

Strengthening Agricultural Extension Training

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

By

**Agnes Oywaya-Nkurumwa, Dimelu Mabel Ukamaka,
Saweda Liverpool-Tasie, Ifeoma Quinette Anugwa,
Frank Tchuwa, Murari Suvedi, Agwu Ekwe Agwu,
Charity Chanza and P.V.K. Sasidhar**



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Agnes Oywaya-Nkurumwa

Kenya • Egerton University

Dimelu Mabel Ukamaka

Nigeria • University of Nigeria, Nsukka

Saweda Liverpool-Tasie

USA • Michigan State University

Ifeoma Quinette Anugwa

Nigeria • University of Nigeria, Nsukka

Frank Tchuwa

Malawi • Lilongwe University of Agriculture and Natural Resources

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

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CONTENTS

List of Tables, Boxes, and Figures	v
Abbreviations and Acronyms	vii
Acknowledgements	viii
Executive Summary	ix
1.0 INTRODUCTION	1
1.1 Agriculture in Kenya	1
1.2 Development of Agricultural Extension in Kenya.....	4
1.3 Study Background.....	12
1.4 Research Questions and Objectives of the Study.....	15
1.5 Organization of the Report	16
2.0 THEORETICAL ORIENTATION PROCESS SKILLS AND COMPETENCY GAPS IN AGRICULTURAL EXTENSION	17
2.1 Agricultural Extension and Advisory Services	17
2.2 Review of Agricultural Extension Services in Kenya.....	19
2.3 Review of Undergraduate Agricultural Extension Training Curricula.....	32
3.0 METHODOLOGY	43
3.1 Study Population and Sampling	43
3.2 Operationalization and Measurement of Variables	44
3.3 Design and Development of the Survey Instrument.....	48
3.4 Data Collection and Analysis	48
3.5 Limitations of the Study	49
4.0 RESULTS AND DISCUSSIONS	50
4.1 Findings from Online Survey of Agricultural Extension Professionals.....	50
4.1.1 Demographics of Agricultural Extension Professionals.....	50
4.1.2 Institutional Characteristics of Agricultural Extension Professionals.....	51
4.1.3 Process Skills and Core Competencies	52
4.1.4 Appropriate Ways to acquire the Core Competencies.....	70
4.1.5 Major Barriers to Effective Implementation of Extension Curricula.....	72

4.2	Findings from Focus Group Discussions	74
4.2.1	General Perceptions of Community about Agricultural Extension.....	74
4.2.2	The Changing Needs of the Changing Agricultural Systems	76
4.2.3	One Activity that the Extension Service is Doing Particularly Well.....	77
4.2.4	Major Recommendations to Improve Agricultural Extension Services.....	78
4.2.5	Critical Job Skills/Core Competencies Required of Agricultural Extension Workers	80
4.2.5	Coverage of Job Skills/Core Competencies in UG Curriculum.....	81
4.2.6	Barriers to Effectively Train UG Students in Required Core Competencies	82
4.2.7	Suggestions to Overcome the Barriers.....	84
4.2.8	Broad Modifications Suggested in Agricultural Extension Curriculum	85
4.3	Discussion	87
5.0	CONCLUSIONS AND IMPLICATIONS FOR POLICY	93
5.1	Conclusions.....	93
5.2	Implications for Policy	94
5.3	Specific Recommendations for Improving Agricultural extension Curricula.....	95
	REFERENCES	97
	ANNEXURE 1 – ONLINE SURVEY	103
	ANNEXURE 2 – FGD INSTRUMENT	121

LIST OF TABLES, BOXES, AND FIGURES

Table 2.1 :	Categories of Units Covered and Competencies Imparted in the BSc AGED Programme	36
Table 2.2 :	Extension Related Units and Competencies Imparted in The BSc AGED Programme	37
Table 2.3 :	Categories of Units and Competencies Acquired in the BSc AGHE Programme	40
Table 2.4 :	Agricultural Extension Units and Competencies Acquired	41
Table 4.1 :	Demographics of Agricultural Extension Professionals in Kenya	50
Table 4.2 :	Institutional Characteristics of Agricultural Extension Professionals in Kenya	51
Table 4.3 :	Program Planning Skills and Competencies among Agricultural Extension Professionals in Kenya	53
Table 4.4 :	Program Implementation Skills and Competencies among Agricultural Extension Professionals in Kenya	55
Table 4.5 :	Communication Skills and Competencies among Agricultural Extension Professionals in Kenya	57
Table 4.6 :	ICTs Skills and Competencies among Agricultural Extension Professionals in Kenya	58
Table 4.7 :	Program Monitoring and Evaluation Skills and Competencies among Agricultural Extension Professionals in Kenya	60
Table 4.8 :	Personal and Professional Development Skills and Competencies among Agricultural Extension Professionals in Kenya	61
Table 4.9 :	Diversity and Gender Skills and Competencies among Agricultural Extension Professionals in Kenya	63
Table 4.10 :	Marketing, Brokering and Value Chain Development Skills and Competencies among Agricultural Extension Professionals in Kenya	64
Table 4.11 :	Extension Soft Skills among Agricultural Extension Professionals in Kenya	65
Table 4.12 :	Nutrition Skills and Competencies among Agricultural Extension Professionals in Kenya	66

Table 4.13 : Technical Subject Matter Expertise among Agricultural Extension Professionals in Kenya	68
Table 4.14 : Ways to Acquire the Process Skills and Competencies in Kenya	71
Table 4.15 : Summary of Mean Ratings of Scores for Methods of Acquiring skills and competencies	71
Table 4.16 : Major Barriers to Effective Implementation of Extension Worker Training Curriculum in Kenya	73
Table 4.17 : Recommendations for Improving Agricultural Extension Services	79
Box 4.1 : Additional Process Skills or Competencies that Extension Professionals Need	69
Box 4.2 : Additional Appropriate Ways to Acquire Process Skills or Competencies	72
Box 4.3 : Other Barriers to Effective Implementation of Extension Worker Training Curriculum	74
Figure 2.1 : Organizational Structure for Ministry of Agriculture, Livestock, Fisheries, and Cooperatives at National Level	20
Figure 2.2 : Structure of the county level Ministry of Agriculture, Livestock, Fisheries and Cooperatives	21

ABBREVIATIONS AND ACRONYMS

AAP	: Alliance for African Partnership
AGRA	: Alliance for a Green Revolution in Africa
ASDS	: Agriculture Sector Development Strategy
ASDSP	: Agriculture Sector Development Support Programme
ASTGS	: Agriculture Sector Transformation and Growth Strategy
BSc AGED	: Bachelor of Science in Agricultural Education and Extension
BSc AGHE	: Bachelor of Science in Agriculture and Human Ecology
CUE	: Commission for University Education
DLEC	: Developing Local Extension Capacity
FAO	: Food and Agriculture Organization of the United Nations
FFS	: Farmer Field School
GoK	: Government of Kenya
KASEP	: Kenya Agricultural Sector Extension Policy
KNBS	: Kenya National Bureau of Statistics
MoALF&C	: Ministry of Agriculture, Livestock, Fisheries and Cooperatives
MSU	: Michigan State University
NALEP	: National Agriculture and Livestock Extension Programme
PIRA	: Partnership for Innovative Research in Africa
YFCK	: Young Farmers Clubs of Kenya

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– Authors

EXECUTIVE SUMMARY

Kenya's economy is heavily dependent on the agriculture sector, which continues to play a crucial role in food security and poverty reduction. However, sector is faced with many challenges which constrain its ability to deliver on its mandate. In addition, the landscape of the agriculture system has changed greatly in recent years resulting in new needs and challenges. All these changes call for transformation of the agriculture sector. Effective agricultural extension and advisory services have a critical role in transforming agricultural systems, and addressing global, social and economic development objectives and challenges.

Extension agents are key players in the EAS, and their competency determines to a great extent the success of the EAS. They need to possess a set of core process skills and functional competencies upon which the organization bases its primary operation or services. These are basic sets of knowledge, skills, abilities, and behaviors that agricultural extension professionals require to perform their tasks effectively and include: 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.

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 have not changed in tandem with the changing needs of the agricultural systems, in terms of content and delivery methods. Few studies have been done, that focus on identifying gaps in the curricula for training agricultural extension professionals. This study seeks to identify the gaps in the curricula and propose ways of strengthening the training of agricultural extension professionals. The Africa-wide study was done in five Michigan State University – Alliance for African Partnership (MSU-AAP) consortium partner countries namely; Kenya, Malawi, Nigeria, South Africa and Uganda. The study was funded under the Partnerships for Innovative Research in Africa (PIRA) grant. Hence the study is also referred to as AAP-PIRA research. This report is based on findings from Kenya, with a focus on Egerton University, which is the only MSU-AAP partner university in Kenya.

The study was guided by four research questions as follows:

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?

Three main tasks were undertaken in the study as follows: Review agricultural extension curricula currently in use in AAP member universities at the undergraduate level; identify critical process skills and competencies of agricultural extension professionals, process skills gaps, and areas of potential curricular reform; and, recommend improvements/reforms of agricultural extension curricula to prepare the next generation of agricultural extension professionals to competently handle extension service delivery in sub-Saharan Africa.

The study adopted a cross sectional survey research design that involved three data collection methods. It started with desktop reviews of undergraduate agricultural extension training curricula at Egerton university, and agricultural extension services in Kenya. Two reports were prepared, based on the desktop reviews. These were: Review of Undergraduate agricultural extension training curricula at Egerton University and Review of Agricultural extension services in Kenya. The desktop surveys were followed by two focus group discussions (FGDs) involving 22 purposively selected stakeholders in agricultural extension who included representatives from the Ministry of Agriculture, Livestock, Fisheries and Cooperatives; private sector, postgraduate students and university lecturers or faculty. The first FGD was conducted face to face while the second was conducted virtually via zoom. The discussions were recorded and later transcribed. The FGD were guided by a checklist of items that was jointly developed by the AAP-PIRA research team. The third data collection method was an online survey of a wide range of stakeholders in agricultural extension. The online questionnaire was jointly developed by the AAP-PIRA research team. A total of 250 stakeholders were contacted but only 84 respondents attempted to fill the questionnaire, and out of which 68 were able to complete all the items in the online questionnaire.

The Statistical Package for Social sciences (SPSS) version 24 software was used for the statistical analysis. The demographic and institutional characteristics of the respondents were analyzed using frequency, percentages and means. 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. Strategies for improving undergraduate agricultural extension curriculum and major barriers to effective implementation of undergraduate extension curriculum were analyzed using frequencies and percentages.

The FGDs findings revealed that the general view of the public about extension services was that they were invisible and ineffective, especially the government extension services, which was described by some participants as being dead. However, there were some areas where it was extension was reported to be doing well. The FGD participants also pointed out the changing needs of the agricultural and food system. These included the need to: adopt market and value chain approach; integrate climate change, environmental sustainability and

nutrition in extension; enhance use of ICTs including social media; improve professionalism of extension; strengthen research-extension linkages among others.

The FGD findings also revealed the core competencies and skills that were needed by agricultural extensionists to meet these needs. They included: Soft skills especially communication, networking and partnership skills, problem solving, team building, leadership, critical thinking and facilitation among others; ICT skills; community needs assessment skills; entrepreneurship skills, market analysis, value chain analysis, and risk assessment skills; basic research skills; and, practical skills in the technical areas of training. The findings further revealed that the current undergraduate training curricula were not effectively imparting these core competencies. The major barriers to effective training of agricultural extensionists were inadequate funding for supporting the programmes; inadequate academic staff capacity; negative attitude of students towards agricultural extension and low practical skills of students.

The suggested ways to overcome the barriers included: Increased funding to support effective implementation of the curricula; review curricula to incorporate world of work skills and eliminate unnecessary courses; strengthen collaboration with industry and other stakeholders; use of guest speakers and field trip to fill gaps in practicals; socializing youth into agriculture early in life, to counter negative attitudes. The FGD also gave suggestions for broad modifications of the undergraduate extension training curricula at Egerton University especially the Bachelor of Science in Agricultural Education and Extension.

The online survey sought the respondents' view about the importance of selected process skills and competencies and to what degree they were covered in the undergraduate curricula. These skills and competencies were: 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 respondents were required to rate each skill and competency on a scale of 1 to 5, based on how important they were and how well they were covered in the curricula.

The online survey findings revealed that all the 11 process skills and competencies were considered very important, with means ratings ranging between 4.48 and 4.80. The highest mean scores were for Communication Skills (4.80), followed by Personal and professional development skills (4.76) indicating how highly these skills are considered in agricultural extension work. The findings also revealed that the process skills were covered to varying degrees in the curricula, but all the ratings were less than the ratings on their importance. This shows that the extent of coverage of the core process skills and competencies was not commensurate to their level of importance in agricultural extension work. This was confirmed by t-test results which indicated that for all the skills and competencies, there were statistically significant differences between their ratings in importance and the degree to which they were covered in the curricula.

The online survey respondents also gave suggestions for appropriate ways to acquire the process skills and competencies. These included targeting pre-service training by reviewing and upgrading curricula; and strengthening internship programmes. Other avenues include targeting In-service training through short courses for serving extension professionals and proper job orientation training programmes for new staff. The respondents also gave their views about the barriers to effective implementation of extension curricula. As with the FGD findings, the leading barrier was inadequate funding which had negative effect on the ability of institutions to provide resources and facilities and support practical activities as well as hire adequate well-trained staff.

The study concludes that the current undergraduate curricula for training agricultural extensionists are not sufficiently matching the extension needs of the changing agricultural systems. There are gaps in the coverage of process skills and core competencies which can be filled through curricula review; stronger collaborations with industry and other stakeholders in agricultural extension; use of in-service training programmes and effective job orientation programmes for new extension staff. The study findings have implications for policy, given the important role of agricultural extension services in facilitating transformation of the agricultural system in Kenya. There is need for enhanced funding for pre-service education and training at agricultural colleges and universities; improving in service training and professional development for serving extension professionals; and, recognizing and supporting important role of agricultural extension. At institutional level policy makers should support capacity building of extension lecturers in the required core competencies and skills; and also support revitalization of agricultural extension curricula to align them with current needs of extension services.

CHAPTER 1 : INTRODUCTION

1.1 Agriculture in Kenya

Kenya's economy is heavily dependent on the agriculture sector, which continues to play a crucial role in food security and poverty reduction. The sector is key to the achievement of the 10% economic growth envisaged in Kenya's Vision 2030 (Government of Kenya [Government of Kenya], 2010a; 2012; 2018b; 2021). The direct contribution of the agriculture sector to the GDP is estimated at about 31% while indirect contribution to the GDP is about 27%, indirectly through linkages with manufacturing and service-related sectors (Kenya National Bureau of Statistics, 2021).

Kenya's agriculture sector is key to attaining food security for the country's rising population which grew from 37.7 million in 2009 to 47.6 million (Government of Kenya, 2019). About 80% of the population lives in rural areas and depend directly and indirectly on agriculture as a source of livelihood (Geopoll, 2018). The sector serves as a source of employment for up to 40% of the total population and 70% of the rural population (FAO, 2020; World Bank, 2019). It is also important in environmental protection and sustainable development and foreign exchange earnings (World Bank, 2019).

Kenya has a diversity of agro-ecological zones, which makes the country suitable for a wide range of agricultural activities. The country has three main production systems namely; extensive, semi-intensive and intensive systems (Government of Kenya, 2021). The agriculture sector is composed of three sub-sectors namely; crops, livestock and fisheries. The crops sub sector comprises mainly of food, horticultural and industrial crops. The main food crops produced are maize, potatoes, beans and sorghum, with maize being the most widely produced, and accounting for over 70% of marketed value for food crops (Kenya National Bureau of Statistics, 2021). Beans are also widely grown in many of the arable parts of the country. In 2020, the food crops contributed about 6% of total marketed agricultural production. Horticulture is a key agricultural sub-sector in Kenya, and consists of cut flowers, fruits and vegetables including potatoes. It is one of the leading foreign exchange earners in the country. In 2020, it accounted for 29.5% of marketed agricultural production, with cut flowers contributing 71.6% of this production.

Industrial crops in Kenya are grouped into two categories. Temporary industrial crops consist of sugarcane, pyrethrum, cotton, sunflower, barley, tobacco, coconut and bixa. The permanent industrial crops are tea, coffee and sisal. In 2020, industrial crops contributed about 32.6% of the total marketed agricultural production. Tea, which is the leading foreign exchange earner in Kenya for about 73.5% of the marketed output from industrial crops (Kenya National Bureau of Statistics, 2021). Kenya is a leading exporter of black tea in the world.

The Livestock sub-sector is an important source of livelihood, with people in ASAL areas relying almost entirely on the livestock. In 2019 Kenya had a livestock population of about 2.2 million dairy cattle, 559,000 dairy beef, 13 million indigenous cattle, 19.3 million sheep,

28 million goats, 4.6 million camels, 1.2 million donkeys, 443,000 pigs, 30.3 million indigenous chicken, 5.6 million layers, 2.9 million broilers, 561,000 rabbits and 1.2 million beehives (Kenya National Bureau of Statistics, 2020). This sector accounted for 32% of marketed agricultural produce in 2020 (Kenya National Bureau of Statistics, 2021).

The Fisheries sub sector in Kenya is a significant source of income, food and employment to a large population. The Sub Sector is mainly composed of freshwater sources such as lakes, rivers and dams; marine sources mainly the Indian Ocean, and aquaculture (pond fish farming). Lake Victoria, which is also shared by Uganda and Tanzania, is the biggest source of freshwater fish, not just in Kenya and East Africa, but also on the African continent. Fish production is estimated at 150,000 tonnes annually, the sub-Sector contributes about 5% of AgGDP (Government of Kenya, 2021).

The structure of the agriculture sector in Kenya is dualistic (Government of Kenya, 2021). The sector is dominated by small scale producers consisting of subsistence farmers and fisherfolk, pastoralists, commercial small-scale farmers and commercial fisherfolk. This sector is characterized by subsistence production, reliance on rainfed production and low mechanization (Ministry of Agriculture and Livestock Development, 2021). Despite this, the small-scale agriculture sector accounts for 75% of agricultural output and up to 70% of marketed agricultural produce. In 2020, the small-scale agriculture sector accounted for 73% of total marketed agricultural output (Kenya National Bureau of Statistics, 2021). The large-scale agriculture sector in Kenya is made up of a relatively small number of producers. The large-scale producers engage mainly in cash crop farming and commercial livestock production. The fisheries subsector in Kenya contributes significantly to the economy and livelihoods, and supports more than one million people in Kenya, directly and indirectly. It is dominated by small-scale fisher folk who account for 90 per cent of the country's fish production.

According to the 2019 Kenya population census (Kenya National Bureau of Statistics, 2020) there were a total of 6.4 million farming households comprising of 1.7 million crop farmers, 3.9 million mixed farmers, 760,000 Livestock farmers, and about 30,000 fisher folks). The majority of the farm sizes fall in the smallholder category, ranging from 0.2 to 3 hectares (KARI, 2019a).

There are numerous challenges facing the agriculture sector in Kenya The major ones as outlined in Government of Kenya (2021) include: Inadequate legal and policy frameworks, with many policies and legislation being outdated and inconsistent with the current constitution of Kenya; land subdivision and fragmentation, whereby over-subdivision has resulted in uneconomical agricultural units; low adoption of agricultural technology and innovation mainly by smallholder farmers who make up the bulk of agricultural producers; land degradation and declining soil fertility; and decreasing land for agricultural production due to increasing competition from alternative land uses.

Other challenges include: Frequent conflicts between communities due to cattle rustling, livestock and wildlife encroachment on private land due to scarcity of pastures especially

during periods of drought; prevalence of pests and diseases that result in high pre-harvest and post-harvest losses; climate change and its associated negative effects; non-adherence and inadequate quality control systems which negatively affects the export market. This is coupled with reliance on a few external market outlets which exposes agricultural exports to risks of changes in demand and unexpected non trade barriers from foreign markets. The domestic market on the other hand suffers from inadequate market access and marketing information infrastructure due to poorly organized market information systems.

Additional challenges are: High cost, adulteration, low and inappropriate application of key inputs; poor infrastructure; over reliance on rain fed agriculture; gender inequalities at household level, which constrain women farmers' access to and control over productive resources and their participation in agriculture value chains; Loss of biodiversity and vectors for pollination mainly due to excessive use of pesticides and other farming practices which has a negative effect on productivity; and, the challenge of aging farmers, whereby most of the agricultural enterprises are owned and/or managed by people who are elderly. Youth participation in agriculture in Kenya remains quite low as many of them shun the sector due to negative attitudes and low access to resources (Government of Kenya, 2018b; Geopoll, 2018; KARI, 2019a). The agriculture sector in Kenya is also negatively affected by inadequate entrepreneurial skills and lack of entrepreneurial mindsets among many small-scale farmers, as this hinders commercialization (Government of Kenya, 2021).

The agriculture sector in Kenya requires major and sustained transformation, in order to overcome the challenges in the sector, commercialize and contribute effectively to food security and economic development. Agricultural extension services have a key role in achieving this transformation (Government of Kenya, 2012; Government of Kenya, 2019; Government of Kenya, 2021). As emphasized in Kenya's National Agriculture Sector Extension Policy; *...a well-functioning agricultural extension service operated by the public and private sectors is one of the critical inputs required for increased agricultural productivity to transform subsistence farming into modern and commercial farming, attain food security, improve incomes and reduce poverty* (Government of Kenya, 2012).

This critical role of effective extension and advisory services in transforming agricultural systems and addressing global social and economic development objectives is widely recognized (DLEC, 2019). Agricultural extension and advisory services are an important avenue for sharing important knowledge, technologies and that inform farmers' production decisions resulting in optimization of returns on investments made in agriculture (Government of Kenya, 2021; Gido et al., 2015; Kingiri, 2020). Extension also helps to link farmers to other actors in the agricultural value chains (Government of Kenya, 2021). Agricultural extension services in Kenya are dominated by the public sector. However, in the last decade, there has been increasing recognition and involvement of the private sector in agricultural extension service delivery (Government of Kenya, 2010; Government of Kenya, 2012b; IFPRI, 2019).

1.2 Development of Agricultural Extension in Kenya

Agricultural extension services in Kenya have evolved significantly since their introduction in the early 1900s. The evolution pattern in Kenya is not unique, as it is a path that has been followed by many developing country agricultural extension and advisory services. DLEC (2019) identifies four main stages through which extension services have evolved. These are; the Foundation phase in the 1950s and 1960s, expansion phase in the 1970s and 1980s; Privatization in the 1990s and early 2000s and Post-2008 Pluralistic phase.

1.2.1 Historical development of agricultural extension services in Kenya

1.2.1.1 Agricultural extension in the pre-independence period. This corresponds to the Foundation phase in DLEC (2019). Agricultural extension services were first introduced in Kenya in the early 1900s during the colonial era. Extension services were initially reserved for white settler farmers who practiced commercial farming. The native Africans were mainly engaged in subsistence farming and pastoralism under communal land ownership. In the early colonial days, there were two separate agricultural extension delivery arms; one for white settlers and some limited services for the Africans (Mukembo& Edwards, 2015; Government of Kenya, 2012). The Swynnerton Plan of 1954 was instrumental in the development of African agriculture as it was an attempt to intensify African agriculture by expanding crop and livestock production. The Plan, which was implemented over an 8-year period allowed Africans to grow cash crops, created security of land tenure by promoting individual land ownership and also allowed Africans to access credit. The Swynnerton Plan also made provision for strengthening agricultural extension services for Africans (Government of Kenya 2021). The initial extension services for Africans were delivered in a top-down coercive manner through strict enforcement of agronomic requirements which were delivered simultaneously with harsh soil conservation regulations. This resulted in fear, mistrust, and uneasy relations between the African farmers and extension staff.

1.2.1.2 Early post-independence era. This represents the expansion phase as indicated by DLEC (2019). After independence, agricultural extension services became the responsibility of Government and were established under the Ministry of Agriculture (Muyanga& Jayne, 2006; Nambiroetal., 2006). Guided by government policy as set out in Sessional Paper No. 10 of 1965 that was aimed at promoting rapid economic growth, government extension services focused on both smallholder and large-scale farmers and concentrated on high potential areas where potential impacts could be easily attained (Government of Kenya, 2021). Two main approaches were used; one focused on food production, also referred to as whole farm approach, which was mainly used by the Government extension service. The other was a commodity-based approach focusing on production of cash crops such as tea, coffee, pyrethrum and sisal, and was mainly used by private sector and some parastatals and corporations (Muyangaand Jayne, 2006). The whole farm approach was therefore used from independence in 1963 to the 70s and was coupled with the integrated agricultural development approach (Government of Kenya, 2012).

In the early independence years, extension services were highly centralized and offered in a top-down and instructive manner. However, in 1983, the government adopted a more decentralized approach to development, by adopting the District Focus for Rural Development, which took services closer to the people and encouraged participation in decision making and focus on local priorities. Agricultural programmes and projects were planned with local participation through District agricultural committees and District Development Committees (Nambiro et al., 2006). The decentralization of extension services was pursued in two ways; first by decentralizing government responsibility for extension services through reforms that were aimed at sharing responsibility for extension with other ESPs, and also improving accountability and responsiveness (Nambiro et al., 2006). Decentralization of extension services thus facilitated entry of other extension service providers such as non-governmental organizations (NGOs, Community-based organizations (CBOs), private companies and farmer organizations (Muyanga and Jayne, 2006). The management of extension programmes was also decentralized through adoption of participatory programmes that gave farmers more decision-making power in designing programmes and disseminating extension messages (Nambiro et al., 2006).

The Training and Visit Extension system of extension was introduced in Kenya in 1982, as the National Extension Programme (NEP) (Muyanga and Jayne, 2006). It was aimed at improving the management of extension; strengthening the research-extension farmer linkages; focusing the role of extension agents to education only; improving coverage of farmers by limiting number of farmers each extension agent was to serve; improving on mobility of extension agents among others. T & V was based on a rigid fortnightly schedule of trainings and visits and used the contact-follower farmer approach (Benor et al., 1984). The T & V system was implemented country wide, and lasted up to 1998, after which it was abandoned. An impact assessment of T&V in Kenya by Gautam (2000) revealed that the extension system had limited impact on the institutional development of extension services, and that it failed to achieve sustained improvement in agricultural productivity among Kenyan small-scale farmers.

T&V, along with the early approaches used under the conventional or traditional agricultural extension model were faulted as being top-down and prescriptive and required a lot of resources in terms of money, staff and other supporting resources. With the implementation of the Structural Adjustment Programmes in the 1980s and 1990s, the government agricultural extension services came under sharp criticisms due to inefficiencies and failure to deliver (Gautam & Anderson, 1999). As reported by Muyanga and Jayne (2006) the traditional public extension system came across as outdated and inflexible, among other weaknesses and could not therefore cope with the changing demands of a modernizing agriculture sector. The need to respond to the challenges facing public extension services led the Ministry of Agriculture to develop the first ever agricultural extension policy in Kenya, the National Agricultural Extension Policy (NAEP) in 2001. This laid the foundation for the development of other policies and strategies to guide extension work, along with their implementation frameworks.

1.2.2 Recent Extension Approaches, Strategies and their Implementation Frameworks

After the abandonment of T&V extension in Kenya, the Government through the Ministry of Agriculture formulated the National Agriculture Extension Policy (NEP) in 2001. This policy and its implementation framework, as well as subsequent policies and strategies are discussed in the following section.

1.2.2.1 The National Agricultural Extension Policy and the National Agriculture and Livestock Extension Project. The National Agricultural Extension policy was developed in 2001 by the Ministry of Agriculture and Rural Development as a way of mitigating the inefficiencies of the conventional agricultural extension system. This was the first ever agriculture extension policy and was aimed at improving the inefficiencies of the agricultural extension service and responding to changing needs at national and farmer level (Kiara, 2011).

The policy recognized the need to change from the one-size fits-all style of extension to a diversified and decentralized extension system that recognized the differences in ecological and other conditions in various parts of the country. The policy articulated the importance of clientele participation and participation of other stakeholders, unlike the earlier extension models that used top-down approaches. It also called for demand-driven extension as opposed to supply driven extension where technologies were forced on farmers whether they recognized the need for them or not. NAEP also recognized the role of the private sector in pluralistic extension; and set out modalities for commercialization and privatization of extensions services. The policy called for three models of extension, with regard to privatization and commercialization.

The NAEP introduced a participatory approach in extension by incorporating farmer and other stakeholder participation. The policy promoted pluralism in extension service delivery by supporting the participation of diverse extension service providers. Although previously under the district focus for rural development approach, provision of extension services by multiple players was facilitated, this was not entrenched in policy. NAEP therefore provided for entrenchment of pluralism in extension service delivery in policy. The key features of extension under NAEP are: demand-driven, self-reliance, professionalism, participation and holism, sustained natural resource management and research-extension linkages (Kiara 2011).

The National Agriculture and Livestock Extension Programme (NALEP) was the implementation framework for NAEP. As reported by Cuellar et. al. (2006), the programme was implemented countrywide by the Ministry of Agriculture through the National Agriculture and Livestock Extension Project (NALEP) with support from the Swedish International Development Agency (Sida). The programme's aim was to strengthen the contribution of agriculture and livestock to social and economic development and poverty alleviation by promoting pluralistic, efficient, effective and demand-driven extension services to farmers and agro-pastoralists. Pluralism was promoted by encouraging other stakeholders' input in extension work in order to benefit from synergies.

NALEP used a Shifting Focal Area Approach (SFAA), to actualize the principle of participation, which involved farmers in directly setting and fulfilling their own development goals thereby

resulting in demand driven extension services (Amudavi, 2003). The SFAA approach which was aimed at improving effectiveness and efficiency in extension provision, focused support at the grass-roots level of the administrative division and location where implementation takes place. All extension resources and activities were concentrated in one location at a time, which was selected in a participatory manner involving community representatives. As described by Kiara (2011) the first step in the SFAA was identification of various service providers in the area and their activities. This was followed with mobilization of the community through a participatory broad-based survey, through which a basket of opportunities in agricultural enterprises was prepared and shared with the farmers. Farmers were required to form Common Interest Groups (CIGs), based on an agricultural enterprise chosen from the basket of opportunities. They then obtained extension services through their CIGs, on a demand basis. Group method of extension was therefore the preferred way of delivering extension services to farmers. After one year, it was expected that there would be sufficient impact of extension, and another focal area was selected.

The implementation of NAEP was not as successful as had been anticipated. Some of the factors that led to failure included inadequate institutional arrangements, narrow ownership, lack of a legal framework, lack of goodwill and commitment among some of the top managers, and slow flow of resources. This led to review of the policy to the National Agricultural Sector Extension Policy (NASEP).

1.2.2.2 National Agriculture Sector Extension Policy (NASEP- 2012). The NASEP adopted a sector wide approach, unlike NAEP that had a narrow focus on agriculture. The policy sought to address a number of weaknesses that had been identified in the NAEP. The areas of focus for NASEP included:

- Managing pluralistic extension service for effective service delivery.
- Developing private sector-operated extension services to complement public extension services.
- Commercializing and privatizing public extension services without compromising public interest. Three models were proposed: Model 1: offers free public extension services; Model 2: With partial cost-shared provision of extension services; and, Model 3: with fully commercialized agricultural extension services.
- Harmonizing extension approaches and methods especially those promoting demand-driven extension and capacity building for grassroots institutions.
- Addressing institutional weaknesses in capacity building and technology development and dissemination.
- Addressing weaknesses in research–extension–clientele linkages, packaging and disseminating technologies.
- Creating functioning institutional frameworks to coordinate and provide linkages among stakeholders, including those involved in providing extension facilitating factors.

- Mainstreaming cross-cutting issues in extension messages such as sustainable use of natural resources, gender, HIV/AIDS, quality of goods and food safety.
- Efficient management of pluralistic extension services, development of private sector-operated extension.
- The policy also provided guidelines on matters of standards, ethics and approaches and guides all players on how to strengthen coordination, partnership and collaboration.
- NASEP also advocated for use of ICTs in the approaches used by extension service providers for wider coverage and enhanced information sharing

NASEP was implemented through the NASEP Implementation Framework (NASEP-IF). This framework continued to use the shifting focal area approach (SFAA) and the use of CIGs that were used under NALEP. The period spent in a focal area was increased from one to 2-3 years as it had been realized that one year was too short for impact to be realized. Through NASEP, the private sector's role in extension services was enhanced.

1.2.2.3 Agriculture Sector Development Strategy (ASDS) (2010-2020). ASDS is a multi-sectoral document, prepared by 10 agriculture sector ministries. The overall goal of the Strategy is to transform Kenya's agricultural sector into an innovative, commercially oriented, competitive and modern industry in order to achieve improved food security and poverty reduction (Government of Kenya, 2010).

The ASDS was aimed at domesticating the Comprehensive Africa Agriculture Development Programme (CAADP), whose overall goal is to help African countries reach a higher path of economic growth through agriculture led development which eliminates hunger, reduced poverty and food insecurity and enables expansion of exports (Government of Kenya, 2021; African Union, 2003). The ASDS underscores the need for agricultural extension support to ensure that modern and effective methods and technologies are applied in order to position the agricultural sector as a key driver in achieving the 10 per cent annual economic growth rate envisaged under the economic pillar of Vision 2030. ASDS set the stage for reforms in Agricultural extension service delivery. One of the targets set to be achieved by 2015 was reformed and streamlined agricultural services such as in research, extension, training and regulatory institutions to make them effective and efficient.

The ASDS was implemented through the Agriculture Sector Development Support Programme (ASDSP). The first phase of ASDSP (ASDSP I) was developed from 2010, but its implementation began in January 2012. It was designed and intended as a Sector Wide Approach programme to provide the overall framework for coordinating all programmes supporting the different parts of the ASDS.

The ASDSP I had three components:

- Development of a transparent system for improved agricultural sector coordination and harmonization and an enabling policy and institutional environment for the realization of the ASDS.

- Strengthening of environmental resilience and social inclusion of value chains.
- Promotion of viable and equitable commercialization of the agricultural sector through value chain development.

The ASDSP I emphasized three strategies for its implementation: Demand-driven extension services, stakeholders taking the lead in the implementation of the programme, and use of partnerships. Coordination in ASDSP was facilitated by the public sector but implementation was led by stakeholders. The programme represented an approach to value chain development with strong partnership between the public and private sector (Government of Kenya, 2017).

During the first 5-year phase (2012-2016), ASDSP was implemented as a national programme, with coordinators in all the 47 counties of Kenya. The programme introduced a value chain development approach to extension service delivery, where extension services support all nodes of the value chain, not just production. Every county selects three agricultural value chains which are to be given priority for a period of five years. All extension efforts are directed to the promotion of the selected value chains. For example, in Nakuru County, the priority value chains from 2017 to 2022 were; avocado, pyrethrum, dairy, aquaculture (fish), and potato. Selection of priority value chains is supposed to be done in a consultative manner involving the Department of Agriculture and other stakeholders. Sometimes however, politics come into play as county governors take up some value chains as their flagship projects, sometimes for political purposes.

Review of the first phase of ASDSP led to implementation of the second phase, which was referred to as ASDSP II, covering the period 2017-2022.

ASDSP II (2017-2022)

The goal of ASDSP II was to contribute to the transformation of crop, livestock and fisheries production into commercially oriented enterprises that ensure sustainable food and nutrition security in Kenya. This was in line with Kenya's Vision 2030 and the Agriculture Policy 2016. The purpose of the programme was to develop sustainable priority value chains for improved income, food and nutrition security. ASDSP II was designed by the Ministry of Agriculture as a way of enhancing the contribution of the agriculture sector to two of the Kenya Government's Big Four agenda, namely, food and nutrition security, and, manufacturing. The focus of the programme was on building the capacity of different value chain actors at different levels to tackle the problems that hinder commercialization of Agriculture.

The programme is implemented by the national and county governments with strong participation of the private sector as direct beneficiaries or service providers. ASDSP II is financed by the Government of Kenya, Sida and the European Union (EU) for a period of five years (2017-2022).

There are four result areas in ASDSP II:

- i. Productivity of priority value chains increased: This is aimed at overcoming one of the major barriers to productivity along the value chains, which is low productivity.

- ii. Entrepreneurial skills of priority value chain actors strengthened: This result area targets enhancement of entrepreneurial and technical skills of value chain actors and service providers. This is aimed at growing the agriculture related micro, small and medium enterprises to achieve commercialization.
- iii. Access to markets by priority value chain actors improved and linkages: This is achieved through facilitating linkages to markets, financial services and access to market information. The linkages extend to other relevant stakeholders in the value chains.
- iv. Strengthened structures and capacities for consultation, collaboration, cooperation, and coordination in the agricultural sector strengthened. This is especially critical under the devolved system of government, whereby there is need for the devolved county governments to work in harmony with the national government.

ASDSP II uses the same approach as ASDSP, and emphasizes on demand driven extension and participatory approaches, and works mainly through farmer groups. (MoALF&C, n.d.;

A mid-term evaluation of the programme revealed that it has had a positive effect in the development and strengthening of priority value chains at county level and also led to strengthening of the entrepreneurial skills of value chain actors (Gray et. al., 2021)

1.2.3 Current Developments with Regard to Extension related Policies and Strategies

There are a number of new developments as follows:

1.2.3.1 Agricultural Sector Transformation and Growth Strategy (ASTGS) (2019-2029).

The ASTGS was prepared by the Ministry of Agriculture, Livestock, Fisheries and Irrigation, to succeed the Agriculture Sector Development Strategy (ASDS), which lapsed in 2020. According to the ASTGS document (Government of Kenya, 2019) the aim of the strategy is to drive Kenya's agricultural transformation and support food security aspirations. ASTGS focuses on four priority areas. These are: Food and nutrition security; improved incomes for farmers and local communities; reduced cost of food, and, increased employment, especially for women and youth.

ASTGS has nine flagships that are meant to transform the agriculture sector and achieve its potential and achieve the four priority areas. Of interest to agricultural extension is Flagship 7, on knowledge and skills. The strategy proposes the launching of three knowledge and skills building programs focused on technical and management skills in the field for 200 national and county government transformation leaders, 1,000 farmer-facing SMEs, and 3,000 extension agents. Under this flagship, the strategy proposes to revitalize extension services in the counties by hiring 3,000 digitally-skilled youth extension workers and recruiting them through national television and radio extension programmes.

Due to the devolution of agriculture to the counties, the programme has not been rolled out country wide. Each county will have the choice of either implementing it or not. The MoALF&C simply provides a blueprint for the programme, including recommendations for training existing extension officers; funding for county support from national agricultural research

organisations (e.g. KALRO); and supplements to county budgets to support the implementation of the programme for the counties that choose to adopt it.

The implementation of ASTGS is still in the initial stages, and therefore its effect on agricultural extension in Kenya is yet to be felt.

1.2.3.2 The Agriculture Policy 2021. The Agriculture Policy 2021 came into effect after the lapse of the earlier Agriculture Policy (2016-2020). As outlined in the Policy document (Government of Kenya, 2021) the two goals of the policy are to transform crop, livestock and fisheries production into commercially oriented enterprises that ensure sustainable food and nutrition security, and to provide a framework for the support and intensification of cooperation and consultation between the National and County governments and among other stakeholders for enhanced development of crops, livestock and fisheries.

The policy recognizes agricultural extension as a critical avenue for sharing knowledge, technologies and information, and for linking farmers to relevant stakeholders. It therefore aims to promote appropriate cost effective and accessible extension services for different ecological zones. The policy outlines a set of policy statements aimed at the national and county governments. The national government is expected to provide guidelines and standards for delivery of extension services in the agricultural sector. It is also required to establish a system of regulating, quality assuring, inspecting, monitoring and evaluating extension services.

The county governments are required to:

- Establish a system of ensuring compliance with the relevant standards for extension services' delivery, monitoring and evaluating extension service providers.
- Support the development and packaging of transformative agricultural technologies, information and business opportunities in the agricultural sector.
- Provide for a mechanism for monitoring and tracking impacts of technologies and delivery models on overall development and improvement of household livelihoods
- Support Public Private Partnerships for development of extension services.
- Ensure adequate resources are provided for the delivery of extension services in crops, livestock and fisheries.

The Agriculture Policy (Government of Kenya, 2021) recognizes the main cross-cutting issues in agriculture as; a changing climate, gender, disaster management, corruption, HIV/AIDS, vulnerable groups, drugs and substance abuse, resource-use conflicts and literacy levels. These are aspects that are expected to be mainstreamed into agricultural extension messages.

1.2.3.3 Kenya Agriculture Sector Extension Policy (KASEP) (2022). In 2021, the Ministry of Agriculture, Livestock, Fisheries and Cooperatives began the process of reviewing the NASEP and was concluded in 2022, with the launching of the Kenya Agriculture Sector Extension Policy (KASEP). The main purpose of reviewing NASEP was to incorporate the aspect of

devolution of agriculture (and extension) to the counties which was missing (Government of Kenya, 2021). This is in line with the New Constitution 2010 (Government of Kenya, 2010b) that introduced devolution of government in Kenya. The Kenya Agriculture Sector Extension Policy has not been officially rolled out, although the draft was subjected to stakeholder consultations.

1.3 Study Background

The agriculture sector is central to Kenya's economic growth and development (World Bank, 2022; Government of Kenya, 2021). Kenya's Vision 2030 Third Medium Term Plan reiterates the country's commitment to Sustainable Development Goals 1 & 2, to end poverty and hunger (Government of Kenya, 2018a). Despite the agriculture sector achieving a 5.4 per cent growth in 2020, up from 3.0 in 2019 (Kenya National Bureau of Statistics, 2021), many Kenyans still suffer from food insecurity and poverty. About one third of households in Kenya suffer from hunger, and over 3 million people in ASALs were reported to be food insecure in 2020 (World Bank, 2022; Government of Kenya, 2021). Most of the hunger and poverty is concentrated among farming households. Farmers are therefore key to ending hunger and poverty. However, lack of information on improved and appropriate agricultural technologies are a major contributor to continued food insecurity, with extension services to small scale farmers in many developing countries being unreliable or even non-existent (AGRA, 2020).

According to the Comprehensive Africa Development Programme (African Union, 2003), growth in the agriculture sector is dependent on acceleration of adoption of the most promising technologies and technology delivery systems that quickly bring innovations to farmers and agribusinesses. These two areas touch on the mandate of the agricultural advisory and extension services, thereby indicting their critical role in providing information and technological support along the value chains, in order to increase production, productivity and profitability and improve the livelihoods of Kenyans (Government of Kenya, 2019). Transformation of agricultural food systems and increased productivity in Kenya and other Sub-Saharan countries largely depend on the effectiveness of agricultural extension service delivery to farmers and other actors in the food system (Danso-Abbeam et al., 2018). However, extension services in Kenya as with other developing countries are largely seen as being ineffective (World Bank, 2019).

Although there may be other factors contributing to this ineffectiveness, a major contributor is the quality of training that agricultural extension professionals receive, especially at undergraduate level. Through undergraduate level training extension professionals are expected to be equipped with knowledge, skills and competencies that they require to perform their work effectively. The quality of training is greatly determined by the kind of curriculum that is used. In many African countries, including Kenya, the curricula for training agricultural extensionists have remained fairly static over the years, and have not been able to match the current fast changing demands on agricultural advisory and extension services.

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. In order 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 (Suvedi & Kaplowitz, 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 critical link for successful agricultural extension service delivery, and their effectiveness often determines the success or failure of an extension program (FAO, 2017). 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). In addition, 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 in order 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 (Nwaogu & 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.

Process skills and core competencies are basic sets of knowledge, skills, abilities, and behaviors that agricultural extension professionals require to perform their tasks effectively (Suvedi & Ghimire, 2015). 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. 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.

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 & Terblanche, 2016; Nwaogu&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.

Agricultural universities in sub-Saharan Africa face challenges of having their undergraduate training curricula modeled decades ago after Western universities with few or no changes. With changing agriculture and rural development contexts, colleges and universities in Africa and Asia are recognizing the need to revise and upgrade their undergraduate curricula in extension. This has necessitated studies to identify process skills and core competency gaps of extension staff members that limit their abilities to adapt their training to changes in food systems based on local conditions in both regions.

In Kenya, there are a number of universities that offer agricultural extension training at undergraduate level. All academic programmes offered at the universities, including the undergraduate agricultural extension programmes are regulated by the Kenyan Commission for University Education, to ensure compliance with standards.

This study focuses on undergraduate agricultural extension training at Egerton University. The University is among the leading agricultural training institutions in Kenya and the east African region. It is one of the oldest institutions of higher learning in Kenya, having started as a farm

school for white settler farmers in 1939. Over the years, Egerton University (EgU) has grown into a major trainer of quality agricultural professionals, for Kenya and the sub-Saharan Africa region. The University offers a wide range of agricultural programmes including; agronomy; soil science; horticulture, animal production; veterinary medicine; agricultural economics and agribusiness management; agricultural engineering; dairy and food technology; agricultural education and extension; and agriculture and human ecology. The Bachelor of Science in Agricultural Education and Extension programme (BSc AGED) and the Bachelor of Science in Agriculture and Human Ecology (BSc AGHE) have specific focus on agricultural extension training.

In recent years, the need for agricultural extension professionals who are competent in technical skills as well as the processes and delivery of services has been rising as a result of “diverse and dynamic agricultural systems, advancing science and technologies, changing socio-demographics, increasing globalization and growing competition for resources” (Suvedi & Ghimire, 2015). These changes demand that agricultural extension professionals be proficient in the technical aspects of their areas of expertise as well as in the processes and delivery of the services.

The curricula for training agricultural extensionists, however, have not been changing at a rate that can allow for adequate response to the changing needs of agricultural food systems. It is therefore, not clear whether the skills and competencies imparted in the undergraduate agricultural extension programmes equip the graduates with the core competencies and skills they need to effectively meet the needs of the changing agricultural food systems. This gap was the focus of the AAP-PIRA project on ‘Strengthening Agricultural Extension Training in the MSU-Alliance for African Partnership (AAP) Consortium Partners in Africa.’ The project seeks to identify the process skills and core competencies needed by agricultural extensionists in the changing agricultural food systems, and gaps in the undergraduate training curricula.

1.4 Research Questions and Objectives of the Study

The study sought to answer the following 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 overall aim of the study is to strengthen agricultural extension training by improving the curricula and recommending other ways through which agricultural extension professionals can acquire the required skills and core competencies.

The specific objectives were to:

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.

The study consisted of three major tasks as follows:

Task 1 – Review agricultural extension curricula currently in use in AAP member universities at the undergraduate level.

Task 2 - Identify critical process skills and competencies of agricultural extension professionals, process skills gaps, and areas of potential curricular reform.

Task 3 - Recommend improvements/reforms of agricultural extension curricula to prepare the next generation of agricultural extension professionals to competently handle extension service delivery in sub-Saharan Africa.

1.5 Organization of the Report

This report is organized into five chapters. The first chapter gives an introduction to the study and provides information on agriculture in Kenya, history of agricultural extension in Kenya, organization of extension services and challenges in Kenya's agricultural extension system. The chapter ends with the study background, significance and objectives of the study. The second chapter provides the theoretical orientation of the study. It looks at process skills and competency gaps in agricultural extension curricula.

The third chapter of the report covers the Methodology, which includes the Study Population and sampling, conceptualization and measurement of variables, design and development of online survey instrument, data collection and analysis and the limitations of the study.

Chapter Four presents the results of the study, and the associated discussions. Chapter Five gives the conclusions of the study and implications for policy. The Appendices section contains the two instruments that were used to data collection, namely the Online Survey Instrument and the Focus Group Discussion Questionnaire.

CHAPTER 2 : THEORETICAL ORIENTATION

PROCESS SKILLS AND COMPETENCY GAPS IN AGRICULTURAL EXTENSION

This chapter discusses the theoretical orientation of the study with regard to agricultural extension and advisory services and the process skills and competency gaps in agricultural extension. It also presents reviews of the agricultural extension services in Kenya, and the Egerton University curricula for training agricultural extensionists.

2.1 Agricultural Extension and Advisory Services

Extension is a process of non-formal educational through which useful advice and information is passed to farmers, with the aim of increasing farm efficiency and standards of living of rural people. Extension is not only concerned with helping farmers improve their productivity, but it also aims at helping them build their ability to take charge of their lives and future development (Oakley & Garforth, 1985).

Extension services have evolved over the years, and so have the terminologies used to refer to it. The term 'advisory services' is increasingly used, sometimes interchangeably with extension. However, advisory services according to DLEC (2019) refer to an approach to extension services that involves giving services that correspond to client needs based on their demand. Extension has also been referred to as 'communication for innovation (Leeuwis, 2013). The term 'extension and advisory services' (EAS) is now commonly used to refer to *'all the activities that provide the information and services needed and demanded by farmers and other actors in rural settings to assist them in developing their own technical, organizational and managerial skills and practices so as to improve their well-being'* (Davis & Franzel, 2018, P.6).

Extension and advisory services contribute to technological, institutional and socio-economic change in many developing countries whose economies depend largely on agriculture (Davis et al. 2016, as cited in Davis & Franzel 2018). Although the bulk of extension services are offered by governments as a way of helping achieve their national goals, other players are also involved in the provision of extension and advisory services. Extension services have the potential to promote agricultural and rural development, and help smallholder farmers break out of cycle of low productivity and poverty (Davis & Franzel, 2018; Franca et al., 2016).

The context in which agricultural extension services are operating has changed greatly as compared to the early years of the 70s, 80s and 90s. These changes are well-outlined by Franca

et al (2016). One of the changes is the shift from government dominated extension services to pluralism, where multiple actors including private sector, NGOs, producer organizations and farmer cooperatives (Franca et al., 2016). Extension focus has also expanded beyond the traditional mandate of improving agricultural productivity for food security, and includes climate change, soil and water management, marketing, infrastructure and social issues affecting adoption of agricultural innovations.

The needs of today's farmers differ greatly due to changing and unique social, economic, political and environmental contexts in which they operate (Franca et al., 2016). Changing trends in terms of liberalization, privatization, commercialization and globalization have all contributed to changes in the context in which extension services are currently operating in (Amudavi, 2003; Franca et al., 2016).

There has also been change in the understanding of innovation and how it comes about. In early years, innovation was seen to emerge primarily from researchers, move in a straight line through extension agents to farmers who were only viewed as consumers. The theory and practice of extension has therefore changed from the linear perspective to more systemic approaches. The innovation systems concept is therefore increasingly being applied with, innovation being seen from an innovation systems perspective, where multiple actors are involved in generation of innovations through linkages and interactions (World Bank, 2012). Extension is therefore viewed as one of the players in the agricultural innovation system (AIS).

There is a recognition that it takes more than research, education and extension to get farmers to innovate. There is need for linkages among various actors, characterized by dynamic interactions, which should take into account the environment in which take into account the context in which the actors are operating (World Bank,2006). With the changes in the context in which agricultural development is taking place, there is a shift in the focus and role of extension services, from intermediaries for channeling information to farmers, to brokers to different actors within an AIS context (World Bank, 2012). Extension agents are no longer seen as channels for disseminating agricultural technologies but they serve as catalysts and facilitators in promoting community development (Christopolos 2010 as cited in Kiptot& Franzel 2015).

The need for extension services to look beyond the goal of helping countries to achieve food security and focus on the broader goal of increasing farm incomes and improving livelihoods has been emphasized. As summed up by Davis and Franzel (2018), there are three recent developments in EAS. Improved targeting of clientele and inclusiveness by focusing on the needs of different types of clientele such as women, youth, minority groups etc. Another development in EAS is expansion of extension content beyond the

traditional focus on production to include issues that are pertinent in communities that they serve, such as climate change, marketing, soil and water conservation among others. The current or contemporary agricultural extension and advisory services, therefore differ significantly from the traditional ones. The key elements that characterize these contemporary services are: Privatization; pluralism; decentralization, client participation and, women and youth focus (Suvedi & Kaplowitz, 2016). Consequently, the competencies and skills that extension professionals require in order to perform their tasks effectively in the context of the contemporary AEAS have also expanded beyond the traditional ones. This is the focus of this study that seeks to identify the core competencies and skills needed by extension professionals, and the gaps in the undergraduate training curricula, with a view to strengthening their training.

2.2 Review of Agricultural Extension Services in Kenya

This section presents literature review on agricultural extension services in Kenya. It covers the organization of agricultural extension services, the main extension methods being used in Kenya, and the challenges facing the extension services.

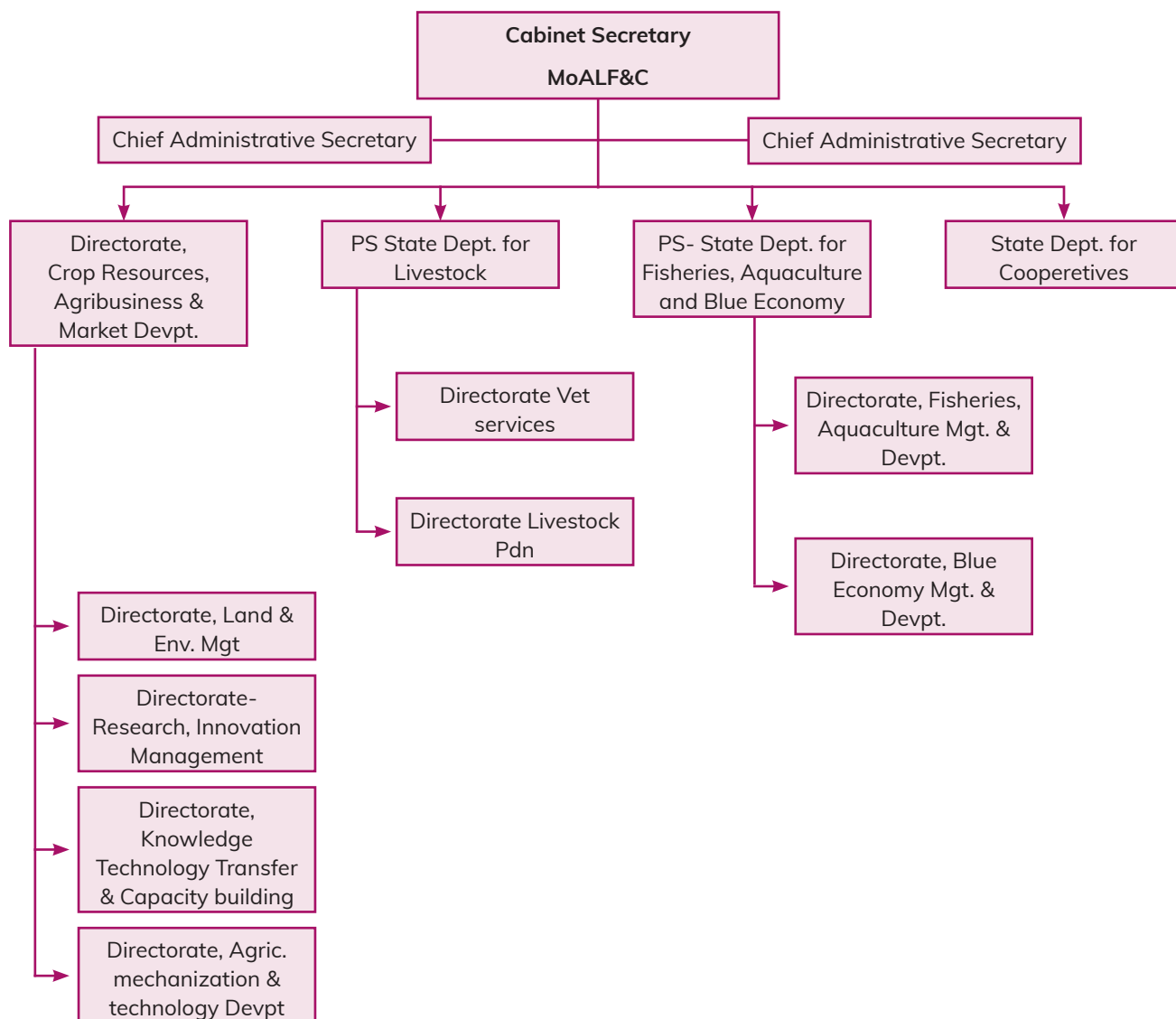
2.2.1 Organization of Agricultural extension and advisory services in Kenya

Agricultural advisory and extension organizations in Kenya fall into two broad categories: The public sector and the private sector.

2.2.1.1 Public Sector Extension Services. These are fully or partially funded by the Government. Several organizations fall under the public extension services. They include:

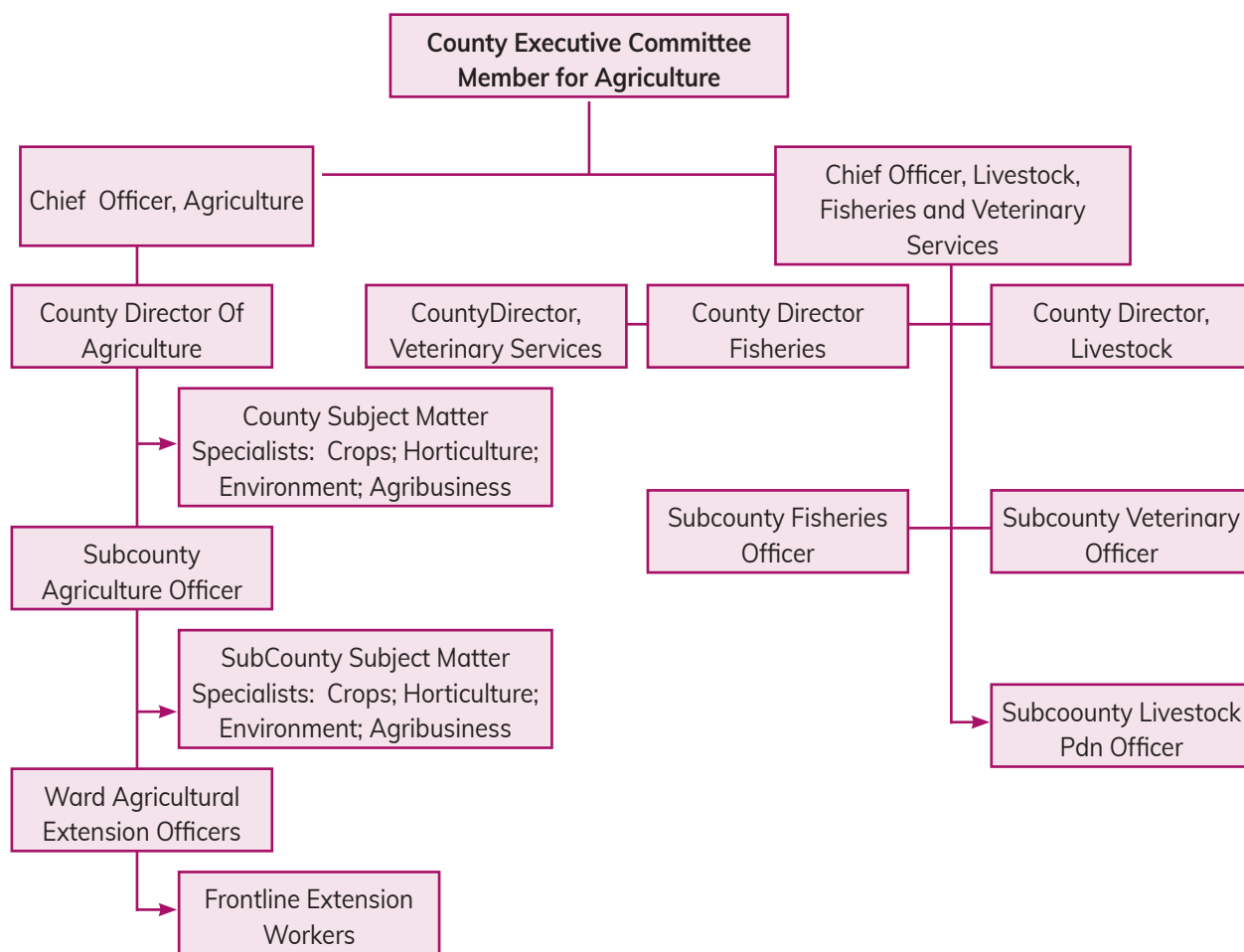
2.2.1.1.1. Ministry of Agriculture, Livestock, Fisheries and Cooperatives (MoALF&C). This is the largest provider of agricultural extension services in Kenya. It consists of four departments namely; State Department for Crop Development and Agricultural Research whose mandate includes agricultural extension services; State Department for Livestock; State Department for Fisheries, Aquaculture and the Blue Economy; and State Department for Co-operatives. The Vision of the MoALF&C is: *A food secure and prosperous nation anchored on innovative, competitive and commercially oriented agriculture and co-operatives sector. Its long-term mission is: To create an enabling environment for sustainable food and nutrition security, sustainable co-operatives sector and improved livelihoods for all Kenyans.* The activities of the MoALF&C are anchored on its core values of: Professionalism, Integrity, Efficiency and effectiveness, Responsiveness, Partnerships, Teamwork, Customer focus and Inclusivity. The Ministry is headed by a cabinet secretary, who is assisted by two chief administrative secretaries, four principal secretaries and three heads of different state departments (Government of Kenya, 2018a). The organizational structure of MoALF&C at the national level is indicated in Figure 2.1.

Figure 2.1 : Organizational Structure for Ministry of Agriculture, Livestock, Fisheries, and Cooperatives at National Level (As at July 2022)



Extension services are provided at the county level under three departments of Agriculture, Livestock and Fisheries. The services are offered throughout the country, in all the 47 counties. Initially, extension services were centrally coordinated and directed. However, when Kenya adopted a devolved system of Government as a result of a constitutional change in 2010, the function of agriculture was devolved to the counties, making the counties fully responsible for all agricultural functions, including extension. The Central Government retains the role of providing the overall policy direction, while the counties execute the policies (Government of Kenya, 2010b). The structure of the Ministry of Agriculture at the counties is as indicated in Figure 2.2.

Figure 2.2 Structure of the county level Ministry of Agriculture, Livestock, Fisheries and Cooperatives (As at July, 2022)



2.2.1.1.2 Commodity-based Parastatals. These are quasi-governmental organizations that promote specific commodities. Examples include the Kenya Tea Development Authority, Pyrethrum Board of Kenya, Kenya Sugar Authority, Coffee Board of Kenya and Dairy Board of Kenya. Extension is provided in varying degrees depending on the circumstances and priorities of the individual parastatal. They operate an independent budget financed from fees levied on the produce promoted. These organizations employ their own extension staff to offer advisory services to farmers. Extension is offered as part of a package that includes provision of agricultural inputs and services to varying degrees.

2.2.1.1.3 Regional Development Authorities. The main objective of the Regional Development Authorities is to plan and coordinate integrated economic development activities in the area they cover. The area covered by each coincides with the major river basin existing in the country. For example, Lake Basin Development Authority (LBDA), Kerio Valley Development Authority (KVDA), the Coast Development Authority (CDA), the Tana and Athi River Development Authority (TARDA), EwasoNyiro South Development Authority (ENSDA).

Agricultural extension activities undertaken usually involve promotion of a number of agricultural innovations and commodities. Their targets are more geared towards general

development of the regions they cover with agriculture being one among other areas of focus. Each of these authorities covers large areas and extension impact is relatively modest in view of modest resources at their disposal. Some of the regional development authorities employ their own agricultural extension staff, while others rely on the government extension services.

2.2.1.1.4 Kenya Agricultural and Livestock Research Organization (KALRO). This is the Government research agency that has the mandate to conduct agricultural research in various parts of the country. There are a number of regional KALRO centers with mandates in specific agricultural commodities and livestock. For example, KALRO Njoro is mandated to do research in wheat and oil crops, KALRO Naivasha deals with dairy, and KALRO Tigoni focuses on potato research. They carry out limited extension through their Extension Outreach units which tend to be small. Demonstrations and field days and are the preferred extension methods, whereby the centers invite farmers and other stakeholders and disseminate various agricultural technologies. Some of the centers also sell seed to farmers and provide extension services specific to the crop involved.

2.2.1.1.5 Institutions of Higher Learning. The Commission for University Education in Kenya mandates universities to engage in community outreach through activities such as extension, consultancies, public lectures, corporate social responsibility, environmental conservation and promotion of cultural and social life of the society, and also disseminate research findings (Commission for University Education, 2014). In compliance to this mandate, universities offering agricultural programmes engage in agricultural extension activities in varying degrees. Examples of universities involved in agricultural extension service delivery include; University of Nairobi, Egerton University, Jomo Kenyatta University of Science and Technology, Pwani University, Chuka University and Jaramogi Oginga Odinga University of Science and Technology.

Agricultural extension is conducted through research activities and projects, community outreach activities, consultancies, student outreach programmes etc. For example, Egerton University, which is a leading agricultural training institution in the region and hosts the World Bank-sponsored African Centre of Excellence in Sustainable Agriculture and Agribusiness Management is involved in many communities' outreach and extension initiatives. These are guided by the University's Extension and Outreach Policy (Egerton University, 2021) based on the University's strategic goals and national and regional development goals. The University prioritizes extension and outreach based on the evidence that research and innovation yield better return on investments when they are channeled towards meeting community needs.

Apart from public universities, government funded middle level Technical and Vocational Training colleges are also involved in extension work. Notable ones include Bukura Agricultural College, Dairy Training Institute. In addition to offering certificate and diploma training programmes, these institutions offer short courses to farmers and other stakeholders in the agriculture sector. Some private TVET institutions are also outstanding in their involvement in agricultural extension work. They include Baraka Agricultural College, which specializes

in sustainable agriculture, and Latia Agripreneurship Institute, whose strength is in agri-entrepreneurship training.

2.2.1.1.6 Primary Schools and Secondary Schools. Agricultural extension work through is carried out on two platforms namely; Young Farmers' Clubs (YFCs) and 4-K Clubs.

Young Farmers Clubs of Kenya (YFCK)

These are found in secondary schools and are a subsidiary organization of the Agriculture Society of Kenya (ASK). YFCK was formed way back in 1948, with the aim of preparing young people to be effective farmers in future. Since then, the mandate of YFCK has expanded to include helping young people develop life skills for sustainable development and self-sustenance. Participation in YFCK activities helps young people develop interest and positive attitude towards agriculture. One of the roles of the YFCK is provision of extension services, whereby the members act as disseminators of agricultural technologies and innovations among farmers. The members are expected to not only participate in agricultural activities but to apply the same at home, and also share the knowledge and skills with family and members of the community (YFCK face book page; Agriculture Society of Kenya).

4-K Clubs of Kenya

This programme was introduced in Kenya in 1962 by the Ministry of Agriculture, and is founded on the American concept of 4-H. 4-K stands for the Kiswahili words 'Kuungana, Kufanya, Kusaidia Kenya' which can be translated as 'loosely translating to coming together, to act, to help Kenya'. In the 1990s most 4-K clubs became defunct in schools, but are now being revived because of the re-introduction of agriculture as a subject in primary schools, under the new Competence-based Curriculum (CBC) education system. There are up to 4,000 4-K clubs in Kenya, with a membership of about 200,000. The clubs engage in a wide range of agricultural activities, through which the students can be able to learn and disseminate knowledge to their families and communities (MoALF&C n.d.).

2.2.1.2 Private Sector Extension Services in Kenya. Private sector extension services fall into a number of categories as follows:

2.2.1.2.1 Farmer-based Organizations and Cooperative Societies. These operate on the principle of group action which enables people to attain goals that would be difficult or impossible for them as individuals. Farmer organizations are common in many parts of the country, and are formed for various purposes including labor sharing, collective acquisition of agricultural inputs and services, collective marketing of produce, among others. Farmer groups provide good for a farmer-to-farmer extension, where farmers share information and skills on various agricultural technologies. In addition, groups are used as platforms for offering extension services, and are a widely used method in Kenya. The groups can be large in size, forming cooperative societies, such as Kenya Farmers' Association, Kenya Cooperative Creameries, Kenya Planters Cooperative Union, Others are smaller organizations covering specific geographical areas and dealing with specific commodities e.g., Limuru Dairies, Githunguri Dairies etc. Some of the successful cooperatives employ their own extension

staff, to serve their members. The extension services are at times coupled with inputs and other services.

Other farmer organizations that provide some agricultural information and services to their members include: Fresh Produce Exporters Association of Kenya (FPEAK); Kenya Flower Council; and the Cereal Growers Association. Farmer groups are key intermediaries in agricultural extension and help to enhance small scale farmers ability to access extension services. They not only improve efficiency and effectiveness but also increase equity in extension service delivery (Muyanga & Jayne, 2006). The use of farmer groups was strongly promoted under NALEP, where farmers were encouraged to form Common Interest Groups (CIGs) through which they were able to demand for extension services (Government of Kenya, 2010a).

2.2.1.2.2 Private Commercial Firms and Companies. There are a number of private commercial firms that are focused on the promotion of specific agricultural commodities. They include British American Tobacco, Mastermind Tobacco which promote tobacco for cigarette manufacture, Kenya Seed Co which promotes the production of maize seed, wheat, pulses, pasture and vegetable seed, the Kenya Breweries which promotes production of malting barley, Kenya Nut Company which promotes macadamia nut production, exporters and processors of Horticultural produce (e.g., Oserian Flowers, Sian Flowers, Homegrown). There are also a number of sugar companies e.g., Nzoia Sugar Company, South Nyanza Sugar Company, West Kenya Sugar Company.

Extension services are provided solely for business reasons, the company's primary goal being to make profit. Produce can be grown by farmers under contracts with marketing and processing farms. The companies may avail credit facilities to out growers for land preparation, purchase of inputs, and transportation of produce where necessary. The company extension workers not only educate farmers but also perform these other duties. They can serve also as salesmen for the companies. The extension units are generally small.

Being profit-oriented, the companies have to ensure their extension units justify their existence by delivering their goods and services in a cost-effective manner. These services are therefore well managed and have been successful in terms of producing raw materials for the company as well as opening up opportunities for farmers to increase their incomes and enabling the country to save or earn the much-needed foreign exchange. Extension is thus sometimes organized more efficiently and less bureaucratically by commercial firms than by Government.

Private firms, manufacturers of agro-dealers and service providers are also involved in providing extension, with some using extension as a marketing strategy for their products and services. A good example are the agro-input dealers who have proliferated in the last few years in Kenya. They sell a wide range of agricultural inputs including fertilizers, seed, crop and livestock chemicals, equipment etc. Many farmers rely on them for their extension needs. Muyanga and Jayne (2006) report that in the dairy sub-sector companies and individual provide extension advice about good dairy management practices and also offer artificial

insemination and veterinary services. The private companies are active in demonstrations, field days and agricultural shows, with some sponsoring the major agricultural shows

Other private companies that offer extension and advisory services as well as other agri-services. They include Kenya Organic Agriculture Network, Technoserve, Cereal Growers Association, Digi Farm, Agile Consultants Caritas and others (MoALF&C, 2021a)

2.2.1.2.3 Non-governmental Organizations (NGOs). Generally, NGOs address various issues and concerns. The socially focused NGOs are more committed to the pursuit of social objectives than the public extension services. Some of the areas they have been addressing include: Strengthening rural family resource base, developing community initiatives, focusing on marginalized and gender equality. The environmentally focused NGOs are quite committed and address important issues such as environmental conservation, sustainable agriculture, agroforestry, organic farming. Majority of them have extension staff trained in relevant agricultural disciplines to certificate, diploma or degree level.

NGOs are broadly divided into faith based and secular NGOs. Examples of faith-based NGOs include the Catholic Church through its diocese in various parts of the country, the Anglican Church of Kenya. International faith-based NGOs include World Vision, Food for the Hungry, Just Earth among others.

Among the secular NGOs are; Farming Systems Kenya, One Acre Fund, Welt Hunger Kenya, CARE Kenya, SACRED Africa; TechnoServe; and AgriProFocus. International development organizations are also involved in agricultural extension work either directly or through partners. They include the Netherlands Development Organization (SNV); the German Development Corporation (GIZ), USAID, FAO and AGRA among others.

2.2.1.2.4 Private Consultants/Commercial Extension Practitioners. Commercial extension practitioners are gaining prominence in Kenya, with increasing commercialization of agriculture. They target high value export crops such as flowers and other horticultural produce especially for the export market. They give farm management advice at a fee for service basis after making a thorough analysis of different production options open to a farmer. They might also provide/offer advice on production technologies such as plant disease control.

2.2.1.2.5 Extension through projects under the MoALF&C. There are a number of projects being implemented through the Ministry of Agriculture, which have strong components of agricultural extension. The main ones are:

Kenya Climate Smart Agriculture Project (KCSAP)

This is a five-year Government Project (2017-2022) sponsored by the World Bank and being implemented in 24 counties. The main objective of KCSAP is to increase agricultural productivity and build resilience to climate change risks in the targeted smallholder farming and pastoral communities in Kenya, and in the event of an eligible crisis or emergency, to provide immediate and effective response. The implementation of KCSAP is guided by the Agriculture Sector Development Strategy (Government of Kenya, 2010; World Bank 2019; MoALF&C, n.d.)

The National Agricultural and Rural Inclusive Growth Project (NARIGP)

This is a Government of Kenya (Government of Kenya) project implemented through the Ministry of Agriculture, Livestock Fisheries and Cooperatives (MoALF&C), state department for crop development and agricultural research, with funding support from the World Bank. It supports community-driven Development, strengthening producer organizations and value chain development supporting county community-led development, and, project co-ordination & management.

Other projects include the Small-Scale Irrigation and Value Addition Project, Kenya Cereal Enhancement Programme, Regional pastoral Livelihoods Resilience Project among others.

2.2.2 Common Extension Approaches and Methods Used in Kenya

In agricultural extension service delivery, it is important to select appropriate extension methods. Extension services in Kenya are delivered by multiple extension service providers, using different extension methods (Kingiri&Nderitu, 2014). Some methods are more commonly used by particular organizations while others are common across the board.

The extension methods fall under three broad categories of Individual Methods, Group Methods and Mass Methods. These are as follows:

2.2.2.1 Value Chain Extension Approach. This method of extension was introduced through the Agriculture Sector Development Support Programme (ASDSP) to support the development of value chains (Government of Kenya 2010a). With the setting up of value chain platforms and multi-stakeholder engagements, extension is offered along the value chain, within a context of many value chain actors and stakeholders. This approach is mainly used by the county government extension services.

2.2.2.2 Farmer Group Approach. This method has emerged to be very popular among most organizations providing extension services. Given the inadequate numbers of extension agents in Kenya, the group approach enhances farmers' access to extension as they are better able to demand for extension services. The groups also serve as fora for knowledge exchange and joint learning among the farmers. They also benefit from other advantages of group action which include improved access to inputs and other agri-services due to joint procurement, improved access to markets and better commodity prices, improved access to credit (Muyanga & Jayne, 2006) Farmer groups are the main method used by government extension services and many NGOs.

The farmer group approach was first promoted under NALEP, where farmers were encouraged to form common interest groups (CIGs) based on their agricultural enterprise preferences, and these groups were used as points of contact the extension agents. The use of CIGs has continued even under ASDSP, by government and non-governmental extension service providers.

2.2.2.3 Farmer-to-Farmer Extension. This involves farmers disseminating agricultural information and technologies to their fellow farmers. Farmer field schools (FFS), which have

been in use for a while in Kenya utilize the farmer-to-farmer approach as farmers after training become trainers for their fellow farmers. The FFS have been promoted by FAO, and are commonly used by many NGOs. They are fora that provide opportunities to learn by doing and consist of groups of farmers who get together to study a particular topic based on an enterprise of their choice (SUSTAINET EA, 2010). Through the FFS approach of learning by doing, farmers are empowered with knowledge and skills and become experts in their own farms. Apart from gaining technical knowledge and skills, farmers enhance their decision-making ability and also learn how to organize themselves (Ibid).

Another good example of farmer-to-farmer extension that is used in Kenya is AGRA's model of village -based advisers (AGRA, 2020). This is first implemented in Kiambu, one of the counties in Kenya, as a way of filling the gap left by the almost non-existent agricultural extension services. It uses farmers in partnership with public, private and NGO agricultural extension service providers, who are trained and then serve as agricultural advisers to their fellow farmers.

2.2.2.4 Commodity-based Extension Approach. This approach is also known as contract extension. It is used commonly by commodity-based organizations such as the Coffee Board of Kenya, Kenya Tea Development Authority, Pyrethrum Board of Kenya, East African Breweries and British American Tobacco. Farmers enter into contractual arrangements to produce certain commodities using prescribed methods in order to ensure the desired quality. Extension may be accompanied with provision of inputs and services. The farmers in turn, are guaranteed markets for their produce.

2.2.2.5 Individual Farm Visits. This method of extension was popular in the early years of extension but that is not the case now. Farm visits have been found to be expensive in terms of staff time and resources, and in view of the limited extension staff and resources in Kenya, the farmer group approach has been emphasized more. However, individual visits are still conducted, though infrequently, on demand-driven basis (MoALF&C, n.d.). The individual farmer has to bear the cost of facilitating the visit by the extension agents, which is expensive for many small-scale farmers.

2.2.2.6 Agriculture Training Centres. These are established under the MOALF&C in every county. They offer short trainings to farmers on various aspects of agriculture, livestock and fisheries, based on the enterprises that are suitable for the particular agro-ecological zone. ATCs are located in most of the counties in Kenya. Pastoralist areas have Pastoral Training Schools. The ATCs and PTSs offer a wide range of short trainings to farmers and other actors in the agricultural value chains, that can last from a day to two or more weeks.

2.2.2.7 Information and Communication Technologies-based Agricultural Extension Methods. The use of Information and Communication Technologies (ICTs) in extension service delivery has been gaining prominence in Kenya over the years. ICTs play a crucial role in bridging the gap in extension service delivery caused by inadequate extension staff. In recognition of this importance, the National Agriculture Sector Extension Policy (NASEP) (Government of Kenya, 2012) called for increased use of ICTs in extension service delivery.

The policy set the stage for the introduction in 2014 of the e-extension programme in Kenya, under the Ministry of Agriculture, Livestock and Fisheries. This approach uses a wide range of ICTs such as mobile phones in combination with radio, video shows, information kiosks, web portals, rural tele-centres, video conferencing, innovative community radio and television programmes, and offline multimedia CDs.

Through the government e-extension programme under the MoALF&C, 654 e-Extension agents across the country were selected and trained. Each was equipped with a smart phone, a laptop and modem to facilitate them to reach farmers. The programme is still in place and playing an important role in complementing the conventional extension delivery methods. Traditional ICTs such as the radio have become an important source of agricultural information to farmers in many parts of the country. Radios are readily accessible to most Kenyan farmers, and many local/vernacular language radio stations are in place. Through these farmers are able to get advisory services on various enterprises, in a language that they understand e.g., Mugambowa Murimi (Voice of the Farmer) programme that is aired in the Kikuyu language and is very popular among the community. Television is also an important source of information, although it is not as accessible as the radio. Some of the National television stations have channels dedicated to Agriculture e.g., Kenya Television Network (KTN) Farmers TV, while others air programmes for farmers at designated times e.g., Shamba Shape-Up programme. Vernacular television channels are available in many parts of the country and they are used to convey agricultural messages to farmers.

Social Media such as Facebook, WhatsApp, You Tube, Twitter and the internet search engines have also emerged as important avenues for delivering advisory services. Mobile-based social media and digital applications are also in place, for serving farmers' extension needs. They include platforms such as Mkulima Young, Digi-Farm, M-Farm, M-soko and Viazi Soko among others. Through these platforms, farmers are able to obtain critical production and market information.

An innovative ICT based approach that was introduced in recent years is the Farmer Call Centre. The first Farmer Call Centre in Kenya was established in March 2018 at the Nakuru Agriculture Training Centre through the support of the County Government (County Government of Nakuru (n.d.)). The Nakuru Farmers' Call Centre is the first of its kind in Kenya, although this concept is widely used in other parts of the world such as India. The Centre uses mobile telephony to interact with farmers, whereby they can call the Centre and ask questions and receive answers to their queries. The approach uses Short Message Service (SMS), WhatsApp, Facebook, Twitter and phone calls to provide farmers with fast hand information from agricultural experts. The Centre also links farmers to other actors in the agriculture sector enabling them to access any services or information that may not be readily available. It covers the three sub-sectors of crops, livestock and fisheries and operates in a demand-driven manner. The Call Centre, which is under the Ministry of Agriculture is aimed and supplementing the government extension service, which is highly constrained due to shortage of staff and limited resources. The Viazisoko Digital Platform developed

by the National Potato Council of Kenya (NPCK) is a Web-based portal, Mobile App and USSD platform that is used for online marketing of potato related products and services and disseminating information on good agricultural practices.

2.2.2.8 Other Mass Media used for Extension. Newspapers, magazines, fact sheets and posters are among other mass media that serve as important channels for delivery of extension messages. For example, Egerton University in partnership with the Nation Newspapers (one of the main newspapers in Kenya) have a pull out every Saturday called 'Seeds of Gold' which carries content on agricultural technologies and innovations, and also addresses farmers' questions. The Standard Newspaper, another leading national newspaper has a pull out every week, that is known as Smart Farming. Biovision Africa Trust, an international NGO also produces a magazine known as the Organic Farmer that disseminates information on ecological organic agriculture.

2.2.3 Challenges facing agricultural extension and advisory Services in Kenya

Agricultural advisory and extension services in Kenya, as in many other developing countries face a myriad of challenges. These challenges fall into various categories as outlined in the Kenya Agriculture Sector Extension Policy (Ministry of Agriculture and Livestock Development, 2021a).

2.2.3.1 Capacity in Extension Service Delivery. This challenge is experienced in several ways, the main one being low staffing levels among both private and public service providers. A recent rapid assessment of the state of agricultural extension carried out in 17 counties revealed an average extension staff to farmer ration of 1:1,277 with four of the counties having ratios below 1:2000 (Ministry of Agriculture and Livestock Development, 2021a). This situation exacerbated by the low levels of employment of new staff especially in the Ministry of Agriculture, where many of the extension officers have retired or are close to retirement with few replacements being done. The Ministry extension service is therefore characterized by an aging staff whose energy levels may be fairly low, and whose ICT capacities may be limited.

Another capacity challenge is the low levels of specialized skills and scope of knowledge on extension service delivery. This is coupled with inadequate institutional capacity to train personnel (extension providers and researchers) on important emerging issues such as organic farming, biotechnology, and the characterization and selection of indigenous plants and animals of socio-economic importance. This refers to pre-service training of the extensionists as well as In-service training. The extension staff are therefore not adequately equipped to meet the demands in the current agricultural food systems.

Another factor constraining capacity in extension is low enrollment by the youth to agriculture related courses. Agriculture as a career remains unattractive to many youths, and few choose to pursue this career path. Therefore, although the Government as the major employer of agricultural extensionists has not been employing much, the available pool of qualified professionals is also limited.

2.2.3.2 Low Funding. The Kenyan Government is yet to attain the minimum 10 percent funding for agriculture as per the Malabo Declaration commitments to enhanced funding to agriculture. There is therefore inadequate investment in the agricultural extension service, which curtails the delivery of services.

The state of infrastructure in terms of offices, equipment and transport in many parts of Kenya is wanting. Many offices are dilapidated, there is no provision of transport to facilitate extension workers' movements, and much of the equipment is outdated or unserviceable

2.2.3.3 Weak Research-Extension Linkages. This has remained a proverbial challenge affecting agricultural extension in Kenya, despite policy commitments to strengthen the linkages. There remain weak institutional mechanisms for research extension client linkages, as well as inadequate investment to support research extension client linkages by both public and private sectors. Strong research-extension linkages are critical to achieving agricultural transformation, as they facilitate the flow of relevant agricultural technologies and innovations to value chain actors leading to increased agricultural production and productivity (Belay & Alemu, 2017).

2.2.3.4 Partnership, Collaboration and Coordination. This is another challenge facing extension services in Kenya, and is experienced in three ways. First is inadequate coordination of actors in Advisory Extension Service Delivery. There are many extension service providers in Kenya, but they are not well coordinated, which results in duplication, wastage of resources and failure to build on synergies. In addition, the institutions that coordinate advisory and extension Service delivery do not have adequate capacity and are therefore unable to effectively play their role. There is also lack of a framework for partnerships and collaboration.

2.2.3.5 Inadequate policy, legal, regulatory and institutional framework for extension and advisory Services. Due to this inadequacy, Extension service providers lack proper regulation and guidelines in the provision of extension services.

2.2.3.6 Extension Standards and Quality Assurance. There are three challenges associated with extension standards and quality. First is the wide variation in the quality of services rendered by ESPs. Although some ESPs are well qualified to render quality services, there are also some whose services do not meet the required standard. There is lack of a mechanism for enforcing adherence to the standards.

The second challenge is the lack of a regulatory institutional framework for certification and accreditation of extension professionals. Kenya does not have an accrediting body for agricultural extensionists. The third challenge with regard to standards is the lack of formal guidelines governing code of ethics for extension service provision.

2.2.3.7 Extension and Advisory Approaches and Methods. There are three main challenges regarding extension and advisory approaches and methods. The first is the inadequate integration of extension approaches and methodologies; second is the limited access to ICT hardware, software and skills for e-extension which hinders the use of ICTs in extension

service delivery, especially among public service ESPs. The third challenge is the inappropriate deployment of agricultural extension approaches and methods.

2.2.3.8 Cross-cutting Issues in Delivery of Agricultural Extension Services. Five challenges to do with cross-cutting issues are highlighted as:

- Lack of information (among extension service providers) about the clientele's rights on extension. This is reported to have a negative impact on agricultural production and extension service delivery.
- Inadequate competence on environmental and gender concerns among the extension officers, hence inability to effectively address these issues.
- Inadequate consideration of special needs for the vulnerable groups including drug, substance and alcohol abusers
- Youth not being adequately involved in extension programmes, due to their limited access to means of agricultural production such as land and financial resources.
- The issue of nutrition sensitive agriculture is not adequately addressed due to inadequate capacity for nutrition-sensitive agriculture and lack of nutrition objectives in designing of agricultural extension programmes.

2.2.3.9 Knowledge management. The data management system in the agriculture sector is fragmented and not well coordinated. In addition, there are weak institutional mechanisms for knowledge management among institutional actors. A study on knowledge management challenges in Nandi Hills Subcounty revealed that lack of organized knowledge sharing fora, poor ICT infrastructure and lack of budgetary support were among the major challenges facing knowledge management (Cheruiyot et al., 2020).

In a rapid assessment of the status of agricultural extension services in 17 counties, the key challenges that were reported agree with the aforementioned challenges (MoALF&C, 2021a). They include low funding and investments for agriculture extension; inadequate human and institutional capacity; insufficient qualified extension personnel; inadequate higher education programs for agriculture extension providers; uncoordinated and unregulated pluralistic extension; weak research-extension-farmer linkages and, low adoption of digital extension approaches.

Apart from the general challenges highlighted, government agricultural extension services also face challenges related to devolution. The constitution of Kenya 2010 (Government of Kenya, 2010b) created devolved system of Government whereby many functions that were performed by the national government were devolved to the counties. Among the powers and functions given to counties is agriculture, including crop and animal husbandry, fisheries, plant and animal disease control, livestock sale yards and county abattoirs. Each county therefore has autonomy in the way they handle agriculture. This however has led to some challenges as reported by Githaiga (2015). In many counties, there is a lack of appreciation of the importance of agricultural extension, hence it is not given priority. In addition, funds

meant for agricultural extension are diverted to non-agricultural projects, and in some cases due to corruption, nepotism and cronyism, non-agricultural personnel are hired to agricultural extension positions. Another challenge is that of agricultural extension staff being assigned non-extension tasks, which diverts them from their core mandates. In many counties, government extension services are not visible, and neither are they being felt except in cases where there are projects.

2.3 Review of Undergraduate Agricultural Extension Training Curricula

This section reviews the undergraduate agricultural extension training curricula at Egerton University, which is the only AAP partner university in Kenya. There are two undergraduate academic programmes that offer agricultural extension training at Egerton University.

2.3.1 Rationale for the Review of Agricultural Extension Curricula

This review is undertaken as part of the objectives of the PIRA Project on 'Strengthening Agricultural Extension Training in the MSU-Alliance for African Partnership (AAP) Consortium Partners in Africa'. The problem addressed by the project is the need to align the undergraduate agricultural extension training curricula to the changing context in which agricultural extension services are required to operate to meet current needs in the agriculture sector. While there has been a major paradigm shift in the approach for delivering agricultural extension services from the public- sector- driven, top-down extension system to pluralistic, demand-driven extension services with a focus on value chain development and market orientation, most curricula for training agricultural extension professionals at undergraduate level have not undergone corresponding changes. There is therefore a mismatch between the graduates of the undergraduate agricultural extension training curricula and the needs of agricultural extension service delivery. The project therefore seeks to review the undergraduate curricula with a view to identifying gaps and recommending improvements in the training of agricultural extension professionals.

2.3.2 Methodology for Reviewing the Curricula

This review is based on agricultural extension training curricula offered at Egerton University, which is the only AAP Partner University in Kenya. Data has been collected through desk top review of curriculum documents for two agricultural extension training programmes at Egerton University. These are: BSc in Agricultural Education and Extension (BSc AGED) and, BSc in Agriculture and Human ecology Extension (BSc AGHE). Other documents reviewed include the Universities Standards and Guidelines 2014 by the Commission for University Education, the Egerton University Statutes 2013 and selected Egerton University catalogues.

2.3.3 Over-view of the Undergraduate Agricultural Extension Training Curricula at Egerton University

There are two undergraduate programmes that offer agricultural extension training:

- i. Bachelor of Science in Agricultural Education and Extension (BSc AGED): The programme is offered by the Department of Agricultural Education and Extension.

- ii. Bachelor of Science in Agriculture and Human Ecology (BSc AGHE). The programme is offered by the Department of Applied Community Development Studies

Both Departments fall under the Faculty of Education and Community Studies. The programmes are the oldest in the faculty. The Department of Agricultural Education and Extension was the mother department for two other Departments in the Faculty, and hence has remained in the Faculty of Education, along with the Department of Applied Community Development Studies that hosts the BSc AGHE programme.

The two programmes are offered on full time as well as part-time basis. With the outbreak of the COVID-19 pandemic, online and the e-learning modes have also been introduced, but these have to be blended with face-to-face learning, due to the practical components in the programmes. In line with Commission for University Education (CUE) regulations on duration of undergraduate degree programmes, the BSc AGED and BSc AGHE run for a period of four academic years, with an academic year consisting of two semesters, of 15 weeks each. The two programmes are regulated at national level and institutional level in order to meet the requirements.

2.3.4 Guidelines and regulations governing agricultural extension curricula at Egerton University

All academic programmes at EgU are regulated at national and institutional level. At the national level, the Commission for University Education (CUE) is the body mandated to regulate all undergraduate and postgraduate academic programmes in Kenyan universities. (Commission for University Education, 2014) The standards stipulate the broad objectives that each academic programme must have, which must be aligned to the National development goals in order to contribute to the development of society. The standards also set requirements for minimum hours of a programme, the nature and organization of the course content and the general structure of the programme.

A bachelor's academic programme is expected to provide a broad knowledge base within a discipline involving critical and analytical understanding of the major theories, principles and concepts in the discipline. In addition, it should provide the learner with a comprehensive range of cognitive and analytical skills and their application to various situations; entail demonstration of adequate problem-solving skills; and enhance society consciousness and contributions to the general development of the society. The minimum number of instructional hours in a Bachelors' academic programme are also set, based on various disciplines. The social sciences, where the BSc AGED and BSC AGHE programmes fall, are required to have a minimum of 1680 hours. The content of the academic programmes is required to be set systematically and aligned to the institutional, national and global goals and trends. In Kenya, the Vision 2030 is the long-term blueprint for national development (Government of Kenya, 2007), and all academic programmes have to contribute towards its achievement. In the Economic Pillar of the Vision 2030, agriculture is recognized as a key sector to help deliver the target of 10 percent annual economic growth. The academic programmes also have to be aligned to the Kenya Government's Big Four Agenda on food security, manufacturing, affordable housing and universal health care (Egerton University, 2018).

The academic programmes are also expected to promote the vision and mission of the institution, even as it contributes towards national goals. The Vision of Egerton University is to be a World Class University for the Advancement of Humanity.

According to the CUE guidelines, the programme content should be presented systematically from foundational courses to courses focusing on concepts and principles; application and skills development courses and, practical and project-based courses. The guidelines also require the content of a given programme to be reviewed regularly in order to address current trends in the discipline in focus. At institutional level, academic programmes are guided by the University Statutes. The statutes provide rules and regulations for the structure, organization and implementation of the undergraduate and postgraduate programmes.

According to the Statutes, the minimum number of Credit Factors (CFs) for a bachelor's degree is set at 120 CFs. One Credit Factor is equivalent to 15 lecture hours or 30 practical hours or 60 hours of field experience. The guidelines further stipulate that students should take 15-30 CFs per semester and in addition they must take and pass at least nine CFs of Common Core Courses selected from outside the candidate's area of specialization.

In line with the CUE guidelines, the Egerton University Statutes require that all academic programmes should be reviewed after every four-year cycle, with a new catalogue of academic programmes being produced after each review.

2.3.5 Review of the Bachelor of Science in Agricultural Education and Extension

2.3.5.1 Background Information of the BSc AGED Programme. The Bachelor of Science in Agricultural Education and Extension (BSc AGED) programme grew from a Diploma programme that was introduced in 1967 when the Department was formed in the then Egerton Agricultural College. The core mandate of the Diploma in AGED programme was to train agriculture teachers and extension professionals. The Bachelor of Science in Agricultural Education and Extension was introduced in 1986 when the College was upgraded to University College status.

The BSc AGED programme has continued to focus on its original mandate of training teachers of agriculture for secondary schools and middle level colleges, and training agricultural extension professionals. The Teachers Service Commission is the largest employer of the graduates, as the demand for agriculture teachers outstrips the supply.

The Egerton BSc AGED programme was the first of its kind in Kenyan universities and has remained a leader in the region. Many other public universities have mounted similar programmes, with the Egerton programme being a bench mark, Pwani University, Kisii University Chuka University and Machakos University. The programme continues to serve as a bench mark for similar programmes in the country.

The mission of the BSc AGED programme is to engage in teaching research and community service in agriculture, agriculture Education and Extension, Rural Development and Industrial Education. The philosophical basis of the programme is the need to produce

a critical mass of producers and manpower needed for education, extension and management in agriculture

2.3.5.2 Goal and Programme Learning Outcomes of BSc AGED Programme. The goal of the BSc AGED programme is to prepare graduates with appropriate technical and professional competencies in agriculture, biology, education and agricultural extension. The programme prepares the manpower essential for school agriculture, agricultural extension and rural development. The graduates are also sufficiently qualified to assume responsibilities in the private sector and set up their own businesses.

The programme has seven (7) learning outcomes, of which five touch on agricultural extension training. These are to enable learners to: Plan, implement and evaluate agricultural extension and rural development programmes; manage agricultural organizations; Design and conduct research in agricultural extension; Develop and conduct training in agricultural extension; and, pursue further education in agriculture, agricultural education or extension.

2.3.5.3 BSc AGED Programme Structure and Scheduling of Units. The BSc AGED programme is a double major degree programme, with graduates qualifying as professional teachers, and also with a Bachelor of Science in Agricultural Extension. Because of its nature, the loading of units tends to be much higher than for other academic programmes in the University, since the students have to do a wide range of agricultural courses, professional education courses, basic courses and go for two practicum sessions. The first practicum session is done at the end of the Third Year, involving 12 weeks (a full school term) teaching practice session and establishment of a Teaching Resource project in secondary school. The students then go for the second practicum, Field attachment, at the end of the fourth year. During this time, they are attached to different types of agricultural organizations and get exposure to agricultural extension work (Egerton University, 2016).

2.3.5.4 Categorization of Units Offered in the BSc AGED Programme and Competencies Imparted. The BSc AGED programme has a total of 77 taught units and three practicum units, amounting to 233.5 Credit Factors. According to the Egerton University Statutes Egerton University (2013b) , a Credit Factor (CF) refers to contact hours between a lecturer and students where one Credit Factor is equivalent to 15 contact hours. One contact hour equates to one lecture hour or two hours of tutorials or practicals or three hours of clinical practice. The minimum number of credit factors for a four-year degree programme as per the Egerton University Statutes is 120. The BSc AGED programme therefore has almost double the minimum required C.F.s.

The units in the BSc AGED programme are arranged systematically in accordance to the CUE guidelines. The first year begins with basic/foundational courses while concepts and principles are introduced from the second year. The more specialized courses are concentrated in the third and the fourth year. The teaching practice and teaching practice practicums are conducted at the end of the third year, while the field attachment practicum is done at the end of the fourth year. The courses are categorized as follows:

Table 2.1 : Categories of Units Covered and Competencies Imparted in the BSc AGED Programme

Category	No. of Units	Competencies Acquired
Technical Courses in agriculture	26 (32.5%)	Crop production, horticultural production, soil sciences, livestock production and nutrition, agricultural engineering
Agricultural economics and agribusiness management	8 (10%)	Farm enterprise planning and management, agricultural marketing, Entrepreneurship and agribusiness management
Agricultural Extension courses	11 (13.75%)	<ul style="list-style-type: none"> - Agricultural communication skills - Understanding and utilization of different extension methodologies - Preparation of extension messages - Planning, implementing and evaluating of agricultural extension and rural development programmes - Managing agricultural organizations - Developing and conducting training programmes in agricultural extension
Research methods, technical writing	2 (2.5%)	<ul style="list-style-type: none"> - Designing and conducting research in agricultural extension - Technical reporting and writing
Professional Education and psychology courses	15 (18.75%)	- Applying principles of teaching and learning, developing curricula, preparing teaching materials, effective teaching and assessment, preparing learning resource projects, organizing and managing schools.
Basic science units: Botany and Zoology, Chemistry and Biochemistry	15 (18.75%)	Understanding biological basis of plants and animals and their functioning Understanding Organic and Inorganic Chemistry and Biochemistry, and being able to apply concepts and principles in agriculture
University common core courses	3 (3.75%)	Mathematics, Ethics and Integrity, Environmental education

Source: Egerton University (2016). Catalogue 2016-2020

There are 11 units that directly contribute towards training in agricultural extension. The summary of the units, and the competencies they impart is contained in Table 2.2.

Table 2. 2 Extension Related Units and Competencies Imparted in The BSc AGED Programme

Title of Unit	Competencies Imparted
Fundamentals of Agricultural Education and Agricultural Extension	Understanding of historical background of agricultural extension in Kenya and globally - Appreciation of the significance of agricultural extension
Agricultural Communication skills	- Communicating effectively - Applying different extension methods for effective communication
Agricultural Communication and Technology	Preparing extension teaching materials Preparation and use of communication technologies
Rural Sociology and Development	- Understanding and working with rural communities; - Cultural sensitivity
Principles of Agricultural Extension	Understanding and applying principles of agricultural extension for effective extension work
Agricultural Information Management	- Managing information in agricultural organizations and rural communities - Using ICTs in extension work
Extension Programme Planning, Monitoring and Evaluation	Planning, implementing, monitoring and evaluating agricultural extension programmes
Management of Agricultural Organizations	Managing agricultural organizations
Agricultural Extension and Rural Development	Understanding and applying agricultural extension knowledge and principles in rural development
Field visits and seminars	- Appreciation of agricultural extension world of work - Understanding of contemporary issues in agricultural extension
Field attachment	Appreciation of how agricultural extension works in the real world. - Application of knowledge and skills in agricultural extension

Source: Egerton University (2016) Catalogue 2016-2020

2.3.5.5 Mode of Delivery of BSc AGED Programme. A wide variety of methods are used in teaching the units in the BSc AGED programme. They include lectures, laboratory and field practical sessions, demonstrations, class and group discussions, interactive lectures and field visits.

Most of the extension courses in the programme do not have a practical component. However, the lecturers use interactive methods such as interactive lectures, group discussions, case studies, guest speakers and role play to make the learning more interesting and effective. ICTs are also used to enhance learning through videos, PowerPoint presentations etc. In addition, field trips are used to complement the teaching, where students are exposed to practical field situations. Some of the lecturers have been trained in innovative pedagogical skills and they apply them in teaching.

2.3.5.6 Graduates of the BSc AGED Programme. The double major in the AGED programme allows the graduates a lot of flexibility in terms of career choices. Although many of them initially start as teachers due to the high demand for agriculture teachers and the ease of employment, they later switch to other areas depending on their interests and specializations. Many work in agricultural organizations including the Ministry of Agriculture, as agricultural extension officers while others get into more technical careers in agriculture. The demanding workload of the AGED programmes makes the graduates hardy and resilient, with high capacity for hard work. The graduates also have a wide range of options in pursuing further studies, since they have basic qualifications in many agricultural fields such as agronomy, animal science, horticulture, agricultural economics and agribusiness management etc.

2.3.5.6 Review of the BSc AGED Programme. The BSc AGED programme is reviewed at a regular interval of at least four years, based on the Programme Cycle, as required by the University Statutes and the Commission for University Education. The reviews allow for revision and alignment of the programmes to changing needs and situations, both locally and globally. The reviews are informed by feedback from various stakeholders including alumni, employers, government, other institutions of higher learning, the general society and other relevant stakeholders. Reviews also enable the programmes to be aligned to policy changes and national and global development priorities. By training agricultural education and agricultural extension professionals, the BSc AGED programme produces manpower to help deliver on the Government's development priorities in agriculture.

Significant changes in the Agricultural Extension units were introduced in the 2013-2018 catalogue (Egerton University, 2013a). Up to the year 2012, only one extension education course was being offered in the AGED programme. The course was offered in the Third year of study to the BSc AGED programme and to all other agriculture related programmes as a service course (Egerton University, 2010). However, it was realized that a single extension unit could not adequately impart the necessary knowledge and skills needed for the BSc AGED graduates to perform effectively in a changing context. In the 2013-2018 Review of curricula, the Extension Education unit was split into five units, which were offered in Year 3 and Year 4. The units are:

- Principles of Agricultural extension – Year 3
- Agricultural Information management –Year 4
- Extension programme planning, monitoring and evaluation- Year 4
- Management of Agricultural Organizations – Year 4
- Agricultural Extension and Rural Development- Year 4

The split units are offered to the BSc AGED students only. The traditional extension education course has continued to be offered to the other agricultural programmes as a service course. The Department of AGED also offers the Rural Sociology course to all agricultural disciplines in the University.

Based on CUE guidelines, there has been a shift from focus on objectives to focus on learning outcomes.

2.3.6 Review of the Bachelor of Science in Agriculture and Human Ecology Extension

2.3.4.1 Background Information of the BSc AGHE Programme. The Bachelor of Science in Agriculture and Human Ecology Extension (BSc AGHE) programme is domiciled in the Department of Applied Community Development Studies (ACDS), in the Faculty of Education and Community Studies. The programme aims at developing professionals who will adequately advise on the techniques of improving agricultural enterprises, better management and utilization of farm produce, family, and community resources. The graduates will also have skills and knowledge in areas such as project planning and management, entrepreneurship, community consultancy, gender and development, appropriate technology among others that address community development issues. The BSc AGHE is a double major in Agriculture and Human Ecology and is unique integrating two areas of study crucial for any country's growth and development.

The programme grew from Diploma in Agriculture and Home Economics which was being offered when Egerton was a college. This course was traditionally pursued by females only, because of the Home Economics component. With the upgrading of the institution in 1986, a Bachelor of Science degree in Agriculture and Home Economics was introduced. Over time male students started to join the programme but they felt awkward being associated with a Home Economics course, which was a female domain. To cater for this the course was changed to Agriculture and Human Ecology and reviewed, to include more community development and Human Ecology units.

2.3.4.2 Programme Goal and Learning Outcomes of the BSc AGHE Programme. The programme aims at developing professionals who will adequately advise on the techniques of improving agricultural enterprises, better management and utilization of farm produce, family, and community resources. The specific learning outcomes are aimed at equipping graduates with knowledge, skills and attitudes that will enable them to: Improve the physical, psychological and socio-economic and agricultural development of communities; improve the wellbeing and quality of life of individuals, families and communities; mobilize resources for

the benefit of society and carry out research and innovations; and be flexible and adaptable to various working environments; and; undertake further studies.

2.3.4.3 Programme Structure and Scheduling of Units. The programme is offered over a period of four years. The programme content is presented systematically, according to the CUE guidelines. It starts mainly with foundational/introductory courses in the first year, then moves to courses focusing on concepts and principles; application and skills development courses. There is an 8-week practicum session at the end of the third year and a project-based course in the fourth year (Egerton University, 2016).

2.3.4.4 Categorization of Units Offered in the BSc AGHE Programme and Competencies Imparted. The BSc AGHE programme consists of 56 units that constitute 170 Credit factors. The categorization of the units offered is as summarized in Table 2.3:

Table 2.3 : Categories of Units and Competencies Acquired in the BSc AGHE Programme

Category	No. of Units	Competencies Acquired
Basic and core courses	7 (12.5%)	Basic knowledge in Mathematics, Computer literacy, environmental education, law and society
Technical Courses in agriculture	15 (26.79%)	Crop production, horticultural production, soil sciences, livestock production and nutrition
Economics, Agriculture Economics, Agri-business Management	3 (5.36%)	Applying economic principles and practices in agriculture and community development enterprises; managing projects
Human ecology and community development	24 (42.86%)	Ability to improve the physical, psychological and socio-economic and agricultural development of communities
Extension courses	4 (7.14%)	Understanding and applying various methods in extension work, conducting extension and community outreach
Field attachment (Cuts across Human Ecology, community development and extension)	1 (1.79%)	- Appreciation of real life extension and community development - Application of practical skills in world of work
Rural life	1 (1.79%)	Understanding and working with rural communities
Statistics	1 (1.79%)	Applying statistics in research on communities and development
Total	56	

Source: Egerton University (2016). Catalogue 2016-2020.

There is a close relationship between the units categorized under Human Ecology and Extension, and those categorized under agricultural extension. Four of the units categorized under human ecology and community development are also applicable in agricultural extension. In addition, Field Attachment cuts across both broad categories.

When all these units are combined, they make up 53.57% of all the units in the BSc AGHE programme.

There are eight (8) units that are directly related to Agricultural Extension, as shown in Table 2.4.

Table 2.4 : Agricultural Extension Units and Competencies Acquired

Unit	Competencies Acquired
Introduction to Agriculture, Human Ecology and Extension	Linking agriculture to human ecology and extension; understanding importance and principles of human ecology and extension
Human Aspects in Extension and Development	Understanding role of extension agent, ethical issues; leadership and emerging issues in extension and development
Extension Methods in Human Ecology	Planning, implementing and evaluating extension projects, applying extension teaching methods in human Ecology and community development. Assessing community Needs
Project Planning and Management	Planning and managing community projects, including extension projects
Project Implementation and Evaluation	Implementing and evaluating community projects, including extension projects
Rural Sociology	Understanding and appreciation of rural life, social institutions and culture
Group and Community Dynamics	Understanding of how groups operate and skills for working effectively with groups and communities
Outreach Programme	Identifying community felt needs; designing and applying appropriate interventions; mobilizing community resources, conducting educational programmes for youth and adults in the communities; applying human ecology extension teaching methods
Field Attachment	Practical exposure to all aspects of agricultural extension and community development

Source: Egerton University (2016). Catalogue 2016-2020.

2.3.4.5 Mode of Delivery of the BSc AGHE Programme. Since inception, the BSc AGHE programme has adopted a competence-based approach to teaching. Two of the extension courses have a practical component, and require students to engage in real life scenarios through practical exposure where they get to apply the knowledge and skills gained. The Extension Methods in Human Ecology course has 30 practical hours allocated, while the Outreach programme has 60 hours of practicals. This is in addition to practicals that are conducted in many of the technical courses in agriculture.

2.3.4.6 Graduates of the Programme. The programme is aimed at preparing graduates who have competencies in extension and outreach in communities. Graduates are employed in the public sector, especially the Ministry of Agriculture, Livestock, Fisheries and Cooperatives. The graduates also work in the private sector as development agents, especially in non-governmental organizations dealing with agriculture.

2.3.4.7 Review of the Programme. In accordance with the Commission for University Education 2014 standards and guidelines, the BSc AGHE programme is reviewed on a regular basis after a full cycle of four years. The review is 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. Initially the programme focused mainly on production agriculture, but has been reviewed to include aspects such as appropriate technology, outreach programme

As in the BSc AGED programme, there has been a shift from course objectives to course learning outcomes based on CUE 2014 guidelines. The objectives of the programme and units therefore focus on competencies that the students should acquire (what they should be able to do) rather than what should happen at the end of the programme or individual units. This is reflected in the 2016-2020 reviewed curriculum (Egerton University, 2016).

CHAPTER 3 : METHODOLOGY

3.1 Study Population and Sampling

The study was conducted in Kenya between August 2021 and April 2022. Kenya lies in the Eastern Africa region, and lies along the Indian Ocean. It borders Tanzania, Somalia, Ethiopia, South Sudan and Uganda. Kenya occupies an area of about 587,000 km² out of which 11,000 km² is water, with about 16% is of the landmass being potentially arable land (Government of Kenya, 2021). The country is composed of 47 counties and has a population of about 48 million (Kenya National Bureau of Statistics, 2020). Only about 10% of Kenya's land mass receives adequate rainfall and supports 70% of the agricultural production (Geopoll, 2018). About 84% of the country is characterized as arid or semi-arid (ASAL) with low and erratic rainfall. The ASALs are mainly occupied by pastoralists, ranchers and agro-pastoralists (Government of Kenya, 2021). Most of Kenya's agriculture is fully dependent on rainfall. In the past, most agricultural areas in the country have had two distinct rain seasons; the long rains and the short rains. However, with climate change being experienced in most parts of the world, the rains in the country have become unpredictable and unreliable. In 2019, there were a total of 6.4 million farming households comprising of 1.7 million crop farmers, 3.9 million mixed farmers, 760,000 Livestock farmers, and about 30,000 fisher folks). The majority of the farm sizes range from 0.2 to 3 hectares (Kenya National Bureau of Statistics, 2020).

The target population of this study consisted of all agricultural extension professionals in Kenya, who were drawn from the academia, public sector, private sector and non-governmental organizations in Kenya. Mixed method research design, comprising quantitative and qualitative approaches were employed in collecting data from the study population. Quantitative data was collected through an online survey using the Qualtrics software. Data for the online survey was collected from a sample of agricultural extension professionals in Kenya. They included extension officers in the public and private sector, faculty in universities, researchers, people working in the development world (NGOs), students pursuing postgraduate studies in agricultural extension and alumni. Respondent contact details were obtained from colleagues at Egerton and other universities, alumni networks, agricultural organizational websites, data from the Kenya Forum for Agricultural Advisory Services (KeFAAS) and referrals from identified potential respondents. Through this information, a database consisting of 209 extension professionals was prepared, and this formed the online survey sample. However due to very low response rate, additional potential respondents were identified and also requested to contact people in their networks who could participate in the survey. The final sample size was therefore about 250 who were sent Email invitations to participate in the online questionnaire. Out of a target sample of about 250, 84 responded, with 68 filling the online questionnaire fully. Sixteen respondents filled the questionnaire to varying extent.

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 in order to meet the needs of their clients.

3.2.1 Demographic and Institutional Characteristics

The respondents were asked to indicate their age (in years), gender (male, female and prefer not to respond), highest educational level (HND/Bachelor's, Master's and PhD 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 and 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 and 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.

Program planning skills and competencies. 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 skills and competencies.

Program implementation skills and competencies. These were operationalized as the ability of 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 the programme implementation skills and competencies.

Communication skills and competencies. These were operationalized as ability of agricultural extension professionals to select appropriate communication methods, establish communication with different stakeholders, respect local culture while communicating with clients, prepare required progress report, 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.

Information and communication technologies (ICTs) skills and competencies. These were operationalized as 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.

Program monitoring and evaluation skills and competencies. They were operationalized as the ability of agricultural extension professionals to understand the theories of monitoring and evaluation, conduct online surveys for monitoring and evaluation of 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.

Personal and professional development skills and competencies. These 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.

Diversity and gender skills and competencies. These were 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.

Marketing, brokering and value chain development skills and competencies. 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 different 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.

Other extension soft skills and competencies. Operationalized as the ability of extension professionals develop skills and competencies in the areas of critical thinking, problem solving, time management, stress management, leadership, team work, 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.

Nutrition skills and competencies. Operationalized as the ability of extension professionals to demonstrate basic human nutrition knowledge, understand lifecycle nutrition needs of different household members, advise families on what crops and livestock to be produced 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.

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, 1 = not at all covered; 2 = minimally covered; 3 = moderately covered; 4 = well covered; and 5 = very well covered.

3.2.3 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 and they include; providing practical and contemporary skills, including various soft skills in extension curriculum, including 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 agriculture courses etc. The respondents were required to indicate if each strategy already existed, does not exist, but essential to have and does not exist, but fine to leave out.

3.2.4 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.

3.2.5 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 text books and/or manuals, classroom and demonstration farms or facilities, accreditation of curriculum, time constraint, etc. The respondents were required to indicate their responses by ticking their perceived barriers to effective implementation of undergraduate extension curriculum.

3.2.6 Focus Group Discussions: Process and Outcomes

Qualitative data on the process skills and competency gaps in the undergraduate extension curriculum were collected through focus group discussions (FGDs). Qualitative data for the study was collected through focus group discussions method. face -to-face and online focus group discussions (FGDs). First, potential participants were identified from among various stakeholders in agricultural extension service delivery, including employers, government extension workers, researchers, private extension service providers, non-governmental organizations, postgraduate students, and academic staff. The discussions were guided using a checklist that was jointly developed and agreed upon by the PIRA research team. Fourteen participants were invited for the face- to-face FGD while 12 were invited for the

online FGD. Each of the potential participants was sent an invitation through email. They were asked to confirm their willingness and availability for the FGD as soon as possible. For those who delayed in responding, follow-up was done through mobile phone calls and text messages.

The face-to-face focus group discussion was conducted on 12th November 2021 at a hotel in Nakuru, which is the nearest city from Egerton University. This site was chosen because some participants were coming from distant areas and the town was more easily accessible than Egerton University, which is 25 km out of the city. Ten of the fourteen invited participants attended, out of whom six were female while only three were male. The online FGD was held on 26th November 2021, and attended by 12 participants, where each gender was equally represented.

The discussions were moderated by the Kenyan researcher assisted by a facilitator and a secretary, who was an MSc Agricultural Extension student. The face-to-face FGD was recorded fully on audio. The online FGD was recorded on Zoom. Both recordings were transcribed manually by an experienced transcriber.

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

3.3 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 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 subject's research was obtained from Michigan State University (MSU).

3.4 Data Collection and Analysis

First, a database of key stakeholders was compiled, with information on names, organizational affiliations, positions held and Email contacts. Data was collected through an online questionnaire, that was developed collaboratively by the PIRA research team. Respondents were selected purposively based on their involvement in agricultural extension related work. Emails inviting the respondents to fill an online survey and giving a link for the same were sent to the stakeholders.

The initial database consisted of 209 stakeholders from different agricultural extension-related organizations and parts of the country. The initial response rate to the online questionnaire was quite low. However, reminders were sent out, and in addition, more stakeholders were approached to participate in the survey. At the end, 84 respondents attempted to fill the questionnaire, out of which 68 were able to complete the online questionnaire.

Using the Qualtrics software, the online survey questionnaire was administered to 250 agricultural extension professionals in Kenya, 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, percentages and means. 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 Social Sciences (SPSS) version 24 was the software used for the statistical analysis.

3.5 Limitations of the Study

The main limitation with the online survey was the small sample size, due to low response rate. Out of 250 respondents contacted, only 68 completed the survey fully. This was mitigated through the use of respondents from different backgrounds, and also corroborating with qualitative information from the focus group discussions.

CHAPTER 4 : RESULTS AND DISCUSSIONS

4.1 Findings from Online Survey of Agricultural Extension Professionals

This section presents the findings from the online survey that was administered to agricultural extension professionals. Out of about 250 potential respondents, 84 attempted to fill the online questionnaire, and only 68 completed the survey.

4.1.1 Demographics of Agricultural Extension Professionals

Respondents were requested to provide information about their age, gender and highest education level attained. The results are summarized in Table 4.1

Table 4.1 : Demographics of Agricultural Extension Professionals in Kenya

1. Age (In Years) (N=67)		
Category (In Years)	Frequency	Percent
21-30	4	5.97
31-40	11	16.42
41-50	16	23.88
51-60	30	44.78
above 60	6	8.96
Total	67	100.00
2. Gender (N=69)		
Category	Frequency	Percent
Male	34	49.28
Female	34	49.28
Prefer not to respond	1	1.45
Total	69	100.00
3. Education (N=68)		
Category	Frequency	Percent
Bachelor's degree/HND	16	23.53
Master's degree	28	41.18
Doctoral (Ph.D.) degree	24	35.29
Total	68	100.00

Most of the respondents (about 45%) were between 51-60 years. Overall, 68.66% of the respondents were above 50 years of age, which implies a skewness in terms of the age distribution of the respondents. The lowest age was 27 years, while the highest was 72 years.

There was equal gender distribution among the respondents, with 49.3 percent male and female. One respondent preferred not to respond to this question. Most of the respondents were highly educated, with the highest percentage (41%) having masters' degrees and 35% having doctoral degrees. Only 23.3 percent had Bachelors' degree or higher national diploma.

4.1.2 Institutional Characteristics of Agricultural Extension Professionals

The respondents were also requested to provide information about their institutional characteristics. Four aspects were considered, i.e., familiarity with undergraduate AGEX curriculum, number of universities whose AGEX curriculum they are familiar with, the position currently occupied, and number of years of experience in agricultural extension profession or agriculture related field. The results were as indicated in Table 4.2

Table 4.2 : Institutional Characteristics of Agricultural Extension Professionals in Kenya

1. Familiarity with UG Agricultural Extension Curriculum (N=84)		
Category	Frequency	Percent
Familiar	68	80.95
Unfamiliar	16	19.05
Total	84	100.00
2. Familiar With How Many Universities' UG Agriculture Extension Curriculum (N=-84)		
Number of Universities	Frequency	Percent
1	68	80.95
2 -3	15	17.86
4 or more	1	1.19
Total	84	100.00
3. Current Position (N=68)		
Category	Frequency	Percent
University Extension Staff	18	26.47
Public Sector Extension Professionals	31	45.59
Private Sector Extension Professionals and Others	19	27.94
Total		100.00
4. Experience in Extension Profession / Agriculture Related Fields (In Years) (N=68)		
Category	Frequency	Percent
0-5	6	8.82

6-10	7	10.29
11-15	10	14.71
16-20	9	13.24
above 20	36	52.94
Total	68	100.00

Majority of the respondents (about 81%) had deep knowledge of the curriculum of one university. One respondent reported having knowledge of curricula for 7 universities, which is quite unusual. About 18% had knowledge of 2 or 3 universities.

The respondents' current position was varied, with some being in the public sector, private sector, non-governmental organizations (NGOs) and university staff. Majority of the respondents (46%) were from the public sector, with most working in the government extension service. They were followed by university lecturers, who made up 26.5% of the respondents. The private sector was not well represented, accounting for only 14.71%. Researchers and people working for NGOs had equal representation of 5.88 percent, which was very low representation. One respondent was a student, pursuing a masters' degree in agricultural extension.

Majority of the respondents (about 81%) had deep knowledge of the curriculum of one university. One respondent reported having knowledge of curricula for 7 universities, which is quite unusual. About 18% had knowledge of 2 or 3 universities. Most of the respondents (81%) reported being familiar with the current undergraduate level extension curriculum. This implies that they were well-positioned to provide information about the curricula.

The lowest number of years worked was two years, while the highest was 60 years. More than 50% of the respondents had over 20 years' experience as agricultural extension professionals. Only about 15% had 5 years or less of experience. This implies that the respondents were very experienced in the field of agricultural extension.

4.1.3 Process Skills and Core Competencies

The respondents were asked to rate a number of skills and competencies in terms of how important they were to the agricultural extension professional, and how well they were covered in the undergraduate training curriculum. The ratings were on a scale of 1-5, as follows:

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.

4.1.3.1 Program Planning Skills and Competencies. The respondents were asked to rate six programme planning skills and competencies on their importance and the degree to which they were covered in the undergraduate agricultural extension training curricula. These were: 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 6) Familiar with administrative and financial rules of their respective organizations (to utilize human and financial resources in extension programs).

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

Extension professionals should be:	How important is this skill or competency for an extension worker?*	How well does the undergraduate extension curriculum cover this skill or competency? (N=55)**
	Mean (SD) (N=73)	Mean (SD)
Familiar with the vision, mission and goals of National /State (sub-national) extension service and agricultural development strategies, programs, and policies.	4.69 (0.72)	3.54 (0.97)
Able to conduct needs assessment and engage stakeholders to prioritize local needs.	4.68 (0.72)	3.51 (0.94)
Able to conduct baseline or benchmark studies.	4.51 (0.80)	3.25 (1.09)
Able to mobilize resources/funds to address priority needs.	4.42 (0.86)	2.85 (1.16)
Able to engage local stakeholders (e.g., NGOs, cooperatives, local agro-dealers) in extension program planning.	4.62 (0.74)	3.24 (1.04)
Familiar with administrative and financial rules of their respective organizations (to utilize human and financial resources in extension programs).	4.37 (0.83)	2.95 (1.06)

* 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.

The respondents rated all the programme planning skills and competencies as either important or essential, with all of them having a mean rating of over 4.3. The highest rating

was 4.69, for importance of familiarity with the vision, mission and goals of National /State (sub-national) extension service and agricultural development strategies, programs, and policies. When the mean rating was calculated for only respondents who were familiar with the undergraduate extension training curricula, a higher value of 4.79 was obtained. The lowest rating score for this group was on familiarity with administrative and financial rules of their respective organizations at 4.42. This agrees with the scoring for the entire group, but is higher as compared to the 4.37 score. This implies that the lower scores are coming from respondents who were not familiar with the curricula of the undergraduate AGEX training programmes.

The differences between means for those who were familiar and those who were unfamiliar with the AGEX curricula were computed. For all the six programme planning skills and competencies, only one was found to have statistically significant difference between means. This was 'Able to mobilize resources/funds to address priority needs' where those who were familiar had a mean of 4.52 while the unfamiliar had 4.00. Overall, the results show that all respondents considered the skills and competencies in programme planning important, and close to essential. Overall, the results show that all respondents considered the skills and competencies in programme planning important, and close to essential.

The mean ratings on how well the skills and competencies are covered in the undergraduate curriculum ranged between 2.85 and 3.54. Four of the skills were rated between 3.24 and 3.54 meaning they were moderately well covered. However, the skills on ability to mobilize resources, and familiarity with administrative and financial of their organizations were rated slightly below 3.0, (2.84 and 2.95). These scores indicate moderate coverage, since they are closer to 3.0, although they are not as well covered as the other four skills.

When the scores were calculated for only those respondents who were familiar with the curricula, they ranged from 2.85 to 3.55 which is not different from the range obtained for the entire group.

A paired t-test was calculated for mean scores obtained for the importance of the programme planning skills and the extent to which they are covered in the curricula, for respondents who were familiar with the curricula. For all the six programme planning skills and competencies, t-test values of between 7.89 and 9.94 were obtained for 54 degrees of freedom, and all were found to be statistically significant at 0.00. This means that for all the programme planning skills and competencies, there is a statistically significant difference between how important they are rated and the extent to which they are covered in the curricula. This clearly indicates a gap and an opportunity for improving the curricula.

4.1.3.2 Program Implementation Skills and Competencies. The respondents were required to rate nine (9) skills and competencies relating to programme implementation. These were: 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. 6) Delegate responsibilities to staff as needed 7) Follow participatory decision-making in extension work. 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.

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

Extension professionals should be:	How important is this skill or competency for an extension worker? (N=73)*	How well does the undergraduate extension curriculum cover this skill or competency? (N=56)**
	Mean (SD)	Mean (SD)
Coordinate local extension programs and activities.	4.71 (0.56)	3.55 (0.85)
Demonstrate teamwork skills to achieve extension results.	4.75 (0.46)	3.46 (0.99)
Able to form farmers' groups and support them.	4.64 (0.61)	3.57 (0.97)
Engage local stakeholders (e.g., NGOs, Self Help Groups, Cooperatives) in implementing extension programs.	4.60 (0.62)	3.43 (0.93)
Demonstrate negotiation skills to reach consensus and resolve conflicts.	4.58 (0.58)	3.18 (1.10)
Follow participatory decision-making in extension work.	4.67 (0.55)	3.50 (0.97)
Delegate responsibilities to staff as needed.	4.40 (0.74)	3.09 (1.16)
Be able to engage minority groups (e.g., Female farmers and youth development groups) in extension work.	4.63 (0.54)	3.32 (1.03)
Integrate private or public-private partnerships in extension service provision.	4.66 (0.58)	3.23 (1.03)

* 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.

The ratings for importance of the programme implementation skills and competencies ranged from 4.40 to 4.75, with eight out of nine skills and competencies being rated above 4.5, meaning they were considered close to Essential. When the respondents who were familiar with the curricula were considered on their own, the rating ranged from 4.42 to 4.79, which is not very different from the range for the whole group. The differences between the means among those who were familiar and those not familiar were calculated. The results indicated that two of the skills (Able to form farmers' groups and support them; and 'Integrate private or public-private partnerships in extension service provision') had statistically significant differences in means between the two groups (4.77 vs 4.08 and, 4.75 vs 4.23 respectively for familiar and unfamiliar). Those who were familiar with the undergraduate curriculum therefore scored the importance of the programme implementation skills and competencies higher than those who were not.

The rating on the level of coverage of the programme implementation skills and competencies was significantly lower ranging from 3.09 to 3.57. In comparison, the scores obtained for data from respondents who were familiar with the curricula ranged from 2.85 to 3.54. There is a marked difference between the two ranges, especially for the minimum scores. Although general findings indicate that for all respondents all the skills and competencies on programme implementation were moderately well covered in the curriculum, those who were familiar with the programme indicated that there was lower coverage (2.85) as per their ratings. This indicates an area of improvement as none of the programme planning skills is very well covered or extremely well covered.

A paired t-test was calculated for mean scores obtained for the importance of the implementation skills and the extent to which they are covered in the curricula, for respondents who were familiar with the curricula. For all the nine programme planning skills and competencies, t-test values of between 8.72 and 9.78 were obtained for 55 degrees of freedom, and all were found to be statistically significant at 0.00. This means that for all the programme implementation skills and competencies, there is a statistically significant difference between how important they are rated and the extent to which they are covered in the curricula. This clearly indicates a gap and an opportunity for improving the curricula. This indicates a gap and opportunity for strengthening the curricula.

4.1.3.3 Communication Skills and Competencies: The respondents were asked to rate eight communication skills and competencies in terms of their importance and level of coverage in the undergraduate curriculum. The skills and competencies were: 1) Select appropriate communication methods, 2) Establish communication with different stakeholders, 3) Respect local culture while communicating with clients, 4) Prepare required progress reports, and 5) Share success stories and lessons-learned with stakeholders through various media 6) The responses are summarized as follows:

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

Extension professionals should be:	How important is this skill or competency for an extension worker? (N=72)*	How well does the undergraduate extension curriculum cover this skill or competency? (N=55)**
	Mean (SD)	Mean (SD)
Select appropriate communication methods.	4.78 (0.48)	4.11 (0.79)
Establish communication with different stakeholders.	4.72 (0.48)	3.69 (0.84)
Respect local culture while communicating with clients.	4.78 (0.48)	3.96 (0.79)
Prepare required progress reports.	4.79 (0.47)	3.85 (0.89)
Share success stories and lessons-learned with stakeholders through various media.	4.51 (0.75)	3.33 (1.00)
Use extension methods (e.g., individual, group and mass contact methods) to disseminate information about extension activities and programs.	4.79 (0.47)	4.15 (0.91)
Demonstrate good listening skills and listen to all clients and stakeholders.	4.82 (0.42)	3.91 (0.99)
Demonstrate good public speaking and presentation skills.	4.72 (0.51)	3.89 (0.99)

* 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.

The rating on the importance of the skills was quite high, falling between 4.51 and 4.82. When those who were familiar with the programme were considered on their own, the means ranged from 4.58 and 4.90, which was higher than what was obtained for the combined group. When the difference between means of the scores obtained for each communication skill for those who were familiar with the curriculum and those who were not familiar was determined, results revealed that the t-values for five of the communication skills were significant.

Despite the differences between the two groups, results show that all the skills and competencies were considered almost essential, since the rating was close to 5. Good

listening skills and ability to listen to all clients and stakeholders scored the highest at 4.82 for the combined group.

The results for the rating of the level of coverage in the undergraduate curriculum, were more spread out. The lowest score was 3.33 while the highest was 4.15, indicating that the skills were moderately well covered and very well covered in the curriculum. The ability to Share success stories and lessons-learned with stakeholders through various media got the lowest score, meaning that it is moderately well covered but on a lower level compared to the other skills and competencies. The use of extension methods scored the highest at 4.15, meaning that it is very well covered in the curriculum. None of the skills and competencies in communication were extremely well covered, showing that there is room for improvement.

4.1.3.4 Information and Communication Technologies (ICTs) Skills and Competencies.

Respondents were asked to rate eleven (11) ICT skills and competencies. The findings are summarized in the following table:

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

Extension professionals should be:	How important is this skill or competency for an extension worker? Mean (SD) (N=72)*	How well does the undergraduate extension curriculum cover this skill or competency? Mean (SD) (N=55)**
	Mean (SD)	Mean (SD)
Microsoft Word for word processing (e.g., typing, editing, printing) and designing graphics.	4.46 (0.75)	3.33 (1.11)
Data entry and analysis software such as Excel, SPSS etc.	4.36 (0.84)	2.80 (1.18)
Microsoft Power Point for making presentations.	4.51 (0.79)	3.25 (1.13)
Audio-visual aids such as charts, graphs, and puppet show for teaching and learning.	4.50 (0.69)	3.42 (1.03)
Mass media like FM radio stations and television channels for communication.	4.25 (0.96)	3.07 (1.14)
Computers (email, Internet) for communication.	4.60 (0.60)	3.44 (1.03)

Mobile phone services (e.g., texting, SMS service) for communication.	4.68 (0.53)	3.47 (1.10)
Social media (WhatsApp, Facebook, Twitter, Instagram, etc.) for communication.	4.42 (0.73)	3.09 (1.17)
ICT tools to improve access to information, knowledge, technologies and other innovations.	4.53 (0.67)	3.05 (1.03)
ICT tools to enhance collaboration and partnerships.	4.49 (0.71)	3.00 (1.04)
ICT tools for collecting data, monitoring, and evaluation of extension programs.	4.53 (0.60)	2.91 (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.

The rating of the importance of the skills on ICTs ranged from 4.25 to 4.68, showing that respondents considered all 11 ICT skills as important, and even almost essential. The use of Mass media like FM radio stations and television channels for communication rated the lowest (4.25), but this was still in the range of 'Important'. The highest rating went to skills and competencies in use of mobile phone services for communication which scored 4.68, which was close to essential. When results for those who were familiar with the curriculum were considered separately, the means ranged from 4.39 to 4.71 which was higher than for the combined group. A computation of the difference between means for those who were familiar and those who were not revealed that the t-values were statistically significant for seven of the 11 ICT skills. There was therefore a significant difference in the rating of the importance of the ICT skills between those who were familiar and those who were not familiar with the curriculum, with those familiar rating the importance higher.

The level of coverage in the UG curriculum was scored at between 2.80 and 3.47, meaning the ICT skills and competencies were minimally to moderately covered. The skills in Data entry and analysis software such as Excel, SPSS etc. were rated as being the least covered at 2.80 while the highest was the skills and competencies in the use of Mobile phone services (e.g., texting, SMS service) for communication.

4.1.3.5 Program Monitoring and Evaluation Skills and Competencies. Respondents were asked to rate 11 program monitoring and evaluation skills and competencies. The results are as shown in Table 4.7.

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

Extension professionals should be:	How important is this skill or competency for an extension worker? Mean (SD) (N=71)**	How well does the undergraduate extension curriculum cover this skill or competency? Mean (SD) (N=55)**
	Mean (SD)	Mean (SD)
Understand theories and principles of monitoring and evaluation.	4.59 (0.67)	3.53 (1.02)
Conduct monitoring and evaluation of extension programs.	4.66 (0.58)	3.27 (0.99)
Develop data collection instruments - interview schedules / questionnaires- for monitoring and evaluation of extension programs.	4.65 (0.59)	3.36 (0.95)
Conduct online surveys for monitoring and evaluation of extension programs.	4.31 (0.77)	2.75 (0.99)
Apply qualitative tools and techniques (e.g., focus group discussion, case study etc.) to collect evaluation data.	4.66 (0.56)	3.24 (0.96)
Apply quantitative tools and techniques (e.g., survey, interview, farm data, etc.) to collect evaluation data.	4.58 (0.58)	3.31 (0.98)
Analyze data (qualitative and quantitative).	4.52 (0.65)	3.07 (1.05)
Interpret data (qualitative and quantitative).	4.58 (0.67)	3.20 (1.01)
Write evaluation report.	4.61 (0.60)	3.16 (1.03)
Share evaluation reports within their organizations and with stakeholders.	4.66 (0.58)	3.09 (1.16)
Apply the evaluation findings in replicating/ scaling-up of extension programs.	4.73 (0.51)	2.96 (1.15)

* 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.

The program monitoring and evaluation skills and competencies were rated from 4.31 to 4.73 in importance, implying that they were well covered or extremely well covered. When the means of those who were familiar with the UG curriculum were computed, the range was between 4.47 and 4.75, which was higher than for the combined group. The results of differences between means for those who were familiar and those not familiar with the UG curriculum revealed that the t-values of six out of the 11 M&E skills were statistically significant.

Overall, all the monitoring and evaluation skills had an importance rating of 4.69 for the combined group. This means that the respondents considered the skills and competencies to be essential for extension practitioners.

The scoring on how well the skills is covered ranged from a minimum mean of 2.75 for Conduct online surveys for monitoring and evaluation of extension programs, to a maximum mean of 3.53 for Understand theories and principles of monitoring and evaluation. The overall mean for monitoring and evaluation skills and competencies was 3.18. This shows that the respondents rated the Monitoring and Evaluation skills and competencies as being moderately covered in the curriculum.

The t-values for difference between means of how important the skills and competencies are and how well they are covered was 0.00 for all the 11 skills and competencies. This means that there is a statistically significant difference between importance and coverage of the skills. It therefore indicates a gap in the curriculum on coverage of skills and competencies on Monitoring and evaluation.

4.1.3.6 Personal and Professional Development Skills and Competencies. Respondents were asked their opinion on the importance and level of coverage of five (5) personal and professional development skills. The results were as shown in Table 4.8.

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

Extension professionals should be:	How important is this skill or competency for an extension worker? (N=71)*	How well does the undergraduate extension curriculum cover this skill or competency? (N=54)**
	Mean (SD)	Mean (SD)
Apply principles of good governance (e.g., client’s participation, accountability and transparency) in extension work.	4.66 (0.58)	3.19 (1.03)
Show commitment to career advancement (participate in lifelong learning, in-service training, professional development events and conferences).	4.65 (0.54)	3.13 (1.23)

Apply professional ethics in extension work i.e., promote research-based recommendation or technology.	4.75 (0.50)	3.43 (1.14)
Follow organizational policies and directives for professional development.	4.79 (0.44)	3.20 (1.09)
Demonstrate honesty and positive attitude towards extension work.	4.85 (0.44)	3.54 (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..

The mean for importance of the skills and competencies ranged from a minimum of 4.67 for ‘Apply principles of good governance (e.g., client’s participation, accountability and transparency) in extension work’ to a maximum of 4.83 for ‘Demonstrate honesty and positive attitude towards extension work’. The mean ratings for those who were familiar with the UG curriculum ranged from 4.66 to 4.84. There were no statistically significant differences between the means for the respondents who were familiar with the curriculum and those who were not.

The overall mean for importance of the five skills and competencies was 4.76. Therefore, all the personal and professional development skills were rated very highly and considered essential for extension workers.

The coverage of the skills and competencies was rated from a mean of 3.13 for ‘Show commitment to career advancement’ to a mean of 3.54 for ‘Demonstrate honesty and positive attitude towards extension work’. The overall mean for professional and personal development skills was 3.30. The results therefore show that the skills and competencies were moderately well covered.

The differences between means of Importance of the skills and competencies and their coverage were computed for all the five skills. All had a t-value of 0.00, meaning that there was a significant difference between the importance and coverage of the skills.

4.1.3.7 Diversity and Gender Skills and Competencies. Seven skills and competencies on diversity and gender were rated in terms of importance and level of coverage. The following table shows the results:

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

Extension professionals should be:	How important is this skill or competency for an extension worker? (N=70)*	How well does the undergraduate extension curriculum cover this skill or competency? (N=54)**
	Mean (SD)	Mean (SD)
Understand that diversity exists within and among clients and stakeholders.	4.61 (0.64)	3.44 (0.96)
Identify the needs of small-scale farmers.	4.82 (0.46)	3.76 (0.93)
Identify the needs of minority groups.	4.63 (0.64)	3.26 (1.05)
Develop extension programs to benefit women farmers.	4.58 (0.60)	3.19 (1.07)
Develop extension programs to benefit youth.	4.62 (0.54)	3.24 (1.01)
Engage marginalized and vulnerable groups in extension programs (e.g., disabled, resource poor farmers).	4.68 (0.58)	3.00 (1.12)
Do teamwork with diverse staffs.	4.63 (0.62)	3.31 (1.08)

* 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.

The mean of the scores on importance of the gender and diversity management skills and competencies ranged from 4.59 to 4.81, with an average of 4.65. The means for those who were familiar with the curriculum ranged from 4.57 to 4.83. There were no statistically significant differences between the means obtained among those respondents who were familiar and those who were not familiar with the curriculum.

The means obtained therefore indicate that Gender and diversity management skills and competencies were considered almost essential for extension workers.

The rating on the coverage of the gender and diversity management skills ranged from 3.00 (moderate) to 3.76 (close to well covered) with a mean of 3.31. The respondents therefore felt that the skills were moderately well covered.

The t-values for the differences between importance and coverage for each skill and competency were computed, and all were found to be 0.00. There was therefore a significant difference between the importance of the skills and how well they were covered in the curriculum, for all the gender diversity and management skills.

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

Respondents were asked to rate six (6) marketing, brokering and value chain skills and competencies. The results are indicated in Table 4.10:

The means for importance of Marketing, Brokering and Value Chain Development Skills and Competencies ranged from 4.48 (Apply brokering/advisory skills in agribusiness development) to 4.74 (Be able to link farmers producers' organizations/cooperatives/agribusiness companies with market).

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

Extension professionals should be:	How important is this skill or competency for an extension worker? (N=71)*	How well does the undergraduate extension curriculum cover this skill or competency? (N=54)**
	Mean (SD)	Mean (SD)
Have basic knowledge of agribusiness development.	4.63 (0.62)	3.43 (0.92)
Apply brokering / advisory skills in agribusiness development.	4.28 (0.94)	3.06 (0.98)
Have knowledge on different agricultural markets and linkages.	4.69 (0.52)	3.20 (0.96)
Demonstrate knowledge of value chain logistics and input-output linkages in the value chain.	4.56 (0.75)	2.98 (0.98)
Facilitate entrepreneurship development among extension clientele.	4.68 (0.53)	2.96 (0.95)
Be able to link farmers producers' organizations/cooperatives/agribusiness companies with market.	4.75 (0.50)	2.98 (1.04)

* 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.

When means were computed separately for those who were familiar with the curriculum, the range was found to be between 4.40 and 4.74. A computation of the difference between the means obtained for those who were familiar and those not familiar with the curriculum found t-values for three of the six skills to be statistically significant. The means given by those who were familiar with the curriculum were significantly higher.

The overall mean for all the skills was 4.67. These results show that the skills and competencies were rated highly in terms of importance. The means of the level of coverage in the curriculum ranged from 2.96 to 3.43 with an overall average of 3.10. The respondents therefore considered the skills to be moderately well covered in the curricula. The t-values for the differences between the means of importance and coverage for each skill and competency were computed. All the t values were found to be 0.00, showing a significant difference between the importance of the skills and how well they are covered in the UG curriculum.

4.1.3.9 Extension Soft Skills. Respondents were asked to rate 17 soft skills. The results are shown in the following table:

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

Extension professionals should possess the other soft skills like:	How important is this skill or competency for an extension worker? (N=70)*	How well does the undergraduate extension curriculum cover this skill or competency? (N=54)**
	Mean (SD)	Mean (SD)
Critical thinking	4.67 (0.53)	3.09 (1.14)
Problem solving	4.80 (0.40)	3.43 (1.00)
Time management	4.81 (0.43)	3.39 (1.11)
Stress management	4.69 (0.50)	2.83 (1.18)
Leadership	4.71 (0.49)	3.41 (1.04)
Teamwork	4.76 (0.43)	3.37 (1.05)
Flexibility	4.67 (0.47)	3.24 (1.06)
Self-motivation	4.77 (0.46)	3.11 (1.19)
Interpersonal skills	4.74 (0.44)	3.35 (1.14)
Positive work attitude	4.80 (0.44)	3.26 (1.20)
Collaboration	4.77 (0.42)	3.44 (1.00)
Conflict management	4.66 (0.48)	3.24 (1.03)
Group formation and development	4.60 (0.55)	3.41 (1.07)
Negotiation skills	4.60 (0.55)	3.06 (1.09)

Networking skills	4.69 (0.47)	3.20 (1.14)
Facilitation skills	4.66 (0.54)	3.41 (0.98)
Creativity / Innovativeness	4.76 (0.46)	3.28 (1.14)

* 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.

The mean ratings on importance of the 17 soft skills ranged from 4.49 to 4.81. The means obtained among those who were familiar with the UG curriculum ranged from 4.64 to 4.81. There were no statistically significant differences between the means given by those who were familiar and those who were unfamiliar with the curriculum, except for two (2) out of the 17 soft skills. These were 'Critical thinking' and 'Creativity/innovativeness' where those who were familiar with the curriculum rated them significantly higher.

Despite these slight differences, the overall mean on importance of the extension soft skills was found to be 4.73. The soft skills were therefore rated very highly by both groups, as being close to Essential for extension workers. The means on the level coverage of the skills ranged from 2.83 to 4.44, with an overall average mean of 3.27. This indicates the soft skills are moderately well covered in the UG curriculum. Computation of difference between means of importance and coverage for each soft skill gave a t-value of 0.00, indicating a significant difference between importance and level of coverage.

4.1.3.10. Nutrition Skills and Competencies. Respondents were asked to rate seven nutrition skills in terms of importance and level of coverage. Results were as indicated in the following table:

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

Extension professionals should:	How important is this skill or competency for an extension worker? (N=69)*	How well does the undergraduate extension curriculum cover this skill or competency? (N=53)**
	Mean (SD)	Mean (SD)
Demonstrate basic human nutrition knowledge (e.g., food composition, balanced diet, supplements, nutritional composition of various foods, nutrition deficiency symptoms etc.).	4.39 (0.88)	3.06 (1.08)

Understand lifecycle nutrition needs of different household members (e.g., children of various age groups, pregnant and breastfeeding mothers, elderly).	4.26 (0.85)	2.79 (1.15)
Able to advise families on what crops and livestock to be produced to ensure balanced diets.	4.58 (0.83)	3.34 (1.18)
Advise families to improve gender relations for increased agriculture production and nutrition.	4.49 (0.70)	3.09 (1.02)
Demonstrate postharvest handling technologies that conserve nutrients and food safety (e.g., food storage, freezing fruits and vegetables, making pickles, jams, jellies).	4.55 (0.78)	3.30 (0.91)
Have basic knowledge about food labeling (e.g., organic foods).	4.32 (0.76)	2.64 (1.06)
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).	4.41 (0.83)	2.74 (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.

The means for importance of nutrition skills ranged from 4.32 to 4.60. The means obtained among those who were familiar with the curriculum ranged from 4.30 to 4.61. However, there were no statistically significant differences between those who were familiar with the curriculum and those who were not, except in one out of the seven (7) skills (Have basic knowledge about food labeling e.g., organic foods). The average/overall mean for importance of all the nutrition skills was 4.48. The nutrition skills were therefore rated as important.

Level of coverage ranged between 2.64 (Have basic knowledge about food labeling (e.g., organic foods) and 3.34 (Able to advise families on what crops and livestock to be produced to ensure balanced diets). The average mean was 2.99. The nutrition skills were therefore rated as moderately well covered, although some skills like ‘having basic knowledge about food labeling’ were on the lower side. There were statistically significant differences between means of importance and level of coverage of the nutrition skills, with all skills and competencies having a t-value of 0.00.

4.1.3.11 Technical Subject Matter Expertise/Skills and Competencies. Ten skills and competencies in technical subject matter expertise were rated in terms of importance and level of coverage. The following table gives a summary of the results:

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

Extension professionals should:	How important is this skill or competency for an extension worker? (N=70)*	How well does the undergraduate extension curriculum cover this skill or competency? (N=54)**
	Mean (SD)	Mean (SD)
Demonstrate technical knowledge in their basic discipline (e.g., field crops/livestock/fishery/horticulture, etc.).	4.83 (0.51)	4.19 (0.80)
Understand adult learning principles and hold practical skills required to teach improved farming practices.	4.76 (0.46)	3.91 (0.96)
Understand the new technology being promoted, i.e., what it is, why, and how it works.	4.79 (0.48)	3.61 (0.88)
Facilitate farmers to access inputs and services (e.g., credit, seed, fertilizers, feed, artificial insemination, etc.)	4.74 (0.53)	3.33 (0.99)
Be able to educate community members about different types of risks and uncertainties (e.g., due to market fluctuations, natural disasters, etc.).	4.77 (0.49)	3.37 (1.01)
Be able to educate community members about climate change and climate smart agriculture.	4.80 (0.44)	3.37 (0.98)
Refer to and make use of publications-- journals, research reports, etc.	4.40 (0.79)	3.26 (1.01)
Generating knowledge or producing research reports / journal publications.	4.33 (0.86)	3.19 (1.10)
Able to harness, document, validate and integrate local / indigenous knowledge.	4.50 (0.72)	3.22 (1.14)

Understand social system under which farming takes place (e.g., rural sociology knowledge).	4.73 (0.51)	3.67 (1.10)
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* 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.

The skills and competencies in technical subject matter expertise were rated as important and close to essential. The mean ranged from 4.46 (Generating knowledge or producing research reports / journal publications) and 4.91 (Demonstrate technical knowledge in their basic discipline (e.g., field crops/livestock/fishery/horticulture, etc.) with an overall mean of 4.70.

The level of coverage was rated between 3.19 (Generating knowledge or producing research reports / journal publications) and 4.19 (Demonstrate technical knowledge in their basic discipline (e.g., field crops/livestock/fishery/horticulture, etc.). The overall average mean was 3.51. The skills were therefore moderately to well covered. Calculation of differences between the means of importance and coverage of each of the 10 skills and competencies yielded t-values of 0.00, showing that there were statistically significant differences between the importance of the technical/subject matter skills and the degree to which they are covered in the undergraduate curriculum.

4.1.3.12 Additional Process Skills or Competencies that Extension Professionals Need. The additional 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. Organizing themed conferences
2. Strategic management
3. Emerging technologies (in the line of agriculture) which are going to be the drivers of development
4. Qualitative data analysis
5. Capacity on agricultural innovation
6. Gender-based value chain analysis and development
7. Resource mobilization skills
8. Rapid rural appraisal skills
9. Use of basic engineering equipment to measure and lay farm structures e.g., terraces.
10. Exposure of extension service providers to most industrialized nations for knowledge sharing
11. Linkage for data sourcing to policy actions

12. Linking producers and consumers to address exploitation by intermediaries
13. Regional and cross regional advantages for comparisons in Sustainable agriculture
14. Resource management
15. Driving or riding skills to reduce cost of transport especially being driven to meet clients
16. Ability to think outside the box- through innovativeness and creativity
17. Ability to access and utilize current information about farming
18. Identification of policy issues in the field
19. Knowledge on effects of climate change on agricultural productions and mitigation and adaptation measures
20. Basic understanding on application of gender analysis tools, gender responsive project designing, planning and budgeting
21. Agricultural and rural innovation harnessing skills
22. Knowledge on policies and regulatory frameworks in the agricultural and rural development landscape
23. Enhanced skills on development, production and distribution of ICT based extension learning materials
24. Policy analysis, development and evaluation
25. Valuing (and recognizing) variability in the ASALs
26. Knowledge of models and programs of extension in the government
27. Interaction with government agricultural officers, researchers and farmers to monitor understanding of their trainings
28. Strategic thinking and foresight analysis
29. Facilitating multi-stakeholder innovation platforms
30. Resource mobilization skills
31. Ownership and accountability by all parties in programs
32. Fund raising
33. Bio and circular economy, sustainability

4.1.4 Appropriate Ways to Acquire the Core Competencies

The respondents were asked to rate five suggested ways through which the lacking skills and competencies could be acquired. The results are summarized in the table that follows:

Table 4.14 : Ways to Acquire the Process Skills and Competencies in Kenya

	Total	Not appropriate	Somewhat appropriate	Appropriate	Very appropriate
Through Preservice Training by revising or updating the curriculum.	69	1 (1.45%)	3 (4.35%)	47 (68.12%)	18 (38.30%)
Requiring Internship at various work environments (i.e., Public Institutions, NGOs, Private Companies, Farmer Organizations, Cooperatives, etc.) during undergraduate programs.	69	0 (0.00%)	2 (2.90%)	44 (63.77%)	23 (52.27%)
Through Basic Induction Training (e.g., job orientation training at the beginning of job)	67	0 (0.00%)	4 (5.97%)	43 (64.18%)	20 (46.51%)
Through Inservice Training (e.g., training offered during the employment at Universities, Training Institutes/Centers, etc.)	68	0 (0.00%)	4 (5.88%)	43 (63.24%)	21 (48.84%)
Providing opportunities to attend Trainings, Seminars, Workshops, Webinars, etc.	69	0 (0.00%)	0 (0.00%)	42 (60.87%)	27 (64.29%)

Almost all the respondents rated the suggested methods as being appropriate or very appropriate. The mean ratings for each method of acquiring the skills and competencies were calculated, and the results were as summarized in the table that follows:

Table 4.15 : Summary of Mean Ratings of Scores for Methods of Acquiring Skills and Competencies

Method of acquiring skill and competency	N	Mean (Sd)*
Providing opportunities to attend Trainings, Seminars, Workshops, Webinars, etc.	69	3.39 (0.49)
Requiring Internship at various work environments (i.e., Public Institutions, NGOs, Private Companies, Farmer Organizations, Cooperatives, etc.) during undergraduate programs.	69	3.30 (0.52)

Through Inservice Training (e.g., training offered during the employment at Universities, Training Institutes/Centers, etc.)	68	3.25 (0.56)
Through Basic Induction Training (e.g., job orientation training at the beginning of job)	67	3.24 (0.55)
Through Preservice Training by revising or updating the curriculum.	69	3.19 (0.58)

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

Majority of the respondents rated all the suggestions as either appropriate or very appropriate. The highest mean at 3.39 was for 'Providing opportunities to attend trainings, seminars, workshops, webinars etc. The lowest mean of 3.19 was for Preservice training by revising or updating the curriculum. However, results show a very narrow range between the highest and lowest means. This implies that the respondents felt that all the methods were almost equally appropriate.

Additional Appropriate Ways to Acquire Process Skills or Competencies in Kenya. The additional appropriate ways to acquire process skills or competencies as indicated by the respondents are summarized in Box 4.2

Box 4.2 : Additional Appropriate Ways to Acquire Process Skills or Competencies

1. Creation of dedicated seminars to agricultural extension and advisory work
2. Undergraduate students should be exposed to critical thinking to enable them be creative and innovative in order to be good entrepreneurs that can help farmers to also come up with good business plans and management.
3. Strengthening students' attachments
4. Integrating service industry with training by attaching learners to mentors and providing opportunities for practical
5. Sabbatical leave for staff in agricultural institutions within the country/region and other regions of the world in institutions that hold dear/value agricultural extension training
6. Through more research
7. Being involved in developing research innovations
8. Prior exposure and orientation of prospective extension undergraduates to extension professionals and extension work in the country.
9. Exchange and benchmarking of programmes

4.1.5 Major Barriers to Effective Implementation of Extension Curricula

Respondents were asked to indicate the barriers to the effective implementation of extension worker training. They were allowed to indicate more than one barrier. The responses are summarized in the following table:

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

Barrier	Frequency	Percentage
Budget to support practical learning experience (e.g., field visits and demonstrations)	66	78.57
Student motivation to study extension and in practical extension work	40	47.62
Development of an effective extension curriculum	35	41.66
Classroom and demonstration farms or facilities	33	39.29
Teacher motivation to teach required process skills and competencies	31	36.9
Quality textbooks and/or manuals	30	35.71
Quality faculty to teach extension courses	27	32.14
Time constraint	24	28.57
Accreditation of curriculum	19	22.62
Other (please specify)	17	20.24

The barrier that was reported by the highest percentage of respondents (78.57%) was 'Inadequate funding/budget to practical learning experiences such as field visits and demonstrations. Most respondents reported that practical learning was curtailed by inadequate funds to support practical learning activities. Other barriers related to funding were 'Inadequate/lack of classroom and demonstration farms or facilities reported by 39.29% of the respondents; and quality text books and/or manuals reported by 35.7% of respondents. It is therefore clear that lack of or inadequacy of resources presents a major barrier to the effective implementation of extension worker training.

Another significant barrier was 'Student motivation to study extension and in practical work' reported by 47.62% of respondents. This touches on the students' attitude towards agriculture-related careers. This is a reflection of the general negative attitude of many youths in Africa towards agriculture. The quality of the curriculum was also found to be a considerable barrier, where 41.66% of respondents reported it as 'Development of an effective extension curriculum'. The quality of faculty teaching extension was also cited as a barrier, with 36.9% of respondents reporting 'Teacher motivation to teach required process skills and competencies' while 32.14% reported 'Quality staff to teach extension courses.' Time was reported to be a constraint by 28.57% of respondents, whereby the time available for delivering the extension courses was not adequate for imparting the required skills and competencies.

Accreditation of the curricula was not a major barrier, and was reported by only 20.24% of respondents. This is because in Kenya, all academic programmes offered in the universities have to be accredited by the Kenyan Commission for University Education. This challenge may therefore have applied to isolated cases. 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

1. Lecturers lacking practical skills, due to inadequacy of their training.
2. The undergraduate agricultural extension programme has too many units and may not accommodate additional units.
3. Aligning the training to the needs of the job market
4. Departmentalization/compartmentalization of areas of expertise in extension, with low harmonization and integration.
5. Not keeping up with technological advancements in the delivery of content and offering of services to extension clientele (Low level of technology use in extension service delivery, especially ICTS)
6. Lack of opportunities to practice extension/ Appropriate engagement after training (lack of Job/internship opportunities)
7. Having a department of agricultural extension in tertiary and institutions of higher learning to promote the course and engage more in practical oriented aspects of the course
8. Lack of/inadequate policies on extension; Poor Government policies to support extension
9. Low Government support and commitment to agricultural extension in terms of resources

4.2 Findings from Focus Group Discussions

4.2.1 General Perceptions of Community about Agricultural Extension

Most of the participants reported that agricultural extension is mostly lacking on the ground. It is described as not being seen and not being felt, and one participant put it bluntly that *“agricultural extension is no longer there. It is dead”*. These views were mostly related to government extension services. Some participants also reported hearing that extensionists are few, most of them are old, and they use outdated methods and have nothing new to offer. It was further reported that extension is inadequate in number of staff and also in issues addressed.

The government extensionists, however, reported that the extension service was said to be doing well, especially after devolution (Devolution refers to a system of devolved

government that was adopted in Kenya following the enactment of a new constitution in 2010). With devolution, the agriculture functions, including agricultural extension, were decentralized to the counties (Government of Kenya, 2010b). Before this, the agricultural extension services were centralized and offered by the national government. One government extensionist brought up the issue of farmers' trust and emphasized that despite the challenges faced by the government extension service, farmers still have a lot of trust in the government service and see private extension service providers mostly as being driven by the need for gain.

The reasons given for the challenges in the government extension service were mainly to do with reduced funding to agriculture. Kenya has not been able to reach the minimum 10% allocation of its budget to agriculture, as stipulated in the Malabo Declaration (African Union, 2014).

Another reason given for the challenges faced in agricultural extension service was the devolution of the agriculture function to the counties. Whereby funding of government agricultural extension services is the responsibility of the counties. The participants reported that out of the financial allocation given to the counties for agriculture, very little is actually used to support agricultural extension service delivery. This is confirmed by a Ministry of Agriculture unpublished survey, which reported that most of the funds allocated to agriculture in the counties is spent on development projects and not services like agricultural extension (MoALF&C, 2021a).

The issue of extensionists not being seen was attributed partly to a change contained in the National agriculture and Livestock extension Policy (Government of Kenya (2012) from supply- driven to demand- driven extension. In the words of one participant: *Since the devolved agricultural system started, which is now 10 years, I think those areas of emphasis, farm visits, farm demonstration, farmer training and tours, have died.* The shift in approach was also not well communicated to many farmers, and many of them are unaware of it. As one participant put it: The farmer was left to go and demand but he or she wouldn't know, what am I going to demand?

It was also reported that youths feel left out by the extension service, and the outdated methods used by extensionists were not encouraging to them. Reports about agricultural extension graduates indicated that they were not inspired, not confident, and lacked soft skills, as indicated by their performance during internships and practicum sessions.

It was also reported that private sector providers feel the government's expectations of them to provide extension services are too high, especially in that the government is better placed to offer services. One participant asked: *Why shouldn't the public sector actually strengthen itself to provide the services? Because extension would be better provided and again everywhere.* The role of the private sector in agricultural extension has become increasingly significant and is advocated for in the National Agriculture Sector Extension Policy (NASEP) (Government of Kenya, 2012).

A government extension agent shared that, in some counties, extension projects were being controlled by the wrong people because of politicization of funding. She put it as: *You find wrong projects being controlled and directed by wrong people because of money issues, and you find that the extensionists themselves are not supported to reach out to the farmers.*

4.2.2 The Changing Needs of the Changing Agricultural Systems

It is generally recognized that agricultural systems have changed a great deal in recent years, and with these changes come changing needs for agricultural extension. The FGD participants shared a number of issues that they felt represented the needs of the changing agricultural systems. They included the need to:

- Integrate various aspects into agricultural extension, especially nutrition and climate change.
- Address the issues of markets, including value addition.
- Adopt a farm-to-table approach, whereby the food chain does not end at the market but on the table. As one participant expressed it: *'Extension must show how to respond, to supporting not only increased production, but also elements that happen across the whole value chain'*. Extension should therefore respond to the need to shorten the value chain because of the advantages associated with a shorter value chain
- Focus on value addition, commercialization/agribusiness, and providing market information. This point was emphasized by several participants.
- Build early warning systems in relation to droughts and other emergencies into extension.
- Have a holistic programme that considers priorities at various levels and be able to look at the bigger picture, focus on priorities at different levels. As expressed by one participant:

...extension needs to be responsive to three things: things that are happening within the environment, things that are happening within the economy, and things that are happening within people, society. A holistic training program for extensionists is one that helps an extension person to have a mind that looks at the three key components.

- Prepare graduates who can be responsive to the changes in the agricultural systems.
- Support those already in the field to be more responsive to changes through retooling.
- Become more innovative in agricultural research, so as to look into non-conventional and emerging areas into which farmers are venturing e.g. production of dragon fruit.
- Employ social media to provide information. Public organizations offering extension, such as the universities, KALRO, and the Ministry of Agriculture need to recognize their increasing use and their potential as a significant source of information. One participant raised concern about the credibility of the information that is shared in the social media and the urgent need for credible institutions to put up credible digital content. One participant suggested that the use of social media can be strengthened effectively

through partnerships, whereby those who are good in hosting or operating the social media platforms can partner with those who are good in content creation and packaging.

- Improve professionalization of agricultural extension through certification or registration based on meeting certain professional standards. This is a recommendation that is contained in the National Agriculture Sector Extension Policy, but legislation and implementation have been slow. As of June 2022, Kenya did not have a body for registering extension professionals.
- Focus on environmental sustainability.
- Strengthen the linkages between research and extension to ensure that extensionists have current content.
- Build capacity by improving extensionists' skills in how to link up with various actors in the value chain.
- Update extensionists about extension policy and other relevant policy guidelines. As one participant put it: *There is that need for them to read that policy because it is there...* What came out through the online FGD is that the policy document is available in the offices, but many extensionists are not familiar with the contents.
- Help extensionists to understand the context of the farmers and align programmes accordingly. In the words of one participant: *Today we are not just going to the field and saying do this. You listen, you observe, you assess.* The emphasis on value addition and commercialization should be context based.
- Train extensionists to be facilitators who are able to learn also from the farmers and not just instructors who issue commands.

4.2.3 One Activity that the Extension Service is Doing Particularly Well

Participants were asked to share what they felt extension was doing particularly well. One private sector participant reported that his organization was doing particularly well in *optimizing on farmers' feedback to provide the information they need*. He reported that his organization has put in place very effective mechanisms of capturing farmers' feedback so it can address the farmers' real needs. In addition, feedback platforms are used to provide extra information that may reveal the latent needs of the farmers.

It was also pointed out that extension has also done well in changing the mindset of farmers from focusing on production to agribusiness. More farmers now have a market orientation. Closely related to this was the issue of promoting value addition and a value chain approach. This has been aided by the Agriculture Sector Development Support Programme (ASDSP). Among its main components is the promotion of value chains (Government of Kenya, 2010a). Each county in Kenya is therefore required to identify priority agricultural value chains that should be supported and promoted. Extension efforts are then directed towards these value chains for a period of time.

Another participant opined that extension has also done well in promoting specific value chains in the counties, with a lot of crop diversification being reported in some counties. Because extensionists have skill in understanding the farmers and communicating with them, another thing they do well is partner with research to help in promoting adoption of improved agricultural technologies.

In the area of training, it was reported that some academic programmes, such as the bachelor of science in agriculture and human ecology extension (AGHE) and the B.Sc. in community development at Egerton University, have done quite well in imparting practical skills in community engagement and outreach. One participant from Baraka Agricultural College (a Technical and Vocational Education and Training institute) reported that the college was doing quite well in providing extension within the broader context of community development, where the focus is not only on agriculture. Another way in which extension training is being done well is through the field attachment programmes that undergraduate students are required to go through as part of their training. During the field attachment, students are attached to agricultural organizations for a period of eight weeks, during which they get practical exposure to the world of work. According to one of the participants: *Our students go for field attachment, and that field attachment transforms the way our students think about the kind of work they will do in future.*

Another success reported is that, through the field attachment programmes, students are able to showcase the knowledge and skills gained in their institutions and in effect help to market the training institutions. Another participant reported that the training institutions are doing well in training sufficient agricultural extension graduates to meet the needs of county and national governments and even the private sector. There is sufficient capacity, but the main challenge is the employment of these graduates. As major stakeholders, universities also are involved in providing policy direction in agricultural extension.

Extension has also done well in packaging and disseminating information to farmers. Despite the challenges faced by the government extension services, gains in impact have been made. A participant from an NGO reported that her organization, which uses the farmer field school approach, has done very well in promoting the uptake of certified seeds among target farmers, which has contributed to significant improvement in production.

Another participant reported a success story of a school project in livestock production that had great impact in the community. Many farmers came to learn from the school and adopted improved livestock technologies. Examples of the technologies include artificial insemination, planting of livestock feeds like Napier grass, improved breeds of livestock, construction of livestock structures.

4.2.4 Major Recommendations to Improve Agricultural Extension Services

The participants gave several recommendations on how to improve extension. The recommendations touched on various aspects, which were grouped into four categories as summarized in the following table:

Table 4.17 : Recommendations for Improving Agricultural Extension Services

Strengthening Training programmes	Strengthening capacities of Extensionists	Improving extension approaches	Improving linkages with stakeholders
<ul style="list-style-type: none"> - Invest more in extension education and training by providing more resources to support learning, and hiring more faculty/ lecturers - Use a more practical approach in agricultural extension training. - Review extension curricula regularly to capture current trends and labor market needs 	<ul style="list-style-type: none"> - Improve the extension worker to farmer ratio through hiring of more staff - Extensionists should read and familiarize with extension policies - County governments to employ more staff and provide more resources - Lobby county governments to get to 10% funding Invest more county budgets in agriculture, to get minimum 10% - Improve extension: farmer ratio - Improve funding - Capacity building for extensionists in the field - Improve funding - Capacity building for extensionists in the field 	<ul style="list-style-type: none"> - Use more of ICTs - Develop programmes for specific target groups - Provide targeted extension - Digitize extension - Involve more youth in agriculture programmes - Use a business model in extension, whereby the value of extension to stakeholders is clearly communicated. - More investment in farmer group development and strengthening - Make extension more holistic and focus on market - ICT focus - Document success stories - Integrate nutrition - Promote agripreneurship among extensionists (they should lead by example) 	<ul style="list-style-type: none"> - More collaboration between institutions dealing with extension - Avoid duplication of activities - Link farmers to markets - Develop programmes that have clear roles for extensionists - Structured collaboration between universities and county governments - More harmonized and coordinated extension programmes - Strengthen collaboration between county government and extension service

Most of the participants' suggestions were about improving/strengthening extension approaches and methodologies. They included using a value chain approach and market orientation, strengthening groups for better market access, increasing use of ICTs, and integrating nutrition and climate change into extension. One participant from the private sector emphasized that the value of agricultural extension needs to be clearly evident. In his words *"using a business model in extension is very key, for that way we actually show value for money and how that can be done"*.

A number of suggestions focused on strengthening the extension organizations through increased funding, hiring more staff, and building the capacity of the extension agents. Strengthening linkages with research and enhancing partnerships and collaborations with stakeholders were also emphasized as a way of improving agricultural extension. In the words of one participant: *What we need to recommend is a structured collaboration between the universities and the counties with the support from the central government.*

Some suggestions targeted the curricula for training extensionists by calling for a more practical orientation and improved funding for extension education to facilitate incorporation of a more practical learning approach in the training programmes. There was also a suggestion about regular review of extension curricula to take into account the changing needs and trends in the agricultural systems. According to the participant, *...regular review, at least interval of five years so that we can capture new areas and maybe merge some areas, drop some areas that we are able to go with the trend.*

Two participants in the online FGD suggested the need for a regulatory framework, with one stating: *...we need a regulatory framework as far as extension is concerned because we don't want every Tom, Dick and Harry to purport to be doing agricultural extension, and they have no background in agriculture, so they would just be earning money and yet they're not doing the right thing.*

4.2.5 Critical Job Skills/Core Competencies Required of Agricultural Extension Workers

The participants gave their ideas about what they considered as the critical job skills needed by extensionists today. They included:

- Soft skills: Communication skills, networking and partnership skills, facilitation skills, interpersonal skills, conflict resolution, problem solving, negotiation, team building, leadership, facilitation and critical thinking. Regarding interpersonal skills, one participant stated that; *there is also an issue of interpersonal skills, do you know how to relate well with people and also how are you behaving in your work environment?*

These soft skills were suggested by most of the participants as critical job skills.

- The issue of integrity was stressed upon by one participant who stated:
... we must also include in our training issues that deal with integrity; ... those students we release to the field, senior officers must have certain elements of training integrity so that they can help the farmers understand the possibility of being exploited by cartels in our systems.

- ICT skills were also suggested by a number of participants, not only for the extensionists but also for the lecturers so that they can train students on how to effectively integrate ICTs in extension. The need to upgrade the computer courses offered in the undergraduate training was also stressed upon with one participant stating, *they need to advance it to maybe the programming languages so that by doing so the extension workers would be able to come up with small programs which reach farmers.*
- Basic research and proposal writing skills.
- Community needs assessment skills.
- Innovation and job creation: One participant argued that *...we have now to think outside the box; we have been training students so that they can get a job and that's why we are complaining that the counties are not employing and so on. It is time we now focus on innovations and job creation.*
- Proposal writing and farm business planning: One participant emphasized that *"... we also want to focus on self-employment, we need them to have the skill for proposal writing and farm business planning because such opportunities are there for consultancy services."*
- Entrepreneurship skills, market analysis, value chain analysis, and risk assessment skills.
- Practical technical skills in the specific areas of training. One participant put it as: *Practical skills then technical skills*, emphasizing the need for graduates to have competence in the technical skills.

4.2.5 Coverage of Job Skills/Core Competencies in UG Curriculum

The general message from the participants was that the undergraduate curricula do not effectively train students on the critical job skills and competencies. Some of the participants gave their opinions in form of questions such as: *...are their adequate staff to provide these skills to the students? Or even the range of staff?* Many universities do not hire adequate staff because of financial constraints.

Other questions asked were: *Do we have the link with industry? How are they introduced to the world of work?* The message here was that universities do not have sufficient linkages with industry and therefore do not effectively prepare students for the world of work. For many students, the first time they interact with the world of work is when they go for field attachment, when they are attached to agricultural organizations for a period of eight weeks. In the case of the agricultural extension programmes at Egerton University, this is done at the end of the third year, before the students move to the final year of study. Another participant felt that the skills and core competencies were contained in the curricula, but the curricula were delivered in a hurry, which does not allow sufficient time for students to internalize the skills. The general feeling of the participants was that the undergraduate curricula were not adequately training graduates in the critical job skills and competencies.

4.2.6 Barriers to Effectively Train UG Students in Required Core Competencies

The barriers suggested by participants can be grouped into the following categories:

Resource constraints: Many participants reported inadequate funding as a major constraint. Many public universities in Kenya, including Egerton University, operate with less than optimum funding. The government does not give 100% financing, and institutions are expected to raise money through income-generating initiatives and research. This, however, has become increasingly difficult for many public universities in recent years.

The inadequate funding has a negative effect on the degree to which practical training can be offered because it affects the ability to purchase learning materials. This leads to scenarios where practical classes are not offered at all, or they are held as demonstrations where students only watch. In some cases, the practical classes have to be scaled down, sometimes to levels where they are not effective for learning. Participants also reported lack of facilities and inadequate learning facilities such as laboratories, well-equipped farms and workshops, and even lecture halls. These further affect the quality of training. A participant from one of the universities represented summed in this way:

In those young universities we also face serious challenges in terms of personnel. We don't have adequate staff, those who can teach, can handle the agricultural education and even extension, and this could be attributed to maybe funding levels of those universities.

Inadequate funding to public universities also affects ability to finance academic field trips that are critical in giving students practical exposure to the world of work. Inadequate funding also affects ability of institutions to hire adequate faculty, and even ability to facilitate engagements with guest speakers and other stakeholders. One participant put it as *lack of good funding to enable collaboration with communities and exposure*. Inadequate collaboration with industry is therefore a major barrier. Although it is tied to shortage of funding, it could also be as a result of other factors such as the nature of the programme and time constraints, which were also reported by participants. Agricultural extension training cannot be considered complete without students' engaging in outreach programmes. A participant put it as:

You cannot have a comprehensive outreach program unless you have good funding to collaborate with the community, to be able to take the students out, during term time so that they see what happens....

Low funding is also responsible for the inability of public universities to engage adequate numbers of lecturers who can offer quality training to the students. Many participants indicated that universities lack adequate numbers of staff to deliver quality programmes. The inadequacy was reported in terms of both numbers of staff and numbers specialized in specific areas. As a result, many lecturers end up being overburdened, with little time to prepare quality learning experiences, including practical classes. This also affects their morale because they are not able to deliver the way they would desire to.

Another challenge reported was the high number of students, which, coupled with inadequate

staffing, leads to low lecturer: student ratios and affects the quality of interaction and effectiveness of learning. The high student number also puts a strain on resources available for teaching and conducting practical classes. This challenge is mainly experienced with the B.Sc. AGED programme at Egerton University, where the average class size ranges from 140 to 170 students. The students are taught in one group and sometimes combined with other programmes in cases of shared units. In other universities offering the agricultural education and extension programme, the student numbers are not as high, but they still grapple with staff shortages.

The nature of the B.Sc. AGED programme was also reported to be a challenge by some participants, who cited the barriers of time pressure and limited time to focus on hands-on experience. According to the Egerton University Statutes, the minimum number of credit factors (CFs) required for a four-year undergraduate programme is 120 CFs, with one CF being equivalent to 15 hours of lectures or 30 hours of practicals or 60 hours of clinicals or industrial attachment (Egerton University, 2013b). The B.Sc. programme, however, has a total of 233.5 CFs, almost double the recommended minimum, because the programme is a double major -- graduates qualify as professional teachers as well as agricultural extensionists with a broad base in technical agriculture. The timetable is therefore fully packed from morning to evening, and there is very little free time during the day. Incorporating practicals would require that some units be adjusted or dropped altogether. Another participant pointed out a related barrier: *There is limited time to put those hands-on experiences to move from theory to practical.*

Another barrier is the negative attitude of students toward agriculture. Many youths in Kenya look down on agriculture as compared with other professional fields. Another barrier reported by one of the participants is students *being employment focused*. Among the agricultural programmes offered at Egerton University, the B.Sc. AGED programme is quite popular, with an average intake of 140 students per year, and the number ends up increasing as students transfer from other programmes. One of the major reasons for the popularity of the programme is the ease with which graduates get jobs, especially in teaching. The demand for teachers of agriculture in Kenya is quite high and outstrips the supply. The graduates are therefore, almost guaranteed a job in teaching, unlike graduates in other agricultural programmes who have to wait longer to get employment. This employment focus means that not all the students in the programme love agriculture, but some are attracted by the prospect of easy employment attached to it. This may affect the attitude of such students toward their studies.

An interesting barrier that was pointed out in the online FGD related to the positioning or housing of the B.Sc. AGED programme. One participant captured it well thus: *...where is it supposed to be housed? That's where the question has been. Is it under education or in agriculture as a department? So that has been a challenge.* This point brought out very interesting discussions among the participants. The participants argued that the housing of the B.Sc. AGED programme had major implications for the emphasis given to agricultural extension and even the funding allocated to the programme.

The B.Sc. AGED programme at Egerton University is housed in the Faculty of Education and Community Studies. It was among the two founding programmes in the then Faculty of Education and Human Resources. This has resulted in emphasizing and strengthening the education aspect of the programme at the expense of the agricultural extension aspect. The programme is therefore seen and valued more as a teacher education programme and viewed as such by students who enroll in it. In the university's efforts to restructure the academic division, there have been calls for the B.Sc. AGED programme to be moved to the Faculty of Agriculture. These calls have been firmly resisted from within and the department of Agricultural Education and Extension, and the Faculty of Education and Community Studies, that hosts the Department . The programme is considered a major pillar in the faculty, and there are fears that moving it to the Faculty of Agriculture would significantly weaken the faculty. In addition, some members of the Department of AGED express fears of being swallowed up if they are moved to the Faculty of Agriculture.

The FGD participants from other universities shared that their programmes were also located in the faculties of education, with emphasis being put on the education component. A participant from one of the universities represented put it that:

In fact, it has gone to the point of reducing the courses in agriculture like the agriculture crop production and animal production units have been reduced to a point that you feel that this person will not be competent in the field at all."

One participant suggested that there is need to find out where the agricultural education and extension programme is housed in other universities around the world and the effect of this on resource allocation for agricultural extension. In his own words: *"Since you're collaborating with Michigan State, you might find out where AGED at Michigan State is located...."*

4.2.7 Suggestions to Overcome the Barriers

Participants came up with a number of suggestions on how to counter the barriers in agricultural extension training. One was an appeal for the government to invest more in agricultural extension training so as to minimize the challenge of inadequate funding and resources. This should involve hiring more academic staff as well as providing more teaching and learning resources. There should also be adequate funding to support practical aspects of training. As expressed by one participant: *We need adequate manpower at higher level to be hired by the university administrators to ensure that we've got that capacity.* In addition, more collaboration should be sought with industry, and more field trips and guest speakers used to strengthen the exposure of students to the world of work. There is also need to *incorporate world of work skills into the curriculum.* This implies the need to review the curricula and ensure that they make provision for more exposure of students to stakeholders and organizations involved in agricultural and extension work. It was also suggested that collaboration with industry should be strengthened.

On the inadequacies in the training of undergraduates, one participant suggested:

Suppose the institutions come up with modular trainings of some skills. For instance, you can go through your B.Sc. and do technical courses and agricultural courses, then after that you

can join in for some specific modular skills and soft skills, maybe negotiation skills, and this person will be taking these more seriously because they have already been out and they know exactly which skills they require.”

The need to eliminate units that are not directly useful and focus on world of work skills was also suggested by one of the participants. In his own words he posited:

...bring in these world of work skills, they're saying, why do we need to do history of education? Why do we need philosophy when it was eradicated? Pick only the areas that I need. Pick all the principles in the world and pick only the topics that we need. The rest we don't need....

To deal with the barrier of limited time for practicals, one participant suggested that there should be more guest speakers and field trips.

Regarding the barrier of negative attitude of students toward agriculture, one way suggested by the FGD participants for countering this is to socialize youth into agriculture from a young age. This implies targeting and working with school children in primary and secondary schools, before they get into universities. In Kenya, primary schools have 4- K clubs (derived from the Kiswahili words *'KuunganaKufanyaKusaidia Kenya'*), and secondary schools have Young Farmers' clubs, through which school children engage in agricultural activities. These can therefore be good platforms for capturing the young children and inculcating a positive attitude toward agriculture. In the past, these platforms have not been given much attention, especially the 4-K clubs in primary schools, because agriculture was not being taught as a subject at that level. However, with the new competence- based education system that has been adopted in Kenya (now in its fifth year of implementation), agriculture has been given more attention and emphasis, and efforts are under way to revive the 4-K clubs. In June 2021, the president of the Republic of Kenya launched rebranded 4-K clubs and gave directives that would encourage participation of school children in agriculture. This is likely to have a positive effect on the students' attitude toward agriculture, which is likely to be carried over to the universities.

4.2.8 Broad Modifications Suggested in Agricultural Extension Curriculum

The participants suggested a number of modifications to the B.Sc. AGED curriculum to remove or merge some course units in order to create room for more important units to be included. In one participant's words:

...if you look at some of the course units that are offered in extension at undergraduate level, some of those are topics under other course units. If you split them so much, then you'll be at a disadvantage. In this case you'll not be able to include some of the most useful units that should be included under extension because that time has been occupied by so much details at undergraduate level, which should not be the case.

Several participants suggested the need to incorporate more computer knowledge. Currently the B.Sc. AGED curriculum does not have any computer unit, so students have to acquire computer skills through their own means and efforts. The previous catalogue had one unit

in Computer, which was called Introduction to Computer Applications. The course had an element of practicals, but the time allocated was only one hour per week. The content of the course was largely theoretical. When the curriculum was reviewed in 2018, the computer course was removed.

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It was also suggested that the content in agricultural information management be enriched and made more practical, with ICT also being incorporated. The need to include content on writing fundable proposals was also brought out, so that graduates can write proposals and get funding for organizations where they are employed.

Another suggestion was that the course on Introductory technical drawing, where students have traditionally drawn manually, should be revised to incorporate computer- aided design. The course in entrepreneurship should be made more practical and have a component on preparation of farm business plans and fundable proposals. As one participant put it:

It can be enriched so that they have the practical aspect of that so that when they're above there serving the farmers, they're even able to prepare proposals that can attract funds. They can take the farmers through and even be entrepreneurs themselves....

This suggestion ties in well with the suggestion given by one participant in the face-to-face FGD that agricultural extensionists should be entrepreneurs themselves so that they 'practice what they preach'. In the current curriculum, the unit on entrepreneurship is taught in a purely theoretical manner. The need for a practical orientation was emphasized, with one participant summing it up with the words: *The approach that we should use now is the CBC, not theoretical things but competence-based curriculum (CBC)*. This was in reference to the new Competency-based Curriculum (CBC) education system that was introduced in Kenya in 2017, to replace the earlier system which laid a lot of emphasis on passing of examinations rather than acquisition of competencies (Amutabi, 2019).

Most of the input on changes or modifications to the agricultural extension curriculum came from the participants in the online FGD who had access to the B.Sc. AGED curriculum before the workshop. In addition, most of the participants were lecturers, although from different universities, and were involved in teaching in AGED programmes in their institutions. For the face-to-face FGD participants, the curriculum was shared afterwards, and they were requested to provide feedback on what modifications or changes can be made. Majority of them did not give this feedback, even after being reminded. Others said the curriculum was okay as it was.

One participant raised the issue of the way the BSc Agricultural extension programme is abbreviated as BSc AGED. She argued that *“extension is silent, so are you are producing an education person per se only or the extension is subsumed in the education? Yeah, so there is need to actually bring it out clearly in the abbreviations that is, not just Agricultural Education, but there is the aspect of extension”*.

This argument is quite valid, because with the current abbreviation, the emphasis is on the agricultural education component of the programme, which involves teacher education. The programme is thus viewed largely as being oriented towards training of teachers of agriculture, which downplays the aspect of agricultural extension.

4.3 Discussion

This section discusses the major findings of the online survey and the focus group discussions.

4.3.1 Discussion on Demographics of Agricultural Extension Professionals

4.3.1.1 Age of agricultural extension professionals. The findings of the online survey revealed that most of the agricultural extension professionals were quite advanced in age. More than half of the respondents (53.7%) were above 50 years, with the category with highest percentage (44.8%) being between 51-60 years. Only 22.4% of the respondents were aged 40 years and below. These results agree with those obtained from respondents in the focus group discussions, most of whom reported that the general feeling in the public was that ‘extension is dead’. Among the reasons given for this view were that extensionists are few, most of them are old, they use outdated methods and generally have nothing new to offer. These findings are confirmed by the findings of a rapid survey conducted by the MOALF&C on the state of agricultural extension services in Kenya. The study found that the Crops Department which had 51% of all staff in the Ministry was leading in the number of staff who were over 50 years at 60%. The livestock Department accounting for 16% of staff had 49% of the staff being over 50 years (MoALF&C, 2021a).

The Fisheries and Cooperative departments which accounted for 17% of the staff had a more youthful staff profile with 69% and 71% respectively being below 50 years. Overall, therefore, the staff in the MoALF&C are aged. The age of extension staff has a positive correlation with the amount of knowledge and experience they have. The online survey found that about 53% of the respondents had over 20 years’ experience in agricultural extension and agriculture related fields. the age may also limit their level of productivity thus compromising the quality of service delivery (MoALF&C, 2021b). This is especially felt among field extension workers who are expected to spend long hours out in the field delivering services.

The challenge of an aging workforce is not restricted to the agriculture sector, but cuts across Kenya’s civil service as revealed by Madichie (2021). A study of an organization that was representative of the Kenyan civil service found that majority of the staff were between 51-60 years old confirming that Kenya’s civil service is skewed to older people. The problem of an aging workforce can be traced back to the freeze in employment and downsizing of staff occasioned by the Structural Adjustment Programmes (SAPs) instituted by the World Bank

and the International Monetary Fund (IMF) in the 1980s and 1990s. Although Sessional paper No. 1 of 1986 which was the blue print used to implement the SAPs in Kenya recognized the key role of extension services in helping the country to intensify production of food and export crop as a matter of national survival, the service along with the agriculture sector was not spared (Republic of Kenya, 1986). The reforms had far reaching effect including freeze in employment, and retrenchment of public servants including some who served in critical areas (Government of Kenya, 2021).

Many counties have few extension workers as attested by the study by MoALF&C(2021a), which found that the average staff-farmer ratio for 17 counties reviewed is approximately 1: 1,277, with some counties going as low as 1:2000. This is against a target of 1:600 that is envisaged in the Agriculture Sector Transformation and Growth Strategy (ASTGS) to be achieved by 2029 (Government of Kenya, 2019).

4.3.1.2 Gender of the Respondents. The online survey revealed equal representation in terms of gender, with both male and female having 49.3%. This is not a true reflection on the gender distribution of agricultural extension professionals. A study by Ministry of Agriculture and Livestock Development (2021a) found that overall, over 60% of the Ministry's extension staff in 17 counties that were studied were male. This was the pattern was maintained across all the departments of the Ministry.

4.3.1.3 Education Level. The online survey revealed that all the respondents were highly educated, with three quarters of them (76.4%) having masters' degree and above. This is not a reflection of the education levels of the agricultural extension staff in Kenya and could have resulted from the non-random sampling of the respondents. However, another explanation could be the challenges involved in responding to the online questionnaire, which was fairly long and demanded concentration. It is probable that those who were able to commit time and fill it to the end were people who had experience with research and understood the importance of the information that was being collected.

Generally, in terms of education level, majority of field level extension personnel have diploma. Those serving as subject matter specialists have master's degree while those in management have PhDs. Staff in institutions of higher learning and research are required to have postgraduate degrees.

4.3.2 Discussion on Process Skills and Core Competencies

4.3.2.1 Critical Process Skills for Agricultural Extensionists. The online survey investigated 11 process skills and competencies that were thought to be critical for extension professionals. These were:

- 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

The online survey findings revealed that all the 11 process skills and competencies were rated between important and essential with means ranging between 4.48 and 4.80. The highest mean score for was for Communication Skills (4.80), indicating how highly these skills are considered in agricultural extension work.

These findings are confirmed by the focus group discussions where participants pointed out the critical skills for extensionists. Soft skills stood out as the most critical job skills and core competencies, with communication being suggested by most participants. The communication skills and competencies that were covered in the online survey included being able to Select appropriate communication methods; establish communication with different 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.

Extension is basically a process of communication, and without communication there can be no extension. Communication is at the heart of agricultural extension work, with the quality of extension work being largely determined by the quality of the communication process (Nikolić et al, 2020). Communication is one of the necessary personal skills for extension workers and forms a large part of the extension agent's job (FAO, 2019).

The online survey results also showed that Personal and professional development skills and competencies were almost essential, with a mean of 4.76 out of a maximum of 5. The skills included: 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, creativity/innovativeness.

Respondents rated all the skills as very important, with scores of between 4.60 and 4.81 implying they were almost essential. These findings agree with the findings from the FGDs. Participants indicated that similar soft skills as being also critical for extension professionals. These were; networking and partnership skills, facilitation skills, interpersonal skills, conflict

resolution, problem solving, negotiation, team building, leadership, facilitation, critical thinking, integrity. Innovation and job creation was also suggested to be an important skill or competence for promoting self-reliance and curbing the problem of unemployment especially among graduates.

Soft skills are character traits and interpersonal skills that characterize a person's relationships with other people and are important in helping people to function well in the workplace. They enable people to effectively use their hard or technical skills for more productivity.

Soft skills are the skills that are important for people to function effectively in the workplace. They are especially critical for extension professionals whose work involves a lot of interaction with people, especially farmers. FAO (2019) refers to them as necessary personal skills for extension workers, and adds other skills like commitment to extension work, humility in working with farmers, confidence, reliability and determination to achieve something. Etiquette and language are also important skills for extension workers.

Apart from communication and soft skills, the FGD participants also suggested the need for ICT skills, community needs assessment which is part of programme planning; entrepreneurship skills, value chain analysis and risk assessment. The need for sound technical skills was also pointed out by the FGD participants, with emphasis on graduates acquiring practical competencies in their technical areas of training. According to FAO (2019), the technical knowledge extension workers must have included technical skills; rural life including cultural knowledge, religious protocols, policy, and adult education.

Among the areas of technical knowledge needed by extensionists are cross cutting issues like climate change. How well the challenge of climate change is addressed is an important determinant of achievement of long-term food security and sustainable agriculture (World Bank, 2022).

Nutrition sensitive agriculture is an area that is gaining a lot of attention, and the integration of nutrition into agriculture was pointed by an FGD participant out as one needs of the changing agricultural food systems. Entrepreneurship skills are important for extension professionals to assist farmers to embrace agribusiness. This is critical if the thousands of smallholder farmers who are farming at subsistence level are to be moved into commercial farming. One FGD participant suggested that extension professionals should lead by example in the area of entrepreneurship, by being entrepreneurs themselves. The agriculture policy (Government of Kenya, 2021) emphasizes the importance of adequate entrepreneurship skills among value chain actors, without which many farmers with alternative sources of income subsidize unviable farm enterprises while those without alternatives continue to be poor.

4.3.2.2 Extent to Which the Process Skills and Competencies are Covered in the Undergraduate Curriculum. The findings from the online survey indicated that although all

the process skills were covered to some extent, this was not commensurate to their level of importance. Although there was variation in the mean ratings for all the process skills and competencies investigated, the responses showed that the respondents felt they were moderately well covered as the means ranged between 2.99 and 3.86. The differences between the means of level of importance and level of coverage for all the skills and competencies were analyzed and yielded t-values that were significant ($t=0.00$). This implies that there was a significant difference between the level of importance attached to each skill and competency and the extent to which it was covered in the curriculum. This points to gaps in the undergraduate agricultural extension training curricula.

These results were confirmed by the findings from the FGDs which indicated that the undergraduate curricula do not effectively train students on the critical job skills and competencies.

4.3.3 Discussion on Appropriate Ways to Acquire Core Skills and Competencies

Various methods were suggested for acquiring the core skills and competencies. One was through pre-service training by revising and updating the undergraduate curriculum. There are opportunities for doing this, as stipulated in the CUE guidelines (Commission for University Education, 2014; Egerton University, 2021) where each academic programme is required to be reviewed at the end of each cycle. For undergraduate programmes, this is done after four years, and in line with this, Egerton University endeavors to produce a new catalogue of academic programmes every four years. Ideally, the reviews should involve consultations with stakeholders such as employers, alumni, students, academic staff and the general community. The Reviews are meant to take into account stakeholder needs and any other changes such as policy, global or national issues etc.

Internship programmes are also a good way of acquiring skills and competencies. The BSc AGED programme does not have provision for internship, but students usually participate in an 8-weeks field attachment programme at the end of their fourth year of study. This gives them exposure to the world of work and an opportunity to practically exercise some of the things they have learnt in their training programme. The students however have the freedom to seek out internship opportunities once they complete their studies. Short trainings like seminars, workshops and short courses also provide a good opportunity to extension professionals to build their skills. This is in line with one of the principles of agricultural extension, which is the capacity-building of extension personnel (FAO, 2019).

In Kenya, this role is carried out by the Kenya School of Agriculture, was established in 1949 as an agricultural staff training college but upgraded later. The Kenya School of Agriculture is a tertiary agricultural training institution under the Ministry of Agriculture, Livestock, Fisheries and Cooperatives (MoALFC) in the State Department for Crop Development and Agricultural Research (SDCDR). It is registered and licensed by the Technical and Vocational Education

Training Authority (TVETA) to offer certificate and diploma courses in Agriculture in addition to short courses (MoALF&C, n.d.).

Other ways in which the core skills and competencies can be acquired are through job orientation training where new employees are taken through a thorough orientation training programme to align them with the requirements of the workplace. An avenue that has not been explored much is the use of exchange programmes between institutions within and outside, as suggested by some FGD participants. The exchange programmes present good opportunity for cross learning and building synergistic partnerships. In Kenya, there are a number of TVET institutions that are very strong in the practical aspects of agriculture. Undergraduate students can benefit a lot by participating in exchange programmes or learning programmes with these institutions, especially in view of the challenges faced by universities in delivering practical learning courses due to inadequate funding.

4.3.4 Discussion on Major Barriers to Effective Implementation of Extension Curriculum

Regarding the barriers to the effective training of the extension professionals, there was agreement between the findings of the online survey and the FGDs. The leading barrier was inadequate funding which negatively impacted on the ability of universities to offer practical aspects of training, provide sufficient laboratories, demonstration farms and classrooms; and also, to hire sufficient academic staff. The problem of inadequate funding is affecting almost all the public universities in Kenya. Other barriers reported was the quality of reading resources, which could be related to the inadequate funding.

A related challenge reported was the class size, especially for the BSc AGED programme at Egerton University and the loading of the programme which does not allow for additional practical courses.

CHAPTER 5 : CONCLUSIONS AND IMPLICATIONS FOR POLICY

5.1 Conclusions

The conclusions of this study, according to the objectives are as follows:

5.1.1 Conclusionson Objective 1

The first objective of the study was 'Review Agricultural Extension Curricula currently in use at AAP member universities at the undergraduate level'.

The study has reviewed the curricula of two undergraduate agricultural extension programmes at Egerton University, Kenya. These are: Bachelor of Science in Agricultural Education and Extension (BSc AGED) and Bachelor of Science in Agriculture and Human Ecology Extension (BSc AGHE). The study findings have revealed that the BSc AGED programme is a double major, with graduates qualifying as professional teachers and agricultural extensionists. The programme consists of 80 units totaling 233.5 Credit Factors, against the recommended minimum 120 Credit Factors for a Four-year Bachelors' degree programme.

The bulk of the BSc AGED programme (32.5%) consists of technical courses in agriculture. These include: Crop production, horticultural production, soil sciences, livestock production and nutrition, agricultural engineering. Almost all these units have practical components. This implies that the graduates have good grounding in technical agriculture. Agricultural extension units make up 13.75% of the units in the programme. These are mostly delivered in a theoretical manner, as they do not have provision for practicals. However, interactive and ICT based methods of delivery are used in delivering the units. The students get practical exposure through Field visits and Field/industrial attachment. The programme is therefore, deficient in imparting practical agricultural extension skills and competencies to graduates.

The BSc AGHE programme aims to prepare graduates who have competencies in human ecology, community development and extension. Review of the BSc AGHE programme has revealed that the bulk of the units are in Human Ecology and Community development. These units however are closely related to agricultural extension and when taken together account for 53.57% of the units. The delivery of these units has been highly competence based from the inception of the programme, with most of the units having practical components.

The technical agriculture units in the BSc AGHE programme constitute about 26.8% of the total units. The graduates therefore do not have a very broad and strong technical base in agriculture. This is a reflection of the main thrust of the programme, which emphasizes more on human ecology and community development.

5.1.2 Conclusions on Objective 2

The second objective was 'Identification of critical process skills and competencies of agricultural extension professionals, process skills gaps, and areas of potential curricular reform'.

Findings from the study have revealed that the process skills and competencies that are critical for agricultural extensionists are: 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 (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, creativity/innovativeness); Nutrition; and, Technical subject matter expertise.

Non-traditional technical areas that are critical include Climate change; Nutrition and Nutrition sensitive agriculture; and entrepreneurship. The study has also revealed that although the critical process skills and competencies are covered in the undergraduate agricultural extension curricula, the extent of coverage is not commensurate to the level of importance attached to the skills and competencies. The curricula are mostly inadequate in most of the process skills and competencies including practical skills in the technical areas.

5.1.3 Conclusions on Objective 3

The third objective was 'Recommend improvements/reforms of agricultural extension curricula to prepare the next generation of agricultural extension professionals to competently handle extension service delivery'.

The recommended improvements as per the study findings are the review of the existing undergraduate agricultural extension curricula to ensure enhanced coverage of the core process skills and competencies especially; ICT skills, soft skills, community needs assessment, entrepreneurship, and human nutrition. In addition, the mode of delivery of the curricula should be more practical to ensure graduates are competent.

The study has also revealed that key process skills and competencies can be imparted through internship programmes for agricultural extension graduates, hence the need to strengthen these programmes.

5.2 Implications for Policy

The findings of this study have clearly indicated the gaps that exist in the core competencies and skills of the agricultural extension professionals, which show that they are not delivering

services effectively based on the current needs of the agricultural extension systems. Given the centrality of the agriculture sector in Kenya's economy and the key role that agricultural extension and advisory services play in helping the agriculture sector to deliver on its mandate, there is urgent need for policy makers to pay attention to the quality of agricultural extension training. This can be achieved through:

- Enhancing funding for pre-service education and training at Agricultural Colleges and Universities to ensure adequate resources and manpower.
- Recognizing the important role of agricultural extension and strengthening it as a profession and field of study
- Improving in-service training and professional development for extension professionals in the field

At institutional level the policy makers should invest in:

- Building the capacity of extension faculty to enable them to effectively equip students with the required core competencies and skills.
- Supporting revitalization of the agricultural extension curricula to align them to the current needs of the extension and advisory services.
- Supporting linkages with industry to provide students with needed practical exposure and skills and fill up any gaps that they be in the curricula.

5.3 Specific Recommendations for Improving Agricultural extension Curricula

The following are suggested ways in which the undergraduate agricultural extension training curricula can be strengthened:

- There is need to enhance the level of coverage of all the core competencies and skills that were investigated in this study. This is based on the findings of the Online survey, where except for communication skills where some aspects were reported to be well-covered in the curricula, there was a significant difference between the importance of the core competencies and skills, and their level of coverage in the undergraduate curriculum.
- There is need to include and strengthen courses that impart ICT skills in the undergraduate training curricula. Adequate practical coverage should be ensured on use of modern ICTs in agricultural extension.
- More soft skills should be incorporated into the UG agricultural extension training curricula. Although the study found that the aspect of Communication skills was well covered in the current curricula, many other soft skills were found to be inadequate. The inadequate soft skills include many of those that were investigated in this study

including: critical thinking; problem solving; time management; creativity/innovativeness; leadership, stress management; teamwork; self-motivation flexibility; networking, partnerships and collaboration, etc.

- Entrepreneurship training should be strengthened and made more practical. The units in the current curricula are inadequate and delivered theoretically. Skills in value chain analysis and writing of business plans should also be incorporated in the curricula.
- Community needs assessment should be covered in depth and more practically. Although the topic is contained in some of the units offered in the BSc AGED programme, it is taught theoretically with almost no practical component.
- The curricula should incorporate practical skills in writing fundable proposals. This is necessary for graduates to assist their clientele (farming communities) prepare winning proposals and obtain resources for their organizations, especially NGOs, research organizations and even private sector.
- A unit on Human Nutrition should be included in the undergraduate Agricultural Extension curricula, especially for the Egerton University BSc AGED programme that does not have any unit that touches on human nutrition. This will enable the graduates to effectively integrate nutrition into extension, in line with the nutrition sensitive agriculture agenda.
- The mode of delivery for the undergraduate agricultural extension training should be made as practical as possible to enhance the acquisition of core competencies and skills by the graduates and make them more effective in their work. In addition, this will help align the programme to the competence-based education curriculum that was recently adopted in Kenya.
- There is need to strengthen linkages and collaborations with industry and stakeholders as these can enhance student exposure to practical experiences and reduce the gap in lack of practical experience among the graduates.

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Strengthening Agricultural Extension Training Process Skills and Competency Gaps in Undergraduate Agricultural Extension Curriculum in Kenya

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

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,

Research Partners from USA

- Prof. Murari Suvedi, Michigan State University suvedi@msu.edu
- Prof. Saweda Liverpool-Tasie, Michigan State University lliverp@msu.edu

Research Partners from Nigeria

- Prof. Agwu Ekwe Agwu, University of Nigeria ekwe.agwu@unn.edu.ng
- Prof. Mabel Dimelu, University of Nigeria mabel.dimelu@unn.edu.ng
- Dr. Ifeoma QuinetteAnugwa, University of Nigeria ifeoma.irohife@unn.edu.ng

Research Partners from Malawi

- Prof. Charity Chanza, Lilongwe University of Agriculture and Natural Resources cchanza@luanar.ac.mw
- Dr. Frank Tchuwa, Lilongwe University of Agriculture and Natural Resources ftchuwa@luanar.ac.mw

Research Partner from Uganda

- Prof. Margaret Mangheni, Makerere University mnmangheni@gmail.com

Research Partner from Kenya

- Dr. Agnes Oywaya-Nkurumwa, Egerton University aoywaya@egerton.ac.ke

Research Partners from South Africa

- Dr. Kristin Davis, IFPRI; University of Pretoria K.Davis@cgiar.org
- Ms. Lindie von Maltitz, University of the Free State vonmaltitzl@ufs.ac.za

Research Partner from India

- Prof. P.V.K. Sasidhar, Indira Gandhi National Open University.
E-mail: pvksasidhar@ignou.ac.in

Strengthening Agricultural Extension Training

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

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.

<p>How important is this skill or competency for an extension worker?</p> <ol style="list-style-type: none"> 1. Not Important 2. Somewhat Important 3. Moderately important 4. Important 5. Very Important <p>Please check a box (✓) for each statement that best represents your opinion.</p>	<p>Based on Your Answer in Question 2, How Well Does the Undergraduate Extension Curriculum Cover this Competency?</p> <ol style="list-style-type: none"> 1. Not at All Covered 2. Minimally Covered 3. Moderately Covered 4. Well Covered 5. Very Well Covered <p>Please check a box (✓) for each statement that best represents your opinion.</p>
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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					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		
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					B02						
		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	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					B02						
		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		
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					C02						
		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	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					C02						
		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		
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					D02						
		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	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					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		
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					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		
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					F02						
		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	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					G02				
		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 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					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
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					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
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					J02				
		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	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					J02						
		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	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					J02						
		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	Demonstrate technical knowledge in their basic discipline (e.g., field crops / livestock/ fishery/ horticulture etc).												

Job skills and competencies: Extension professionals should:		J01					J02						
		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		
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. field visits and demonstrations)

- Student motivation to study extension and in practical extension work
- Teacher motivation to teach required 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 Kenya

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 Kenya

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:

- f. a. How effective our extension programmes are in addressing the needs of our
food and agricultural systems?
- g. 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?
- h. 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?
- i. 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!

About This Document

Periodic updating of the undergraduate (UG) agricultural extension curriculum is necessary to train graduates with core process skills and competencies required to deliver effective extension advisory services (EASs). This AAP-PIRA research project assessed the process skills and competency gaps in UG agricultural extension curriculum in Kenya with specific 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 training extension workers with required core competencies, and how can these barriers be removed? Data was collected through review of UG agricultural extension curricula at Egerton University, review of agricultural EASs in Kenya, focus group discussions, and an online survey targeting a cross section of stakeholders in agricultural extension. Overall, the results revealed a significant gap between the level of importance of core competencies and skills and their level of coverage in the current UG agricultural extension curricula. In order to keep curricula relevant to the changing agricultural systems and to ensure compliance with standards, the authors identify and recommend 11 process skills and core competencies with 97 subcompetencies for inclusion in UG agricultural extension curricula. The study also recommends capacity building of extension professionals to fill up core competency gaps through short courses. It also recommends strengthening of the curricula through enhanced resource allocation to facilitate a more practical approach to training.

Lead Researchers

Dimelu Mabel Ukamaka

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

Saweda Liverpool-Tasie

USA • Michigan State University • lliverp@msu.edu

Ifeoma Quinette Anugwa

Nigeria • University of Nigeria, Nsukka • ifeoma.irohife@unn.edu.ng

Frank Tchuwa

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

Murari Suvedi

USA • Michigan State University • suvedi@msu.edu

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

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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Country-Based Researcher

Agnes Oywaya-Nkurumwa

Kenya • Egerton University • aoywaya@egerton.ac.ke

