Transforming Post-Secondary Agricultural Education and Training by Design: Solutions for Sub-Saharan Africa

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This report was commissioned by the World Bank (AFTHD). It is based on findings from comparative analysis of case studies completed in seven Sub-Saharan African countries, three country visits by the author, and a review of relevant literature. The findings, interpretations and conclusions expressed here are those of the author alone, and do not necessarily reflect the views of the Board of Executive Directors of the World Bank or of the governments they represent.
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### Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>AET</td>
<td>Agricultural Education and Training</td>
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<tr>
<td>AGORA</td>
<td>Access to Global On-line Research in Agriculture</td>
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<td>AIS</td>
<td>Agricultural Innovation System(s)</td>
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<td>AKIS</td>
<td>Agricultural Knowledge and Information System(s)</td>
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<tr>
<td>ATVET</td>
<td>Agricultural Technical and Vocational Education and Training</td>
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<tr>
<td>AU</td>
<td>African Union</td>
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<tr>
<td>CGIAR</td>
<td>Consultative Group for International Agricultural Research</td>
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<tr>
<td>DANIDA</td>
<td>Danish International Development Agency</td>
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<tr>
<td>DFID</td>
<td>Department for International Development (UK)</td>
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<tr>
<td>FAAP</td>
<td>Framework for African Agricultural Productivity</td>
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<td>FARA</td>
<td>Forum for Agricultural Research in Africa</td>
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<td>FASA</td>
<td>Faculty of Agronomy and Agricultural Science, Dschang University</td>
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<tr>
<td>ICT</td>
<td>Information and Communication Technology</td>
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<tr>
<td>ISAE</td>
<td>Higher Institute for Agriculture and Livestock, National University of Rwanda</td>
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<td>ISNAR</td>
<td>International Service for National Agricultural Research</td>
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<td>MPRSP</td>
<td>Malawi Poverty Reduction Strategy Paper</td>
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<tr>
<td>MDG</td>
<td>Millennium Development Goals</td>
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<tr>
<td>NAES</td>
<td>National Agricultural Extension System</td>
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<td>NAETS</td>
<td>National Agricultural Education and Training System</td>
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<td>NARS</td>
<td>National Agricultural Research System</td>
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<tr>
<td>NEPAD</td>
<td>New Partnership for Africa’s Development</td>
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<tr>
<td>NGO</td>
<td>Non-governmental Organization</td>
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<td>NORAD</td>
<td>Norwegian Agency for Development Cooperation</td>
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<td>NRC</td>
<td>Natural Resources College, Malawi</td>
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<td>NTCs</td>
<td>National Teachers Colleges</td>
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<tr>
<td>OECD</td>
<td>Organization for Economic Cooperation and Development</td>
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<tr>
<td>PSAET</td>
<td>Post-secondary Agricultural Education and Training</td>
</tr>
<tr>
<td>SEMCIT</td>
<td>Sustainability, Education, Management of Change in the Tropics</td>
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<tr>
<td>SSA</td>
<td>Sub-Saharan Africa</td>
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<td>TEAL</td>
<td>The Essential Electronic Agriculture Library</td>
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<tr>
<td>UEM</td>
<td>Universidade Eduardo Mondlane, Mozambique</td>
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<td>USAID</td>
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Executive Summary

If Africa is to register progress towards agricultural development, including food and nutrition targets contained in the Millennium Development Goals, it will need to augment the human resource and institutional capacities that manage the continent’s agricultural sector. A key step to this end will be a reform of the institutional systems, curricula and pedagogy that comprise agricultural education at the level of post-secondary education. This report analyzes the current status of post-secondary agricultural education and training in Sub-Saharan Africa and proposes ways to boost its performance and impact.

BACKGROUND

The present report is one component of a six-part World Bank study that assesses secondary and post-secondary agricultural education and training systems in Africa, provides justification for increased donor attention to this largely neglected area, and identifies the most effective areas of investment for future development assistance. The following report focuses specifically on post-secondary agricultural education and training. It is derived from a review of relevant literature, seven country field studies, and interviews conducted by the principal investigator in three of these seven countries. Its purpose is to highlight promising options for constructive intervention in the system, institutional, curricular and funding spheres of agricultural education and training.

FINDINGS

This report argues for increased attention to post-secondary agricultural education and training (PSAET) in Sub-Saharan Africa. The need for an energized PSAET is considerable. Most PSAET institutions are ineffective because policies are lacking or un-enforced. System governance is rigid and overly centralized. Curriculum content is not oriented to human capacity needs. Institutional linkages are nil or without development-oriented significance. Computer and Internet “connectivity” are meager. Physical infrastructure is deteriorating and inadequate for the increasing populations of students. The report suggests that enhanced and redirected PSAET capacities will bolster agricultural development and also help to attain the World Bank’s Millennium Development Goals. In short, competent employable human resources in agricultural disciplines are a necessary condition for Africa’s advancement.

An important constraint on this undertaking is the insufficient attention given by African governments to the development of agricultural innovation strategies. Innovation capacities and incentives (in technical, commodity, institutional and policy spheres) are needed in order for Africa to build and maintain its competitiveness in an increasingly global agricultural market. This report maintains that these strategies can be advanced more effectively by incorporating educational institutions with other stakeholders in this transformational process.
A unique challenge faced by efforts to improve agricultural education is that student and public attitudes toward agriculture tend to be negative in much of Africa. Primary and secondary schools often treat agricultural activities as “a punishment” for unruly students, and parents frequently view agriculture as an unpromising career choice. At the tertiary level, students rarely choose to study agriculture of their own free will. Instead, they are likely to be channeled into agricultural studies by supply-driven admissions procedures. These practices deter students from considering agriculture as either a profession or a business. Changing these negative attitudes toward agriculture-related employment is critical for effective agricultural development. Concerted public information efforts, backed by financial incentives and opportunities, are needed to alter disapproving mind-sets toward agricultural vocations.

By presenting conceptual frameworks and practical guidelines, the report seeks to constructively engage the multiple constraints that appear to prevent investment in formal post-secondary agricultural education and training systems in Sub-Saharan Africa. In response, two types of interventions are proposed for recuperating agricultural education and equipping it to meet the challenges of globalization. The first targets the institutional capacities of PSAET systems. The second intervention is larger in scope and builds on the first: it proposes the development of an integrated Workforce Education System that operates in direct support of government programs to foster agricultural innovation.

SOLUTIONS

The report uses an analysis of seven country case studies to identify three main challenges that confront post-secondary agricultural education and training systems. These are: creating appropriate incentives for human capital development in agriculture, establishing meaningful institutional linkages with national and global information networks, and putting in place the infrastructures necessary for initial learning and lifelong education. The country analyses also confirm the continuing relevance of three longstanding objectives that have guided agricultural education and training systems in Africa: (a) to produce appropriately prepared human resources for public and private employment in agricultural activities; (b) to generate or adapt agricultural knowledge through research; and (c) to pass on this and other relevant knowledge to agricultural producers and service providers through extension and continuing education activities.

The report then proposes a two-pronged response to these challenges. The first recommends a broader approach to post-secondary agricultural education. This would reach beyond the formal training of students to engage the relevant workforce in continuing education that keeps pace with technological change. Denominated a “workforce education system,” it would tie together the various instructional capacities for educating post-secondary students and training workers in the business and fields of agricultural development. This would be accomplished by bringing the following three instructional sub-systems into closer collaboration:

- *Formal post-secondary agricultural education systems* that provide student learning and enable agricultural personnel to further their academic degree levels;
• *In-service training systems* that operate in both public and private spheres of agricultural endeavor to orient and specialize employees; and

• *Non-formal education and training systems* operated by local government and non-governmental organizations to upgrade the skills of agricultural producers.

In this context, post-secondary education is viewed as one aspect of a lifelong learning system designed for those employed in agriculture. This approach aspires to nurture a constant process of short-term, longer term, formal and informal educational experiences that enables the agricultural workforce to stay abreast of the changing technologies, new knowledge and cultural practices necessary for competitive agricultural production.

The second response constitutes an original approach to thinking about the role of government and agricultural business. It recommends the involvement of academic staff, students and workforce personnel in the development of a national agricultural innovation system. It envisions government, business and communities acting together to form the necessary elements of such a system. In this context, a nation’s formal, in-service and non-formal educational programs might work together (or at least side-by-side) to constitute the agricultural knowledge systems that support agricultural innovation.

Even where governments have taken steps to foster agricultural innovation systems, they have not yet directly involved formal post-secondary agricultural education and broader workforce education initiatives in this effort. As a result, the institutional components of these systems are generally not linked internally among themselves or externally with the development goals of agricultural innovation systems. Consequently, their potential to contribute more significantly to meeting immediate national development goals is limited by their isolation, their lack of vision, and their weak lines of public accountability. This lack of linkage points up the need for policies, governance mechanisms, and management autonomy that will encourage greater interaction among PSAET institutions and other agricultural stakeholders. The purpose of such linkages would be to progressively bring together formal, in-service and non-formal educational programs as the main elements of a Workforce Education System that would nourish and accelerate the performance of the national innovation system for agriculture.

In summary, policy interventions and investments in the following areas would improve productivity and economic performance of the agricultural sector in Sub-Saharan Africa:

• appropriate incentives for human capital development in agriculture,

• meaningful institutional linkages with national and global information networks,

• the physical facilities necessary for initial learning and lifelong education,

• creation of an integrated Workforce Education System for the agricultural sector, and

• coordination and governance mechanisms that enable post-secondary agricultural education and training institutions, together with an emerging Workforce Education System, to support directly the national agricultural innovation system.
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We should by now understand that a system cannot do anything else but what it was designed for. The existing systems of education were not designed for the 21st century, not even the 20th. They are the creation of the 19th century industrial machine age. They clearly show the bureaucratic, assembly-line practices of that age.

Bela H. Banathy, International Systems Institute, Carmel, California

1. What is the Purpose of Agricultural Education?

The ultimate goal of agricultural education and training is to promote human advancement through increased agricultural contributions to the economy. A more immediate objective is to apply knowledge via teaching and research to meet the needs of production, agricultural export, and domestic consumption within a highly competitive world trade environment. The social purpose is to provide smallholders and the rural poor with food security and income generation under conditions of rising population and growing land scarcity. In short, this is the conceptual argument for investing in human capital formation for agriculture.

In practice, however, agriculture is little valued as a professional career in Sub-Saharan Africa. Tertiary education graduates are unlikely to seek employment in the rural sector and, if they do, it most probably will not be to work on farms. The hot sun, back-breaking labor, long hours, insecure income, unpredictable production, and lack of “big city” services keep most tertiary education graduates in the metropolises even if they have to work at jobs which pay poorly. Although nearly one-fifth of Africa’s economy is based on agriculture and 80 percent of its population depends upon agriculture for its livelihood (Commission for Africa, 2005: 45), this does not automatically translate into a demand for agricultural education and training.

1.1 Organization of the Report

The report is organized into eight parts. The first section begins with the question, “What is the ultimate purpose of PSAET?” and outlines the organization of the report. The second section provides the background of the report. Section three reviews the report’s objective. Section four engages and redefines the conceptual territory surrounding PSAET as a system and also as a component in workforce education. The fifth section compares the findings from the seven country case studies, organizing them into six issue areas: policy and funding; system governance; human capacity development; curriculum development; institutional linkages; and physical infrastructure, equipment and communications technology. The countries surveyed are Cameroon, Ghana, Malawi, Mozambique, Rwanda, Senegal and Uganda. Based on findings from these seven studies, relevant literature and the principal investigator’s interviews in three of the seven countries, the
sixth section outlines the three main challenges that confront PSAET systems. The seventh section expands the concept of post-secondary agricultural education and training into a larger framework by proposing a “transformation” of PSAET as a whole into a Workforce Education System. Briefly, this means integrating the PSAET institutions, private and public sector in-service training programs, and non-formal field training and development activities into an integrated framework of lifelong learning for all those who work in the agricultural sector. The last section presents the conclusions.

2. Background of the Study

This report reflects the World Bank’s concern with the immediate and long-term situation of agricultural education and training (AET) in Sub-Saharan Africa. In that context, it deals specifically with post-secondary agricultural education and training (PSAET). This report forms one part of a larger, six-part review of AET by the World Bank and constitutes the review’s principal “field study.” The other parts include (a) global insights into the evolution of agricultural education and training, (b) secondary-level agricultural education and training, (c) multi-country collaboration in regional post-graduate training, (d) a typology of agricultural knowledge and information systems in Sub-Saharan Africa, and (e) two case studies on the role of AET within an agricultural innovation system. Together these six studies will form inputs into the World Bank’s Framework of African Agriculture Productivity (FAAP) through which the Bank anticipates investment of US$400 million over the next four years to strengthen national capacities to provide farmer services, applied research and relevant education.

The World Bank’s financial support for agricultural education has diminished since the 1970s and in the 1990s practically ceased (Saint, 2005 and Rygnestad, et al. 2005). The Bank’s present concern results from the human and agricultural development crises that currently exist in sub-Saharan Africa. Recent literature and project experience suggest that the development of human capital now constitutes a major constraint in Africa’s agricultural advancement, leading to the conclusion that greater attention should be given to strengthening institutional capacities for technical and professional education for the agricultural sector, especially at the post-secondary level. Figure 1 graphically illustrates the World Bank’s funding in billions of U.S. dollars for agricultural research, extension and education in developing countries from 1980 through 2001,\(^1\) and clearly shows that education was the most neglected component of the research-extension-education triad.

For the foreseeable future, Sub-Saharan Africa’s agriculture is likely to remain the main sector producing exportable goods in most countries, although this is under debate (see

\(^{1}\) During 1987-1997 donor support for the “knowledge triangle” of education, research and extension diminished. Agricultural education and training was only 2% of the Bank’s $4.8 billion investment in agriculture and rural development. Since 1998 only 3.1% of Bank lending for agricultural and rural development in sub-Saharan Africa went to post-secondary agricultural education and training. The World Bank is the largest investor in agricultural research and development, and yet the total loan commitment of US$ 2.2 billion in the research, extension and education portfolio for 2002 committed only one percent to education, and of this total loan commitment to research and development Africa received only 24 percent or approximately US$ 200 million (Rygnestad, Rajalahti and Pehu, 2005).
Hazel and Ellis at IFPRI, 2005: also Rosset, 1999; and cf. Blank, 2002). It is also the main source of income for large numbers of people and provides basic food subsistence for the majority of these populations (Sarris, 1990). While agricultural technology levels will play a substantial role in determining their welfare, the main limiting element for small farmers is lack of access to resources and other knowledge services such as agricultural education and extension. SSA is the only developing region in the world where food insecurity has worsened rather than improved in recent decades (Rosegrant, et al., 2005).

Today post-secondary agricultural education and training in SSA is returning to the World Bank investment portfolio after a long hiatus. But constraints of PSAET systems are even greater today than they were when investments were at a minimal level of financial support. Globalization of labor and product markets, the advances by and access to information and communication technologies, and socio-political transformations taking place in the world pose new challenges to PSAET systems in SSA. Together these press for the re-design of PSAET institutions so they may play a larger role in meeting the challenges of globalization.

3. Objective of the Report

The purpose of this report is to analyze the constraints and compare the potential contributions of the various providers of post-secondary agricultural education and training in selected countries. At the center of the report is the comparison of findings from the seven country studies – Cameroon, Ghana, Malawi, Mozambique, Rwanda, Senegal, and Uganda (summaries are presented in Annex 1). These are complemented by the principal investigator’s on-site assessments in three of these countries (Ghana, Senegal and Uganda) and a review of the relevant literature. Analysis of the case studies leads to a delineation of three main challenges that currently confront PSAET institutions. Further analysis, based on the implications of these challenges, leads to a major proposition: to expand PSAET

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2 Rosegrant et al. (2005) posit three policy scenarios likely to affect the supply of, demand for, and trade of crops: (a) the business as usual scenario that assumes a continuation of current trends; (b) the pessimistic scenario that envisions a future in which trends in agricultural production and nutrition deteriorate by comparison with business as usual; and (c) the vision scenario that shows what type of transformation will be necessary for Africa.
systems, reorient them to new labor market demands, and integrate them into a broader “workforce education system.”

Before moving to the body of the report, three short discourses are necessary in order to set the stage. The first presents concepts and definitions and stipulates how they are used in this report. The second reviews the institutional complexity of PSAET in SSA, highlighting the different system models that operate in SSA, the various contexts in which they operate, and the diverse post-secondary educational institutions that comprise these systems. The third discourse rehearses a broad view of agricultural education and training and introduces an “agricultural workforce” perspective.

4. Re-defining the Territory

This section examines a number of concepts, including PSAET and AET, agricultural knowledge and information systems (AKIS), agricultural innovation systems (AIS), strategic alignment, and policy. The PSAET “territory” needs to be broadened because the report indicates that although PSAET institutions are contributing to agricultural and human development, they could be doing much more. Yet these systems are entangled by impediments that prevent them from fulfilling their traditional goals of teaching traditional post-secondary students and – in the case of university faculties of agriculture – of undertaking research. PSAET institutions are also often challenged by the unemployment and under-employment situations in their countries where weaknesses in labor-market development limit the employability of graduates and slow the emergence of private agricultural businesses.

4.1 Definitions

AET and PSAET. This report distinguishes between agricultural education and training (AET) and post-secondary agricultural education and training (PSAET). Whereas the latter refers only to formal tertiary level institutions and systems that award diplomas, certificates or degrees to graduates, the former applies to all educational activities (non-formal and in-service, as well as formal) aimed at the agricultural sector.

In short, the concept of post-secondary agricultural education and training not only comprises the PSAET system, but can also reach beyond the formal PSAET system to include non-formal providers of “post-secondary” education and training, such as in-service training. The distinctions hinge on whether reference is specifically to the formal PSAET system and its “tertiary education” institutions or to AET as a whole, including secondary and post-secondary agricultural education.

PSAET is generally used throughout this report instead of “tertiary education.” For those who find the acronym cumbersome, the alternative would have been to say AET or post-secondary AET. The distinction between AET and PSAET is meaningful to this paper, however, because it is intended to signal that AET is part of the entire formal system of agricultural education that embraces secondary, tertiary, in-service, distance and lifelong components.
AET refers to institutions and courses of agricultural instruction at all levels and duration, from full-time to short-term and continuing education, while PSAET is specific to post-secondary institutions. This distinction is intended to underscore that the learning which occurs at the lower levels of the education system impacts specifically the attitudes toward agricultural education at upper levels, as well as those towards agriculture and agricultural development in general. Indeed, attention to National Teacher Colleges (NTCs) is also important when thinking about PSAET systems. NTCs prepare agricultural education teachers for primary and secondary education schools, and the acquired attitudes and understanding of NTC graduates have a direct impact on the attitude of younger students who might consider a career path in agriculture. Hence, NTCs deserve inclusion within the PSAET system because they have a significant role in the preparation of students who might consider entering agriculturally related occupations.

**AKIS.** An Agricultural Knowledge and Information System (AKIS) is the entire complex of public agencies and private sector organizations that generate new knowledge and provide agricultural knowledge and information services to producers and rural people. AKIS is often referred to as “the knowledge triangle” (Eicher, 2004; Rivera, et al., 2005).

![Agricultural Knowledge and Information System for Rural Development](image)

The central purpose of the AKIS system is to serve farmers, or what in this document are more aptly termed “agricultural producers”. Figure 2 does not point to other entities involved, such as government, private sector, civic society, support systems, markets, etc. Nor does this simplified diagram recognize the importance of AKIS to users and beneficiaries other than the rural producer. Conceptually it assumes the flow of information from the various “knowledge” institutions to those who can use it to improve agricultural development and rural livelihoods.

AKIS constitutes the knowledge support services that interact with other critical elements in developing agriculture. These elements include producers, agricultural development

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3 The minimum admission requirement for NTC teachers is often only the completion of study in chemistry and biology and the attainment of two principal passes. Agriculture is not a prerequisite except in the NTCs that prepare agricultural education teachers. Student teachers graduate with diplomas after a two-year course. As with PSAET institutions there is no data on placement.

4 Agriculture includes, for example: farmers, both monocroppers and mixed, animal breeders, foresters, and fisherfolk; therefore the term “agricultural producers” seems more inclusive and appropriate.
support systems (credit, inputs and supplies), and market opportunities – all of which are strengthened by government policy or weakened by its inadequacies. Figure 3 illustrates these critical links and places knowledge generation and knowledge communication services (research, extension and education) in the center as purveyors of information and training for farmers and other support service providers, as well as contributors to knowledge about market opportunities.

Figure 3. Critical Links

![Critical Links Diagram](https://example.com/diagram)


**AIS.** An Agricultural Innovation System (AIS) is aimed at producing, accessing and using knowledge in new ways to contribute to the creation of wealth and social well-being by “adding value to existing knowledge, resources and skills” (Hall, 2006). A social construct based on the industrial notion of National Innovation Systems or NIS, with roots in evolutionary economics (Balzat, 2002), AIS advances the concept of a sectoral innovation system (Breschi & Malerba, 1997). AIS suggests the idea of a line of attack where innovation is needed, whether in the technical, managerial, commodity or institutional arenas (Rivera, 2006).

The AIS framework from a knowledge triangle (AKIS) perspective is illustrated in Figure 4. In principle, AIS encompasses the major agricultural systems, including agricultural supply systems and the three major knowledge generation and dissemination processes (agricultural research, extension/advisory programs, and the agricultural education) or what is generally referred to as AKIS.

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5 Developed in the 1990s, the AIS framework is founded on a rather broad definition of “innovation” and stresses the potential value of linking a broad set of stakeholders, including the public and private sectors, as well as farmer-based organizations, bilateral agencies, and non-governmental organizations.
A composite agricultural knowledge system framework matters. The AIS concept urges national agricultural knowledge generation and communication systems toward the advancement of institutions and individuals that demand and supply knowledge and technologies. It also gives greater attention to the rules and mechanisms by which these different agents interact. At the top of Figure 4 is a reminder that, despite the present emphasis on the role of the private sector in agricultural innovations and development, the role of government continues to be a crucial element in policy formulation and agricultural sector regulation, particularly through its allocation of public funds and creation of specific incentives via its policy decisions.

**Strategic Alignment.** Strategic alignment refers to linking AKIS institutions with a view to mutual goal orientation (Rivera, 2006). It implies collaboration among public sector and private sector agricultural organizations, the rural sector’s agricultural producers, and other stakeholders with the shared aim of developing the agriculture sector and AIS initiatives in specific directions. Commitment by government to promoting strategic alignments – preferably in cooperation with private industry and producers – is required if AKIS institutions are to agree on the goals that guide agricultural development. Jointly deciding upon a set of goals and then acting to accomplish these goals is one way of getting the individual AKIS institutions to operate in concert in responding to the challenge of promoting new knowledge and fostering innovation.

**Policy.** Policy in this report refers to public policy, not to corporate or international policy. Public policy is the process by which values and resources are authoritatively allocated for a group or for society as a whole. It is the process whereby government determines to put forward measures to accomplish some goal. It generally implies the acquisition or expenditure of resources – whether in terms of extractive, distributive or other measures. Only a representative government can “authoritatively” act on behalf of the whole society, and everything the government chooses to do, or not to do, results in the “allocation of values and resources.” With respect to agricultural education in particular, and knowledge services in general, three main questions continually arise for policymakers: (a) what purpose(s) should be served, (b) how should the services be managed, and (c) how can the services be improved or changed for the better?

### 4.2 PSAET Complexity: Diverse System Models, Institutions and Contexts

**Diverse Models.** Most African universities were modeled on European universities. The two most important, according to Michelsen and Hartwich (2004) are the Anglophone (British) and Francophone (French) models. The British higher education system includes universities, polytechnics, and colleges. The French system tends to include universités (universities), instituts (institutes), and Grandes Écoles (higher schools). The “Grandes Écoles” are intellectually and socially selective; but they are usually not involved in research, although exceptions are the rule as in Mali (see: Institut de recherche pour le développement, 2004). In general, the variety of PSAET institutions in Anglophone and Francophone systems may be categorized according to (a) universities [universités], (b) agricultural colleges [écoles nationales], and (c) agricultural technical and vocational education and training centers [centres de formation professionnelle]. Although imperfect, this distinction should be helpful. An amalgam of the different perspectives in these diverse models suggests the common objectives of teaching, research, and outreach. It is this inclusive perspective that informs one of the main thrusts of the present study.

**Distinct Institutions.** The PSAET systems in the seven countries studied in this report encompass distinct institutions operating at different levels with separate mandates and organizational purposes, and include both public and private institutions. The systems embrace (a) faculties of agriculture (although these do not exist in all countries in SSA) and also faculties of agriculturally related subjects, such as rural sociology, forestry, fisheries, life sciences, and veterinary schools; (b) agricultural colleges; (c) agricultural
technical education and vocational training centers; (d) polytechnics; \(^7\) and (e) agrarian institutes.

It would be misleading to categorically lump all PSAET institutions together without distinguishing their differing status, purposes and clientele. Policies that strive to treat all universities equally are unlikely to be particularly cost-effective (Beitema et al., 1998), and the same may be said for the other sets of institutions in the PSAET hierarchy.

An analysis of the country case studies tends to reveal considerable policy emphasis on the role and potential of universities, less on agricultural colleges, and very little on agricultural TVET centers, polytechnics and agrarian institutes – although there are exceptions. This bias reflects a tendency to give preference to those institutions at what might be called the top of the PSAET “hierarchy” of institutions. Consequently, agricultural education in most countries accords greater importance to degree-oriented education than to practical training. As a result, the acquisition of conceptual information is emphasized over the gaining of skills and competencies.

Comparing the data gathered from the seven studied countries reveals considerable variation within the above categorization. The system models differ from Anglophone and Francophone models to Portuguese and American models. The functions of the distinct PSAET institutions may also differ. For example, faculties of agriculture in the universities either may not exist or co-exist with other related faculties, such as faculties of forestry or simply agriculturally related departments such as Plant Biology, Animal Biology, Sociology or Geography, and Schools of Medicine and Veterinary Sciences. Acknowledging these differences, the present report seeks to discern the common constraints faced by these various institutions and to explore their collective potential to contribute further to human and agricultural development.

4.3 The Agricultural Workforce: Spanning Three Education Sub-Systems

PSAET system complexities also prompt questions not only about its purpose but its clientele. In some countries PSAET institutions cater entirely for traditional student populations (i.e., the 18 – 24 year old cohort). But in others, post-secondary training centers embrace a wider audience, including farmers, fisher men, breeders, professionals and artisans. The first part of this report has concentrated on PSAET systems and institutions, but now it begins to encourage thinking beyond the “post-secondary” hierarchy to consider the agricultural “workforce” and its education needs. The latter proposition seeks to expand the boundaries of the target audience for agricultural education by recognizing the need to upgrade the capacities of adults already in the agricultural workforce or in enterprise development, in addition to educating students (Payne, Forrester, & Ward, 1993).

\(^7\) Two new polytechnics were established in Mozambique in 2006 to train people with vocational competencies in agriculture.
In Figure 5, the “workforce education” concept is illustrated, using three columns. The first refers to **formal agricultural education** covering the formal school institutions, including PSAET institutions. The second column covers **in-service (job-oriented) training** operating in both public agencies and private organizations – and for the individual may bring in vocationally-oriented self-directed learning (Clardy, 1992). The third column includes **non-formal agricultural education and training**, broadly conceived to embrace a variety of educational programs aimed at diverse tasks, such as upgrading the knowledge base of farmers and professionals, strengthening farmer organizations, or lifting the horizons of secondary students and out-of-school youth to engage their energies in agricultural development. This inclusive approach to education is consistent with the present worldwide trend toward lifelong learning and just-in-time instruction in order to foster and maintain national competitiveness in the global economy.

Formal and non-formal agricultural educational sub-systems are independent in principle, but not always in fact. Today it is not uncommon for public servants in the ministry of agriculture, employees in a private sector company, and NGO extension agents to be enrolled in a higher education distance learning program and at the same time be receiving in-service training. Or they might participate in a nonformal “how-to” training program. In Uganda, for example, Sasakawa Global 2000 provides fellowships to community extension workers so they can pursue degree education in agricultural extension at Makerere University. These fellowships target mid-career extension workers who have practical skills but lack academic training. The fellows are released from their employment duties for two years or so on condition of returning to their position with, of course, the expectation of promotion.

Non-formal agricultural education and training programs include various knowledge sources, such as specialists, peers, information resources and communications technologies (ICTs), radio and mass media, as well as knowledge providers, such as district, bilateral and NGO professional and technical training programs. Some PSAET institutions – through their continuing education centers and their community outreach programs – are also involved in training programs for agricultural professionals, vocational technicians and producers.

Figure 5 takes a broad view of post-secondary agricultural education and training. It is *not* intended to suggest equivalency of education expertise or quality, nor comparable purposes or type of education. But it *is* intended to highlight the connections that might be, and should be, forged by the PSAET institutions in exposing students to the various arenas of agricultural knowledge generation, exchange and development.

This broad view of agricultural education and training helps clarify the rationale in this report for expanding the concept and practices of PSAET systems. In its totality, Figure 5 represents a comprehensive “workforce education system” in which agricultural and agriculturally related education is directed toward human capital development within the agricultural workforce for the purposes of agricultural development. The “workforce” in this case includes teachers and students engaged in agricultural study and outreach; public and private directors, administrators and delivery personnel already employed; and also (but not least) agricultural producers and professionals operating in the agricultural domain.
5. Comparison of Findings from Seven Country Case Studies

The comparative analysis in this section is based on the findings from the seven country studies that are summarized in Annex 1. This analysis concludes by identifying three main challenges for PSAET systems in Sub-Saharan Africa. These challenges are then discussed in Section 6.

5.1 The Organizing Issues in the Seven Country Studies

The country studies are rich in historical detail, institutional descriptions, and discussion of the constraints and potential of PSAET systems in SSA. On balance, they emphasize a generally distressed situation and common emerging trends. The seven selected countries are different in many ways but share some similarities. Some have suffered through relatively recent civil conflicts. Some have experienced major economic and agricultural crises. Others have endured natural disasters that have affected life and livelihoods. In some cases, reforms have been introduced, not so in others. Some stress the specifics of
PSAET institutions as they exist, while others envision not only an expanded system but one that incorporates multi-functional producer and professional education for the rural sector. Although some authors confine their study to PSAET, others address the importance of connecting PSAET institutions with secondary schools, as well as with other AKIS institutions and government innovation targets.

The summary of each country’s findings is organized according to six issue areas (see Annex 1). These are used in Section 6 to provide a framework for specific reform implementation measures. No attempt is made to analyze the countries in terms of size, GDP or other macro-economic and social concerns. Rather, the summaries highlight each study’s major findings with a view to clarifying commonalities and constraints in the individual country PSAET systems.

The Organizing Issues. Six issue areas are considered critical for PSAET development and change. They include:

- **Policy and Funding**, which provide the basis of national PSAET strategy and support that strategy with mandates and financial commitments for institutional capacity building, human capital development, and agricultural advancement;
- **System Governance**, which covers structural arrangements, institutional pluralism, accountability and stakeholder representation;
- **Human Capacity Development**, which includes graduate output along with teaching and staff training to modify teaching methods and maintain curriculum relevance;\(^8\)
- **Curriculum Development**, which is concerned with provision of current knowledge of direct relevance and the inculcation of professional competencies;
- **Institutional Linkages**, which include collaboration with sister PSAET institutions, with external organizations, and with regional and global agricultural knowledge networks, as well as “strategic alignment” of the knowledge-triangle institutions (AKIS) and their further alignment with agricultural innovation goals (AIS); and
- **Physical Infrastructure, Equipment and Communications Technology**, which refers to buildings, laboratories, instructional farms, libraries, internet access, and computer availability.

The ways that PSAET institutions engage the above issue areas appear to determine the extent to which the PSAET systems may advance in some counties while others maintain an outmoded orientation to the demands of today’s global economy and current opportunities for agricultural trade. The following comparative analysis is therefore organized around these six issue areas.

\(^8\) For international communications on training courses and connections, see “The Drum Beat” [http://www.comminit.com/training2006.html](http://www.comminit.com/training2006.html)
5.2 Comparative Analysis of the Seven Countries: Trends and Common Problems

The following comparative analysis of the seven countries highlights trends and common problems as a prelude to discussion of the three challenges that will follow in Section 6. Please note that the figures on numbers of graduates are not comparable since in some cases several institutions are counted and in others only one or a few. Also, where table cells have been left empty, this means that information was not provided or could not be inferred.

5.2.1. Government Policy and Funding

In some cases, policies exist on paper but are not implemented. If PSAET systems are to overcome the current constraints being felt by universities, agricultural colleges, polytechnics and other post-secondary institutions, it will only be done by virtue of explicit policy attention and associated funding. While some may argue that PSAET institutions in SSA should strive towards equivalence with their counterparts in developed countries, this report contends that, on the contrary, these institutions should be re-conceptualized into a larger framework that responds to prevailing country circumstances.

Post-secondary knowledge systems can become immediate contributors to a nation’s agricultural innovation system by cultivating the critical links illustrated earlier in Figure 3. To achieve such benefits requires government policy initiatives that orient post-secondary institutions to concrete agricultural goals, especially those associated with agricultural innovations, and hold institutional staff accountable for their performance in this arena.

In official policy documents, PSAET institutions are often left to infer their roles under the aegis of sector-wide agricultural policies – whether these policies seek to promote food security (e.g., Ghana), or agriculture as a business for smallholders (e.g., Uganda). On balance, explicit policies for PSAET system development tend to be lacking or else scattered among various ministry mandates. As a result, conscious policy attention to the outputs that PSAET institutions are expected to contribute to agricultural policy objectives holds out the promise of noticeable benefits.

A related concern regarding policies for education and agriculture is that agriculture is generally considered part of economic policy while education is seen as social policy. This is a false dichotomy. Not until agricultural education is tightly linked to agricultural innovation and development will PSAET be fully appreciated for its potential to contribute to economic growth.

The main elements of government agricultural policy in relation to post-secondary agricultural education and training are highlighted in the following Table A1.

<table>
<thead>
<tr>
<th>Policy Element</th>
<th>Cameroon</th>
<th>Ghana</th>
<th>Malawi</th>
<th>Mozambique</th>
<th>Rwanda</th>
<th>Senegal</th>
<th>Uganda</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural policy mandate PSAET</td>
<td>Conduct activities of 'knowledge triangle' to support high level skilled (rural) manpower (FASA)</td>
<td>PSAET system to support agric policy aimed at food security</td>
<td>Teach, conduct research and outreach activities.</td>
<td>Teaching, research and extension</td>
<td>Positive national plan and Min/AG policy but no goals set for PSAET institutions.</td>
<td>No specific PSAET mandate. Absence of Faculties of Agric in the two main universities</td>
<td>Teach and conduct research in agriculture and related sciences (Makerere Univ.) Support agric policy for small producers and agribusiness.</td>
</tr>
<tr>
<td>PSAET objectives</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Explicit PSAET Policy</td>
<td>None (positive policy only in FASA teaching)</td>
<td>Scattered in different documents; not clearly communicated</td>
<td>Not clearly spelled out by the govt.; Bunda College has developed its own policy</td>
<td>None, but pluralistic agric. policy environment</td>
<td>None</td>
<td>None</td>
<td>Positive policy in the form of National Agricultural Education Policy.</td>
</tr>
<tr>
<td>Coordinating body for PSAET</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Current agric policy reforms</td>
<td>Slow</td>
<td>Slow (sometimes unsuccessful, leading to closing of colleges)</td>
<td>Slow (sometimes unsuccessful, leading to closing of colleges)</td>
<td>Reform in place, but slow moving</td>
<td>Reform underway, but PSAET not responding (due to resource constraints)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
PSAET Funding Situation

The country studies find an across-the-board shortage of funds for PSAET institutional capacity building, including staff training, student accommodations, laboratories, computers and computer facilities, and other teaching equipment. The PSAET funding situation for each country is summarized in Table A2.

Some studies state that donors tend to keep shifting gears. An initial investment to support a particular development objective is often not allowed the time required for it to be achieved before another priority is adopted that siphons off funds from the original initiative. The argument is that donors change their priorities so frequently that no priority is maintained long-term.\textsuperscript{9} This “forcing function,” whereby priorities are imposed from the outside, might usefully be reviewed. Ways need to be found to protect well thought through government priorities from being undermined by new donor initiatives.

Table A2. PSAET Funding Situation in Selected Countries, 2006.

<table>
<thead>
<tr>
<th>Country</th>
<th>Cameroon</th>
<th>Ghana</th>
<th>Malawi</th>
<th>Mozambique</th>
<th>Rwanda</th>
<th>Senegal</th>
<th>Uganda</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yearly expenditure per student</td>
<td>$727</td>
<td>$561 to $895</td>
<td>$1,633</td>
<td>BSc: $558-986 MSc: $2,600</td>
<td>$2,551</td>
<td>$856 to $3,846</td>
<td>$559 to $1,186</td>
</tr>
<tr>
<td>Funding Sources (Main source: government)</td>
<td>Govt. (low and med. level education); govt. and research institutions (FASA)</td>
<td>Govt., donors, students consulting</td>
<td>Govt., donors, students</td>
<td>Govt., Donors, (UEM)</td>
<td>Govt., donors, students</td>
<td>Govt. sponsors only undergraduates at Makerere. Donors help students (through short courses and private students)</td>
<td></td>
</tr>
<tr>
<td>Govt. funding for research and extension</td>
<td>None</td>
<td>Limited</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Government (a) Scholarships; and (b) loans for students</td>
<td>(a) None at low and medium levels</td>
<td>(b) loans for fee payment</td>
<td>(a) large number of scholarships</td>
<td>(a) Few (for female undergraduates only in Makerere)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Figures do not include Polytechnic Institute of Chokwe as it opened in 2006.

\textsuperscript{9} Recently there has been a commitment by donors to make country priorities more important than donor priorities and to harmonize monitoring and evaluation systems among each other and align them with country-owned systems (ref. the Paris Declaration on Aid Effectiveness, February 2005). This does not however address the issue of “long-term” priority commitments. See http://www1.worldbank.org/harmonization/Paris/FINALPARISDECLARATION.pdf
Need for a National Strategy. With respect to policy mandates and funding commitments, this report concludes that governments would benefit from developing national PSAET strategies aimed at advancing PSAET contributions to human capital for agricultural development, especially through collaborations supporting agricultural innovation. Such strategies would also require attention to issues of institutional governance.

5.2.2. Governance

Governance of public institutions is generally centralized at the national level in SSA, which means that decision-making and approval authority remain within the central government. NEPAD’s Council of Higher Education argues (2001), “the governance of the universities has been assumed almost entirely by the state, often with political intervention with respect to student selection, faculty appointments and promotions, curriculum design, etc.”

Government continues to be the main source of funding despite some incipient efforts (Senegal and Uganda) toward decentralization. Notably, Uganda has decentralized much of its agricultural extension services to district level with the proviso that funds be distributed to farmer associations so that they will have the resources to directly hire extension service providers. However, no plan exists for upgrading extension workers once they become dependent on private funds. Uganda’s PSAET system is not yet decentralized.

In most cases, faculties of agriculture and agricultural colleges fall under the joint authority of education and agriculture ministries. Formal responsibility for PSAET institutions is often unclear. Therefore neither ministry pays enough attention to the development of agricultural education. In Ghana, for example, the Ministry of Education displayed little knowledge of the agricultural education situation within its tertiary institutions.

Another aspect of this problem is that some PSAET institutions are located under the Ministry of Agriculture and others are placed under the Ministry of Education. This makes coordinated policies and funding nearly impossible. Too often, agricultural education fails to attract explicit policy attention because it falls “between the cracks” of agricultural policy and educational policy. One solution may lie in providing greater autonomy to the institutions, and equipping them with governing councils that include representatives of both ministries, plus those of other stakeholders.

The country case studies tend to agree that reform measures are needed that involve both public and private sectors in supporting knowledge-providing institutions. Such measures would likely require change in PSAET governing boards and other internal mechanisms, involving new stakeholders in the oversight of PSAET institutions.

A summary of current governance structures for PSAET in the country studies is given in Table B.

10 See Turner & Hulme, 1997:151 ff., their chapter on “Decentralization within the State: Good Theory but Poor Practice”.

16
Table B. PSAET System Governance in Selected Countries, 2006.

<table>
<thead>
<tr>
<th>Governance</th>
<th>Cameroon</th>
<th>Ghana</th>
<th>Malawi</th>
<th>Mozambique</th>
<th>Rwanda</th>
<th>Senegal</th>
<th>Uganda</th>
</tr>
</thead>
<tbody>
<tr>
<td>Centralized</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Fragmented</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decentralizing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X (reforms in place)</td>
<td>X (reforms in place)</td>
</tr>
</tbody>
</table>

5.2.3. Capacity Building

- **Academic Staff and Teachers**

The country studies document a steady decrease in academic staff and a steady increase in student enrolments (e.g. Cameroon, Ghana, Rwanda and Senegal). Although the number of teachers has not kept pace with student enrolment, teacher-student ratios tend towards inefficiency in many PSAET institutes. In all countries, qualified teaching and administrative staff are in short supply. A sizeable percentage of academic staff positions remain unfilled in many institutions. In addition, qualified academic staff will be needed to keep pace with the rapid growth in post-secondary enrolments, especially in countries where the demand is high (e.g., Senegal). Opportunities for postgraduate study that might increase staff numbers are extremely limited, as are occasions for staff training that might keep their knowledge current and result in curriculum changes. The current AET staffing situation in the countries studied is presented in Table C1.

Public-private partnerships and public support for selected educational services from private firms are frequently mentioned in the country studies as a way of addressing the staffing shortfall. The public sector holds the key to policy reform directives requiring new or revised public policy vision. Only the public sector, i.e., national governments, with the concerted help of their sub-governments, can assume these responsibilities.

As the cost of PhD programs has risen, some universities, Makerere in Uganda for example, establish “sandwich courses” with other universities as a cost-efficient approach to staff development. This appears to work well for advanced PhD students, who pursue joint PhD programs with universities such as Wageningen in the Netherlands and EARTH University in Costa Rica.

The studies suggest that faculties and administration of PSAET institutions would benefit through sharing with, and learning from, other regional and international knowledge sources. Such an exchange of knowledge would help to ensure that academic staff maintain their technical capacities as new knowledge and technologies become available. In this
regard, the World Bank might consider working with governments to convene Consultative Strategic Planning Workshops that bring together participants from the various universities and agricultural colleges in each major sub-region of Africa to discuss how best to develop post-secondary AET institutions.

In some cases, academic staff do not possess the right mix of skills for training contemporary students in agriculture. The studies note that many faculties of agriculture do not have practical experience in business management or skills application, nor in related business development and social skills. Some universities and colleges appear to have begun to grapple with the challenge of imparting practical skills of direct relevance to students interested in working with agri-business, such as managerial and social skills in dealing with rural communities. For their part, administrators and faculty point to additional deficiencies involving staff development, instructional farms, student accommodations, teaching materials, laboratory equipment, computers, and financial sponsorship of students.

Institutional Record Keeping. A straight-forward but critical need for PSAET systems is systematic record keeping, including qualitative data, kept up-to-date on an annual or at least biennial basis. This would make the task of determining the strong and the weak spots in the systems, and what perhaps needs immediate assistance, more manageable than it is at present. Better record keeping would allow researchers to follow the improvements and declines in the system and to determine whether these occurred consciously or were due to unexpected events.
### Table C1. Situation of PSAET Academic Staff and Teachers in Selected Countries, 2005/2006

<table>
<thead>
<tr>
<th></th>
<th>Cameroon</th>
<th>Ghana</th>
<th>Malawi</th>
<th>Mozambique</th>
<th>Rwanda</th>
<th>Senegal</th>
<th>Uganda</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher-Student Ratio</td>
<td>1:11 for FASA</td>
<td>1:11</td>
<td>1:10</td>
<td>1:8 **</td>
<td></td>
<td></td>
<td>1:12</td>
</tr>
<tr>
<td></td>
<td>(1:6 Bunda; 1:26 NRC)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experience of teachers (years in current job)</td>
<td>Inexperienced</td>
<td>15-20 yrs</td>
<td>1-5 yrs (for 77% of teachers)</td>
<td>≤ 6 yrs</td>
<td>No higher agricultural education faculty</td>
<td>20 yrs; 2-20 yrs (Makerere)</td>
<td></td>
</tr>
<tr>
<td>Education of Teachers (figures represent percentage of teachers with that degree)</td>
<td>Inadequate education (low and medium levels); FASA: 64% (PhD)</td>
<td>41% (PhD); 42% (MSc)</td>
<td>24% (PhD)</td>
<td>14% (PhD)</td>
<td>7% (PhD)</td>
<td>42% (MSc)</td>
<td>43% PhD (Makerere) 44% MSc</td>
</tr>
<tr>
<td>Evaluation of Teaching Programs &amp; Lecturers</td>
<td>None</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Teacher Salaries</td>
<td>a) Low</td>
<td>a) Low</td>
<td>a) Low</td>
<td>a) Low</td>
<td>a) Low</td>
<td>a) Low</td>
<td>a) Low</td>
</tr>
<tr>
<td>b) Dual employment</td>
<td>a) Low</td>
<td>b) Yes</td>
<td>a) Low</td>
<td>b) Yes</td>
<td>a) Low</td>
<td>b) Yes</td>
<td>b) Yes</td>
</tr>
<tr>
<td>Workshops and Seminars for Teachers</td>
<td>Yes, but not regular</td>
<td>Depends on grants</td>
<td>Yes, but not regular</td>
<td></td>
<td>Yes, but not regular</td>
<td>Depends on grants</td>
<td></td>
</tr>
</tbody>
</table>

** Figures do not include Polytechnic Institute of Chokwe as it opened in 2006.

*** Figures do not include Polytechnic Institute of Chokwe as it opened in 2006.
In the countries studied, it appears that most teaching in agricultural education is comprised of “chalk and talk” presentations of theory and facts. As a result, students often have little opportunity to develop technical competencies or job skills prior to seeking employment. For example, the survey reveals that hands-on training experiences for students are minimal, study work placements are limited but receiving increased attention, and that no country offers job placement services to graduating students (see Table C2).

The studies all emphasize the need to increase practical learning methods through direct student contact with development operations (farmer organizations, NGOs, bilateral organizations, agribusinesses, etc.). Ideally this should involve some form of student placement or internship. Such collaboration will require new attitudes by academic staff and students, as well as by senior officials who decide on staff promotion and tenure.

Unfortunately, PSAET institutions do not maintain student tracking systems. Thus, no follow-up data can be found on students after they graduate. The Malawi study emphasizes that such student tracking systems are needed. These databases would enable periodic “tracer studies” of graduate performance on the job, help to build a network of alumni who might be a source of possible partnerships, and facilitate the involvement of former graduates in classroom teaching, field trips and student career orientation.

A particularly worrisome trend among students is the spread of negative attitudes towards agricultural careers. Both students and parents tend to equate agriculture with farming, and to see it as a dead-end in terms of employment aspirations. Thus, “change of attitude towards agriculture” is critical, according to the Uganda National Agricultural Education Policy document. The reference here is in part to primary and secondary schools that treat agriculture as “a punishment,” and deter students from considering agriculture as a business. This is a relevant and important area of concern as the knowledge and attitudes of secondary teachers will certainly influence students who might continue education in an agricultural specialty.
### Table C2. Capacity Building - Students

<table>
<thead>
<tr>
<th></th>
<th>Cameroon</th>
<th>Ghana</th>
<th>Malawi</th>
<th>Mozambique</th>
<th>Rwanda</th>
<th>Senegal</th>
<th>Uganda</th>
</tr>
</thead>
<tbody>
<tr>
<td>Job Placement Services</td>
<td>None</td>
<td>Some</td>
<td></td>
<td></td>
<td>None</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Hands-on Practical Training Emphasis</td>
<td>Inadequate (due to resource constraints)</td>
<td>Inadequate (due to weak linkages between AKIS components)</td>
<td>Inadequate (due to lack of field equipment)</td>
<td>Inadequate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student Placements</td>
<td>Pvt. Sector, own enterprises; option of automatic employment with public service no longer available</td>
<td>Min. of Food and Agriculture, Teaching, financial institutions, NGOs</td>
<td>Pvt. Sector, (self employment being encouraged)</td>
<td>Pvt. Sector, NGOs and public extension (at diploma level)</td>
<td>Students seeking higher agric ed. must go abroad to study</td>
<td>Public service (majority), research institutes, donor funded projects, NGOs, private sector</td>
<td></td>
</tr>
</tbody>
</table>

* Note: the figures on numbers of graduates are not comparable since in some cases several institutions are counted and in others only one or a few.

**** Figures do not include Polytechnic Institute of Chokwe as it opened in 2006.

### 5.2.4. Curriculum Development

The studies consider imperative that PSAET institutions produce “graduates” with knowledge and skills relevant to the opportunities provided in the labor market. Because labor market opportunities are becoming more diverse, curricula will need to adjust in response. The content of teaching, assignments and practical work will need to differ depending on whether students are interested in agricultural extension and advisory services with the public or non-governmental sectors, commercial production or input supply with agri-business, agricultural education/teaching, or contemporary scientific knowledge for a career in agricultural research.

*Teaching Approaches and Methods.* Curriculum and teaching methods tend to be traditional lecture methods, with little practical training to meet needs of agricultural labor market – although the ISAE in Rwanda appears to be a notable exception. All of the studies underscore the need for new teaching methodologies, such as “learning by doing,” where the student is the center of attention and the teacher becomes facilitator.
The World Bank argues that rapidly changing market conditions require a major shift in the content of agricultural education from a production to a market orientation. This is especially critical given the current need to “substitute growth through increased input use” with “growth driven by a more knowledge-intensive agriculture” (World Bank 2004:13-14).

**Accountability.** In the field of education three main types of accountability systems are found (Anderson, 2005): (a) compliance with regulations – the current situation in most PSAET institutions in SSA; (b) adherence to professional norms – the situation with a few PSAET institutions in SSA; and (c) results-driven performance in terms of student learning – the recommendation put forward later in this report.

**Labor Market Monitoring.** The country studies underscore PSAET system shortcomings with regard to labor-market preparation, but in fact the labor market for agriculturally oriented professions is not well understood. Research into the labor market realities of individual countries is needed in order to track changing human resource needs in the agricultural sector, to align the profile of human resource outputs with the agricultural development strategy of each country, and to ensure that students are not prepared for jobs that do not exist.

An illustration underlines this point. “In recent years,” according to a press release by the Kilimo Trust, “investment in private sector agriculture in East Africa has been very limited, despite the fact that East Africa’s agriculture sector has many entrepreneurs with good ideas for building successful businesses. A lack of access to finance and technical assistance has meant that many businesses have been unable to expand. This in turn has resulted in a failure by the private sector to adopt improved technologies, products and services to the agriculture sector, which acts as a key constraint on rural job creation, development and food security” (Kilimo Trust, online).

**Agribusiness.** Expansion of business-oriented agriculture curricula is the *sine qua non* if PSAET institutions are to meet the presumed need for competent graduates to advance agricultural business development. If SSA governments examine and act on the basis on a cross-sectoral perspective of agriculture and agribusiness development, as the World Bank proposes (2000), then the contribution of PSAET systems can be critical in supporting and enhancing the process of economic and social advancement.

The PSAET leadership has a formidable task in seeking to shift from traditional production-oriented curricula to a more diversified and demand-responsive set of course offerings that also incorporate modern pedagogical methods. Although the science/knowledge/research challenge remains a major priority, especially for universities, a business-based approach is also needed. This will require new understandings of what entrepreneurial producers and agri-businessmen need to know and the skills they will have to master.

Incentives cited in the studies for promoting staff and student development toward agri-business include the following:
a. Upgrade the knowledge, skills and attitudes of faculty through faculty development programs, with understanding that the upgrading is intended to result in course development and curriculum revision as well as changes in teaching techniques that utilize adult education and other practical orientations to student learning.

b. Provide opportunities for faculty to work directly with agri-business firms to tailor courses to include skills relating to particular agri-business needs.

c. Encourage agri-businesses to promote apprenticeship and internship programs and to sponsor students in their business area(s) of interest. This might also eventually involve businesses in providing scholarships and endowments for students who would be interested to work for a fixed period of time in the company providing the scholarship or endowment.

d. Instead of graduates undertaking special project papers before graduating, some might develop agri-business plans. These plans might then form part of a competition and the three or four plans judged best at the end of each semester, or year, would be provided a recognition award, perhaps including a cash reward. [These plans might be especially practical for students who seek to become self-employed and expect to use the plan to acquire funds from banks for entrepreneurial credit.]

e. Familiarize academic staff with local and foreign agricultural businesses and develop relationships with selected agricultural entities. Staff might then invite agri-business personnel to the classroom, or have classes visit companies, to discuss specific technical and managerial processes operative in that business.

New Education Technologies. Digital technologies (distance education, e-learning, and course management systems)\textsuperscript{11} offer considerable potential for in-service staff development, knowledge upgrading, or just-in-time learning. Some regional initiatives have developed, such as the African Virtual University, but distance-education initiatives are not yet contributing significantly to increasing access to higher education in SSA, a need that is becoming more urgent given the overload on academic staff in traditional classrooms.

An overview of key curriculum characteristics in the case study countries is provided in Table D.

\textsuperscript{11} See: A Safari; P. McGee; & C. Carmen; (2006); Managing Courses Defining Learning: What Faculty, Students, and Administrators Want; \textit{Educes}, July-Aug., 50-70.
Table D. Curriculum Characteristics in Selected Countries, 2006.

<table>
<thead>
<tr>
<th></th>
<th>Cameroon</th>
<th>Ghana</th>
<th>Malawi</th>
<th>Mozambique</th>
<th>Rwanda</th>
<th>Senegal</th>
<th>Uganda</th>
</tr>
</thead>
<tbody>
<tr>
<td>Curriculum</td>
<td>Inflexible and outdated</td>
<td>Inflexible</td>
<td>Traditional teaching methods</td>
<td>Has evolved with changing circumstances; emphasizes field practices</td>
<td>Limited work-study Continuing educ. prog. not available</td>
<td>Overload of students; not enough facilities or teachers.</td>
<td>Emphasizes practical training</td>
</tr>
<tr>
<td>Labor market needs</td>
<td>Not met adequately</td>
<td>Not met adequately</td>
<td>Not met Adequately</td>
<td>Not met adequately</td>
<td>ISAE curricula oriented to labor market</td>
<td>Not met adequately</td>
<td></td>
</tr>
<tr>
<td>Incorporation of indigenous knowledge</td>
<td>No</td>
<td>To some extent</td>
<td>Adequately</td>
<td>Adequately</td>
<td>ISAE curricula oriented to labor market</td>
<td>No inter-disciplinary study</td>
<td></td>
</tr>
<tr>
<td>Elective courses</td>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Yes (except Bukalesa)</td>
</tr>
</tbody>
</table>

5.2.5. Institutional Linkages

In a knowledge society, institutional linkages are vital for PSAET development. Three types of linkages are desirable: (i) with other PSAET institutions in the same country; (ii) with the national AKIS and AIS systems; and (iii) with regional and international knowledge networks (e.g., CGIAR). Horizontal linkages between AET institutions, especially between the weaker colleges and the stronger university faculties, can help to offset shortcomings at each to mutual benefit. Likewise, vertical linkages down to target populations, and up to regional and international knowledge networks can enable PSAET institutions to ground their teaching in rural realities while keeping abreast of new knowledge generated by the global scientific community. To some extent, the ability of PSAET institutions to tie into larger knowledge networks is one of the differences between a purely AKIS approach and a combined AKIS-AIS approach.

AKIS linkages have been the subject of much discussion (Kaimowitz, 1990; Crowder & Anderson, 1996; Eponou, et al., 1999; and many others). ISNAR during the 1980s and 90s produced a pile of documents two feet high just on linkages between research and extension. But the underlying question is not “linkages,” but linkage for what purpose? The paucity of strategic thinking on this question is perhaps the reason why linkages have not improved as much as desired over the many years that the subject has been treated.

The present report suggests that one major purpose for developing AKIS linkages should be for the PSAET systems, national research organizations, and extension-type services to contribute together to the promotion of agricultural commodity and technical innovations. For that to happen, “strategic alignment,” referred to in the definitions section of this report, is necessary for the three knowledge systems to work towards mutually agreed-upon priorities and goals determined within the larger needs of an agricultural innovation agenda.
Collaboration with other PSAET institutions as well as with research bodies, farmer groups and other production and development associations can benefit faculties of agriculture and teachers in agricultural colleges. Short courses of continuing education can be designed to update extension officers knowledge and to qualify extension staff for career advancement. Continuing education might, whenever possible, make use of farmers associations, graduate associations, NGOs, commercial enterprises and research extension centers (Crowder et al. 1998).

Demand-Oriented Research. Universities are not yet engaged in demand-oriented rural research. One study recommends university researchers to collaborate in teams with national agricultural research organizations (NARO) and other agricultural researchers. Indeed, in Uganda a system of competitive research grants has been initiated which promises to encourage university research as well as university research projects with NARO researchers.

Regional and International Linkages. Linkages to regional and international knowledge resources also contribute in various ways to the advancement of PSAET systems, e.g. through information on funding opportunities, through databases on new developments in knowledge and technology, and through maintaining contact with researchers sharing research interests. Such linkages, now so accessible through the internet, provide connections that can serve in developing research, modifying curricula, and providing information on outreach programs that have contributed to professional and community development. When vertical linkages reach down to target populations and then up to national, regional and international knowledge networks, the possibility is created of a combined AKIS/AIS approach. At present, however, such linkages are relatively rare in practice. Table E summarizes the case study findings with regard to institutional linkages.

Outreach. Several studies recommend the establishment of outreach centers or programs. In particular, one priority suggestion is that PSAET institutions help farmers organize into special interest groups. Notably, RUFORUM, a consortium of twelve Eastern and Southern Africa universities, submitted in 2006 a proposal to Kilimo Trust for the universities in their consortium to engage in outreach programs to strengthen farmer institutions and linkages to research.

Most of the seven country studies call for PSAET systems to cooperate in upgrading extension (advisory) service agents and other agricultural professionals. Mentioned also is the benefit of universities becoming involved in programs for secondary teachers and students to advance their knowledge about modern trends and developments in agriculture and life sciences. Of interest is Senegal’s previous experimentation with a program to engage out-of-school youth in practical aspects of agricultural and supply-chain development – which was dissolved for lack of funds.

12. Ruforum (Regional Universities Forum for Capacity Building in Agriculture) was initiated in 1991 as “Forum” by the Rockefeller Foundation to enhance graduate training at MSc. level. In 2004, it was transformed into RUFORUM, and operates in Kenya, Malawi, Mozambique, Tanzania, Uganda, Zambia and Zimbabwe. Ruforum is owned by a consortium of 12 Universities with a Regional Secretariat located in Uganda.
Table E. Institutional Linkages among PSAET Institutions in Selected Countries, 2006.

<table>
<thead>
<tr>
<th>Local and AKIS linkages</th>
<th>Cameroon</th>
<th>Ghana</th>
<th>Malawi</th>
<th>Mozambique</th>
<th>Rwanda</th>
<th>Senegal</th>
<th>Uganda</th>
</tr>
</thead>
<tbody>
<tr>
<td>No direct or long-term links w/ public or private research, or w/ agric. and professional organization</td>
<td>Poor PSAET links with research institutes and agric industry.</td>
<td>Poor (esp. with private businesses); poor NRC linkage with research institutes; poor Bunda linkage with extension.</td>
<td>Limited links between education, research and extension.</td>
<td>Formal, but no real links with AKIS institution</td>
<td>Little collabor. among institutions. At best, personal links promoted from fear of losing funds.</td>
<td>Poor PSAET links with research institutes, extension, pvt. business, and producer organizations (at college level and Gulu).</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Regional linkages</th>
<th>Lacking</th>
<th>Poor</th>
<th>Lack of inst. networking</th>
<th>Some, with universities</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>International linkages</th>
<th>Few</th>
<th>Some, with NGOs and universities abroad</th>
<th>Some, with universities abroad (underway)</th>
<th>Some, NGOs and universities abroad</th>
<th>Minimal</th>
<th>Students link with universities abroad</th>
<th>Some, with international organizations and research institutes, sandwich courses</th>
</tr>
</thead>
</table>

5.2.6. Physical Infrastructure, Equipment and Technology

To visit university faculties of agriculture and agricultural colleges is to see serious deficiencies in teacher and administration facilities, student accommodations, instructional farms, laboratories, and classrooms. Working conditions and the study environment, to put it mildly, are less than inviting. Equipment is either old, worn-out or conspicuous by its absence.

School buildings, laboratories and instructional farms are either widely deteriorated or absent altogether. Modern teaching tools, such as computers, conference software and distance education software are either rudimentary or non-existent. While student cost-sharing is sometimes advocated for computer use, one study (Malawi) notes that the introduction of cost-sharing measures led to a reduction in student use of the internet.

Computer Access. Frequently only one or two computers can be found at agricultural colleges, and they are generally used to maintain administrative records. Students and even faculty often have little or no right to use these “administration” computers for learning purposes. Even if one or two computers could be made available to students and staff, no funds are provided for accessing the internet or other learning tools. In agricultural colleges, the so-called “digital divide” is more often a gaping chasm.
Table F. Status of Physical Facilities, Equipment and Information Technology

<table>
<thead>
<tr>
<th></th>
<th>Cameroon</th>
<th>Ghana</th>
<th>Malawi</th>
<th>Mozambique</th>
<th>Rwanda</th>
<th>Senegal</th>
<th>Uganda</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lacking in library materials</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Degradation of work conditions; lacking publications.</td>
<td>X</td>
</tr>
<tr>
<td>Lack of field equipment &amp; school farms</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Lack of lab equipment</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Lack of computers and Internet access</td>
<td>X</td>
<td></td>
<td>X</td>
<td>None for students in NRC</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

* X = lacking

5.3 Good Practices and Positive Steps Forward

Various bright spots are visible on the landscape of agricultural education and training in Sub-Saharan Africa. Although the absence of ties to the employment market is fairly widespread, occasional exceptions exist. For example, the École des Cadres Ruraux, Bambey, Senegal conducts training in agricultural enterprise management using commercial case studies. This exposure to commercial concerns helps students develop skills and knowledge which are valued by industry, thereby enhancing their chances of future employment. In Mozambique, the policy has been to encourage pluralism in agriculture which, in turn, has enabled the integration of students into diverse areas in the agricultural sector.

Universities in SSA are also beginning to explore new ways of providing their students with advanced and practical knowledge in agricultural and rural development. Notable here is the fact that a substantial component of the curriculum in the first two years in the Polytechnic Institute of Chokwe in Mozambique consists of field practices. Each student formulates a business plan to cultivate crops on an allotted piece of land. Another encouraging example is that set by Makerere University, which sends selected students abroad via “sandwich study programs” to gain advanced and hands-on experience at other universities, including EARTH University in Costa Rica\(^\text{13}\) and Wageningen University in The Netherlands.\(^\text{14}\)

\(^{13}\) EARTH (Escuela de Agricultura de la Región Tropical Húmeda) University, located in Costa Rica -- a private, non-profit university dedicated to education in the agricultural sciences and natural resources.

\(^{14}\) Wageningen University, founded in 1918, is one of the world’s leading education and research centers in the plant, animal, environmental, agrotechnological, food and social sciences.
Even though curriculum reform has been slow in Ghana, some efforts have been made to introduce new programs and courses. Course initiatives in non-traditional agriculture include beekeeping, mushroom cultivation, and grasscutter rearing.\textsuperscript{15} Agribusiness and Entrepreneurship are among the new programs that have been developed in Ghana. Malawi has introduced Agribusiness and Forestry into its curriculum. In particular, the institutes in Malawi emphasize self-employment, and entrepreneurship is a special area of focus in the agribusiness program. In Rwanda, the Université National Rwanda and the Kigali Institute for Science and Technology have pursued reforms and innovation in teaching.

Two examples of efforts to confront new non-traditional educational goals are evidenced by the University of Cape Coast in Ghana and Makerere University in Uganda. Cape Coast has installed a Research Extension Linkage Committee as a mechanism for internal coordination, with a view to fostering its AKIS system. Makerere University has responded to the government’s policy to promote “agriculture as a business for smallholders.” Through its Continuing Agricultural Education Center, the university provides short-term continuing education programs which include young farmers and other out-of-school participants in the development of agriculturally related skills. Additionally, both Makerere and Cape Coast seek to cooperate with regional and international organizations that generate and disseminate practical knowledge. Bunda College in Malawi has been able to develop strong interconnections with research organizations, both at the national and the international levels. An innovative effort on the extension front, in terms of strengthening linkages, is its Trainer of Trainers program that aims at bringing students and farmers together to learn from each other.

Finally, although a shortage of qualified academic staff permeates many PSAET institutions, the problem is less acute for institutes of higher education. Cameroon, for instance, appears to have well qualified academic staff. The Cameroon University of Dschang Faculty of Agronomy and Agricultural Sciences (FASA) boasts 64% of its staff members being PhD holders.

\textsuperscript{15} A small grassland animal that is a source of meat for Ghanaians.
6. **Addressing Three Challenges: Towards a PSAET System Solution**

Three challenges emerge from the analysis of the case studies, field visits, and the review of relevant literature.

The first and most obvious is the challenge to advance the dual needs for science education and agricultural demand-driven university research (Lynam & Blackie, 1994; Alex & Byerlee 1999; World Bank, 2000; Sawyerr, 2002; Michelsen & Hartwich 2004; Eicher 2004; World Bank, 2004; Bateman 2005; Byerlee & Pehu et al., 2005).

The second challenge is that of producing competent graduate students to take up available positions in the agricultural labor market but also to pursue entrepreneurial ventures in agricultural business (Dione, 1997; World Bank, 2002; Atchoarena & Gasperini 2003; Klawe & Whitney 2003; Byerlee & Pehu et al., 2005; Saint, 2005).

Finally, the third challenge is to catalyze PSAET institutions to foster national extension-type services and community development by upgrading the skills of producers, professionals and communities (Nindi, 1993; Bawden, 1996; Crowder & Anderson 1996; Wallace, 1997; Crowder, Lindley, Bruening, & Doron, 1998; Zinnah, Steel, & Mattocks, 1998; Rivera, 1998; World Bank, 1999; Binswanger, 2006).

These three challenges emerge as major goals for PSAET institutions in the country studies. They were continually brought up during interviews in the missions carried out in connection with this report, and are repeatedly cited in the agricultural education literature. They underline that PSAET institutions in SSA face traditional as well as new challenges.

To meet these challenges, three actions are needed: (1) to strengthen institutional linkages, (2) to improve physical facilities, and (3) to provide incentives for developing human capital. In essence, these key actions arise from the six broad issues established as criteria for examining the case studies, in particular from those relating to (a) capacity, (b) curriculum, (c) linkages and (d) infrastructure. Inevitably, the ultimate impact of these actions will depend on the commitment of government to proactive policy mandates and adequate funding, as well as the establishment of effective governance structures both at the national and institutional levels.

This report presents these three challenges as the main purposes of modern post-secondary agricultural education and training institutions. In essence the three challenges, presented in Figure 6, constitute a framework for developing the PSAET institutions.

The purposes, their prospective goals, and the specific measures for the implementation of the three challenges are highlighted in Figure 6. The “three challenges framework” is intended to form a map, or flowchart, for prioritizing areas of investment aimed at promoting incentives for reform. This framework also provides the basis for a larger proposal toward “workforce education systems,” to be discussed below.
6.1 The Knowledge/Science Challenge

The science-based knowledge challenge to PSAET institutions in SSA is to produce competent agricultural scientists, research, and researchers. To do this will require improved access, participation and achievement for students directed toward academic specialization and research, as well as for those students whose aspirations are to take on professional technical responsibilities in the work environment. The response will also necessitate modern curriculum development, research collaboration through competitive and other types of grants, the promotion of science and technology through modern sources of information, and demand-oriented research aimed at contributing to agricultural and rural development.

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16 See Research Program Grant Proposal by Javier Ekboir, IFPRI-ISNAR Division, on “Strengthening the Ability of Competitive Grants to Foster Innovation in Agriculture, 2005.

17 The main principles for demand-oriented research are that it be driven by user demand and accountable to users. Indicators for success would be that farmers use the research and gain greater income as result of use.
The knowledge challenge results from the long-standing crisis in graduate education in agricultural faculties in Sub-Saharan Africa (Lynam & Blackie, 1994). Lynam and Blackie note: “The results of an overburdened and insufficiently trained faculty are declining quality of graduate education, lowering standards, lengthening the time students must spend in getting their degree, a declining emphasis on faculty research and corresponding capacity thereby to oversee thesis research and overextension of degree programs” (p.126). Poor capacity, an aging teaching population, lack of qualified lecturers, outdated reference materials, and a decline in funds for staff recruitment are underscored by the country case studies. Scientific leadership, which forms the backbone of higher education institutions in PSAET systems, is in short supply.

The knowledge challenge involves human capacity and curriculum development, engaging in competitive-grants research with national agricultural research organizations, promoting updated knowledge on science and technology, addressing producer demand-oriented agricultural research issues based on applicable solutions to current and common problems. These tasks emerge directly from the synopses and comparative analysis, but also from observations during the three field visits, and review of the relevant literature. Additionally “the (World) Bank may play a catalytic role by encouraging and facilitating policy dialogue on tertiary education reforms” (World Bank, 2002:xxvi). Implicit in this statement is one of the reform measures being pursued by the Bank and advocated in this report, i.e. demand-oriented programs and services.

Information and communication technology allow access to knowledge through distance education and links to global knowledge networks. Although ICT connectivity is limited in Sub-Saharan Africa, there is still potential to offer university outreach activities cost-effectively using ICTs, especially to industry. Industry would gain immediate access to specialized courses and also to potential consultants and student interns.

PSAET institutions might seek funds to (a) assess the viability of providing “hybrid” education involving a combination of face-to-face and distance education at first to professionals in the work arena, then (b) on the basis on a positive assessment, foster academic and extension distance learning activities based on fee-charges and calculation of initial purchase of software and technology and, given a positive assessment (c) provide faculty and staff instructional development workshops both in creating appropriate distance education courses and becoming competent in the use of distance education techniques. Distance education programs would then be developed depending on the findings of the original assessment as regards fee-based costs to work employers.

Universities are often reluctant to base admissions solely on employment prospects and remain faithful to the traditions of academic freedom. Certainly, students should be relatively free to build their own study courses according to their interests. But for those students whose futures are not targeted toward academe or research institutes, an agricultural entrepreneurial venture or careers in agricultural business might better serve their purposes.
6.2 The Labor Market Challenge

The labor market challenge is to produce qualified students for the agricultural jobs whether in public administration or private business, including producer associations. The labor market challenge is continually emphasized in the country case studies and also in the current literature (World Bank, 2002; Klawe & Whitney 2003; Saint, 2005). This challenge is the result of inflexible, outdated curricula and traditional teaching methods, lack of practical projects, and a shortage of work-study programs. Some universities are introducing new courses into agricultural curricula, and these are the leaders in the field. However, courses that balance theory with practice are generally rare.

The labor market challenge is how to prepare students for self-employment in agriculture, careers in agricultural business and industry, and positions with bilateral and non-governmental organizations, in addition to traditional posts in public administration. This challenge demands the modification of curricula, to engage students in demand-oriented research projects, and promote beneficial and practical training and experiential learning. “Continuous improvement of agricultural learning programs is critical in maintaining a competitive advantage in today’s economic environment while being environmentally sound and socially responsible” (Grier, et al., 2003). A broad agenda for improvement would include:

- Quality and relevance of education
- Development of marketable skills
- Job-related training aligned with market demand
- Clear transition paths from school to work
- Labor market policies that promote job creation
- Regulatory frameworks for the informal sector
- Services and support for disadvantaged youth
- Complementary programs and initiatives for out-of-school youth

The labor market challenge focuses on preparing students with the practical skills and knowledge necessary to enter the workforce successfully. The challenge is to equip students with knowledge about real problems either in agricultural production or agri-business, to advance their skills in practice, to have them develop business plans, and to teach them about the intricacies of agricultural supply chains and value-added commodities.

Management and entrepreneurship training, along with a commercial orientation, need to be included in the university labor market oriented programs. While agricultural colleges are intended to serve a similar purpose, commercial orientation is usually directed toward placing students in professional roles, such as agents in extension (advisory) service rather than promoting them toward entrepreneurial or agribusiness occupations.

Partnerships can be the key to success in promoting educational activities to meet labor market requirements. For example, businesses may partner with universities, agricultural colleges and vocational institutions to provide internships. This could aid students in gaining practical skills. Businesses get inexpensive workers that they can train and
possibly retain after the degree/certificate is earned, plus the education institution gains in reputation which may in turn help recruit better students.

6.3 The Outreach Challenge

The outreach challenge is directed toward provision of national outreach services via continuing education programs and short-term courses to meet the needs of professionals, as well as extension-type and community services for producers who are under-served or fall within the category of Millennium Development Goals. “One way for universities and technical institutes to implement development is through outreach activities,” according to Crowder et al. (1998). Outreach programs can provide follow-up technical support to graduates working in agri-businesses or managing their own production enterprises. Short courses of continuing education can be used to update technical knowledge among extension staff and to qualify them for career advancement (Crowder et al., 1998).

The outreach-directed challenge speaks to the organization and development of outreach/extension-type training programs and the establishment of special outreach units aimed at locally determined priority areas. Most universities have extension units and programs already in place, but these are often academically oriented without exposure to the real problems confronting extension agents in the field. Extension-type outreach programs and university consultancy services could also supplement the tasks of the national extension system. PSAET institutions could help producers to organize or promote beneficial and profitable technologies for small-scale producers or upgrade inservice agricultural professionals. Students in such activities would benefit from practical knowledge and skills and better prepare them for professional positions in their fields of competence.

The outreach challenge presents a wider-ranging set of tasks for PSAET institutions, dependent on individual country problems, interests and concerns. Throughout the synopses and comparative analysis, the proposition is put forward for PSAET institutions to take on responsibility for organizing and providing agricultural extension-type services to promote human capital and become engaged in agricultural socio-economic goals. Upgrading service professionals would be a main task. The field visits also concluded that PSAET institutions could have an important role in upgrading secondary school teachers and their students on an informal basis, as well as serving out-of-school rural youth.

In some cases, as in developed countries, outreach programs might seek to engage secondary school teachers and students in seminars on modern developments in agriculture and the life sciences, or reach out to out-of-school youth to interest them in practical training programs. Also, women’s agricultural education and skills deserve program attention. There is a clear bias against women employees in agriculture, extension and workplace training (Payne, et al., 1993; Rivera & Corning, 1993). This might be an opportunity for PSAET institutions to make up for this disparity, as Uganda has done with its Female Scholarship Initiative.
Reaching out to communities can also benefit students. Community service projects, business plans, or anything that post-secondary students might want to “practice” in action research projects can be of benefit to a local community. This practice can help rural students maintain a connection with their roots and also allow for urban youth to develop more understanding of rural life. [Urban students studying agricultural usually have a steeper learning curve that they seldom climb because of their lack of practical experience in agriculture.]

Partnerships with secondary schools can benefit younger students, possibly encouraging them to pursue further education in an agricultural area and proving to them that there are opportunities in agriculture within SSA. Outreach programs can also benefit farmers by helping them gain access to valuable information and knowledge about innovations at low/no cost, possibly by organizing and developing an agreement with outreach personnel.

6.4 Priorities and Measures for Implementation

The priority areas for responding to all three challenges are the same: (1) strengthen institutional linkages, (2) improve physical infrastructure, and (3) provide incentives to develop human capital. Success in fulfilling these priorities will depend on the policy mandates and funding commitment of government, and on the establishment of effective governance structures both at the national and institutional levels.

Strengthening linkages, improving infrastructure and providing incentives to develop human capital are crucial for developing PSAET in SSA. These priorities underpin the response to the three overarching challenges facing sub-Saharan Africa in designing post-secondary agricultural education and training. These three challenges, as outlined in this section, are to advance knowledge for the purposes of research and scientific development, to adopt an expanded view of academic purposes to include labor market preparation of students, and to engage in outreach to complement training and development programs in the field and serve communities in their development aspirations.

In each priority area, a number of specific measures are outlined in Figure 6 on the PSAET System Challenges. But in general the needs are similar: strengthening institutional linkages horizontally and vertically; upgrading physical facilities and connectivity, and motivating staff through decent salaries, adequate working conditions, and periodic training.

The PSAET Challenges Framework offers benefits on three fronts. It serves government by providing an organized review of the constraints that confront PSAET systems and helps to consider how best to strengthen linkages, improve infrastructure, and provide incentives to develop human capital. Second, it encourages reform to energize PSAET systems. Third, it helps in considering how best to move forward toward transforming post-secondary agricultural education and training systems into a more broad-based concept and practice.
7. The Workforce Education Solution: Contribute to AIS

The “PSAET Challenges Framework” in the previous section is intended to serve as a guide to action in developing PSAET systems. The present section begins by recommending actions aimed at developing a Workforce Education System. This wider and more coordinated approach requires the integration of PSAET systems with those of in-service and non-formal education with the objective of contributing to the development of agricultural innovations.

7.1 Transforming PSAET by Design

Not all governments will respond in like manner to the constraints and problems of their PSAET arrangements. But in general, they usually adopt one of three approaches. Some may seek simply to improve the PSAET institutions by small or targeted interventions. Others may be moved to reform PSAET systems via measures that include decentralization, institutional autonomy, governance pluralism, and demand-oriented programs. Still other governments may desire more sweeping changes aimed at system transformation (see Figure 7).

Figure 7. Transforming PSAET by Design

Existing PSAET Systems

Improvement

Reform

Transformation

PSAET Equipped for the 21st Century

Adapted from B.H. Banathy. (2000).

To this latter end, they may decide to explore the development of a workforce-inclusive system illustrated in section 4.3 on “Education Systems in the Agricultural Workforce” and further elaborated in Figure 8, Workforce Education System Collaboration for AIS. The Workforce Education System aims not only to foster human capital, but also to link education more closely to the development of agricultural innovation systems. Figure 8 illustrates the stages in transforming post-secondary agricultural education and training by design.
The improve option is a minimalist scenario. Through a series of incremental interventions, it strives to build up the individual institutions within the PSAET system as it exists, without commitment to reform or any major effort to envision and develop a more inclusive system that seeks to integrate the three education and training systems illustrated in Figure 5. This option would combine non-criteria funding, based on institutional requests rather than analysis, with investments in selected priority areas, presumably those where the need is seen to be greatest.

The reform option addresses institutional and structural shortcomings in the existing system. It would require government to assemble PSAET stakeholders at the national and local levels to determine the degree of decentralization (whether administrative deconcentration, fiscal decentralization, or devolution), the extent of privatization (especially outsourcing services better implemented by the private sector), and/or demand-oriented processes to be instituted. This would also require a commitment to ensuring appropriate and effective governance mechanisms that bring representatives of all of the key stakeholders to the decision-making table. The literature suggests that such reforms are debatable as to their performance and outcome. Nevertheless, they provide an agenda for consideration.

The transformation option, which seeks to re-shape the form and re-direct the function of the AET system, is discussed more extensively in Section 7.3.

7.2 Connecting the Three Challenges to Workforce Education Systems

Analysis of the three challenges confronting PSAET institutions (Figure 6) reveals that those which pertain specifically to the PSAET system also possess connections to existing formal, in-service and non-formal educational systems illustrated by three columns in Figure 5.

The knowledge challenge clearly connects to the purposes of formal post-secondary agricultural education. It emphasizes formal agricultural education and training and concern with research. Its programs are best promoted in connection with apprenticeship activities in agricultural businesses. Additionally, in an integrated system, students in science programs would take advantage of labor market in-service training through seminars open to both professionals and upper-level students. Investing in the formal system is crucial for science education, research, and technical training.

The labor market challenge connects to the purposes pursued by inservice agricultural education. This challenge stresses the relationship to agricultural business and apprenticeship programs for students, but in an integrated system it would involve both formal and nonformal education, training and development systems. An integrated system would allow employees to move freely into short-term academic and field programs specifically geared to business specialties. Thus, inservice training when connected to formal and nonformal education can operate as an added component in promoting labor-market education.
The outreach challenge connects to educational programs and applied activities in the field. It refers specifically to the non-formal education system. In an integrated system, however, vocational and field professionals would ideally move back and forth between formal and in-service programs. While broader than just professional upgrading, the outreach challenge seeks a connection with the instructional importance of field programs.

By connecting the three challenges with the existing formal, in-service and non-formal educational sub-systems, a larger framework emerges. This larger framework, referred to as the “Workforce Education Framework,” is illustrated in Figure 8 below. It shows how the three educational sub-systems can be viewed as components of a larger development system interacting as a whole. Working together, these coordinated sub-systems can contribute to agricultural development in various ways, but especially via an agricultural-business orientation when fostered by government incentives toward agricultural innovation. As stated at the regional training conference held in Accra, Ghana in 2003, “No country can expect to successfully integrate in, and benefit from, this 21st century economy without a well-educated workforce” (Bollag, 2004).” The following workforce perspective aims to promote the integrated development of a well-educated workforce and a successful, agriculturally innovative economy.

7.3 The Transformation Option: Taking a Workforce Perspective

The workforce perspective calls for a significantly different approach to the post-secondary agricultural education and training “territory.” It aims principally at meeting the need for a competent agricultural workforce as a whole that is linked to the development of an innovative agricultural sector. This is a long-term prospect. It would entail considerable government and donor commitment to transforming the orientation of post-secondary agricultural education in Sub-Saharan Africa.

This “transformation option” calls for a conceptual renewal of PSAET. This would entail a system re-design aimed at connecting (a) PSAET institutions, (b) in-service training programs, and (c) field extension-type service training and development programs, and then linking them explicitly to AIS goals.

The Jinja Consensus, which grew out of the seminars and workshops held as part of the Noragric seminar series, known as SEMCIT (Sustainability, Education, and the Management of Change in the Tropics), also proposed in 2002 the transformation of existing higher education institutions in Africa. The Jinja Consensus recommended the creation of a new African Agricultural University tied to the development of broad-based, flexible and effective networks. Thoughtful though these recommendations may be, they

18 City in Uganda.
19 The Agricultural University of Norway's international gateway Noragric is the Norwegian University of Life Sciences international gateway for its seven departments, as well as for the Norwegian College of Veterinary Medicine and for Norwegian Agricultural Research International. Noragric focuses on agricultural development and livelihood security; biodiversity and natural resource management; and on rights, conflicts, poverty and well-being through research, education and assignments.
appear unlikely to confront the many distinct needs of 48 Sub-Saharan countries in their efforts to meet the full range of challenges facing PSAET in the 21st century.

Figure 8 illustrates a Workforce Education System approach to advancing Agricultural Innovation Systems. Assumed (but not illustrated in the figure) is the involvement of other knowledge stakeholders such as national agricultural research and agricultural communication systems in the implementation of a national agricultural innovation system. Instead, the focus is on the three workforce education system components and their interactivity as a force for promoting agricultural innovations. Government commitment is clearly decisive to incentivize the linkage of PSAET institutions with in-service training and field-based development programs and, even more importantly, to promote their involvement in the tasks of furthering agricultural innovation. Figure 8 puts the Workforce Education System at the center to underline the potential role of these educational institutions as agricultural knowledge support systems to advance AIS.

*Figure 8. Workforce Education System Collaboration for AIS*
Innovation strategies incorporating multiple stakeholders – when well organized and closely linked – can provide valuable expertise to accomplishing development. Technical, commodity, institutional and policy innovations are a major priority in agriculture. The government of Uganda, for example, is working to bring a greater convergence between the PSAET system and the labor market to foster an Agricultural Innovation System. AIS in Uganda appears to mean putting into place market development approaches, involving technical innovations for farmers, effective and efficient provision of services to farmers, and market enablers and agri-businesses that in concert make available supply, value, and market chains that result in national growth, increased farmer incomes, and better livelihoods for rural communities (back-to-office mission report) The expectation is to improve both local and export marketing, and to increase farmer specialty groups, commodity focused out-growers, and value-added crop and animal development.

The “transformation option” proposed in this report is based upon an expanded workforce view of human capital in the agricultural sector. It proposes to bring together (a) formal post-secondary education institutions, (b) in-service training programs in both public and private organizations, and (c) non-formal extension training and development programs. The aim of joining these three educational sub-systems would be to contribute to goal-oriented agricultural innovation targets set jointly by government, agri-business and farmer organizations. A “log frame” is presented in Annex 3 that outlines the main Goal, Objectives, Outputs and Inputs necessary to transform PSAET into a Workforce Education System.

The workforce solution aims to establish greater institutional interconnectedness between the PSAET system and the multiple actors in the agriculture sector. One businessman in Uganda asserts that pineapple production could be geared to the European market if pineapple growers and market specialists were to adhere to the standards and quality demands of that market. The problem, he argues, is to bring the operative actors together to analyze the situation and then develop action plans to realize that export potential. A solution would be to establish interconnections among the various public, private and third-sector actors in the development of pineapple production, processing and marketing. PSAET leaders could be instrumental in forging these connections.

Entrepreneurial practitioner/leaders are needed to steer farmers toward market orientation. To date, this has been promoted mainly by the bilateral and non-governmental organizations. The agricultural colleges and the faculties of agriculture in the universities have yet to produce the kind of practical entrepreneurs and commercial leaders needed at the rural level. Courses in “how to become an outgrower,” “how to organize a cooperative,” “developing value-added products,” and “creating a market information system” are likely candidates for re-designed education and training programs.

Figure 8 diagrams a transformative design. In principle, such transformation of post-secondary agricultural education would begin by bringing together government, business and producers and all education system stakeholders to consider how best to promote an agricultural workforce education system (Hall, 2006). A workforce education approach
would inter-connect major education systems on a flexible basis and thus cater to all participants in the workforce with a view to enhancing their human capital on a lifelong basis and directing that human capital to practical concerns of developing agriculture through an innovations system.

Figure 8 implies political and financial investment in PSAET reform. It is especially dependent upon incentives by government and donors to create linkages, and the involvement of all education and training services in promoting national and local agricultural innovations. This design seeks to improve connections through incentives designed to develop pluralistic, integrated systems. For this to happen, national and institutional governance need to be modified so as to become more flexible and allow for the inter-connectivity of all three workforce education systems within the respective governance mechanisms.

The Framework for African Agricultural Productivity (FAAP) states “the bureaucratic environment of the public sector and a chronic shortage of operating resources constrain the performance of research, extension, training and education systems….” These constraints provide donors with an opportunity to foster the aims of the FAAP framework as it refers to post-secondary agricultural education and training in sub-Saharan Africa. Piecemeal solutions, however, are not the path to seizing these opportunities.

8. Conclusion

This study confirms the importance of PSAET in Sub-Saharan Africa. The need for an energized PSAET is considerable, because competent and employable human resources are crucial to Africa’s advancement. But most PSAET institutions are weak because policies are lacking or unenforced, governance is overly centralized, human capacity needs are not integrated with curriculum development, linkages are nil or without development-oriented significance, “connectivity” is meager, equipment is antiquated, and physical infrastructure is woefully inadequate for the increasing populations of students. This report suggests that in addition to being a critical component in socio-economic and agricultural development, PSAET systems are central to the World Bank goal of developing knowledge societies.

A significant obstacle, confirmed by the country case studies, is that student and parent attitudes toward agriculture and agricultural education in SSA tend to be negative. Changing public attitudes toward agriculture as a career choice is critical if the human resources needed to spur agricultural development are to be generated. Primary and secondary schools often treat agriculture as “a punishment,” and deter students from considering agriculture as a business. Concerted political and educational efforts, backed by financial opportunities and incentives, are needed to alter negative public attitudes toward agricultural activity.

An equally important problem, supported by relevant literature, is the lack of attention by governments to the development of national agricultural innovation strategies. Innovation is a major priority in a globally competitive agriculture market, including technical, commodity, institutional and policy innovations. This report maintains that innovation policy and strategies can be enhanced by incorporating educational institutions as well as other stakeholders in the pursuit of profitable innovation objectives.

In short, public attitudes toward agriculture and the crafting of innovation strategies for agricultural development are fundamental to creating the context in which PSAET institutions can bridge into the 21st century. These two developments alone can bring about a critical change in a nation with respect to its agriculture sector, and move it more quickly into the global mainstream.

Findings from the seven country case studies indicate major constraints in a number of issue areas. However, some institutional innovations have been conceived in the countries analyzed, and these have been mentioned in the text above. While a plethora of problems remains, individual institutional efforts to move forward in the development of post-secondary agricultural education are noteworthy. The response of PSAET institutions to problem areas indicated in the analysis will likely determine the extent to which PSAET systems in some countries advance while others maintain an outmoded and non-competitive orientation to today’s global economy. A number of detailed suggestions for institutional improvements are given in the comparative analysis and throughout the text.

Drawing from the seven country case studies, the report points to three priorities that confront post-secondary agricultural education and training systems. These are: incentives for human capital development, meaningful institutional linkages, and learning-related physical facilities.

The report underlines two complementary approaches to transforming post-secondary agricultural education and training Sub-Saharan Africa. The first addresses specifically the capacity constraints that characterize formal post-secondary agricultural education and training systems in Sub-Saharan Africa. The second approach is larger in scope and builds on the first, proposing the establishment of a Workforce Education System that operates in support of government programs to foster agricultural innovation.

In addition, the report proposes a broader view of what post-secondary agricultural education is about, not just training students but engaging them as producers in the pursuit of the lifelong learning essential to build and maintain competitiveness.

Finally, a new perspective is suggested for thinking about the role of government and agricultural business in utilizing faculty, students and workforce personnel in developing Agricultural Innovation Systems. This approach would require the integration, or what might be called “re-cycling,” of workers back and forth within a larger system of formal, in-service and non-formal educational offerings that operate to promote greater practical
knowledge and skills advancement. This perspective envisions government, business and communities acting in concert to generate and contribute to the development of agricultural innovations systems.

Even in the few cases where African governments have taken steps to promote agricultural innovation systems, they have not yet directly harnessed PSAET and workforce education systems in this effort. As a result, the various educational sub-systems are not linked either internally among themselves or with the development of the goals of agricultural innovation systems. This limits their potential to contribute more significantly to meeting immediate national development goals. This lack of linkage calls attention to the need for connections between PSAET systems and other “post-secondary” education activities. The purpose of such linkage would be to engage all workforce education systems – formal, inservice, and nonformal – in contributing to the national development of agricultural innovations. At its most ambitious, the report’s main proposal posits a giant step forward whereby Sub-Saharan Africa would originate workforce education systems linked to agricultural innovation. But at the least, the design of post-secondary agricultural education and training deserves to be reconceived and positive efforts made to guide it into the 21st century of lifelong learning.
References


Conroy, C.A.; (2000); Reinventing Career Education and Recruitment in Agricultural Education for the 21st Century; *Journal of Agricultural Education, 41*:4, 73-84.


Crowder, L. van; W.I. Lindley; T.H. Bruening; & N. Doron; (1998); Agricultural Education for Sustainable Education: Challenges for Developing Countries in the 21st Century; *Journal of Agricultural Education and Extension, 5*:2, 71-84.


Gooderham, P.N. & J. Lund; (1992); Organizational Adaptation and the Role of Training; In: M. Jones & P. Mann (Eds.); HRD: International Perspectives on Development and Learning; West Hartford, CT: Kumarian; 45-58.


Horgan, B., 1998; Transforming higher education using information technology: First steps; The Horizon, January/Spring.

Institut de recherché pour le développement; no 19, mars 2004 has statistics on higher education research in Mali. Bamako. See website on the Institut de Recherche pour le Développement : http://www.mali.ird.fr/actualities/actualities.htm


Kilimo Trust. New Investment in East African Agricultural Enterprise. Kampala: African Agricultural Capital (AAC) and Kilimo Trust. Website: admin@kilimo.co.ug


Lindley, W.; T. Bruening & L. Van Crowder; (1998); Agricultural education for Sustainable Education; *Journal of Agricultural Education and Extension*, 5:2, (September).


Nindi, B.; (1993); Agricultural Transformation in Sub-Saharan Africa: The Search for Viable Options; *Nordic Journal of African Studies*, 2:2, 142-158.

OECD. http://trendchart.cordis.lu/


Rivera, W.M.; (2006); Agricultural Knowledge and Development in a New Age and a Different World; *Journal of International Agricultural Education and Extension*, vol. 13, no. 2, 2006, 57-67.


Rivera, W.M. & G. Alex; (2004); The Continuing Role of Government in Pluralistic Extension Systems; *Journal of International Agricultural and Extension Education*, November issue.

Rivera, W.M. & S.L. Corning; (1993); Challenges to Agricultural Extension to Employ Women as Professionals and to Develop Programs for Women in Agriculture – A Global Perspective; *Journal of Extension Systems*, 9:1, June, 52-73.


Rosset, P.; (1999); Small Is Bountiful; *The Ecologist*, v.29, i.8, Dec.

Rukuni, M.; M.J. Blackie; & C.K. Eicher; (1998); Crafting smallholder-driven agricultural research systems in southern Africa; *World Development*, 26:6, 1073-1087.


Zinnah, M.M.; R.E. Steel; & D.M. Mattocks; (1997-1998); From margin to main stream: revitalization of agricultural extension curricula in universities and colleges in sub-Saharan Africa; Training for Agriculture and Rural Development, 1997-98; Rome: FAO).

[Note: For a list of World Bank Publications on Tertiary Education by Year of Issue, see Appendix E, Table E.3 in "Constructing Knowledge Societies: New Challenges for Tertiary Education," (2002), World Bank.]

[For a comprehensive worldwide list of links to organizations dedicated to higher education in Africa, see: http://www.bc.edu/bc_org/avp/soe/cihe/inhea/organizations.htm

[For information on African Universities, see: http://library.stanford.edu/africa/africaneducation/african-universities.html

Country Case Study Researchers:


Annex 1

Synopses of Seven Country Case Studies

The following summaries do not attempt to analyze the countries in terms of size, GDP or other macro-economic and social concerns. Rather, they highlight the studies’ major findings with a view to identifying commonalities and constraints in the PSAET systems.

CAMEROON

Cameroon’s system comprises the agriculturally oriented University of Dschang, five other state universities (Buea, Douala, Ngaoundere, Yaounde I and Yaounde II), and 18 agricultural colleges. In Cameroon, PSAET institutions operate in two different ministries. The low and medium level agricultural personnel are trained at the 18 institutions placed under the Ministry of Agriculture and Rural Development (MINAGRI), while the high level personnel are trained solely at the Faculty of Agronomy and Agricultural Sciences (FASA). FASA is one of the five institutions that make up the University of Dschang, one of the six state universities of the Ministry of Higher Education (MINESUP). MINAGRI and MINESUP are two different entities, with separate objectives and functions, and the Cameroon study was split into two main parts: part I on post secondary AET institutions in MINAGRI, and part II on the lone PSAET institution in MINESUP (i.e. FASA).

<table>
<thead>
<tr>
<th>ISSUES</th>
<th>CONSTRAINTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Policy and Funding</td>
<td>▪ Lack of funding results in poor infrastructure and equipment, along with loss of faculty.</td>
</tr>
<tr>
<td></td>
<td>▪ No government funding for research and extension (which, if available, could help to orient education, provides skills and possible jobs to students).</td>
</tr>
<tr>
<td></td>
<td>▪ Funding entirely by government at low and medium level training.</td>
</tr>
<tr>
<td></td>
<td>▪ No scholarships for students.</td>
</tr>
<tr>
<td>Governance</td>
<td>▪ Centralized.</td>
</tr>
<tr>
<td>Capacity Building</td>
<td>▪ Poorly staffed colleges and universities (at low and medium levels).</td>
</tr>
<tr>
<td></td>
<td>▪ Inadequate education levels of some lecturers at low and medium levels.</td>
</tr>
<tr>
<td></td>
<td>▪ Appointment of lecturers to non-university positions.</td>
</tr>
<tr>
<td></td>
<td>▪ No evaluation of teaching programs and lecturers.</td>
</tr>
<tr>
<td></td>
<td>▪ No job placement services.</td>
</tr>
<tr>
<td></td>
<td>▪ No motivation in teaching due to poor incentives; and insufficient salaries.</td>
</tr>
<tr>
<td></td>
<td>▪ Colleges located in remote areas and attract few teachers.</td>
</tr>
<tr>
<td></td>
<td>▪ No regular workshops and seminars to update teachers in modern technological developments and teaching methods</td>
</tr>
<tr>
<td>Curriculum Development</td>
<td>▪ Inflexible and outdated curriculum mandated by ministries.</td>
</tr>
<tr>
<td></td>
<td>▪ Curriculum does not capture indigenous knowledge.</td>
</tr>
<tr>
<td></td>
<td>▪ No elective courses.</td>
</tr>
<tr>
<td></td>
<td>▪ General curriculum does not meet the needs of labor market.</td>
</tr>
<tr>
<td>Linkages</td>
<td>▪ No formal or long-term linkages between PSAET and public or private research institutions, local communities, private businesses, agricultural organizations, professional organizations, or between universities.</td>
</tr>
<tr>
<td>Infrastructure and Equipment</td>
<td>▪ Lack of: teaching materials, library books, laboratory equipment, vehicles for field trips, computers for students, Internet access.</td>
</tr>
</tbody>
</table>
**Illustrative Data on Cameroon Capacity Building: Change in Faculty of Agronomy and Agricultural Sciences**

<table>
<thead>
<tr>
<th>Academic year</th>
<th>Lecturers</th>
<th>Students</th>
<th>Lecturer/student ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995/96</td>
<td>85</td>
<td>373</td>
<td>1/4</td>
</tr>
<tr>
<td>2000/01</td>
<td>77</td>
<td>664</td>
<td>1/9</td>
</tr>
<tr>
<td>2005/06</td>
<td>58</td>
<td>660</td>
<td>1/11</td>
</tr>
</tbody>
</table>

Note the reduction in faculty and the increased number of students.

**GHANA**

In Ghana, interviews were carried out in two universities (the University of Cape Coast and the University of Ghana) and two agricultural training colleges (the Kwadaso Agricultural College and the Ejura Agricultural College). In addition to the institutes where the interviews were conducted, there are three other universities: Kwame Nkrumah University of Science and Technology in Kumasi, University of Education at Winneba, and the University for Development in Tamile, and also three other agricultural colleges, viz.: the Agricultural Training College in Mampong, Nyankpala Agricultural College, and Ohawu Agricultural College. There are also ten polytechnics that operate as preparatory tertiary institutions. Three of these provide training programs on agricultural subjects.

<table>
<thead>
<tr>
<th>ISSUES</th>
<th>CONSTRAINTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Policy and Funding</td>
<td>▪ Policies for PSAET are scattered in multiple documents.</td>
</tr>
<tr>
<td></td>
<td>▪ Policies are not clearly communicated from ministries to PSAET due to poor linkages.</td>
</tr>
<tr>
<td></td>
<td>▪ Slow policy reform due to lack of coordinating body.</td>
</tr>
<tr>
<td></td>
<td>▪ Lack of funding for equipment, technologies, practical training.</td>
</tr>
<tr>
<td>Governance</td>
<td>▪ Fragmented</td>
</tr>
<tr>
<td>Capacity Building</td>
<td>▪ Practical training inadequate due to increasing student numbers and resource constraints.</td>
</tr>
<tr>
<td></td>
<td>▪ Lack of practical training results in graduating students who are not suited for labor market or entrepreneurship.</td>
</tr>
<tr>
<td></td>
<td>▪ Lecturers engage in other jobs to earn additional income; lecturing not an attractive career option among graduating students.</td>
</tr>
<tr>
<td>Curriculum Development</td>
<td>▪ Curricula not adequately oriented toward agribusiness and practical skills.</td>
</tr>
<tr>
<td></td>
<td>▪ Curricula reform is slow to occur due to lack of funding; lack resources to promote new courses.</td>
</tr>
<tr>
<td></td>
<td>▪ Curriculum does not adequately incorporate indigenous knowledge.</td>
</tr>
<tr>
<td>Linkages</td>
<td>▪ General linkages (of all kinds) do exist, but they are weak and need strengthening.</td>
</tr>
<tr>
<td></td>
<td>▪ Poor linkages between PSAET/AET and agricultural industry.</td>
</tr>
<tr>
<td>Infrastructure and Equipment</td>
<td>▪ Laboratories and institutional farms poorly equipped.</td>
</tr>
</tbody>
</table>
MALAWI

In Malawi there are two PSAET institutions: Bunda College of Agriculture and Natural Resources College (NRC). The study is based on both institutions.

<table>
<thead>
<tr>
<th>ISSUES</th>
<th>CONSTRAINTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Policy and Funding</td>
<td>• Lack of funding and inconsistency of funding.</td>
</tr>
<tr>
<td></td>
<td>• External funding from private sector exists but is overestimated.</td>
</tr>
<tr>
<td></td>
<td>• No policies that clearly govern PSAET.</td>
</tr>
<tr>
<td>Governance</td>
<td>• Centralized.</td>
</tr>
<tr>
<td>Capacity Building</td>
<td>• Aging teaching population (most are over 50).</td>
</tr>
<tr>
<td></td>
<td>• Most teachers have served less than 5 years.</td>
</tr>
<tr>
<td></td>
<td>• Lack of students with practical and commercial skills who can move straight into private sector.</td>
</tr>
<tr>
<td></td>
<td>• Teaching not an attractive employment option and frustrating due to lack of proper funding.</td>
</tr>
<tr>
<td>Curriculum Development</td>
<td>• Traditional methods of teaching. Little use of modern didactics such as power projectors.</td>
</tr>
<tr>
<td></td>
<td>• Lack emphasis on practical and agribusiness skills.</td>
</tr>
<tr>
<td>Linkages</td>
<td>• Lack linkages to agricultural industry; poor NRC linkage with research institutes; poor Bunda linkage with extension.</td>
</tr>
<tr>
<td>Infrastructure and Equipment</td>
<td>• Inadequate libraries and laboratories.</td>
</tr>
<tr>
<td></td>
<td>• Shortage of teaching and learning materials, offices, study space.</td>
</tr>
</tbody>
</table>

MOZAMBIQUE

Mozambique’s degree-granting institutions include the Faculty of Agronomy and Forestry Engineering (FAEF) and the Faculty of Veterinary (FVET) at the university of Eduardo Mondlane University (UEM). In February 2006, the government created two other degree-granting institutions: the Polytechnic Institute located in the center of Mozambique (Manica Province) and the other in Chokwe in the south (Gaza Province). Agricultural degree education started to expand by the end of the 90s and early 2000 with the establishment of the Faculty of Agronomy of Catholic University of Cuamba (Niassa Province) and the Mussa Al Bique Faculty of Agronomy (Nampula Province), both in the northern region. Diploma level has been traditionally offered by two institutions namely the Agrarian Institute of Chimoio (IAC), operating since independence in the central region (Manica Province), and by the Agrarian Institute of Boane (IAB) working since 1986 in the southern region (Maputo Province). A third agrarian institution was created in 2004, the Agrarian School of Chokwe, which also offers certificate courses in agriculture.
Mozambique

<table>
<thead>
<tr>
<th>ISSUES</th>
<th>CONSTRAINTS</th>
</tr>
</thead>
</table>
| Policy and Funding            | ▪ Policy promotes pluralistic actors in agriculture and contributes to absorption of graduates into agriculture.  
▪ Lack of funding.  
▪ Limited research and extension outputs due to lack of funding.                                                                                           |
| Governance                    | ▪ Centralized.                                                                                                                                                                                                  |
| Capacity Building             | ▪ Lack of qualified lecturers (esp. at polytechnic and diploma level) which results in basic and often outdated curriculum.  
▪ Low salaries leading to some turnover of staff.  
▪ Poor student performance - Number of graduates low relative to the number of entering students.                                                  |
| Curriculum Development        | ▪ Curriculum constrained by poor infrastructure.                                                                                                                                                                |
| Linkages                      | ▪ Limited linkages between education, research and extension, due to limited staff and funding and lack of institutional networking.  
▪ Completed research projects not disseminated to potential users.                                                                                     |
| Infrastructure and Equipment  | ▪ Inadequate libraries and laboratories; Lack computers and internet access.  
▪ Lack of field equipment.                                                                                                                                 |

RWANDA

The National University of Rwanda (UNR) and the Institut Supérieur d’Agriculture et d’Elevage (ISAE) are the two major PSAET institutions in Rwanda. The study was conducted in the province of Butare, at the National University of Rwanda (UNR) resides, and in the province of Ruhengeri, at the Higher Institute of Agriculture and Breeding (Institut Supérieur d’Agriculture et d’Elevage -- ISAE).

Two major constraints are apparent: (1) inadequate budget for investment, student preparation and faculty salaries, and (2) lack of agreements and planning and coordination agendas for effective collaboration with public, private and producer sectors. The job market is unresponsive due in part to public sector downsizing. Qualified students often do not find jobs.
Rwanda

<table>
<thead>
<tr>
<th>ISSUES</th>
<th>CONSTRAINTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Policy and Funding</td>
<td>▪ Positive national plan and Min/Ag policy but no deadlines or quantitative goals set for UNR and ISAE.</td>
</tr>
<tr>
<td></td>
<td>▪ Government provides main funding but on a variable basis. PSAET not a high priority. World Bank pays for expatriate faculty salaries and study grants for 3rd cycle students. UNDP funds diminishing.</td>
</tr>
<tr>
<td>Governance</td>
<td>▪ PSAET institutions under the Min/Ed but their research and teaching programs are linked to Min/AG goals.</td>
</tr>
<tr>
<td></td>
<td>▪ Institutions lack central administration records on salaries and students.</td>
</tr>
<tr>
<td></td>
<td>▪ 3. Some cost recovery from students: monthly payment of USD 37 to pay lodging, meals and medical expenses.</td>
</tr>
<tr>
<td>Capacity Building</td>
<td>▪ Institutions lack staff, especially those with higher education (PhD) qualifications.</td>
</tr>
<tr>
<td></td>
<td>▪ 2. No projects with research, or with farmers, extension services, or producer organizations. Basic research mainly limited to vegetable production, animal production, soil science and forestry.</td>
</tr>
<tr>
<td>Curriculum Development</td>
<td>▪ UNR does not promote partial work/study. No apprenticeship programs with agri-B outside the required 1.5 months during five-year degree program. Program consists of five years: 2 years agronomy, 3 years engineering, and a study project.</td>
</tr>
<tr>
<td></td>
<td>▪ No continuing education program.</td>
</tr>
<tr>
<td></td>
<td>▪ ISAE moving toward curriculum development for labor-market, which market is at present is minimal.</td>
</tr>
<tr>
<td>Linkages</td>
<td>▪ Formal but no real links with AKIS.</td>
</tr>
<tr>
<td>Infrastructure and</td>
<td>▪ Buildings in disrepair. Much need for modern equipment, including computers and access to internet.</td>
</tr>
<tr>
<td>Equipment</td>
<td></td>
</tr>
</tbody>
</table>

Illustrative data on Rwanda institutional climate in the Faculty of Agronomy

<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of students in ‘sandwich’ courses or in part-time work with agricultural companies.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Number of projects with :</td>
<td>ISAR</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>ISAE</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>IRST</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Number of projects with producer organizations</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Number of projects with peasants</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Number of projects with extension services</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Meetings with extension personnel)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Part-time apprenticeships</td>
<td>180 hours for entire university training.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This “all-zeros” table highlights that students are not encouraged to undertake partial work assignments or apprenticeships in the field outside of the required 1.5 months during the five year study program.
SENEGAL

The two universities in Senegal do not have faculties of agriculture, only agriculturally relevant departments such as biology, geography and sociology. Therefore higher agricultural education study must be pursued abroad in other countries.

The main PSAET institutions for agricultural and rural education are the Ecole inter-État de sciences et médecines vétérinaire (EISMV), the Ecole Nationale Supérieure d’Agriculture (ENSA), and seven intermediary technical schools.

The intermediary schools include the Ecole Nationale d’Economie Appliquée (ENEA ), Ecole Nationale des Cadres Ruraux (ENCR), Ecole des Agents Techniques d’Agriculture (EATA ), Ecole des Agents Techniques d’Elevage (EATE), Ecole des Agents Techniques des eaux et forêts (EATEF),Ecole des Agents techniques Horticoles ( EATH ), Ecole nationale de formation des monitrices rurales (ENFMEFR ). In addition there are about 20 centers of professional training for peasants, farmers, fishermen, animal breeders and artisans.

The Senegal study covers mainly the two post-secondary education institutions of ENSA and ENCR, and the two national centers for technician training: the Centre National de Formation des techniciens de l’Agriculture et du génie Rural (CNFTAGR) and the Centre de Formation professionnelle Horticole CFPH).

<table>
<thead>
<tr>
<th>ISSUES</th>
<th>CONSTRAINTS</th>
</tr>
</thead>
</table>
| Policy and Funding   | ▪ Agriculture education is relatively limited due to the absence of faculties of agriculture in the two universities.  
▪ PSAET institutions often work with public service on projects that show no comparative advantage and may be detrimental to the public mission. |
| Governance           | ▪ Reforms are in place to decentralize, promote the private sector and the civil society. |
| Capacity Building    | ▪ Students seeking higher education in agricultural sciences must go abroad.  
▪ Lack of funds contributes to low quality education.  
▪ All PSAET institutions are diversifying their training offerings, to obtain added funds. |
| Curriculum Development| ▪ There are more potential students than space for them; accordingly many lack access to higher education.  2. Hundreds of potential students seek entrance to the ENCR, but each year only the 35 who pass the entrance exam are accepted into the School. This situation applies to all the schools, as well as to the universities.  
▪ Curriculum is conservative, theoretical, and falling behind in new knowledge. No inter-disciplinary study. |
| Linkages             | ▪ Little collaboration among institutions, at best informal personal links, often promoted from fear of losing funds. |
| Infrastructure and Equipment | ▪ Degradation of working conditions is evident.  
▪ Publications and equipment lacking. |
Following the withdrawal of Swiss aid in 1998, financial resources come from two sources: the national budget and the institutions’ own resources. According to the study, the national budget is characterized by its sparse and uneven contributions.

In addition, it appears that higher education faces greater difficulties in Francophone countries – “where campuses are overcrowded and too much politised…” (Amat, 2001). Trends indicate that the increase in student numbers is rather extraordinary and that, as a result, problems are becoming acute. “The tradition of free university education inherited from France has led to a dramatic increase of student numbers,” according to Guedegbe (2000). As indicated by findings in other countries, such as Cameroon, not only is the number of students increasing, but at the same time academic staff numbers are declining.

The crisis of Francophone Africa higher education systems, according to Guedegbe (2000), can be partially ascribed to the fact that they have not adapted to changing realities. The current Francophone university, he states, is still operated like the French universities before 1968. The authoritarian administrative model that exists in these universities is rigid and hierarchical, and no longer reflective of realities in France itself. The lack of integration of students’ concerns was one cause of unrest and riots on campuses in Francophone Africa in the last 1990s (Guedegbe, 2000).

**UGANDA**

The Uganda study examines Faculties of Agriculture in Makerere University and Gulu University and the Bukalasa and Arapai Agricultural Colleges, as well as the Makerere Continuing Agricultural Centre in Kabanyolo.

<table>
<thead>
<tr>
<th>ISSUES</th>
<th>CONSTRAINTS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Policy and Funding</strong></td>
<td>▪ Positive policy formulated as National Agricultural Education Policy (NAEP).</td>
</tr>
<tr>
<td></td>
<td>▪ Lack of funding for faculty, infrastructure and equipment.</td>
</tr>
<tr>
<td></td>
<td>▪ PSAET system not responding to policy reforms.</td>
</tr>
<tr>
<td></td>
<td>▪ Inadequate funding for field training and outreach activities.</td>
</tr>
<tr>
<td></td>
<td>▪ Policies do not promote linkages with PSAET actors; institutions, private sector, organizations.</td>
</tr>
<tr>
<td><strong>Governance</strong></td>
<td>▪ Reform in place to decentralize, but not yet operative.</td>
</tr>
<tr>
<td><strong>Capacity Building</strong></td>
<td>▪ Inadequately qualified college staff who are underpaid, demoralized and frustrated.</td>
</tr>
<tr>
<td></td>
<td>▪ Government has suspended staff recruitment at Makerere Univ.</td>
</tr>
<tr>
<td></td>
<td>▪ Poor motivation and poor attitude of students toward agriculture.</td>
</tr>
<tr>
<td><strong>Curriculum Development</strong></td>
<td>▪ PSAET institutions still focused on producing graduates for public service, not labor market.</td>
</tr>
<tr>
<td></td>
<td>▪ Private companies retrain graduates they hire.</td>
</tr>
<tr>
<td></td>
<td>▪ Courses theoretical and examination oriented; not linked to experiential learning.</td>
</tr>
<tr>
<td></td>
<td>▪ Students resent practical work (i.e., being used as farm laborers).</td>
</tr>
<tr>
<td><strong>Linkages</strong></td>
<td>▪ Linkages poor or non-existent at college level. Poor linkages with other PSAET institutes or between PSAET and research institutes, extension personnel, private business, and producer organizations (at college level and Gulu).</td>
</tr>
<tr>
<td><strong>Infrastructure and Equipment</strong></td>
<td>▪ Lack of funds to repair and rebuild institutions.</td>
</tr>
<tr>
<td></td>
<td>▪ Lack of educational materials, research and teaching facilities, laboratory materials and space.</td>
</tr>
</tbody>
</table>
Annex 2

World Bank Lessons and Investment Guidelines

The World Bank (2002: xxvii) lists the following lessons from recent tertiary education project experience to clarify that Bank support to client countries should be:

- Appropriate to a country’s specific circumstances.
- Predicated on strategic planning at national and institutional levels.
- Focused on promoting autonomy and accountability.
- Geared toward enhancing institutional capacity and facilitating the cross-fertilization of relevant regional experiences.
- Sequenced, with a time horizon consistent with the long-term nature of capacity enhancement efforts.
- Sensitive to local political considerations affecting tertiary education reform.
- In countries where the need is acute, the choice of lending instrument should be guided by the following considerations:
  - Adaptable program loans (APLs) are preferred in countries with a strategic framework and expectations of political stability, as they facilitate a systemwide, holistic, long-term approach. When necessary, the first phase of the APL could focus on consolidating the strategic framework for reform and on building consensus among all stakeholders.
  - Budget support can be extended in the context of programs for the education sector as a whole in countries where the tertiary education reform agenda is a high priority and where there is a clear commitment from all stakeholders to support the proposed reforms.
  - Technical assistance loans (TALs) or learning and innovation loans (LILs) are appropriate where there is government interest in initiating change in the tertiary education sector but the conditions for implementing a reform are not fully met (that is, when there is high need but low political will). Countries should use TALs to help formulate a comprehensive reform strategy and build a national consensus around it. LILs should be used to pilot innovations before they are replicated on a larger scale.
  - International Finance Corporation (IFC) loans and guarantees in support of individual private institutions can be extended to complement International Bank for Reconstruction and Development (IBRD) loans in countries that have established a positive regulatory and incentives framework to promote private tertiary education. IBRD lending that involves private tertiary education would focus on system-wide interventions for quality improvement and accreditation (using competitive funding) or for the establishment of student loan schemes for the entire private sector.

Most of the options outlined above are directly relevant to middle-income countries. Important distinctions are warranted, however, for three groups of World Bank clients: transition countries, low-income countries and small states. Such countries operate under special conditions that require a different focus and set of priorities. For further guidelines for these three groups of countries, see World Bank (2002: xxix).
### Annex 3. Transforming PSAET into a Workforce Education System: Log Frame

<table>
<thead>
<tr>
<th>Goal</th>
<th>To transform AET to meet human capital and agricultural innovation system goals</th>
<th>Indicators</th>
<th>Assumptions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1. Three main AET systems cooperate in promoting human capital development and collaborate in pursuing AIS goals set by pluralistic committees made up of government, business and producer organizations.</td>
<td></td>
<td>Flexibility of participant interchange established among three AET systems.</td>
</tr>
<tr>
<td></td>
<td>Government in conjunction with pluralistic committees pursues AIS goals</td>
<td></td>
<td>Government in conjunction with pluralistic committees pursues AIS goals.</td>
</tr>
<tr>
<td>Objective</td>
<td>To transform by design the post-secondary agricultural education and training systems in sub-Saharan Africa into efficient and effective institutions supporting an economic and social renaissance on the continent.</td>
<td>Linkages strengthened with other PSAET institutions, with national research, businesses and producer organizations and regional and international knowledge sources. Infrastructure improved. Incentives provided to develop human capital.</td>
<td>Government commitment to PSAET and its priorities for development. PSAET institutions committed to cooperation and set regular meetings for improving the system. Infrastructure improved. Incentives established.</td>
</tr>
<tr>
<td>Outputs</td>
<td>(a) sound policy and funding arrangements, (b) sound governance, (c) adequate human capacity, (d) sound market oriented curriculum, (e) extensive linkages with other PSAET institutions and with the broader innovation system, and (f) adequate infrastructure and equipment</td>
<td>PSAET policy established. AKIS policy established. AIS goals established. PSAET institutions promote staff training and curriculum development, horizontal and vertical linkages, and integrate equipment use into courses.</td>
<td>Government commitment to PSAET development with AIS goals in mind. AIS goals established with view to involve all three AET education subsystems. PSAET institutions made more accountable, based on results defined in terms of student learning.</td>
</tr>
<tr>
<td>Inputs</td>
<td>(a) bricks and mortar, (b) equipment, (c) training, including scholarships and grants, (d) government/institution programs to implement mandates for PSAETs, and (e) technical assistance and consultations/analysis of reforms</td>
<td>Buildings repaired and built where needed, computer space with computers available for students. Training programs which are “development oriented” (see: section 3.4 on “Priorities and measures for implementation.”) Institutional mandates modified to promote interchanges with inservice programs and field training. Technical assistance from international, bilateral and non-governmental organizations.</td>
<td>Government, donor and national institutions and organizations committed to cooperation and collaboration for transforming PSAET and AET systems, with a view to advancing agricultural innovation. AIS aimed at achieving Millennium Development Goals through efforts that promote food security and making agriculture into a business for the smallholder.</td>
</tr>
</tbody>
</table>