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Process Skills and Competency Gaps in Undergraduate Agricultural Extension Curriculum in Nigeria, Malawi, South Africa, Uganda, and Kenya

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Dimelu Mabel Ukamaka, Lindie von Maltitz, Margaret Najjingo Mangheni, Murari Suvedi, Agwu Ekwe Agwu, Charity Chanza, P.V.K. Sasidhar, Agnes Oywaya-Nkurumwa, Chidimma Frances Ifeonu, Kristin Davis, Ifeoma Quinette Anugwa, Saweda Liverpool-Tasie, Frank Tchuwa, and Maheshwari S Elapata

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Dimelu Mabel Ukamaka
Nigeria • University of Nigeria, Nsukka

Lindie von Maltitz
South Africa • University of the Free State

Margaret Najjingo Mangheni
Uganda • Makerere University

Murari Suvedi
USA • Michigan State University

Agwu Ekwe Agwu
Nigeria • University of Nigeria, Nsukka

Charity Chanza
Malawi • Lilongwe University of Agriculture and Natural Resources

P.V.K. Sasidhar
India • Indira Gandhi National Open University

Agnes Oywaya-Nkurumwa
Kenya • Egerton University

Chidimma Frances Ifeonu
Nigeria • University of Nigeria, Nsukka

Kristin Davis
South Africa • International Food Policy Research Institute & University of Pretoria

Ifeoma Quinette Anugwa
Nigeria • University of Nigeria, Nsukka

Saweda Liverpool-Tasie
USA • Michigan State University

Frank Tchuwa
Malawi • Lilongwe University of Agriculture and Natural Resources

Maheshwari S Elapata
USA • Michigan State University

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ABBREVIATIONS AND ACRONYMS

AAP	:	Alliance for African Partnership
AEAS	:	Agricultural Extension Advisory Service
AGED	:	Agricultural Education and Extension
AGHE	:	Agriculture and Human Ecology
BARI	:	Bachelor of Agricultural and Rural Innovation
BMAS	:	Benchmark Minimum Academic Standard
CUE	:	Commission for University Education
FGDs	:	Focus Group Discussions
GDP	:	Gross Domestic Product
GFRAS	:	Global Forum for Rural Advisory Services
ICTs	:	Information and Communication Technologies
IGNOU	:	Indira Gandhi National Open University
KEFAAS	:	Kenya Forum for Agricultural and Advisory Services
LUANAR	:	Lilongwe University of Agriculture and Natural Resources
MSU	:	Michigan State University
NUC	:	National University Commission
PIRA	:	Partnerships for Innovative Research in Africa
SELPS	:	Supervised Experiential Learning Projects
SEPs	:	Supervised Extension Projects
UFAAS	:	Uganda Forum for Agricultural Advisory Services
UNN	:	University of Nigeria Nsukka

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– Authors

EXECUTIVE SUMMARY

Process skills and core competencies are basic sets of knowledge, skills, abilities, and behaviors that agricultural extension professionals require to perform their tasks effectively. Periodic review of undergraduate (UG) agricultural extension curricula is necessary to train graduates with core process skills and competencies that will enable sustainable food security, improved livelihoods, and natural resource conservation. The study reviewed the UG agricultural extension curriculum used in five MSU-AAP Consortium member universities covering Nigeria, Malawi, South Africa, Uganda, and Kenya with the following research questions:

1. What are the curriculum development processes in MSU-AAP universities?
2. What are the structure and contents of the UG agricultural extension curriculum?
3. What instructional methods are used for the transaction of the UG curriculum?
4. What core process skills and competencies are covered in the curriculum?
5. What are the strengths and gaps in the UG agricultural extension curriculum in Africa?

Data were collected through a desktop review of curriculum documents for agricultural extension training programs offered at the universities and literature on the competency needs of extension professionals. The courses in agricultural extension approved by the countries' national regulatory bodies / institutions and taught in universities were reviewed. The contents were evaluated against the available literature on current and emerging functions of agricultural extension professionals and expected competencies, and reviewed scholarly work on capacity needs analysis of extension advisory services (EASs) to develop a framework for assessing the UG agricultural extension curricula at the universities. Eleven competencies domains were identified and operationalized: program planning; program implementation; communication; ICTs; program monitoring and evaluation; personal and professional development; diversity and gender; marketing, brokering, and value chain development; extension soft skills; nutrition; and technical subject matter expertise. The number of courses in the UG agricultural extension curriculum that addressed each competence domain was identified and evaluated.

Key Findings from the Review of Agricultural Extension Curriculum

1. The UG agricultural extension programs in the five countries are regulated through national or institutional processes, or both, by various regulatory bodies. The processes seem to be more inclusive, comprehensive, and periodical in some universities than in others.

2. The curricula for the programs are largely aligned with the 11 competency domains, but with outstanding emphasis on technical competence rather than human/process skills and competencies.
3. Some critical professional competency domains such as soft skills; gender and diversity; health, nutrition, and food safety; brokerage, markets, and value chains; and personal and professional development are not well covered in most curricula. Also, some subject matter -- particularly on contemporary issues and technologies in competency domains such as ICTs, program planning, and program implementation, among others -- are not adequately addressed.
4. The dominant pedagogical approach for the transaction of the curriculum is lecture complemented with some interactive and learning-enhancing tools such as group assignments, role play, success stories, case study, power point presentations, etc.
5. There is no practical component in some courses in many universities, and few universities have dedicated structure in the programs to sufficiently expose students to hands-on training and experiential learning.

Key Recommendations for Policy Decisions

1. The process of curriculum development and management, whether at the national or institutional level, should strategically involve the functional participation of relevant stakeholders in the development of a robust and inclusive curriculum responsive to the ever-changing agricultural and food system, the needs of diverse value chain actors, the evolving roles of extension and advisory services and the competence needs of extension professionals. Curriculum review should be timely and periodical.
2. Universities should target a balance in technical and process competencies in the curricula for training extension professionals in Africa.
3. Courses or subject matter/contents should be revised or developed to target training in process skills, particularly soft skills, personal and professional development, and gender and diversity, among others, to prepare extension professionals to be competitive and relevant in the world of work.
4. Outdated courses/contents that are repetitive and do not target a specific competency domain should be screened out or removed to accommodate more relevant and current subject matter; and curriculum/course development/revision should be guided with a specified learning outcome, aside from general learning outcomes of a program.
5. In addition to designating a considerable space in the curriculum for adequate exposure of professionals to hands-on and experiential learning using internships, industry

placements, and rural/community residential experiences, courses should have practical components.

6. Universities should promote and encourage the use of interactive pedagogies and information communication technologies that would improve cognitive and affective learning by professionals to enhance overall learning. ICT-based pedagogies should be encouraged and promoted to support traditional methods for enhanced learning and acquisition of a wide spectrum of knowledge and skills useful in a highly competitive world of work. The implementation, however, would need a supportive system, sustainable funding for the provision of relevant facilities, and training of adequate human resources.

CHAPTER 1 : INTRODUCTION

1.1 Agriculture in Sub-Saharan Africa

The agricultural sector in sub-Saharan Africa is one of the major drivers of economic growth and poverty reduction and contributes about 15.3% to the overall real GDP in the region (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. Despite 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 agricultural extension curriculum -- has resulted in poor quality training of extension workers. That, in turn, has resulted in low adoption of agricultural technologies and decreased productivity of farmers and other food system actors (Babu et al., 2020).

1.2 Agricultural Extension Advisory Services in Sub-Saharan Africa

Agricultural food system transformation and increased productivity in sub-Saharan Africa are dependent to a large extent on the delivery of agricultural extension advisory services (EASs) to smallholder farmers and other food system actors (Danson-Abbeam et al., 2018). This is achieved through the provision of research-based educational and informational programs, typically for rural populations. 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 the effective and timely communication of up-to-date information useful in making informed decisions (Tesso, 2016). In the current dynamic and changing food systems, extension is faced with the challenge to serve as the connecting actor in complex agricultural innovation systems (Kaynak and Boz, 2019); to go beyond technology transfer to facilitation and beyond learning to training; 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). Agricultural extension is now expected to advise on business and entrepreneurship, value addition, and farmer institution development, and to facilitate linkages between farmers, other actors, and service providers (Mangheni, 2016).

Prevailing circumstances relating to rapid economic growth, diverse and dynamic agricultural systems, evolving technologies, market liberalization, and growing competition for resources have caused a significant impact on the role of agricultural extension advisory service (AEAS) providers in both developing and developed countries (Suvedi & Ghimire 2015; Chikaire et

al., 2018). Also, current trends involving socio-demographic variations, climate change, evolving technologies, globalization, national and regional poverty reduction, and food security strategies present new challenges for extension that call for competent agricultural extension workers (Shimali et al., 2021). To be effective, extension professionals are expected to remain current with emerging technologies and capable of handling challenges, tapping opportunities, and demonstrating competencies in their services (Nwaogu and Akinbile, 2018). They need to possess a set of core process skills and functional competencies upon which the organization bases its primary operation or services.

1.3 Study Background

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 for producing agricultural development professionals and administrators who can shoulder the responsibilities of enhancing sustainable food and agricultural systems and reducing poverty among 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 (Cevahir and Ismet, 2019). However, the agricultural training institutions in Africa have changed a little since their inception and remain averse to change (Davis et al., 2008; 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 do not meet current agriculture needs in the local contexts (Freer, 2015; Fredua-Kwarteng, 2019). The training curriculum lacks relevant and current subject areas for building the requisite skills and competencies of extension professionals. The result is that instructors deliver knowledge and information to students with heavy theoretical emphasis, leaving students unequipped with the skills they need to meet the needs of employers, smallholder farmers and entrepreneurs (Freer, 2015). Therefore, periodic review of undergraduate agricultural extension curricula 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 resource conservation. This study reviewed the undergraduate agricultural extension curriculum used within MSU-AAP Consortium member universities with the following research questions and objectives.

1.4 Research Questions

1. What are the curriculum development processes in MSU-AAP universities?
2. What are the structure and contents of the undergraduate agricultural extension curriculum?
3. What instructional methods are used for the transaction of the undergraduate curriculum?
4. What core process skills and competencies are covered in the curriculum?
5. What are the strengths and gaps in the undergraduate extension curriculum in Africa?

1.5 Objectives

1. Assess the curriculum development process for undergraduate agricultural extension in the universities.
2. Review the contents and methods used for the transaction of the undergraduate agricultural extension curriculum.
3. Recommend necessary improvements/reforms in the undergraduate agricultural extension curriculum to prepare the next generation of agricultural extension professionals to competently handle extension service delivery.

CHAPTER 2 : THEORETICAL ORIENTATION

PROCESS SKILLS AND COMPETENCIES OF AGRICULTURAL EXTENSION PROFESSIONALS

"Competence" indicates the sufficiency of knowledge and skills that enables a person to act in a wide variety of situations. According to Issahaku (2014), competence is a skill, a personal characteristic, or a motive demonstrated by various behaviors that contribute to outstanding performance in a job. It is the sufficiency of knowledge and skills that enables a person to act efficiently and effectively in a wide variety of situations (Davis, 2015). It comprises physical or intellectual ability, skill, or both, and performance capacity to do as well as to know. It is carried out under standardized conditions and is judged by some level or standard of performance as "adequate", "sufficient", "proper", "suitable", or "qualified". It can be improved; it draws upon an underlying complex ability and needs to be observed in real-life situations (Shavelson, 2010). In other words, competence is the ability to do something efficiently and effectively.

Several studies have been conducted around the world on the emerging competencies of agricultural extension systems and extension employees. The Ohio State University Extension Competency Model (Cochran, 2009) recognizes 14 core competencies central to any job in Extension: communication, continuous learning, customer service, diversity, flexibility and change, interpersonal relationships, knowledge of Extension, professionalism, resource management, self-direction, teamwork and leadership, technology adoption and application, thinking and problem solving, and understanding stakeholders and communities. 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) surveyed extension professionals in Cambodia, India, Malawi, and Nepal to help determine the essential competencies for effective front-line extension workers in those settings. The authors grouped the competencies under five major extension programming functions: program planning, program implementation, program evaluation, communication, and information communication technology.

The competencies were further divided into two broad categories: process skills or functional competencies, and technical skills (Suvedi and Kaplowitz, 2016). Process skills or functional/ soft competencies include networking with local organizations, facilitating group formation, resolving conflict, and engaging stakeholders in program planning; they are skills that 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.

In another study, Nwaogu and Akinbile (2018) identified 13 important core competency needs of extension professionals: program planning, program implementation, communication skill, extension education and teaching, information communication technology, leadership skill, social value and culture, program evaluation and research, organizational management, knowledge of the organization, professionalism, technical subject matter expertise, and group management. In their ranking, professionalism was considered the most important competency, followed by program planning and knowledge of the organization. Information communication technology was considered the least important. This is supported by Diamond (1994) in Issahaku (2014), who suggests that agricultural extension advisory service professionals in developing countries should possess professional competence in administration, program planning and execution, evaluation, communications, teaching and extension methods, and understanding of human behavior. The expectation is that a professional extension officer should demonstrate a positive attitude toward extension service, have a strong work ethic, effectively interpret research findings, and carry out assignments confidently without supervision. 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 professionals to include understanding policies, programs, and strategies of agricultural development; communication skills; education and communication technology; leadership; diversity, pluralism, and multiculturalism; program evaluation and research; extension and organization management; professionalism; and technical subject matter expertise. The learning kit developed by GFRAS (2012) outlines the core competencies required by field staff, managers, and lecturers to effectively interact with the various actors in the agricultural innovation system, including skills in the value chain and farmer organization management, community mobilization, agricultural entrepreneurship, risk mitigation, knowledge management, and employability, among others. According to Kaynacki and Boz (2019), the general conclusion of research carried out in various countries is that extension workers should always keep up with the changes in the professional subjects for the organization and the target group, as well as for the security of their careers. Thus, revitalizing the agricultural extension curriculum, particularly at the undergraduate level in universities, is imperative to strengthen the training of agricultural extension providers in Nigeria.

CHAPTER 3 : METHODOLOGY

The study was undertaken in five MSU-AAP consortium partner universities in Africa:

- University of Nigeria Nsukka
- Egerton University, Kenya
- Makerere University, Uganda
- Lilongwe University of Agriculture and Natural Resources (LUANAR), Malawi; and
- University of Pretoria in South Africa.

The study assessed the undergraduate agricultural extension curricula used in these universities. Data were collected through a desktop review of curriculum documents for agricultural extension training programs offered at the universities and literature on the competency needs of extension professionals. We reviewed the courses in agricultural extension approved by the countries' national regulatory bodies/institutions and taught in universities. We evaluated the contents against the available literature on current and emerging functions of agricultural extension professionals and expected competencies, and reviewed scholarly work on capacity needs analysis of extension and advisory services to develop a framework for assessing the undergraduate agricultural extension curricula at the universities.

Eleven competencies domains were identified and operationalized: program planning (familiar with the vision, mission, and goals of the national extension service and agricultural development strategies, able to conduct a needs assessment, conduct benchmark studies and mobilize resources, among others), program implementation (able to coordinate extension programs, demonstrate teamwork and negotiation skills, engage diverse local stakeholders, delegate responsibilities, follow participatory approach, etc.), program monitoring and evaluation (understand monitoring and evaluation concepts, conduct monitoring and evaluation of extension programs, develop data collection instruments, apply qualitative and quantitative tools to collect evaluation data, etc.), heath, sanitation, and food safety (demonstrate knowledge of essential human nutrition, understanding the life-cycle nutritional needs of various household members, crop selection to ensure balanced diets, etc.), gender and diversity (to understand the diversity within and among stakeholders, identify their needs, and develop extension programs to benefit and engage women and others), brokering, markets and value chains (brokering/advisory skills in an agribusiness environment with sufficient knowledge of agricultural markets and linkages, facilitate entrepreneurship, etc.), personal and professional development (to practice principles of good governance, show commitment to career advancement, apply professional ethics in work), technical know-how (demonstrate basic technical knowledge, understand adult learning principles, understand the new technology being promoted, educate community members about various types

of risks and uncertainties, educate community members on climate change and climate-smart agriculture etc.), communication(select appropriate communication methods, respect local culture, prepare reports of their work, share success stories and lessons learned, use various communication channels, etc.), ICTs (ability of extension professionals to use Microsoft Office, computers, audio-visual aids, and social media for dissemination), and soft skills(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, creativity, etc.). The number of courses in the undergraduate agricultural extension curriculum that addressed each competence domain was identified and presented in a bar chart for the programs in the universities.

CHAPTER 4 : RESULTS AND DISCUSSION

4.1 Curriculum Development Process in Universities

The five universities offer different undergraduate academic programs in agricultural extension education. Egerton University in Kenya has two undergraduate academic programs that offer agricultural extension training: the bachelor of science in agricultural education and extension (BSc AGED) and the Bachelor of Science in agriculture and human ecology (BSc AGHE). The Lilongwe University of Agriculture and Natural Resources offers the BSc. in agricultural extension and a three-year diploma in the Natural Resources College Extension program. The University of Nigeria Nsukka offers five- and four-year bachelor of agriculture degrees in agricultural extension. In Uganda, the undergraduate degree programs available are the bachelor of agricultural and rural innovation (BARI), which is taught through face-to-face delivery, and the bachelor of agricultural and rural innovation external program (BARI-EXT), introduced through distance learning. In South Africa, the University of Fort Hare, which is the oldest to begin undergraduate agricultural extension training, offers BSc program. The durations for these programs range from three years (South Africa, Uganda) to four years (Kenya and Malawi) and five years (Nigeria). The programs have clearly stated objectives and comprehensive learning outcomes targeted at developing professionals with adequate knowledge and skills for changing the agriculture and food system and facilitating rural and community empowerment.

The undergraduate programs in the universities are reviewed either every five or four years at national or institutional levels or both. At the national level, all academic programs in Nigeria are regulated by the National University Commission (NUC) through a comprehensive process of stakeholders' workshops organized to produce the Benchmark Minimum Academic Standard (BMAS) documents for all disciplines, which serve as the benchmark for curriculum in the universities. At the national, the most recent review of undergraduate agricultural extension program was conducted in 2007. The curriculum review process at the institutional level is conducted every five years through a simpler linear consultation involving only stakeholders within the university. Similarly, academic programs in Kenya are reviewed every four years by the Commission for University Education (CUE), with a new catalog of academic programs produced after each review. In all cases, the reviews are based on stakeholder feedback, changing national and global development needs, and policy changes. Stakeholders include employers, government, alumni, other institutions of higher learning, and the general society. The regulatory bodies have the mandate to stipulate the broad objectives, learning outcomes, requirements for minimum standards/hours, and the nature, organization, and general structure of the program. In Malawi, South Africa, and Uganda, however, the individual institutions develop and manage their curricula and change them depending on demand, but not without the approval of councils for higher education.

4.2 Curriculum Contents and Teaching Methods Used

The contents of the curricula researched covered many competency domains, but most courses do not have practical components except in Kenya, where there is a significant inclusion of practical components in the courses. For instance, two of the extension courses for the BSc AGHE program in Kenya require students to engage in real-life scenarios through practical exposure where they apply the knowledge and skills gained. The Extension Methods in BSc AGHE course has 30 practical hours allocated; the outreach program has 60 hours. This is in addition to hands-on experiences in many of the technical courses in agriculture. Also, a wide variety of methods are used in teaching the units in the BSc AGED programs at the university. They include lectures, laboratory and field practical sessions, demonstrations, class and group discussions, interactive lectures, case studies, role play, and field visits. Also, ICTs are also used to enhance learning through videos, PowerPoint presentations, etc. In addition, field trips are used to complement the teaching by exposing students to practical field situations. Some lecturers have been trained to apply innovative pedagogical skills in teaching.

Undergraduate degree programs in Uganda, BARI and BARI-EXT are taught face-to-face and through distance learning respectively. With the exception of the SELPs and MUARIK attachments, the bulk of the courses are taught theoretically, as prevalent in many other universities (Ueckert et al., 2011; Twenge, 2009) with the lecture method being the most predominantly used method of teaching (Slavich and Zimbardo, 2012). Some courses designed to be practical end up being theoretical showing a disconnect between the way courses were designed and how they are actually implemented. This could be attributed to certain factors including limited funding. Also, a good number of instructors are not being well grounded with the field - based agricultural extension and advisory service experience, and therefore, deliver theory-based information and knowledge that does not equip students with the required competencies.

The Bunda extension program in Malawi uses the traditional approach of taught courses combined with action-oriented research, dubbed supervised extension projects (SEPs). The students start the SEPs in the second year and continue through to the fourth year. The SEPs form the pillar of the program, intending to expose students to practical extension work before they graduate. The curriculum for B. Agriculture in Nigeria comprises core extension and ancillary courses. The ancillary component of the curriculum includes interdepartmental, interfaculty and general studies that account for about 81% of the courses and mainly contribute to technical and a few basic professional competencies in the curriculum. Contrary to the practical approach used in Malawi, lecture (80%) is the most common pedagogy adopted for the transaction of the curriculum in Nigeria except at the fourth year, which is a 12-month practical year designed for training in technical competencies and basic extension skills. The hands-on- learning/experiential approach (12.5%) and demonstrations/field work (15%) are predominantly used in the practical year. Also, some core and ancillary courses are often transacted through interactive tools such as seminars, group/individual assignments, PowerPoint presentations, laboratory, field demonstration, etc. In addition to classroom

lectures, students are exposed to relevant textbooks in agricultural extension and various e-books.

The contents of the extension program taught at the various institutions in South Africa vary considerably. The B. Agric in agricultural extension at the University of Fort Hare starts with a first-year curriculum that includes basic chemistry, biology, agro meteorology and other introductory subjects, and other years focus mainly on the technical subject matter. During the course of the four years, there are only four devoted agricultural extension courses included in the curriculum, and they generally lack practical components.

The dominant pedagogy for transaction of curriculum is the traditional lecture method, which has several limitations in stimulating interest of learners and enhancing learning. Obviously, lecture can be informative, especially for communicating conceptual knowledge, particularly where there is a significant knowledge gap between lecturer and audience (Charlton, 2006). On the other hand, lecture can be boring and overwhelming, depending on the compelling nature of the message and 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. Above all, such unidirectional lecture mode of instruction, where learners are perceived to be passive recipients of knowledge from lecturers (Driscoll, 2011; Wurdinger and Rudolph, 2009) does not allow learners to make use of and create meaning from experience; and limits the students' ability to develop and apply skills or use their own knowledge to arrive at possible solutions.

The lack of a practical component in most courses makes for a theory- loaded curriculum that leaves students with limited competence and skills and therefore less competitive in the changing world of work. Consequently, graduates who have gone through a technically comprehensive curriculum may be deficient in skills useful to translate their knowledge into farmer level problem solving (Aspin et al., 2012; Caprara et al., 2011; Eyler, 2009).

Moreover, there is limited evidence of use of emerging ICTs tools to promote interaction and learning. This is contrary to the findings of Helena et al. (2020) that, with the emergence of technological advancement, digital learning is on the rise, especially in higher education in the era of 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 technologies 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 Helena et al. (2020), ICT devices can fast-track skills development in agriculture and be the bait that interests youth in agriculture.

4.3 Competence Domain Covered in The Curriculum

The curricula for undergraduate agricultural extension programs in the universities show significant strength in coverage of the 11 competency domains. However, the majority of the curricula (Nigeria, South Africa, Uganda, and Kenya) are more aligned to courses for training in the technical skill and competency domain than functional/process and soft skills. Some competency domains such as soft skills and personal development; health, nutrition, and sanitation; and brokering, market, and value chain are lacking in the curricula of many university programs.

The curriculum for the BSc agricultural extension program in Malawi is one of the few researched that include all the relevant skills and competencies. Contrary to the common emphasis on the technical competency domain, the curriculum has insufficient courses for training in specific technical areas such as postharvest product management and storage, nutrition, food processing, food safety, resource mobilization, management, and governance, though a greater proportion (36%) of the courses are in technical area (Table 1). However, the areas of training that need expansion include technical subject matter on crop production, land resource management, farm mechanization, irrigation and biofuels, industrialization, and entrepreneurship. More substance is further needed on qualitative research methods and risk management in agriculture. The curriculum has no course for training of professionals on soft skills, and health, nutrition and sanitation. Also, communication, ICT, diversity and gender, and personal and professional development are less represented in the curriculum.

Table 1: Distribution of courses based on competence domain in curriculum for bachelor of science in agricultural extension, Malawi

Competencies and skills	Number of courses	Percentage
Program planning	5	10
Program implementation	6	12
Communication	2	4
ICT Technologies	2	4
Program monitoring and evaluation	7	14
Personal and professional skills	3	6
Diversity and gender skills	2	4
Marketing, brokering and value chain development	5	10
Soft skills	0	0

Health, nutrition and sanitation	0	0
Technical subject matter expertise	18	36

In contrast with the BSc extension program, the Natural Resources College (NRC) has more courses on technical competencies (crop management, land resources, livestock, farm mechanization, and irrigation). However, training on some technical subject matters such as product postharvest management and storage, resource mobilization, and management (human and finances) should be addressed. In the context of the skills and competencies researched, the curriculum includes only nine, and training in program planning and soft extension skills is absent Table 2). The curriculum has few courses focusing on organizational and facilitation competencies. Training areas that need improvement are industrialization and entrepreneurship, organizational management, communication and reporting, program planning and implementation, ICTs, and gender and diversity competencies and skills.

Table 2: Distribution of courses based on competence domain in curriculum for Diploma in Agriculture, Malawi

Competencies and skills	Number of courses	Percentage of total
Program planning	0	0
Program implementation	4	8.5
Communication	1	2.1
ICT Technologies	1	2.1
Program monitoring and evaluation	1	2.1
Personal and professional skills	1	2.1
Diversity and gender skills	1	2.1
Marketing, brokering and value chain development	1	2.1
Soft skills	0	0
Health, nutrition and sanitation	1	2.1
Technical subject matter expertise	36	76.5

In Kenya the curriculum for bachelor of science in AGED largely covered all the competence domains except health, nutrition and sanitation. However, as observed in the curricula of other countries, a greater (53.5%) number of courses contributed to the technical subject matter competence and skills (Table 3). Competence areas such as soft skills, diversity and gender, ICTs, communication, and personal and professional development are less targeted in the curriculum.

Table 3: Distribution of courses based on competence domain covered in curriculum for bachelor of science in agricultural education and extension, Egerton University

Competencies and skills	Number of courses	Percentage of total
Program planning	8	10.5
Program implementation	11	14.5
Communication	1	1.3
ICT Technologies	1	1.3
Program monitoring and evaluation	4	5.3
Personal and professional skills	1	1.3
Diversity and gender skills	1	1.3
Marketing, brokering and value chain development	7	9.2
Soft skills	1	1.3
Health, nutrition and sanitation	0	0
Technical subject matter expertise	41	53.9

Similarly, the curriculum for bachelor of science in agriculture and human ecology when bench marked has more courses (43.4%) for technical subject matter skills and lesser number of courses for ICTs (1%) and personal and professional development domains (1.9 %) (Table 4). There is no course for building competence in soft skills in the curriculum. Contrary to the results in other countries, a significant proportion of courses (11.3%) addressed marketing, brokering, and value chain. No course targeted training in soft skills (Table 4).

Table 4: Distribution of courses based on competence domain covered in curriculum for bachelor of science in agriculture and human ecology, Kenya

Competencies and skills	Number of courses	Percentage
Program planning	4	7.5
Program implementation	6	11.3
Communication	2	3.8
ICT technologies	1	1.9
Program monitoring and evaluation	5	9.4
Personal and professional skills	1	1.9
Diversity and gender skills	2	3.8

Marketing, brokering, and value chain development	6	11.3
Soft skills	0	0
Health and nutrition and sanitation	3	5.7
Technical subject matter expertise	23	43.4

The curriculum for undergraduate agricultural extension training in Nigeria, when assessed using the researched competencies domains as a benchmark, is largely aligned with the recommended competency domains but exceptionally skewed to the technical skills domain (67%). However, the contents for training on some skills and competencies domains such as gender and diversity, soft skills, personal development, brokering/marketing and value chain; health, nutrition, and sanitation, and program implementation are not well targeted in the core extension courses (Table 5). Although some of the courses in these competency domains are complemented with a few ancillary courses, their content and appropriateness for addressing specific extension professionals' skills and competency needs are not ascertained because they are general study courses. Also, current knowledge and emerging issues in several competency domains-- such as ICTs, communication, program planning, monitoring and evaluation, cross-cutting issues, etc.-- are lacking in the contents of some courses. The contents of the core extension courses are repetitive, outdated, and theory-loaded, and not designed for clear learning outcomes. Some courses, such as the youth program in agriculture, are not aligned with any competency domain and should be replaced.

Table 5: Distribution of courses based on competence domain covered in curriculum for bachelor of agriculture (Agricultural Extension) program in University of Nigeria Nsukka

Competencies and skills	Number of core extension courses	Number of ancillary courses	Total number of courses	Percentage of total
Program planning	7	2	9	11.5
Program implementation	4	2	6	7.5
Communication	3	2	5	6.25
ICT Technologies	2	2	4	5.0
Program monitoring and evaluation	4	2	6	7.5
Personal and professional skills	0	0	0	0.0
Diversity and gender skills	1	0	1	1.25
Marketing, brokering and value chain development	0	5	5	6.25

Soft skills	3	1	4	5.0
Health, nutrition and sanitation	0	1	1	1.25
Technical subject matter expertise	2	52	54	67.0

In Uganda, the curriculum for the extension program is well aligned with the recommended competency domains except for Introductory Mathematics, which could be removed from the curriculum to make room for more critical content. The core competency domain does not include in the curriculum is soft skills (Table 6). Subject matter in agricultural policy, resilience and adaptation to change, and knowledge management are also not covered in the curriculum. Above all, a few courses touch on core competency domains in ICTs; health, nutrition, and sanitation; gender and diversity, and communication, but the coverage is superficial.

Table 6: Distribution of courses based on competence domain covered in curriculum for bachelor of science in agriculture and rural innovation in Makerere University

Competencies and skills	Number of courses	Percentage of total
Program planning	6	12
Program implementation	10	20
Communication	1	2
ICT Technologies	1	2
Program monitoring and evaluation	4	8
Personal and professional skills	3	6
Diversity and gender skills	1	2
Marketing, brokering and value chain development	5	10
Soft skills	0	0
Health, nutrition and sanitation	1	2
Technical subject matter expertise	18	36

As observed in other universities, the curriculum for extension programs in South Africa focuses mainly on technical subject matter expertise (66.7%). In an effort to cover the extensive number of relevant technical subjects, students are exposed to specific subject matter only once, after which they must move on to the next. There is a limited number of courses relevant to the competencies and skills researched in the areas of communication (2.6%), ICTs (2.6%) personal and professional development (2.6%) among others. There is no course for soft skills in the curriculum. Another concern is the lack of practical training/exposure.

Table 7: Distribution of courses based on competence domain covered in curriculum for bachelor of science in agricultural extension, University of Fort Hare

Competencies and skills	Number of courses	Percentage of total
Program planning	2	5.1
Program implementation	4	10.2
Communication	1	2.6
ICT Technologies	1	2.6
Program monitoring and evaluation	2	5.1
Personal and professional skills	1	2.6
Diversity and gender skills	0	0
Marketing, brokering and value chain development	1	2.6
Soft skills	1	2.6
Health, nutrition and sanitation	0	0
Technical subject matter expertise	26	66.7

Technical courses dominante most curricula. This emphasis on building technical capacity of extension professionals undoubtedly causes lack of a proper balance between technical and professional competencies in staff, which has been identified as a common problem in the extension services of developing countries (Suvedi and Kaplowitz, 2016; Khan et al., 2004; Gibson and Hellion, 1994). This confirms the impression that 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 addition to teaching technical skills, institutions should offer training on process skills and competencies in response to global changes that have influenced agricultural development (Cevahir and Ismet, 2019).

Another strength identified in the curriculum is the 10-week to one-year practical extension programs in two universities (Uganda and Nigeria) aimed to close the gap between theory and practice. In Uganda, Supervised Experiential Learning Projects (SELPS) place students in public- and private-sector organizations across the country for 10 to 15 weeks under day-to-day mentorship by field supervisors. This is further complemented with full-time students' residence at the university farm (MUARIK) for 12 weeks, where they have hands-on training in various aspects of agriculture to acquire practical skills in a range of areas such as ICTs, poultry management, animal sciences, nutrition and health, apiculture, and field crop management. In the same way, the extension program in Nigeria has a 12-month practical year called the Students' Internship Work Experience Scheme, designed for experiential learning in crop production, animal husbandry, farm records and management, extension practice, etc. During

the period, students are engaged in the university farm under the supervision of technical staff and take part in one- week tours/trips to research institutes, agro-industries, private farms, and centers. Such is not the case in South Africa, Kenya, and Malawi institutions, where programs lack a dedicated practical scheme for students' exposure to career realities. These experiences, however, are constrained by limited funding, among other factors, consequently, courses designed to be practical end up being theoretical. Moreover, many instructors may not be well grounded in the field-based agricultural extension and advisory service experience and therefore deliver theory-based information and knowledge that does not equip students with the required competencies.

CHAPTER 5 : CONCLUSION AND RECOMMENDATIONS

The undergraduate agricultural extension programs in the five countries are regulated through national or institutional processes, or both, by various regulatory bodies. The processes seem to be more inclusive, comprehensive, and periodical in some universities than in others. The curricula for the programs are largely aligned with the 11 competency domains, but with outstanding emphasis on technical competence rather than human/process skills and competencies. Some critical professional competency domains such as soft skills; gender and diversity; health, nutrition, and food safety; brokerage, markets, and value chains; and personal and professional development are not well covered in most curricula. Also, some subject matter -- particularly on contemporary issues and technologies in competency domains such as ICTs, program planning, and program implementation, among others-- are not adequately addressed. The dominant pedagogical approach for the transaction of the curriculum is lecture complemented with some interactive and learning-enhancing tools such as group assignments, role play, success stories, case study, PowerPoint presentations, etc. There is no practical component in some courses in many universities, and few universities have dedicated structure in the programs to sufficiently expose students to hands-on training and experiential learning. The study makes the following recommendations:

The curriculum for undergraduate agricultural extension training in the universities should be revised to reflect the following changes:

1. The process of curriculum development and management, whether at the national or institutional level, should strategically involve the functional participation of relevant stakeholders in the development of a robust and inclusive curriculum responsive to the ever-changing agricultural and food system, the needs of diverse value chain actors, the evolving roles of extension and advisory services and the competence needs of extension professionals. Curriculum review should be timely and periodical.
2. Universities should target a balance in technical and process competencies in the curricula for training extension professionals in Africa.
3. Courses or subject matter/contents should be revised or developed to target training in process skills, particularly soft skills, personal and professional development, and gender and diversity, among others, to prepare extension professionals to be competitive and relevant in the world of work.
4. Outdated courses/contents that are repetitive and do not target a specific competency domain should be screened out or removed to accommodate more relevant and current subject matter; and curriculum/course development/revision should be guided with a specified learning outcome, aside from general learning outcomes of a program.
5. In addition to designating a considerable space in the curriculum for adequate exposure of professionals to hands-on and experiential learning using internships, industry

placements, and rural/community residential experiences, courses should have practical components.

6. Universities should promote and encourage the use of interactive pedagogies and information communication technologies that would improve cognitive and affective learning by professionals to enhance overall learning. ICT-based pedagogies should be encouraged and promoted to support traditional methods for enhanced learning and acquisition of a wide spectrum of knowledge and skills useful in a highly competitive world of work. The implementation, however, would need a supportive system, sustainable funding for the provision of relevant facilities, and training of adequate human resources.

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About This Document

This AAP-PIRA project reviewed the undergraduate (UG) agricultural extension curriculum used in MSU-AAP Consortium member universities covering Nigeria, Malawi, South Africa, Uganda, and Kenya with the research questions: (a) What are the curriculum development processes in MSU-AAP universities? (b) What are the structure and contents of the UG agricultural extension curriculum? (c) What instructional methods are used for the transaction of the UG curriculum? (d) What core process skills and competencies are covered in the curriculum? and (e) What are the strengths and gaps in the UG agricultural extension curriculum in Africa? Overall, the findings revealed that the curriculum review processes seem to be more inclusive, comprehensive, and periodical in some universities than in others, the curricula are largely aligned with the 11 competency domains, but with outstanding emphasis on technical competence rather than process skills and competencies. Some critical professional competency domains are not well covered in most curricula including inadequate hands-on training and experiential learning. Based on the recommendations, the agricultural training institutions under AAP universities could revise and strengthen their UG agricultural extension curricula.

Lead Researchers

Dimelu Mabel Ukamaka
Nigeria • University of Nigeria, Nsukka • mabel.dimelu@unn.edu.ng

Murari Suvedi
Nigeria • University of Nigeria, Nsukka • ekwe.agwu@unn.edu.ng

Agwu Ekwe Agwu
Nigeria • University of Nigeria, Nsukka • ekwe.agwu@unn.edu.ng

Charity Chanza
Malawi • Lilongwe University of Agriculture and Natural Resources • cchanza@luanar.ac.mw

P.V.K. Sasidhar
India • Indira Gandhi National Open University • pvksasidhar@ignou.ac.in

Ifeoma Quinette Anugwa
Nigeria • University of Nigeria, Nsukka • ifeoma.irohibe@unn.edu.ng

Saweda Liverpool-Tasie
USA • Michigan State University • lliverp@msu.edu

Frank Tchuwa
Malawi • Lilongwe University of Agriculture and Natural Resources • ftchuwa@luanar.ac.mw

Country-Based Researchers

Lindie von Maltitz
South Africa • University of the Free State • vonmaltitzl@ufs.ac.za

Margaret Najjingo Mangheni
Uganda • Makerere University • mnmangheni@gmail.com

Agnes Oywaya-Nkurumwa
Kenya • Egerton University • aoywaya@egerton.ac.ke

Chidimma Frances Ifeonu
Nigeria • University of Nigeria, Nsukka • phrancesleaticia@gmail.com

Kristin Davis
South Africa • International Food Policy Research Institute & University of Pretoria • K.Davis@cgiar.org

Maheshwari S Elapata
USA • Michigan State University • elapatam@msu.edu

Alliance for African Partnership
Michigan State University
International Center
427 N. Shaw Lane, Room 202
East Lansing, Michigan 48824
aap@msu.edu • aap.isp.msu.edu

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