academic Standards for Undergraduate Programme in Nigerian Universities*: AGRICULTURE. NUC- Abuja

National Universities Commission. (2018). *Nigerian University System Statistical Digest, National University Commission*. Maitama, Abuja. Retrieved from https://nuc.edu.ng/wp-content/uploads/2018/12/REVISED-April-25-Statistical-Digest-min.pdf

Njura, H. J., Kubai, K. I., Taaliu, S. T., &Khakame, K. S. (2020). The relationship between agricultural teaching approaches and food security in Kenya. *Education Research International*, 4, 1 – 18. https://doi.org/10.1155/2020/8847864

Njura, H. J.,Kaberia, I. K.,&Taaliu, S. T. (2020). Effect of agricultural teaching approaches on skills development for food security: A case of secondary schools in Embu County, Kenya. *The Journal of Agricultural Education and Extension*, 26 (3): 239-252 https://doi.org/10.1080/1389224X.2019.1680401

Netherlands Universities Foundation for International Cooperation (Nuffic). (2017).*The education system of Nigeria described and compared with Dutch system*.www.nuffic.nl/en/home/copyright

Nwachukwu, I. (2013). *Agricultural extension and rural development promoting indigenous knowledge*. Abia State: Lamb House Publications.Umuahia.

Nwaogu, F. K., & Akinbile, L. A. (2018). Competencies of agricultural development programme personnel in extension service delivery in Oyo and OgunStates. *Nigeria Journal of Agricultural Extension*, 22 (3), 40-52 https://dx.doi.org/10.4314/jae.v22i3.5

Nwoye, I., &Nwalieji, U. (2019). Male and female participation in the implementation of fadama III additional financing project among cassava farmers in Anambra State, Nigeria. *Journal of Agricultural Extension*, 23(4), 119-129.

Obadara, O. E.,&Alaka, A. (2013). Accreditation and quality assurance in Nigerian universities. *Journal of Education and Practice*,4, (8), 1-9

Obasi, R. (1995). Success story of the ADPS. *Agriscope: A quarterly Newsletter of the Federal Department of Agriculture*, 14(2):10 – 12.

Obwegeser, N., & Papadopoulos, P. (2016). Integrating research and teaching in the classroom: Benefits for teachers and students. *Journal of Information Systems Education*, 27 (4), 249-258.

Ojomo, O., &Ogbemi, O.B. (2018). Evaluation of the impact of students' industrial training on journalistic skills acquisition among polytechnic students in Delta State, Nigeria. *UNIUYO Journal of Humanities*, 22 (2), 473-490.

Okojie, J. A. (2008). Licencing accreditation and quality assurance at Benson Idahosa University: Achievements and challenges. CHEA Summer Workshop. http:/www.chea.orgpdf2008_SW_Julius_Okojie_paper.pdf

Olagunje, O. E., Onyegbula, C. B., Olagunju, O. S., &Oyegbile, S. A. (2019). Assessment of rural women participation in cassava farming in Oyo State. Madukwe, M. C. (ed.):*Proceeding of the 24th Annual Conference of the Agricultural Extension Society of Nigeria*, 112-121

Olorunfemi, T.O., Olorunfemi, O.D., &Oladele, O.I. (2020). Borich needs model analysis of extension agents' competence on climate smart agricultural initiatives in South West Nigeria. *The Journal of Agricultural Education and Extension*, 26 (1), 59 – 73.

Omotayo, A. M. (2010). University of Agriculture Abeokuta Nigeria 30th inaugural lecture 2010: *The Nigerian farmer and the elusive crown*. Department of Agricultural Extension and Rural Development, University of Agriculture Abeokuta. https://unaab.edu.ng/inaugurallectures/

Osaze, E. L. (2015). *The role of women in agricultural production in Ovia Southwest Local Government Area of Edo State, Nigeria.*(Master's thesis),Ahmadu Bello University. Retrieved from http://kubanni.abu.edu.ng/jspui/handle/123456789/7892

Osondu, C. K., Ijioma, J. C., Udah, S. C.,&Emerole, C. O. (2015). Impact of national Fadama III development project in alleviating poverty of food crop farmers in Abia State, Nigeria. *American Journal of Business, Economics and Management*, 3 (4), 225-233.

Oyelami, B., Akinwale, J., &Ladele, A. (2018). Lead farmer extension approach and sustainable extension service delivery in Oyo State, Nigeria. *Contemporary Agriculture*, 67(3-4), 233-241.

Phillip, D., Nkonya, E., Pender, J., &Omobowale, A. O. (2009). *Constraints to increasing agricultural productivity in Nigeria: A review*. International Food Policy Research Institute. http://ebrary.ifpri.org/cdm/ref/collection/p15738coll2/id/18535

Posthumus, H.,Dengerink, J.,Dhamankar, M., Plaisier, C.,&Baltissen. G. (2018). *Enhancing food systems in Nigeria: scope and perspective for Dutch policy interventions*. Wageningen: Wageningen University & Research. Royal Tropical Institute.

Prasad, R. M., Sulaiman, R. V.,& Mittal, N. (2015). Assessing Capacity Development Needs of Extension and Advisory Services (EAS): A Review. *Working Paper 2015 – 001. Hyderabad*, India: CRISP

Ramesh, P., & Krishnan, P. (2020). Professional competence of teachers in Indian higher agricultural education. *Current Science*, 118, (3)10 356-361.

Rasheed, S. V., Sreeram, V., Onima, V. T. &Nimisha (2018).*Agricultural extension curricula in India: Is it relevant to changing times?* AESA Working Paper No.4.

Rivera, W.M. (2006). *Transforming post-secondary agricultural education and training by design: Solutions for sub-Saharan Africa*. Background paper commissioned by the World Bank Washington, D.C. (AFTHD). Retrieved fromhttp://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/AFRICAEXT/EXTAFRREGTOPEDUCATION/EXTAFRREGTOPTEIA/0,,contentMDK:21146696~pagePK:34004173~piPK:34003707~theSitePK:731775,00.html

Salawu, J. A., Adedoyin, S. F., Ogunrin, S. I., & Mundi, N. E. (2008). *Introduction to Agricultural Extension and Rural Sociology*. National Open University of Nigeria. Lagos.

Sasidhar, P.V.K., & Suvedi, M. (2016). *Assessment of core competencies of livestock extension professionals in India*. Modernizing Extension and Advisory Services Project. https://meas.illinois.edu/wp-content/uploads/2016/11/MEAS-EVAL-2016-Core-Competencies-Livestock-Extension-Suvedi-and-Sasidhar-July-2015.pdf

Scheer, S. D., Ferrari, T. M., Earnest, G. W., & Connors, J. J. (2006). Preparing extension professionals: The Ohio State University's model of extension education. *Journal of Extension*, 44(4), 1-12.

Shannon, S., Joan, M., Glenn, I., Sebastian, G., & Cassandra, W. (2020). Competing roles and expectations: Preliminary data from an agricultural extension survey on COVID-19 impact. *Journal of Agromedicine*, 25 (4), 396–401 https://doi.org/10.1080/1059924X.2020.1815619

Shimali, F., Margaret, N. M.,& Margaret, K. (2021). Nutrition education competencies of agricultural extension workers in Uganda.*The Journal of Agricultural Education and Extension*, 27(4) 535-552 https://doi.org/10.1080/1389224X.2021.1880451

Sinkaiye, T., Nwserema, B., &Ajayi, A. (2018). Application of livelihood analysis among farmers in Amah community of Rivers State, Nigeria: Implication for extension agents training. *Journal of Agricultural Extension*, 11(01), 87-98. Retrieved from https://journal.aesonnigeria.org/index.php/jae/article/view/1642

Students Hand Manual. (2014).Undergraduate academic programme. *Department of Agricultural Extension, Faculty of Agriculture, University of Nigeria*, Nsukka. Enugu: University of Nigeria, Publishing Enterprise.

Sulaiman, R. V., & Davis, K. (2012). *The 'new extensionist': Roles, strategies, and capacities to strengthen agricultural and advisory services*. Lindau, Switzerland: Global Forum for Rural Advisory Services (GFRAS).

Suresh, C. B., Adebayo, O., Bedru, B., &Kwaw, S. A. (2020). National Extension Policy and State Level Implementation the Case of Niger State in Nigeria.IFPRI.*Discussion Paper 01942*. DOI: https://doi.org/10.2499/p15738coll2.133780

Suvedi, M., &Kaplowitz, M. (2016). *What every extension worker should know– Core Competency Handbook*. Department of Community Sustainability, Michigan State University East Lansing, Michigan, USA. U.S. Agency for International Development (USAID) Project Modernizing Extension and Advisory Services (MEAS).

Suvedi, M., Ghimire, R. P., &Channa, T. (2018). Examination of core competencies of agricultural development professionals in Cambodia. Evaluation and Program Planning, 67, 89-96. https://doi.org/10.1016/j.evalprogplan.2017.12.003

Suvedi, M., & Sasidhar, P. V. K. (2016). Assessment of core competencies of livestock extension professionals in India.Urbana, IL: *USAID-Modernizing Extension and Advisory Services (MEAS)*. www.meas.illinois.edu

Suvedi, M., &Sasidhar, P.V.K. (2020). *Strengthening agricultural extension training in South Asia (India, Sri Lanka and Nepal) -- Process skills and competency gaps in undergraduate agricultural extension curriculum*. Fulbright Program Research Report, Department of Community Sustainability, Michigan State University, East Lansing, MI (USA).

Tamboli, P.M., & Nene, Y.L. (2013). Modernizing higher agricultural education system in India to meet the challenges of 21st century. *Asian Agri-History 17*(3), 251-262

Tamer, G. I. M., Mahmoud, A. A., & Khairy, H. E. (2022). Challenges and constraints facing the agricultural extension system in Egypt. *Journal of Agricultural Sciences - Sri Lanka17*, (2), 241-257 http://doi.org/10.4038/jas.v17i2.9740

Taylor, P. (1998). Participatory curriculum development for agricultural education and training: Experiences from Vietnam and South Africa. In: Loy Van Crowder (ed.) *Training for Agricultural and Rural Development 1997-98*. Rome: FAO. http://www.fao.org/docrep/W9699E/w9699e00.htm

Taiwo, O. (2020). *Current state of the Nigeria agriculture and agribusiness sector.*Africa Continental Free Trade Area Agreement (AFCFTA) Workshop. September 2020. Abuja - Nigeria

Tesso, G. (2016). Economics of work motivation: Empirical studies of agricultural extension workers in Western Ethiopia. *Asian Journal of Agricultural Extension, Economics and Sociology*, 8 (4), 1 – 10.

Ufiobor, K. A. (2017). *Nigeria agriculture and sustainability: Problems and solutions*. (Bachelor Thesis) University of Applied Sciences YakeshogkolanNovia.

Umeh, B.U. (2017). *Participant farmers' access to components of Fadama III in Anambra State, Nigeria.*(Master'sthesis)University of Nigeria, Nsukka, 1 – 65.

United Nations Data. (2019). *Nigeria*. https://data.un.org/en/iso/ng.html

United States Agency for International Development (USAID). (2015). *Agricultural service providers: Finding sustainable models for strengthening livelihoods in an integrated project*. USAID Community Connector Technical Notes Series, No. 5, August 2015.Abuja -Nigeria

Vishnu, S., Suleiman, R.,&Onima, V. T. (2017). Agricultural extension curricula in India: Is it relevant to changing times? *Agricultural Extension in South Asia (AESA) Working Paper* 2018-00410.13140/RG.2.2.12658.12489.

Williams, S. K. T. (1978). *Rural development in Nigeria*. Ile-Ife, Nigeria: University of Ife Press.

World Bank. (2016a). I*mplementation completion and results report: Third National Fadama Development Project*. Abuja - Nigeria

World Bank. (2016b). *Nigeria – Third National Fadama Development Project: Additional Financing and Restructuring Project Paper*. https://www.gtai.de/GTAI/Content /DE/Trade/ Fachdaten /PRO/2016/08/Anlagen/PRO201608185003.pdf?v=1

World Bank. (2020).*Nigeria - Second National Fadama Development Project: Environmental Assessment: Environmental and Social Impact Assessment (English)*.Washington, D.C. World Bank Group. http://documents.worldbank.org/curated/en/ 308131468759551052/ Environmental-and-social-impact-assessment

World Bank. (2020). *Agriculture, forestry and fishing value added (% of GDP) – Nigeria*. Retrieved from: https://data.worldbank.org /indicator/NV.AGR.TOTL.ZS?locations=NG

Yahaya, M. K. (2020). Enhancing the role of public and private extension in soil conservation and agricultural productivity. A lead paper presented at the 25th edition of the Annual Conference of Agricultural Extension Society of Nigeria (AESON),heldat the University Auditorium, UsmanuDanfodio University Sokoto, 28th – 29th July.

Zakariya, Y.F. (2020). Exposing empirical links between COVID-19 situation report and available data: The case of Nigeria. *Diseases*, 8 (4), 38.

Strengthening Agricultural Extension Training

Process Skills and Competency Gaps in Undergraduate Agricultural Extension Curriculum in Nigeria

Dear Colleagues,

We are conducting an online survey under the research project ***"Strengthening Agricultural Extension Training in the MSU Alliance for African Partnership Consortium Partners in Africa"*** funded by Michigan State University. The core objective of this work is to identify Process Skills and Competency Gaps in Undergraduate Agricultural Extension Curriculum in Africa. You are invited to participate in this study because you have experience with skills and competencies required for effective extension work.

Process skills and core competencies are basic sets of knowledge, skills, abilities, and behaviors that agricultural extension professionals require to perform their tasks well and respond to contingencies, change, and the unexpected. Please keep this definition in mind while you answer the survey questions. The skills and competencies we are researching are categorized as follows in the questionnaire:

1. Program planning
2. Program implementation
3. Communication
4. Information and communication technologies
5. Program monitoring and evaluation
6. Personal and professional development
7. Diversity and gender
8. Marketing, brokering and value chain development
9. Extension soft skills
10. Nutrition skills and competencies
11. Technical subject matter expertise

The findings will be shared with all important stakeholders of agricultural extension education/ training for undergraduate curricular revitalization in Nigeria, Malawi, Kenya, Uganda, and South Africa in specific, and other African countries in general.

The Institutional Review Board approval for human subjects research for this study was obtained from Michigan State University. Please know that your participation in this study is completely voluntary and the information you provide will be treated with strict confidentiality

and will only be used for research purposes. You can withdraw at any time or refuse to answer any questions.

It will take approximately 25 minutes to complete this survey. We recommend that you take this survey on a Desktop or Laptop computer. As a token of appreciation, all respondents will receive a soft copy of the research report. If you have any questions regarding the study, please do not hesitate to contact us.

Please follow this link to the Survey: Take the Survey

Or copy and paste the URL below into your internet browser:

https://msu.co1.qualtrics.com/jfe/preview/SV_eA7j51dpEPqrBau?Q_CHL=preview

Follow the link to opt out of future emails:

Click here to unsubscribe

Thank you for your time and cooperation.

Sincerely,

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Research Partner from India

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Strengthening Agricultural Extension Training

Process Skills and Competency Gaps in Undergraduate Agricultural Extension Curriculum in Nigeria

1. Primarily which country's extension system do you represent? (Check one)
   - Nigeria
   - Malawi
   - Uganda
   - South Africa
   - Kenya
   - Others (Please specify the other country not listed above) _____)
2. Which university (ies) do you have deep knowledge of undergraduate education in agriculture or allied subjects? (Please write the university name(s)_____)
3. What is your current position? (Check one)
   - Extension Staff in a University
   - Extension Researcher
   - Public Sector Extension Professional
   - Private Sector Extension Professional
   - NGO Extension Professional
   - Employer of Agriculture Graduates
   - Any other (Please specify) ----------
4. Are you familiar with current undergraduate level agricultural extension curriculum in the country or institution in questions 1 and 2?
   - Familiar
   - Not familiar

Instructions: Questions A through K have two components: first you will rate the importance of each competency, and the second, you rate how well the undergraduate extension curriculum covers this competency. Please rate the importance and the level of competency on each statement on a 1 to 5 scale as explained below.

How important is this skill or competency for an extension worker?	Based on Your Answer in Question 2, How Well Does the Undergraduate Extension Curriculum Cover this Competency?
1. Not Important 2. Somewhat Important 3. Moderately important 4. Important 5. Very Important Please check a box (✓) for each statement that best represents your opinion.	1. Not at All Covered 2. Minimally Covered 3. Moderately Covered 4. Well Covered 5. Very Well Covered Please check a box (✓) for each statement that best represents your opinion.

A. Program Planning Skills and Competencies:

Job skills and competencies: Extension professionals should be:		A01					A02				
		How important is this skill or competency for an extension worker?					Based on Your Answer in Question 2, How Well Does the Undergraduate Extension Curriculum Cover this Competency?				
		1	2	3	4	5	1	2	3	4	5
1	Familiar with the vision, mission and goals of National /State (sub-national) extension service and agricultural development strategies, programs, and policies.										
2	Able to conduct needs assessment and engage stakeholders to prioritize local needs.										
3	Able to conduct baseline or benchmark studies.										
4	Able to mobilize resources / funds to address priority needs.										
5	Able to engage local stakeholders (e.g. NGOs, cooperatives, local agro-dealers) in extension program planning.										

Job skills and competencies: Extension professionals should be:		A01 How important is this skill or competency for an extension worker?					A02 Based on Your Answer in Question 2, How Well Does the Undergraduate Extension Curriculum Cover this Competency?				
		1	2	3	4	5	1	2	3	4	5
6	Familiar with administrative and financial rules of their respective organizations (to utilize human and financial resources in extension programs).										

B. Program Implementation Skills and Competencies:

Job skills and competencies: Extension professionals should:		B01 How important is this skill or competency for an extension worker?					B02 Based on Your Answer in Question 2, How Well Does the Undergraduate Extension Curriculum Cover this Competency?				
		1	2	3	4	5	1	2	3	4	5
1	Coordinate local extension programs and activities.										
2	Demonstrate teamwork skills to achieve extension results.										
3	Able to form farmers groups and support them.										
4	Engage local stakeholders (e.g., NGOs, Self Help Groups, Cooperatives) in implementing extension programs.										
5	Demonstrate negotiation skills to reach consensus and resolve conflicts.										

Job skills and competencies: Extension professionals should:		B01 How important is this skill or competency for an extension worker?					B02 Based on Your Answer in Question 2, How Well Does the Undergraduate Extension Curriculum Cover this Competency?				
		1	2	3	4	5	1	2	3	4	5
6	Follow participatory decision-making in extension work.										
7	Delegate responsibilities to staff as needed.										
8	Be able to engage minority groups (e.g. Female farmers and youth development groups) in extension work.										
9	Integrate private or public-private partnerships in extension service provision.										

C. Communication Skills and Competencies:

Job skills and competencies: Extension professionals should be able to:		C01 How important is this skill or competency for an extension worker?					C02 Based on Your Answer in Question 2, How Well Does the Undergraduate Extension Curriculum Cover this Competency?				
		1	2	3	4	5	1	2	3	4	5
1	Select appropriate communication methods.										
2	Establish communication with different stakeholders.										
3	Respect local culture while communicating with clients.										
4	Prepare required progress reports.										

	Job skills and competencies: Extension professionals should be able to:	C01 How important is this skill or competency for an extension worker?					C02 Based on Your Answer in Question 2, How Well Does the Undergraduate Extension Curriculum Cover this Competency?				
		1	2	3	4	5	1	2	3	4	5
5	Share success stories and lessons-learned with stakeholders through various media.										
6	Use extension methods (e.g., individual, group and mass contact methods) to disseminate information about extension activities and programs.										
7	Demonstrate good listening skills and listen to all clients and stakeholders.										
8	Demonstrate good public speaking and presentation skills.										

D. Information and Communication Technologies (ICTs) Skills and Competencies:

	Job skills and competencies: Extension professionals should be able to use:	D01 How important is this skill or competency for an extension worker?					D02 Based on Your Answer in Question 2, How Well Does the Undergraduate Extension Curriculum Cover this Competency?				
		1	2	3	4	5	1	2	3	4	5
1	Microsoft Word for word processing (e.g., typing, editing, printing) and designing graphics.										
2	Data entry and analysis software such as Excel, SPSS etc.										

3	Microsoft Power Point for making presentations.										
4	Audio-visual aids such as charts, graphs, and puppet show for teaching and learning.										
5	Mass media like FM radio stations and television channels for communication.										
6	Computers (email, Internet) for communication.										
7	Mobile phone services (e.g., texting, SMS service) for communication.										
8	Social media (WhatsApp, Facebook, Twitter, Instagram, etc.) for communication.										
9	ICT tools to improve access to information, knowledge, technologies and other innovations.										
10	ICT tools to enhance collaboration and partnerships.										
11	ICT tools for collecting data, monitoring, and evaluation of extension programs.										

E. Program Monitoring and Evaluation Skills and Competencies:

Job skills and competencies: Extension professionals:		E01					E02				
		How important is this skill or competency for an extension worker?					Based on Your Answer in Question 2, How Well Does the Undergraduate Extension Curriculum Cover this Competency?				
		1	2	3	4	5	1	2	3	4	5
1	Understand theories and principles of monitoring and evaluation.										

Job skills and competencies: Extension professionals:		E01 How important is this skill or competency for an extension worker?					E02 Based on Your Answer in Question 2, How Well Does the Undergraduate Extension Curriculum Cover this Competency?				
		1	2	3	4	5	1	2	3	4	5
2	Conduct monitoring and evaluation of extension programs.										
3	Develop data collection instruments - interview schedules / questionnaires- for monitoring and evaluation of extension programs.										
4	Conduct online surveys for monitoring and evaluation of extension programs.										
5	Apply qualitative tools and techniques (e.g., focus group discussion, case study etc.) to collect evaluation data.										
6	Apply quantitative tools and techniques (e.g., survey, interview, farm data, etc.) to collect evaluation data.										
7	Analyze data (qualitative and quantitative).										
8	Interpret data (qualitative and quantitative).										
9	Write evaluation report.										
10	Share evaluation reports within their organizations and with stakeholders.										

	Job skills and competencies: Extension professionals:	E01 How important is this skill or competency for an extension worker?					E02 Based on Your Answer in Question 2, How Well Does the Undergraduate Extension Curriculum Cover this Competency?				
		1	2	3	4	5	1	2	3	4	5
11	Apply the evaluation findings in replicating/scaling-up of extension programs.										

F. Personal and Professional Development Skills and Competencies:

	Job skills and competencies: Extension professionals should:	F01 How important is this skill or competency for an extension worker?					F02 Based on Your Answer in Question 2, How Well Does the Undergraduate Extension Curriculum Cover this Competency?				
		1	2	3	4	5	1	2	3	4	5
1	Apply principles of good governance (i.e., clients participation, accountability and transparency) in extension work.										
2	Show commitment to career advancement (participate in lifelong learning, in-service training, professional development events and conferences).										
3	Apply professional ethics in extension work i.e., promote research-based recommendation or technology.										
4	Follow organizational policies and directives for professional development.										
5	Demonstrate honesty and positive attitude towards extension work.										

G. Diversity and Gender Skills and Competencies:

	Job skills and competencies: Extension professionals should:	G01 How important is this skill or competency for an extension worker?					G02 Based on Your Answer in Question 2, How Well Does the Undergraduate Extension Curriculum Cover this Competency?				
		1	2	3	4	5	1	2	3	4	5
1	Understand that diversity exists within and among clients and stakeholders.										
2	Identify the needs of small-scale farmers.										
2	Identify the needs of minority groups.										
3	Develop extension programs to benefit women farmers.										
4	Develop extension programs to benefit youth.										
5	Engage marginalized and vulnerable groups in extension programs (e.g. disabled, resource poor farmers).										
6	Do teamwork with diverse staffs.										

H. Marketing, Brokering and Value Chain Development Skills and Competencies

	Job skills and competencies: Extension professionals should:	H01 How important is this skill or competency for an extension worker?					H02 Based on Your Answer in Question 2, How Well Does the Undergraduate Extension Curriculum Cover this Competency?				
		1	2	3	4	5	1	2	3	4	5
1	Have basic knowledge of agri-business development.										
2	Apply brokering / advisory skills in agri-business development.										

Job skills and competencies: Extension professionals should:		H01					H02				
		How important is this skill or competency for an extension worker?					Based on Your Answer in Question 2, How Well Does the Undergraduate Extension Curriculum Cover this Competency?				
		1	2	3	4	5	1	2	3	4	5
3	Have knowledge on different agricultural markets and linkages.										
4	Demonstrate knowledge of value chain logistics and input-output linkages in the value chain.										
5	Facilitate entrepreneurship development among extension clientele.										
6	Be able to link farmers producers' organizations / cooperatives / agri-business companies with extension.										

I. Extension Soft Skills and Competencies

Job skills and competencies: Extension professionals possess the other soft skills like:		I01					I02				
		How important is this skill or competency for an extension worker?					Based on Your Answer in Question 2, How Well Does the Undergraduate Extension Curriculum Cover this Competency?				
		1	2	3	4	5	1	2	3	4	5
1	Critical thinking										
2	Problem solving										
3	Time management										
4	Stress management										
5	Leadership										
6	Teamwork										
7	Flexibility										
8	Self-motivation										

Job skills and competencies: Extension professionals possess the other soft skills like:		I01 How important is this skill or competency for an extension worker?					I02 Based on Your Answer in Question 2, How Well Does the Undergraduate Extension Curriculum Cover this Competency?				
		1	2	3	4	5	1	2	3	4	5
9	Interpersonal skills										
10	Positive work attitude										
11	Collaboration										
12	Conflict management										
13	Group formation and development										
14	Negotiation skills										
15	Networking skills										
16	Facilitation skills										
17	Creativity /Innovativeness										

J. Nutrition Skills and Competencies

Job skills and competencies: Extension professionals should:		J01 How important is this skill or competency for an extension worker?					J02 Based on Your Answer in Question 2, How Well Does the Undergraduate Extension Curriculum Cover this Competency?				
		1	2	3	4	5	1	2	3	4	5
1	Demonstrate basic human nutrition knowledge (e.g., food composition, balanced diet, supplements, nutritional composition of various foods, nutrition deficiency symptoms etc).										
2	Understand lifecycle nutrition needs of different household members (e.g ., children of various age groups, pregnant and breastfeeding mothers, elderly).										

Job skills and competencies: Extension professionals should:		J01 How important is this skill or competency for an extension worker?					J02 Based on Your Answer in Question 2, How Well Does the Undergraduate Extension Curriculum Cover this Competency?				
		1	2	3	4	5	1	2	3	4	5
3	Able to advise families on what crops and livestock to be produced to ensure balanced diets.										
4	Advise families to improve gender relations for increased agriculture production and nutrition.										
5	Demonstrate postharvest handling technologies that conserve nutrients and food safety (e.g. food storage, freezing fruits and vegetables, making pickles, jams, jellies).										
6	Have basic knowledge about food labeling (e.g., organic foods).										
7	Able to advise on healthy diet (e.g., for fitness and sports, diabetes, cancer and AIDS/HIV, heart health, kidney disease, osteoporosis; weight loss and obesity).										

K. Technical Subject Matter Expertise/Skills and Competencies

Job skills and competencies: Extension professionals should:		J01 How important is this skill or competency for an extension worker?					J02 Based on Your Answer in Question 2, How Well Does the Undergraduate Extension Curriculum Cover this Competency?				
		1	2	3	4	5	1	2	3	4	5
1	Demonstrate technical knowledge in their basic discipline (e.g., field crops / livestock/ fishery/ horticulture etc).										

Job skills and competencies: Extension professionals should:		J01 How important is this skill or competency for an extension worker?					J02 Based on Your Answer in Question 2, How Well Does the Undergraduate Extension Curriculum Cover this Competency?				
		1	2	3	4	5	1	2	3	4	5
2	Understand adult learning principles and hold practical skills required to teach improved farming practices.										
3	Understand the new technology being promoted, i.e., what it is, why, and how it works.										
4	Facilitate farmers to access inputs and services (e.g., credit, seed, fertilizers, feed, artificial insemination, etc.)										
5	Be able to educate community members about different types of risks and uncertainties (e.g., due to market fluctuations, natural disasters, etc.).										
6	Be able to educate community members about climate change and climate smart agriculture.										
7	Refer to and make use of publications--journals, research reports, etc.										
8	Generating knowledge or producing research reports / journal publications.										
9	Able to harness, document, validate and integrate local / indigenous knowledge.										
10	Understand social system under which farming takes place (e.g., rural sociology knowledge).										

L. Additional Information about Competencies: If you feel there are additional job skills and competencies that extension professionals need, but are not listed above, please write them in the spaces below:

1.

2.

3.

4.

M. How can we make agricultural extension curriculum robust and practical? Please rate the following strategies:

Strategies for Improvement	Already exists	Good to have	Important	Essential
Provide practical and contemporary skills (e.g., through mentored internship or attachment to a progressive farmer in a crop season).				
Include various soft skills in extension curriculum.				
Include business management concepts and practices in extension curriculum.				
Expose students to market opportunities, linking farmers with service providers, and develop entrepreneurship.				
Grooming students with broad-based general agricultural courses (e.g., crop and animal production, postharvest, marketing, and joint ventures) along with extension training.				
Incorporate youth development, gender issues, urban/sub-urban agriculture, and climate change concepts in extension curriculum.				
Recruit extension faculty carefully.				
Include research and data analytical skills.				
Offer training of trainer workshops for extension faculty members.				
Develop cutting-edge and practical teaching learning resources – extension textbooks, practical handbooks, training manual, etc.				
Undergraduate extension curriculum/pedagogy should be more ICT oriented				

N. What are the appropriate ways to acquire the above-mentioned core competencies? Please rate each way or mechanism on a scale given below:

Ways to acquire core competencies:	Not appropriate	Somewhat appropriate	Appropriate	Very appropriate
Through **Preservice Training** by revising or updating the curriculum.				
Requiring **Internship** at various work environments (i.e., Public Institutions, NGOs, Private Companies, etc.) during UG, PG, or PhD programs.				
Through **Basic Induction Training** (e.g., job orientation training at the beginning of job)				
Through **In-service Training** (e.g., training offered during the employment at Universities, Training Institutes/Centers, etc.)				
Providing opportunities to attend **trainings,** seminars, workshops, webinars, etc.				

O. If you feel there are additional appropriate ways to acquire process skills or competencies but are not listed above, please write them in the space below.

P. What are the major barriers to effective implementation of extension training curriculum in your country? Please check all that apply.

- Development of an effective extension curriculum
- Quality faculty to teach extension courses
- Quality textbooks and/or manuals
- Classroom and demonstration farms or facilities
- Accreditation
- Time constraint
- Budget to support practical learning experience (e.g. filed visits and demonstrations)

- Student motivation to study extension and in practical extension work
- Teacher motivation to teach requited process skills and competencies
- Other (please specify) _____

Q. What is your age now (in years)? _____

R. What is your gender?

____ Woman

____ Man

S. What is your highest level of education? Select (P) one that applies.

____Bachelor's degree

____Master's degree

____Doctoral (Ph.D.) degree

____Other (please specify_____)

T. How long have you served in extension profession extension or agriculture related fields? (Write total number of years you have worked in extension). _____

U. If you would like to receive a copy of the research report, please provide your e-mail:

Thank you for taking the time to complete this survey!

Strengthening Agricultural Extension Training

Process Skills and Competency Gaps in Undergraduate Agricultural Extension Curriculum in Nigeria

FGD Invitation Letter

Date: ---------

To

Dear Sir / Madam,

Greetings.

We are conducting a research project **"Strengthening Agricultural Extension Training in the MSU Alliance for African Partnership Consortium Partners in Africa"** funded by Michigan State University. The core objective of this work is to identify Process Skills and Competency Gaps in Undergraduate Agricultural Extension Curriculum in Africa.

As part of this research work, we are conducting a Focus Group Discussion on **'Process Skills and Competency Gaps in Undergraduate Extension Curriculum'**, with extension faculty, researchers, practitioners and employers in both public and private organizations as well as extension postgraduate students.

Venue: ----------

Date & Time: ----------

The Focus Group Discussion will be followed by a Lunch.

May I request you to kindly participate in the Focus Group Discussion and share your viewpoints on **"Process Skills and Competency Gaps in Undergraduate Extension Curriculum."**

Please confirm your participation by ---------- (date) by calling me at: ---------- (Phone Number) or via e-mail at: ----------

Thank you for your time and cooperation.

Yours Sincerely,

(Name & Designation of Researcher)

Sample of Introductory Page & FGD Questions

Strengthening Agricultural Extension Training

Process Skills and Competency Gaps in Undergraduate Agricultural Extension Curriculum in Nigeria

Good morning / afternoon ladies and gentlemen and welcome to the FGD. My name is ---------- (Name & Designation). Assisting me is ---------- (Name & Designation). We have asked you to join us today so that we can listen to you, our colleagues and friends of agricultural extension services. More specifically, we are interested in your thoughts and opinions regarding agricultural extension and how extension services could address the evolving needs of our graduates, farmers, agribusinesses and development partners.

The objectives of this Focus Group are to gather information, including perceptions and ideas, from you about:

a. How effective our extension programmes are in addressing the needs of our food and agricultural systems?

b. What are the critical skills and core competencies required of extension workers to effectively plan, implement and evaluate extension work in the changing context?

c. Does our undergraduate curriculum in extension education include education and /or training on these job skills or core competencies necessary for successful extension service delivery?

d. What are the major barriers to effectively train extension workers with the required core competencies and how can these barriers be removed?

Your responses will be used to supplement the results of a broader, nation-wide, and continental survey on **"Strengthening Agricultural Extension Training in the MSU-Alliance for African Partnership (AAP) Consortium Partners in Africa (Nigeria, Malawi, Uganda, Kenya and South Africa)."** The results of the FGD and the nation-wide online survey will be used to recommend subsequent development of competency–based curriculum for extension professionals across Africa. Therefore, it is very important that you respond as openly and thoughtfully as you can. There is no right or wrong answers in our discussion today. Many people have different experiences in extension activities, so feel free to comment even if your thoughts, ideas, and experiences are different from what others have to say. My job is to guide the conversation and keep us on time to be sure we finish in the allotted time, so along the way I may interrupt, or I may push us along a little bit faster, so that we can finish our conversation on time.

This session is audio-taped to ensure accuracy in our written summaries. However, we will do everything in our ability to ensure the confidentiality of your responses; no transcribed comments will be attributed to any individual. To make sure we capture all the comments, we ask that you speak one at a time. Indeed, focus groups are mostly successful when participants share the time among themselves, but don't feel like you have to respond to every question. If any question is ambiguous or confusing in any way, please ask for clarifications.

The session may last about 90 minutes and we will not take a formal break, so if at any time, you wish to get up for coffee or a snack, please feel free to do so.

Do you have any question before we begin?

Let us begin by finding out a little more about each other. As we go around the room, please introduce yourselves and tell us a bit about your involvement in extension and agriculture related business or industry.

1. What are you hearing among your fellow extension professionals and/or from people in the agricultural community about agricultural extension in ----- (Country name)?
2. What has been your own experience with respect to agricultural extension? Are you involved in developing extension curriculum, teaching extension courses, hiring extension workers, supervising extension workers or developing extension programs or policies? Please share your experience.
3. How effective are our extension programs in addressing the needs of the changing agricultural systems? What are one/two things that extension service is doing particularly well in your university, state or region in agriculture arena?

   [Pass around a blank white paper page and pencil. Ask them to list one or two things that extension is doing well.]
4. If you could come up with three major recommendations to improve agricultural extension services and program delivery, what would they be?

   [Pass around a blank paper and pencil. Ask them to list three things to improve the extension services.]
5. What are three critical job skills or core competencies required of agricultural extension workers in the changing agricultural and rural development context?

   [Pass around a blank paper and pencil. Ask them to list three process skills or competencies required of extension workers for effective extension work.]
6. Does our undergraduate extension curriculum effectively train students on the above job skills core competencies?
7. If not, what are the gaps that need to be filled in terms of the current curriculum in existence?
8. Again, what are the main barriers to effectively train undergraduate students with the required core competencies and how can these barriers be removed?

[Pass around a blank paper and pencil. Ask them to list the main barriers and how these barriers can be removed.]

9. What changes or modifications might you recommend with respect to agricultural extension curriculum? Are there courses we are not teaching that we should consider including extension curriculum? What courses or contents are outdated that we should consider dropping out?
10. Finally, we have invited you here because we value your inputs and responses to our questions, but we would like to know who else we should be asking. Do you have suggestions for others we should be including as we continue to seek inputs and advice on how to improve our curriculum? Who are they? What should we be asking them?
11. Are there any final comments?

Our time has passed so quickly. On behalf of Research Team on this Project, I want to thank you for taking time from your tight schedules to share with us this important information. Your comments and suggestions will help us develop recommendations for **"Strengthening Agricultural Extension Training at the Undergraduate Level in Africa."**

If you would like to receive a copy of the research report, please provide your e-mail:

[Pass around a blank paper and pencil to write the e-mails.]

Thank you for your participation!

Table 1 : Program Planning Skills and Competencies among Agricultural Extension Professionals in Nigeria(N=151)

Extension professionals should be:	How important is this skill or competency for an extension worker?* Mean (SD)	How well does the undergraduate extension curriculum cover this skill or competency?** Mean (SD)	Mean difference	t-value (2-tailed sig)
Familiar with the vision, mission and goals of National /State (sub-national) extension service and agricultural development strategies, programs, and policies.	4.58 (0.70)	3.31 (0.97)	1.27	13.93 (0.00)
Able to conduct needs assessment and engage stakeholders to prioritize local needs.	4.63 (0.63)	3.13 (1.03)	1.49	16.16 (0.00)
Able to conduct baseline or benchmark studies.	4.57 (0.70)	3.07 (1.07)	1.51	15.53 (0.00)
Able to mobilize resources/funds to address priority needs.	4.24 (0.91)	2.59 (1.12)	1.65	14.29 (0.00)
Able to engage local stakeholders (e.g., NGOs, cooperatives, local agro-dealers) in extension program planning.	4.57 (0.73)	3.03 (1.15)	1.55	14.71 (0.00)
Familiar with administrative and financial rules of their respective organizations (to utilize human and financial resources in extension programs).	4.38 (0.84)	2.85 (1.08)	1.53	14.40 (0.00)
Index	4.64 (0.40)	3.50 (0.68)	1.14	8.10 (0.00)

* *Scale for Importance: 1 = Not important, 2 = somewhat important, 3 = Average, 4 = Important, 5 = Essential.*

** *Scale for Coverage in UG courses: 1 = Not at all covered, 2 = Minimally covered, 3 = Moderately well covered, 4 = Very well covered, 5 = Extremely well covered.*

Table 2 : Program Implementation Skills and Competenciesamong Agricultural Extension Professionals in Nigeria (N=154)

Extension professionals should be able to:	How important is this skill or competency for an extension worker?* Mean (SD)	How well does the undergraduate extension curriculum cover this skill or competency?** Mean (SD)	Mean difference	t-value (2-tailed sig)
Coordinate local extension programs and activities.	4.65 (0.72)	3.29 (1.08)	1.36	14.00 (0.00)
Demonstrate teamwork skills to achieve extension results.	4.67 (0.62)	3.39 (0.98)	1.27	14.89 (0.00)
Able to form farmers' groups and support them.	4.64 (0.67)	3.20 (1.16)	1.44	14.23 (0.00)
Engage local stakeholders (e.g., NGOs, Self Help Groups, and Cooperatives) in implementing extension programs.	4.57 (0.77)	3.07 (1.19)	1.50	13.55 (0.00)
Demonstrate negotiation skills to reach consensus and resolve conflicts.	4.52 (0.83)	2.89 (1.22)	1.64	14.78 (0.00)
Follow participatory decision-making in extension work.	4.65 (0.70)	3.34 (1.12)	1.31	13.15 (0.00)
Delegate responsibilities to staff as needed.	4.45 (0.84)	3.44 (1.00)	1.01	10.74 (0.00)
Be able to engage minority groups (e.g., Female farmers and youth development groups) in extension work.	4.59 (0.72)	3.20 (1.14)	1.39	13.48 (0.00)
Integrate private or public-private partnerships in extension service provision.	4.46 (0.85)	2.83 (1.19)	1.63	14.64 (0.00)

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Table 3 : Communication Skills and Competencies among Agricultural Extension Professionals in Nigeria (N=153)

Extension professionals should be able to:	How important is this skill or competency for an extension worker?* Mean (SD)	How well does the undergraduate extension curriculum cover this skill or competency?** Mean (SD)	Mean difference	t-value (2-tailed sig)
Select appropriate communication methods.	4.75 (0.64)	3.77 (1.00)	0.97	11.76 (0.00)
Establish communication with different stakeholders.	4.66 (0.61)	3.38 (1.06)	1.28	14.43 (0.00)
Respect local culture while communicating with clients.	4.81 (0.50)	3.81 (1.05)	0.99	11.59 (0.00)
Prepare required progress reports.	4.63 (0.63)	3.26 (1.13)	1.37	14.87 (0.00)
Share success stories and lessons-learned with stakeholders through various media.	4.65 (0.58)	3.06 (1.19)	1.59	15.41 (0.00)
Use extension methods (e.g., individual, group and mass contact methods) to disseminate information about extension activities and programs.	4.79 (0.53)	3.82 (0.93)	0.97	13.01 (0.00)
Demonstrate good listening skills and listen to all clients and stakeholders.	4.70 (0.63)	3.55 (1.01)	1.15	13.62 (0.00)
Demonstrate good public speaking and presentation skills.	4.72 (0.62)	3.50 (1.03)	1.22	13.72 (0.00)

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Table 4 : ICTs Skills and Competencies among Agricultural Extension Professionals in Nigeria (N=151)

Extension professionals should be able to:	How important is this skill or competency for an extension worker?* Mean (SD)	How well does the undergraduate extension curriculum cover this skill or competency?** Mean (SD)	Mean difference	t-value (2-tailed sig)
Microsoft Word for word processing (e.g., typing, editing, printing) and designing graphics.	4.63 (0.70)	3.26 (1.17)	1.36	13.15 (0.00)
Data entry and analysis software such as Excel, SPSS etc.	4.60 (0.73)	3.22 (1.24)	1.38	13.53 (0.00)
Microsoft Power Point for making presentations.	4.69 (0.68)	3.46 (1.19)	1.23	12.10 (0.00)
Audio-visual aids such as charts, graphs, and puppet show for teaching and learning.	4.72 (0.56)	3.40 (1.04)	1.32	14.77 (0.00)
Mass media like FM radio stations and television channels for communication.	4.60 (0.65)	3.06 (1.25)	1.54	14.70 (0.00)
Computers (email, Internet) for communication.	4.66 (0.71)	3.32 (1.20)	1.34	13.04 (0.00)
Mobile phone services (e.g., texting, SMS service) for communication.	4.74 (0.56)	3.59 (1.17)	1.14	11.42 (0.00)
Social media (WhatsApp, Facebook, Twitter, Instagram, etc.) for communication.	4.59 (0.75)	3.31 (1.23)	1.29	11.79 (0.00)
ICT tools to improve access to information, knowledge, technologies and other innovations.	4.69 (0.60)	3.16 (1.13)	1.52	15.18 (0.00)
ICT tools to enhance collaboration and partnerships.	4.64 (0.67)	2.94 (1.22)	1.70	15.37 (0.00)
ICT tools for collecting data, monitoring, and evaluation of extension programs.	4.69 (0.55)	2.94 (1.26)	1.75	15.99 (0.00)

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Table 5 : Program Monitoring and Evaluation Skills and Competencies among Agricultural Extension Professionals in Nigeria (N=153)

Extension professionals should:	How important is this skill or competency for an extension worker?* Mean (SD)	How well does the undergraduate extension curriculum cover this skill or competency?** Mean (SD)	Mean difference	t-value (2-tailed sig)
Understand theories and principles of monitoring and evaluation.	4.69 (0.64)	3.60 (1.01)	1.10	11.77 (0.00)
Conduct monitoring and evaluation of extension programs.	4.77 (0.53)	3.47 (1.10)	1.30	13.08 (0.00)
Develop data collection instruments - interview schedules / questionnaires- for monitoring and evaluation of extension programs.	4.77 (0.53)	3.75 (1.04)	1.02	10.91 (0.00)
Conduct online surveys for monitoring and evaluation of extension programs.	4.54 (0.75)	2.85 (1.33)	1.69	13.51 (0.00)
Apply qualitative tools and techniques (e.g., focus group discussion, case study etc.) to collect evaluation data.	4.74 (0.56)	3.63 (1.08)	1.11	11.54 (0.00)
Apply quantitative tools and techniques (e.g., survey, interview, farm data, etc.) to collect evaluation data.	4.71 (0.57)	3.72 (1.09)	0.99	10.49 (0.00)
Analyze data (qualitative and quantitative).	4.72 (0.61)	3.62 (1.07)	1.10	12.24 (0.00)
Interpret data (qualitative and quantitative).	4.74 (0.53)	3.66 (1.07)	1.08	11.73 (0.00)
Write evaluation report.	4.75 (0.57)	3.45 (1.13)	1.30	13.31 (0.00)
Share evaluation reports within their organizations and with stakeholders.	4.65 (0.67)	3.20 (1.18)	1.45	13.58 (0.00)
Apply the evaluation findings in replicating	4.69 (0.55)	2.94 (1.26)	1.75	15.99 (0.00)
/scaling-up of extension programs.	4.66 (0.64)	3.06 (1.16)	1.60	14.74 (0.00)

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Table 6 : Personal and Professional Development Skills and Competencies among Agricultural Extension Professionals in Nigeria (N=156)

Extension professionals should:	How important is this skill or competency for an extension worker?* Mean (SD)	How well does the undergraduate extension curriculum cover this skill or competency?** Mean (SD)	Mean difference	t-value (2-tailed sig)
Apply principles of good governance (e.g., client's participation, accountability and transparency) in extension work.	4.56 (0.66)	3.21 (1.11)	1.35	13.00 (0.00)
Show commitment to career advancement (participate in lifelong learning, in-service training, professional development events and conferences).	4.61 (0.66)	3.27 (1.09)	1.34	13.10 (0.00)
Apply professional ethics in extension work i.e., promote research-based recommendation or technology.	4.66 (0.63)	3.40 (1.09)	1.26	12.13 (0.00)
Follow organizational policies and directives for professional development.	4.51 (0.76)	3.26 (1.05)	1.24	12.90 (0.00)
Demonstrate honesty and positive attitude towards extension work.	4.79 (0.53)	3.53 (1.06)	1.26	13.74 (0.00)

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Table 7 : Diversity and Gender Skills and Competencies among Agricultural Extension Professionals in Nigeria (N=153)

Extension professionals should:	How important is this skill or competency for an extension worker?* Mean (SD)	How well does the undergraduate extension curriculum cover this skill or competency?** Mean (SD)	Mean difference	t-value (2-tailed sig)
Understand that diversity exists within and among clients and stakeholders.	4.64 (0.65)	3.48 (1.05)	1.16	12.61 (0.00)
Identify the needs of small-scale farmers.	4.79 (0.50)	3.73 (0.94)	1.06	12.90 (0.00)
Identify the needs of minority groups.	4.71 (0.64)	3.46 (1.05)	1.25	13.51 (0.00)
Develop extension programs to benefit women farmers.	4.72 (0.54)	3.48 (1.07)	1.25	13.38 (0.00)
Develop extension programs to benefit youth.	4.72 (0.57)	3.46 (1.02)	1.27	13.79 (0.00)
Engage marginalized and vulnerable groups in extension programs (e.g., disabled, resource poor farmers).	4.68 (0.58)	3.13 (1.16)	1.55	15.12 (0.00)
Do teamwork with diverse staffs.	4.70 (0.59)	3.37 (1.06)	1.34	14.43 (0.00)

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Table 8 : Marketing, Brokering and Value Chain Development Skills and Competencies among Agricultural Extension Professionals in Nigeria (N=153)

Extension professionals should:	How important is this skill or competency for an extension worker?* Mean (SD)	How well does the undergraduate extension curriculum cover this skill or competency?** Mean (SD)	Mean difference	t-value (2-tailed sig)
Have basic knowledge of agribusiness development.	4.55 (0.75)	3.06 (1.04)	1.49	14.25 (0.00)
Apply brokering / advisory skills in agribusiness development.	4.46 (0.80)	2.83 (1.17)	1.63	14.21 (0.00)
Have knowledge on different agricultural markets and linkages.	4.61 (0.67)	2.99 (1.08)	1.62	15.50 (0.00)
Demonstrate knowledge of value chain logistics and input-output linkages in the value chain.	4.59 (0.65)	2.95 (1.11)	1.64	15.77 (0.00)
Facilitate entrepreneurship development among extension clientele.	4.64 (0.62)	3.05 (1.07)	1.59	15.41 (0.00)
Be able to link farmer's producers' organizations/cooperatives/agribusiness companies with market.	4.66 (0.57)	2.93 (1.12)	1.73	16.30 (0.00)

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Table 9 : Extension Soft Skills and Competencies among Agricultural Extension Professionals in Nigeria (N=149)

Extension professionals should possess the other skill like:	How important is this skill or competency for an extension worker?* Mean (SD)	How well does the undergraduate extension curriculum cover this skill or competency?** Mean (SD)	Mean difference	t-value (2-tailed sig)
Critical thinking	4.73 (0.54)	3.13 (1.15)	1.60	15.18 (0.00)
Problem solving	4.77 (0.52)	3.29 (1.05)	1.49	15.44 (0.00)
Time management	4.77 (0.53)	3.23 (1.08)	1.55	15.50 (0.00)
Stress management	4.68 (0.57)	2.96 (1.11)	1.72	16.55 (0.00)
Leadership	4.77 (0.55)	3.51 (0.95)	1.25	14.54 (0.00)
Teamwork	4.77 (0.50)	3.42 (1.00)	1.34	15.43 (0.00)
Flexibility	4.69 (0.58)	3.31 (1.03)	1.38	14.05 (0.00)
Self-motivation	4.69 (0.54)	3.27 (1.05)	1.42	14.74 (0.00)
Interpersonal skills	4.68 (0.57)	3.36 (1.03)	1.32	14.78 (0.00)
Positive work attitude	4.83 (0.44)	3.38 (1.05)	1.45	16.02 (0.00)
Collaboration	4.73 (0.53)	3.25 (1.05)	1.48	15.76 (0.00)
Conflict management	4.77 (0.44)	3.20 (1.09)	1.57	16.50 (0.00)
Group formation and development	4.73 (0.53)	3.40 (1.11)	1.32	13.72 (0.00)
Negotiation skills	4.62 (0.62)	3.02 (1.15)	1.60	15.24 (0.00)
Networking skills	4.67 (0.61)	3.03 (1.13)	1.64	16.11 (0.00)
Facilitation skills	4.74 (0.52)	3.07 (1.08)	1.67	18.15 (0.00)
Creativity / Innovativeness	4.82 (0.41)	3.24 (1.05)	1.57	17.60 (0.00)

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Table 10 : Nutrition Skills and Competencies among Agricultural Extension Professionals in Nigeria (N=148)

Extension professionals should:	How important is this skill or competency for an extension worker?* Mean (SD)	How well does the undergraduate extension curriculum cover this skill or competency?** Mean (SD)	Mean difference	t-value (2-tailed sig)
Demonstrate basic human nutrition knowledge (e.g., food composition, balanced diet, supplements, nutritional composition of various foods, nutrition deficiency symptoms etc.).	4.37 (0.73)	2.96 (1.11)	1.41	13.75 (0.00)
Understand lifecycle nutrition needs of different household members (e.g., children of various age groups, pregnant and breastfeeding mothers, elderly).	4.31 (0.80)	2.89 (1.16)	1.42	12.65 (0.00)
Able to advise families on what crops and livestock to be produced to ensure balanced diets.	4.49 (0.73)	3.05 (1.09)	1.44	13.72 (0.00)
Advise families to improve gender relations for increased agriculture production and nutrition.	4.49 (0.72)	2.99 (1.15)	1.50	13.95 (0.00)
Demonstrate postharvest handling technologies that conserve nutrients and food safety (e.g. food storage, freezing fruits and vegetables, making pickles, jams, and jellies).	4.51 (0.72)	3.09 (1.09)	1.42	14.22 (0.00)
Have basic knowledge about food labeling (e.g., organic foods).	4.32 (0.84)	2.69 (1.15)	1.63	14.81 (0.00)
Able to advise on healthy diet (e.g., for fitness and sports, diabetes, cancer and AIDS/HIV, heart health, kidney disease, osteoporosis; weight loss and obesity).	4.40 (0.81)	2.72 (1.17)	1.68	15.20 (0.00)

* *Scale for Importance: 1 = Not important, 2 = somewhat important, 3 = Average, 4 = Important, 5 = Essential.*

** *Scale for Coverage in UG courses: 1 = Not at all covered, 2 = Minimally covered, 3 = Moderately well covered, 4 = Very well covered, 5 = Extremely well covered.*

Table 11 : Technical Subject Matter Expertise among Agricultural Extension Professionals in Nigeria (N=150)

Extension professionals should:	How important is this skill or competency for an extension worker?* Mean (SD)	How well does the undergraduate extension curriculum cover this skill or competency?** Mean (SD)	Mean difference	t-value (2-tailed sig)
Demonstrate technical knowledge in their basic discipline (e.g., field crops/livestock/ fishery/horticulture, etc.).	4.74 (0.57)	3.57 (0.94)	1.17	13.42 (0.00)
Understand adult learning principles and hold practical skills required to teach improved farming practices.	4.73 (0.54)	3.62 (0.96)	1.11	12.65 (0.00)
Understand the new technology being promoted, i.e., what it is, why, and how it works.	4.74 (0.55)	3.44 (1.06)	1.30	13.55 (0.00)
Facilitate farmers to access inputs and services (e.g., credit, seed, fertilizers, feed, artificial insemination, etc.)	4.68 (0.60)	3.30 (1.07)	1.39	14.18 (0.00)
Be able to educate community members about different types of risks and uncertainties (e.g., due to market fluctuations, natural disasters, etc.).	4.63 (0.64)	3.25 (1.10)	1.38	13.69 (0.00)
Be able to educate community members about climate change and climate smart agriculture.	4.67 (0.63)	3.34 (1.09)	1.33	12.86 (0.00)
Refer to and make use of publications--journals, research reports, etc.	4.63 (0.64)	3.44 (1.06)	1.18	12.60 (0.00)
Generating knowledge or producing research reports / journal publications.	4.59 (0.66)	3.39 (1.06)	1.20	12.23 (0.00)
Able to harness, document, validate and integrate local / indigenous knowledge.	4.58 (0.69)	3.23 (1.12)	1.35	13.35 (0.00)
Understand social system under which farming takes place (e.g., rural sociology knowledge).	4.76 (0.53)	3.62 (1.05)	1.15	13.12 (0.00)

* *Scale for Importance: 1 = Not important, 2 = somewhat important, 3 = Average, 4 = Important, 5 = Essential.*

** *Scale for Coverage in UG courses: 1 = Not at all covered, 2 = Minimally covered, 3 = Moderately well covered, 4 = Very well covered, 5 = Extremely well covered.*

About This Document

Assessment of process skills and competency gaps in undergraduate (UG) agricultural extension curricula would help inform competency-based curricular revitalization, which in turn could promote modernization of agricultural extension and advisory services (EASs) in Nigeria. The AAP-PIRA funded research project addressed this issue with the research questions: (a) Do extension programs effectively address the needs of current food and agricultural systems? (b) What are the critical job skills and core competencies required of extension workers to effectively plan, implement, and evaluate extension work in today's changing context? (c) Does the undergraduate curriculum in extension education include education and/or training on these job skills or core competencies? and (d) What are the barriers to effectively train extension workers with required core competencies, and how can these barriers be removed? Data were collected through review of UG agricultural extension curricula and EASs in Nigeria, focus group discussions, and an online survey. On the whole, the findings revealed a significant gap between levels of importance of extension worker skills and competencies and their level of coverage in UG courses. In order to keep curricula relevant to the changing agricultural systems and maintain the basic minimum academic standards, the authors identify and recommend 11 core competencies with 97 subcompetencies to National Universities Commission of Nigeria for their inclusion in the UG agricultural extension curricula.

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