The Role of Universities in Food Security and Safety: Perspectives Based on the Sasakawa Africa Fund for Extension Education

Jeffreyson K. Mutimba*, Henk C. Knipscheer2 and Deola Naibakelao3
1 Winrock International, c/o Extension Department, Bunda College of Agriculture, P.O. Box 219, Lilongwe, Malawi
2 Winrock International, 1621 N. Kent Street, Suit 1200, Arlington, Virginia 22209–2134, USA
3 Sasakawa Africa Fund for Extension Education, Gurd Sholla, Daminarof Building, P.O. Box 24135, Code 1000, Addis Ababa, Ethiopia

In comparison with other regions, productivity levels for many food products in sub-Saharan Africa are extremely low. As a consequence, production has not kept pace with a rapidly growing population. Chief among the reasons for the low productivity is the low level of training of the agricultural extension professionals who are responsible for advising farmers on better farming methods. The role of universities is to ensure that the wheels of food production and the entire value chain are well oiled with the necessary knowledge and skills to ensure a continuous and sustainable supply of safe food. We argue that lifelong learning ensures that professionals in the field are able to cope with continuously changing needs. We draw from the experience of the Sasakawa Africa Fund for Extension Education’s work with universities in Africa promoting the establishment of lifelong learning programs for mid-career agricultural extension professionals over the past two decades. An on-going initiative aimed at embracing the emerging “value chain” concept in agricultural training is used to illustrate the process of curriculum revitalization, which is one of the greatest challenges to universities. The process requires, among other things, dialogue among the main stakeholders to develop a consensus on strategic vision, goals, and priorities for action; critical analysis of the knowledge and skills needed to meet the changing needs; reform of agricultural education policies; revision of university curricula to make them more responsive to the needs of society; and strong partnerships between universities, employers, and the agricultural industry.

Key words: demand-driven, lifelong learning, value chain

Introduction

1. Contextualizing the Topic

Food security means far more than having sufficient food to meet human needs on a national basis. According to OneWorld Guides (2009), food security is defined by access to sufficient and affordable food. In its report of June 2004, the InterAcademy Council (IAC) argues that, in fact, food security often has less to do with food availability than with access to food. Factors such as low family incomes and poor road infrastructure severely hamper access to food. In this paper, however, our assumption is that increased agricultural productivity is a key element for improving food security. We also see knowledge as a crucial determinant of agricultural productivity and universities as an invaluable source of knowledge.

Gereffi and Lee (2009) observe that the public is increasingly anxious about the reliability of the entire agri-food system from inputs, production, and distribution to consumption. As the agri-food system becomes more global, so do food safety regulations, which have tightened and proliferated.

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* Corresponding author: Winrock International, c/o Extension Department, Bunda College of Agriculture, P.O. Box 219, Lilongwe, Malawi.
Cell: 265 999 425 077, E-mail: jeffmutimba@africa-online.net
These higher standards will also impact small producers. Again, we view knowledge of food safety issues as a crucial determinant of small producers’ access to advanced markets.

We also see a need for lifelong learning because knowledge needs change quickly. As Sutz (2005) points out, the past few decades have seen a steady acceleration in the rate at which knowledge is accumulated, diversified, and disseminated. One result is increasing obsolescence in what people know, how they use that knowledge to solve problems, and even how they solve problems. Lifelong learning is therefore more important than ever, because it allows people, organizations, and countries not only to generate rapid changes in knowledge but also to cope with such changes.

In this paper, we demonstrate how universities can play a role in providing lifelong learning by drawing on the experiences of the Sasakawa Africa Fund for Extension Education working with ministries of agriculture and universities in Africa.

2. The African Context

Agriculture continues to be the dominant economic activity in Africa. It accounts for about 30% of Sub-Saharan Africa’s gross domestic product (GDP), 40% of exports, and approximately 60–80% of employment (Johanson and Saint, 2007). However, Sub-Saharan Africa cannot produce enough to meet its food needs and remains host to 16 of the 18 most undernourished countries (see Johanson and Saint, 2007).

According to the IAC (2004), Africa is a continent full of promise and potential—rich in natural and human resources. But as Borlaug (1996) said ‘you can’t eat potential’. Africa is a place where, because of famine, disease, and a growing population, almost 200 million people are undernourished and 33 million children go to sleep malnourished and hungry every night. The IAC further argues that the nearly stagnant economies in parts of Africa are, to a large extent, a reflection of a stagnant agricultural sector. Kim et al. (2009) postulate that, although the potential for poverty reduction through the agricultural sector is greatest in SSA, the food crisis has also had the most damaging impact in SSA. In comparison with other regions, SSA’s productivity levels for many food products are extremely low, and food production in SSA has not kept pace with the rapidly growing population. Higher agricultural productivity is thus a precondition for growth and development in most African countries, and increasing yields is a key to raising incomes and reducing poverty in rural areas as well as lowering food prices.

Chief among the reasons for the current low productivity is the low level of training of the agricultural extension professionals who are responsible for advising farmers on better methods of farming. Recognizing this reality, in 2002 African governments adopted a Comprehensive Africa Agriculture Development Program (CAADP) under the auspices of their New Partnership for African Development (NEPAD). The program states that larger investments in agricultural research, extension, and education systems are required to achieve the targeted increase in agricultural output of 6% a year over the next 20 years. In 2006 NEPAD issued a Framework for African Agricultural Productivity (FAAP) as a guideline to member states for attaining the goal of 6% annual increases in agricultural production (Forum for Agricultural Research in Africa FARA /NEPAD 2006).

SSA’s food security problem is so serious that food safety issues have taken a back seat. Fragmented laws governing food safety are scattered among different institutions, such as departments of animal health, ministries of health, and local city assemblies, and they are difficult to coordinate. Besides, the bulk of SSA’s food industry is informal, consisting largely of small open roadside stalls and mobile food vendors. This informal sector is not properly covered by food safety laws, but it provides a service to large populations who, because of poverty, depend on it rather than the formal sector, which tends to be too expensive for average Africans. Very little is done to ensure food safety in the informal sector and the general public’s knowledge of food safety is an area that remains largely unaddressed by policy makers.

The Role of Universities

The role of universities is to ensure that the wheels of food production and the entire value chain are well oiled with the necessary knowledge and skills to ensure a continuous and sustainable supply of safe food. Johanson and Saint (2007)
identify two main benefits of agricultural education: (1) it directly raises agricultural productivity by developing farmer capacities and (2) it increases agricultural productivity by generating human capital for support services. FARA/NEPAD (2006: 26) states, “The quality of tertiary agricultural education is critical because it determines the expertise and competencies of scientists, professionals, technicians, teachers and civil service and business leaders in all aspects of agriculture and related industries.”

Higher education in agriculture contributes research and advisory services. Johanson and Saint (2007) identify three ways in which agricultural education and training institutions contribute to productive agricultural innovation systems. (1) Universities are an important source of stimulus for innovation. Through academic networks, institutional linkages, and provision of internet access, they serve as information “bridges” between their societies and repositories of global knowledge, thereby accelerating the flow of new ideas to a system of progressively more connected agricultural organizations. In this way, they play an important role within the information-sharing networks that join the institutional players of a country’s agricultural innovation system. (2) Universities help to adapt innovations produced elsewhere to local circumstances. For example, agriculture is highly location-specific. Available technologies applicable and accessible to Africa are likely to require substantial local adaptation and development to become cost-effective. This requires a detailed and intimate knowledge of local farming systems, which must be captured in the content of agricultural training activities. (3) Universities have the capacity to generate new knowledge through research. Universities often can carry out agricultural research and extension at little extra cost by using existing staff, graduate students, and faculties (e.g., libraries, laboratories, and demonstration farms).

In the area of food safety, universities can play a role in training. Currently, some universities offer public health and food science degree programs but intakes are severely limited. Universities can also conduct research on the extent of food safety problems and on food safety policy issues to provide information for governments and consumer advocacy groups.

In addition, African Universities are expected to produce agricultural science graduates who are critical thinkers, multi-disciplinary problem solvers, and team players who are also “work ready” (Madukwe, 2008).

Sutz (2005) argues that the debate about the role of universities in developing countries is important for two reasons. Knowledge is a crucial tool for overcoming underdevelopment. Relying on a rich endowment of natural resources and cheap labor, without any contribution to local intellectual value-added, has been and continues to be, a dead end for development. In addition, knowledge is not a commodity that can be bought and put to work with little additional effort. To adapt and successfully use knowledge from outside the social system, a strong local knowledge base needs to be created and nurtured. Without it, the world’s information riches are out of the reach of developing countries. Sutz therefore concludes that, to increase their contribution to development through the production and distribution of knowledge, universities in developing countries need to stay in touch with the development needs of their respective countries.

Kibwika and Wals (2008) argue that the university must skillfully identify competence gaps for professionals, farmers, policymakers, and other agricultural stakeholders through collaborative learning for change. It is such engagement with stakeholders that results in innovations that are likely to liberate farmers and nations from the poverty trap and contribute to socioeconomic development that does not compromise the future.

However, making the curricula of agricultural education institutions more relevant to changing needs is perhaps the greatest challenge. With specific reference to the agricultural extension profession, Knipscheer et al. (2002) suggest that reorienting the present extension curricula would require, among other things:

1) Creating a dialogue among the main stakeholders involved in agricultural extension delivery.
2) Developing a consensus on the vision and goals of the extension system and setting up priorities for action.
3) Analyzing the training needs of extension staff (i.e., critical knowledge, skills, and atti-
4) Helping agricultural universities make their curricula more responsive to the changing job market to reduce the discrepancy between training and the work extension staff actually do.

5) Forging strong networks among institutions and agencies.

6) Developing the ability to cope with challenges and to identify and convene stakeholders.

As a practical demonstration of how universities can play a role in food security and safety, we discuss an initiative that we are currently working on following the approach and process outlined by Knipscheer et al.

The Sasakawa Africa Fund for Extension Education Initiative

The Sasakawa Africa Fund for Extension Education (SAFE) initiative is a good example of mid-career training, and it demonstrates the role of universities in lifelong learning for non-traditional students and calls for a need-based curricula (see Box 1 below for an overview of SAFE’s activities in Africa).

1. The Value Chain Approach: An Emerging Training Need

According to the InterAcademy Council (2004), much of the food produced in Africa is lost in post-harvest processes. Some studies report stag-
growing losses, ranging from 10% to 100% in some countries. Sweet potatoes, plantain, tomatoes, bananas and citrus fruits, for example, often perish before reaching the market. Growers and consumers alike would benefit from a reduction in waste. Local processing plants established throughout the African countryside could provide a critical solution to this problem. Local agro-processing not only restricts post-harvest losses, it also increases the economic value of harvested agricultural products. A policy oriented towards such development would produce much more innovation in food processing and distribution in Africa.

Clearly smallholder SSA farmers do not maximize the full potential of their farm products, and if they do not see the full benefits of their efforts, they may stop producing—or at least not produce beyond their basic needs—threatening national and international food security. Smallholder farmers can increase their incomes substantially if they process and add value to their produce to increase their competitiveness in an increasingly competitive environment.

One of the main reasons why farmers do not fully benefit from their produce is that extension services providers are not sufficiently trained to provide advice on anything other than production. Although we are aware of the need for advisory service providers to have sufficient capacity to provide advice covering the entire value chain, it is not clear how this can be achieved. To this extent, SAFE and its partner universities have recently embarked on a needs assessment process to explore ways of ensuring that extension services have sufficient capacity in terms of knowledge and skills to provide advice covering the entire value chain. Specifically, the objectives of the survey are to determine the following: the type of training needed for an extension service to provide advice beyond production, the level at which the training should be provided (e.g., in-service short courses or degree programs), the type and number of staff that would require this kind of training, and the preferred mode of delivery (full-time, part-time, distance learning, etc.) for such training.

1.1 Necessary Training

From our experience, public extension services are the main advisory service providers in SSA, but they are rarely able to articulate anything other than their current needs. An outsider, such as SAFE, can catalyze the linkages between public extension services and agricultural education institutions and assist them in recognizing opportunities. SAFE assists the key stakeholders to reflect on their existing agricultural extension programs, assess their effectiveness at meeting farmers’ needs, and determine whether change is necessary. If change is necessary, SAFE helps the stakeholders examine the implications of that change on the knowledge and skills of their existing extension or advisory staff and determine whether there are any gaps. If gaps exist, SAFE helps them decide how to fill the gaps and facilitates linkages and dialogue with agricultural training institutions. The process involves repeated consultations until the stakeholders develop a common vision of what needs to be done and the implications for curricula at agricultural education institutions. As Kibwika and Wals (2008) point out, through such community engagement, creativity is unleashed and scientists begin to rise to and relish the challenge of solving neglected and complex problems.

To develop appropriate curricula for our value chain example, we need to know what training is needed for an extension service to provide advice beyond production. What advisory services are necessary to help farmers more fully benefit from their production? What key competencies are required to provide advice in post-production value addition?

To answer these questions, we first need to identify post-production bottlenecks and constraints that could be addressed through training. Admittedly, farming is risky and farmers face many constraints along the value chain, and universities cannot solve all of these problems. Our main interest is in identifying those constraints that universities can address through training and research. Of course, there will always be gaps of knowledge and skills on production aspects, but we have discovered that the biggest bottlenecks lie outside production per se. Examples include:

a) Extension services are structured to focus mainly on production.

b) The value chain concept is not well known and is not even included in curricula at most training institutions.
c) There is a huge lack of entrepreneurship. Farmers rarely produce beyond their immediate needs.
d) Farmer organizations are weak and in no position to demand quality services.
e) There are no platforms for continuous learning and innovation.

After having identified these constraints, SAFE is now working to help stakeholders turn them into opportunities and identify the professional competences (knowledge, skills, and attitudes) needed to address them. Each of the constraints is discussed in greater detail below, along with some preliminary suggestions for curriculum content that could address the current shortcomings.

**a) Limited focus of extension services**

Part of the reason why farmers are not maximizing the benefits of their farming is that agricultural extension service providers focus only on the production aspects of agriculture and abandon the farmer after the harvest. Extension services are structured with this production focus, as is the design of university training. As Sutz (2005) points out, universities are not isolated institutions. They are socially embedded, and their guiding visions are influenced by local history and traditions. SAFE’s current efforts in this area are to create awareness of the need to expand extension services and university training beyond production.

**b) Limited knowledge of the concept of value chain**

The value chain concept is generally not well understood in Sub-Saharan Africa, and development agencies have only recently begun to raise concerns about the inadequacies of the current piecemeal approaches to agricultural development. The concept has been difficult for universities to embrace because of a lack of clarity on where training can add value in the many stages from production to consumption, including input accessibility, financial services, production, harvesting and storage, primary processing, market requirements and consumer preferences, packaging and branding, transportation, government regulations, and policy determination. Value chains are a sequence of processes and flows that aim to meet final consumer requirements and take place in a more business-oriented manner. The chain therefore has various components as well as actors whose unique preferences require differentiated services at the different nodes of the chain. The questions arise, then, at what points would training add value and to what extent would it be possible for an agricultural education institution to provide training that would enhance the availability of adequate differentiated services along the value chain.

The business orientation of the value chain concept also raises concerns. For example, not all agricultural enterprises are profitable. Important food crops, especially staples like maize, could easily be displaced by more profitable enterprises at the expense of food security. Another concern relates to smallholder farmers. Can smallholder farmers be active players in a market-oriented value chain or will they be edged out of the chain because of a lack of competitiveness? In theory, value-chain approaches are thought to act as vehicles for linking small businesses to markets, and thus they are essential for improving the livelihoods of rural farmers and thereby reducing poverty (Humphrey, 2006).

The value chain concept as well as value chain mapping and analysis should be incorporated into university curricula so that extension services be expanded beyond the production stage.

**c) Lack of entrepreneurship**

Agriculture in Africa is characterized by subsistence farming. However, African farmers, like farmers elsewhere, are affected by ongoing globalization and the emergence of an integrated market. An integrated market implies that Ugandan rice farmers are competing with Thai rice farmers, and cotton farmers in Tanzania are competing with cotton farmers in China, and so on. Farmers are increasingly expected to gain information about distant markets where prices are quoted in foreign currencies and unfamiliar volumes. The products required for the global market are, therefore, knowledge-intensive (Knipscheer et al., 2002).

Farming in Africa must be viewed and practiced as a business. However, to do so, farmers have to offer quality products that can compete with international products in the current global market. This calls for a concerted effort to improve quality from production to post-harvest handling, processing, packaging, transporting, and marketing. Farmers therefore need competent advisory service providers who can effectively advise them through
this holistic and intensive process.

Specific entrepreneurship content that should be incorporated into curricula include the following: entrepreneurship knowledge and skills (farming as a business, agri-business management, enterprise selection, record- and bookkeeping, and communication), innovation and creativity, agro-processing and value addition, markets, market standards and marketing, ethics and integrity, negotiation, lobbying, and advocacy.

d) Weak farmer institutions

A key and indispensable factor for the protection and enhancement of the smallholder agricultural sector in Africa is the existence of strong farmer organizations that are able, motivated, and sufficiently independent to effectively represent that sector’s interests (Knipscheer et al., 2002; Mutimba, 2005). Currently, smallholder farmers in many SSA countries are not well organized. They do not have sufficient resources, technical and management expertise, or the legal mandate and political power to demand technologies and engage in linkages with research and extension agencies as full partners. There is therefore a need for strong and effective farmer organizations that are able to articulate their needs, identify problems and seek ways of solving them, lobby for services, monitor and evaluate performance of delivery services, articulate and defend members’ interests, and develop business skills. Such organizations will not develop on their own. The process needs to be facilitated and nurtured by the extension service. On its part, the extension service requires specific knowledge and skills on farmer institutional development.

Specific farmer institutional development content that should be incorporated into curricula should include the following: group formation, development, management, and sustainability; lobbying and advocacy; group policy frameworks; and resource mobilization.

e) Lack of platforms for agricultural innovation

Coupled with, and as a result of, the weak farmer institutions, there are no platforms for continuous learning and innovation. The different value chain actors are not well organized internally or externally. They lack a common interest and are fragmented. Therefore, there has been little creativity or innovation in response to emerging challenges and interests. Value chain actors need to be organized around functional innovative learning platforms with well-developed information-sharing mechanisms and clear rules of engagement. Extension practitioners, however, currently lack the competency to facilitate such platforms.

Specific agricultural innovation platform content that should be incorporated into curricula include the following: value chain concepts, stakeholder analysis, platforms for interaction, sensitization and mobilization skills, communication and negotiation skills, facilitation skills, group dynamics and management (including management of partnerships), social and networking skills, and ethics and integrity.

1.2 Level of Training

Following the needs assessment, the survey team must determine the level at which the training should be provided, and that depends on the types of needs that have been identified. Are the needs sufficient to warrant a full-fledged diploma or degree program? If the needs do not warrant a full program, is there a way existing programs can be revised to include the new needs? Existing programs are usually already overloaded, and decisions on what must be dropped to accommodate the new issues can be difficult, especially if faculty members try to protect or expand their individual disciplines within the curriculum.

Some needs can be adequately addressed through short in-service courses. Venues for such training range from tree sheds and farmer training centers in the field to hotels in expensive locations. Some universities have centers for continuing education specializing in short, tailor-made, non-certificate training. In some cases, on-the-job “coaching” might be more appropriate.

1.3 Staff

The survey team must also establish the type of training required and how many extension workers need it. The answers to these questions will depend on how employers plan to use the training graduates. Will they be used as specialists who will be consulted by or train others or will they be frontline workers? The latter would certainly require more graduates than the former. The university also has to consider potential employers. Who will require the services of the graduates of this training and
what is their absorption capacity? The university should also consider the potential for self-employment by the graduates. To what extent can the graduates of this training create their own employment opportunities? The university needs to know this kind of information to decide how best to provide the training. For example, given the costs involved in establishing and running a distance learning program, a university cannot run one for a small group.

In our experience, we have found that employers are more interested in generalists than specialists. They want graduates who can advise farmers on a broad range of issues because farming in most African countries is composed of smallholder farmers engaged in a wide range of production activities.

1.4 Mode of Delivery

After identifying the type of training required, the survey team needs to decide how to deliver it. This decision depends on a range of factors, including the nature of the required skills and knowledge, number of people to be trained, convenience of the prospective training candidates, and employers’ preferences (if the candidates are full-time workers). Several possible options are summarized in Table 1.

We have encouraged the use of part-time and distance learning programs because these programs broaden access to a university education and allow field practitioners to learn while they work. We have realized that regular programs that train high school graduates are not sufficient, even when the training is relevant. Farmers are already grappling with problems and cannot wait for solutions. Practitioners who are already in the field need to be appropriately trained to help farmers cope with existing and emerging challenges.

In SAFE programs, we primarily work with mid-career professionals grappling with real-world issues—people who are trying to make a difference in combating poverty and food insecurity. With this in mind, we have aimed to create curricula with the following characteristics: they are job-oriented, with an emphasis on relevant applied knowledge and skills; they draw on and use the students’ own workplaces as learning opportunities and allow for “learning by doing” field-based instruction where both students and instructors learn from the results of their actions; they allow students to pursue their individual learning needs; and they do not take practitioners away from their employment for unnecessarily long periods.

2. Establishing Strong Partnerships Between Universities and Extension Agencies

After the survey, the survey team proposes a training (degree) program that addresses the identified needs and then organizes a workshop involving key representatives of the stakeholders to discuss the findings of the needs assessment and the proposed program and to work out strategies for initiating and sustaining the program. The workshop provides an opportunity for stakeholders to: engage in dialogue; work towards consensus on the vision for the program, its courses, and the contents of the courses; develop criteria for the selection and admission of students; and to establish program linkages. The workshop also affords an opportunity to raise questions and voice concerns. Facilitating dialogue about these concerns draws on the knowledge, competencies, and experiences of all stakeholders during the program’s conceptualization, development, and implementation. It also facilitates the development of partnerships between organizations working in the agricultural sector. These partnerships are vital for resource mobilization (both human and financial) and the sustainability of such a demand-driven program.

Forging strong linkages is intended to help stakeholders recognize an enduring and shared commitment and the need for each of them to benefit from the diverse talents, resources, experiences, and perspectives within the partnership. Representatives from partner institutions and extension agencies are encouraged to participate in workshops and study tours, to share their experiences and apprehensions, and to support the risk-taking that is inherent in innovative and non-traditional ventures such as the revitalization of curricula.

To date we have had experience with programs that have been run as partnerships between employers and agricultural education institutions. Usually the agreement takes the form of a formal memorandum of understanding in which employers agree to release their staff for training and to pay fees as determined by the universities.
Table 1. Strengths and weaknesses of alternative delivery modes

<table>
<thead>
<tr>
<th>Delivery mode</th>
<th>Description</th>
<th>Strengths</th>
<th>Weaknesses</th>
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<tbody>
<tr>
<td>Full-time programs</td>
<td>100% face-to-face learning and teaching Students have to be on campus on a full-time basis</td>
<td>Most common Students complete on time Easy to monitor quality Learners have easy access to resources Learners easily share experiences</td>
<td>Limited enrollment due to space and other resource limitations Not suitable for students with family and work commitments</td>
</tr>
<tr>
<td>Part-time programs</td>
<td>Involves limited residential face-to-face teaching with long periods of self-directed study</td>
<td>Easy to control quality Broadens access to university education Suitable for those with family and work commitments Reduces demand on residential accommodation Learners have easy access to resources Learners easily share experiences</td>
<td>Requires more preparation of instructional materials than full-time programs Limited access for those living far from universities Takes longer to complete than full time Requires incentive scheme for teaching staff</td>
</tr>
<tr>
<td>Distance learning</td>
<td>Instruction is conducted through media other than face-to-face teaching</td>
<td>Broadens access to a university education Ideal for those with family and work commitments Students do not leave their homes and work places Students manage their own pace</td>
<td>Difficult to monitor quality Requires much more preparation of instructional materials than full-time programs Takes longer to complete than full time Limited access to educational resources</td>
</tr>
<tr>
<td>On-the-job training</td>
<td>Training takes the form of coaching and mentoring on the job</td>
<td>Learners use their job as a learning opportunity Learning directly related to needs</td>
<td>Only limited numbers can be trained</td>
</tr>
<tr>
<td>Short courses</td>
<td>Face-to-face training over short periods of time usually not leading to academic awards</td>
<td>Flexible enough to allow for needs-based training</td>
<td>Lack of academic awards can be a disincentive to learners</td>
</tr>
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Lessons learned

SAFE’s experience so far has been illustrative both in terms of potential benefits and challenges. The initiative has been successful in demonstrating the following points.

- Employers can influence the design of curricula at universities.
- Contrary to their “ivory tower” perception, universities can respond to well-articulated demands.
- Mid-career extension professionals represent an underexploited group of learners—they bring experience that enriches the teaching and learning process, and both students and staff can learn through shared experiences.
- Universities that relax their entry requirements for non-traditional students benefit from these students’ creativity and innovativeness.
- Non-traditional students perform well academically.
Field experience can enrich curricula and teaching at universities—the programs provide unique and rare opportunities for university staff to learn from real-world situations. SAFE has achieved this by catalyzing the process of attitude change among the various stakeholders, assisting in assessing training needs, assisting employers (ministries of agriculture, non-governmental organizations, and community-based organizations) to articulate their needs, sensitizing national universities to be responsive, assisting in developing responsive curricula, designing a flexible admission system that values experience, participating in teaching and monitoring/evaluating the programs, and strengthening the linkages between the stakeholders, both within and between countries.

Challenges

Challenges abound in running an innovative program, and some of the ones we have experienced in the SAFE programs are discussed below.

a) Generalist versus specialist

Employers, particularly extension organizations, are usually looking for generalists—people who are able to advise farmers on a wide range of issues. They argue that agriculture in Africa is composed of smallholder farmers engaged in a wide range of production, with very little specialization. The challenge is to create a curriculum that covers everything from production to value addition to marketing. Coupled with this is the issue of the explosion of knowledge. There is so much to cover that curriculum designers have problems deciding what to include. This sometimes results in curricula that are so packed with theory that there is little or no time for practical matters. Employers are generally not satisfied with current graduates of agricultural education institutions, whom they view as being too theoretical and lacking the practical skills to drive the agricultural modernization process.

b) Lack of qualified staff

Most of the universities involved in the SAFE programs are experiencing a critical shortage of qualified and experienced teaching staff in the area of agricultural extension. Apart from an actual shortage of staff, the teaching staffs generally lack the experience necessary to teach practical programs because they themselves are products of theory-based programs, and most have been recruited immediately after graduating. During a recent discussion with the Dean of the Faculty of Agriculture at Makerere, he questioned how we were going to improve the implementation of the practical aspects of the program and cited the example of Animal Science teachers who do not know how to milk a cow. Indeed, although we believe we are running strong and practically oriented programs, implementation has been quite difficult. It is therefore necessary to invest in retraining the teaching staff at agricultural education institutions so that the graduates will have the desired impact in the field.

c) Lack of resources

Most universities lack sufficient resources to run resource-intensive programs on a sustainable basis. It has therefore been difficult for SAFE to disengage from partner institutions so as to be able to use its limited resources to create new programs.

d) Lack of female participation

The lack of female participation relates to the larger challenge of developing women in leadership roles in agriculture. With the exception of a few countries such as Uganda, there are generally few women in the current pool of agricultural extension staff in both public and private extension services. In many countries in the region, only a small number of women have pursued science-based programs at the secondary and post-secondary school level. As a result, only a limited number of women are available for admission into agricultural and natural resources training programs.

e) Poor rural infrastructure

Infrastructure is a serious problem in countries such as Ethiopia. Because of the poor infrastructure, field supervision of students presents the biggest single challenge of running practical programs. Both staff and transportation resources are strained because transportation is difficult at best and accommodations in the countryside are poor.

f) Language barriers

Differences in educational systems and language between French-speaking and English-speaking countries in Africa hamper inter-university partnerships and make it more difficult to exchange experiences with innovative training approaches in agricultural and natural resources education.
Conclusion

The role of universities and agricultural education in determining the success of efforts to boost agricultural productivity is widely recognized. The wheels of food production and the entire value chain must be well oiled with the necessary knowledge and skills to ensure a continuous and sustainable supply of safe food. Agricultural training curricula must be constantly reviewed and revitalized to meet emerging needs. The process requires, among other things, dialogue among the main stakeholders to develop a consensus on strategic vision, goals and priorities for action, critical analysis of the knowledge and skills needed to meet the changing demands, reform of agricultural education policies, revision of university curricula to make them more responsive to the needs of society, and strong partnerships between universities and the agricultural industry. Knowledge and information are powerful tools in the processes of change. As Haug (1999) said, the strengthening of human capital and the production of knowledge are perhaps the most important elements in agricultural development strategies. The World Bank put it succinctly by concluding that agriculture leads economic growth in many parts of rural Africa, but investments in infrastructure and human capital lead agriculture (Johansson and Saint, 2007).

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