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# COVERING ALL THE ANGLES: USING A SPECTRUM OF IDEAS TO EXPAND AND TRANSFORM AGRICULTURAL EDUCATION AND TRAINING

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# COVERING ALL THE ANGLES:

## USING A SPECTRUM OF IDEAS TO EXPAND AND TRANSFORM AGRICULTURAL EDUCATION AND TRAINING

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# CONTENTS

<b>Acronyms</b> .....	<b>ii</b>
<b>Executive Summary</b> .....	<b>3</b>
<b>Introduction</b> .....	<b>3</b>
<b>The University and Agriculture</b> .....	<b>5</b>
Science, Research and the University .....	6
A Vote for PS-ATET Investment .....	8
<b>An Expanded AET Curriculum</b> .....	<b>9</b>
Emphasis on Rural Development and its Business Development .....	10
Perspective is Important for Agenda Development and Strategic Planning .....	11
<b>Linking the AET System</b> .....	<b>11</b>
Primary and Secondary AET .....	12
Organizing Farmer Education Schools .....	13
Human Resource Development .....	13
Other Potential Partnerships .....	14
<b>An Expanded AET System</b> .....	<b>14</b>
<b>Conclusion</b> .....	<b>17</b>
<b>References</b> .....	<b>19</b>
<b>Annex 1 – EARTH University: A New Approach to Higher Agricultural Education</b> .....	<b>20</b>

## FIGURES

Figure 1: Elements of An Integrated Post-Secondary Agricultural Education Network .....	16
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## ACRONYMS

AET	Agriculture Education and Training
ATE	Agricultural Technical Education
SSA	Sub-Saharan Africa
PS-AET	Post-Secondary University Agricultural Education and Training
PS-AHE	Post-Secondary Agricultural Higher Education
PS-ATE	Post-Secondary University Agricultural Technical Education
PS-ATET	Middle-level Post-Secondary Agricultural Education and Training Institutions
HRD	Human Resources Development
USAID	United States Agency for International Development
AIS	Agricultural Innovation Systems
NRCNCA	National Research Council for National Academies
AKIS	Agricultural Knowledge and Information Systems
NAES	National Agricultural Extension Systems
NARS	National Agricultural Research System
NAETS	National Agricultural Education and Training System
GM	Genetically Modified
NGO	Non-governmental Organization
AIDS	Acquired Immune Deficiency Syndrome
ICT	Information Resources Communication Technology
RPO	Rural Producer Organization
ATS	Agriculture and Technical Schools
PSF	Private Sector Foundation
NTC	National Training College
BTO	Build-Transfer Operate
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
CFI	Contract Farming India
DFV	Desai Fruits and Vegetables
LGU	Land Grant Universities

## EXECUTIVE SUMMARY

This paper puts forward several broad-based proposals for expanding and transforming AET. The sections of this paper contain four interrelated proposals for developing policies and strategies to advance AET. The proposals draw on the literature reviewed in a separate paper although emphasis in some cases expresses the writer's findings and ideas from study and field experience regarding AET in SSA. The proposals cover the following considerations: (1) the relationship of the university (and other AET institutions) to agriculture, (2) the importance of developing practical business and rural development courses/programs in the agricultural curriculum, (3) the implications of an expanded curricula for greater linkages in and beyond the AET complex of systems, and (4) suggestions as to what would constitute an expanded AET system. The paper then concentrates on those issues that inform an understanding of AET as well as on specific recommendations.

For clarity, this concept paper utilizes three basic acronyms: AET to refer to the multiple systems operating in the complex of agricultural education and training-- both formal and nonformal, PS-AET to refer to post-secondary university education and training and PS-ATET to refer to middle-level post-secondary agricultural education and training institutions.

## INTRODUCTION

To begin, it seems appropriate to review the elements of a strategy which, while general, nonetheless clarifies certain considerations in developing an AET agenda. These considerations might be formed as questions. Is the agenda...?

- 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 investment should be guided by the following considerations:
  - Adaptable investments are preferred in countries with a strategic framework and expectations of political stability, as they facilitate a system wide, holistic, long-term approach. When necessary, the first phase could focus on consolidating the strategic framework for reform and on building consensus among all stakeholders.
  - Budget support would then 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.

With these elements of a strategy in mind, an analysis of the literature uncovers five main areas central to AET development:

1. Government policy and funding (Eicher 2006; Rivera 2006; World Bank 2007).
2. AET system governance (Idabacha 2003; Willett 1998), including student participation in governance (Idabacha 2003).
3. Capacity building (of organizations and faculty) (Crawford 2010-“Feed the Future” initiative; Eicher 2006, 2009; Gore et al. 2009; Idabacha 1997; Kibwika & Hagmann 2007; Maguire 2000; Muir-Leresche 2006a; Rivera & Alex 2008; Samy 2008; USAID 1990, 2003a, 2003b; 2010; World Bank, 2004).

Capacity building is linked to innovative capacity (Spielman et al., 2008), innovation systems and capacity (ibid, 2008), research capacity (World Bank 2006), and HRD (Gates Foundation 2010).

Capacity development in the agriculture workforce is a key factor in the success of agricultural and rural development. Without knowledgeable producers, trained research and extension workers, first class administrators, program managers and support staff, little impact can be achieved, even if all other major factors -- land, water, production inputs, finance, etc., are available. Producers and agribusinesses—large and small—must be able to operate in more complex and interrelated production and market chains. Agricultural education and training as a whole is an integral part of any agricultural and rural development effort (FAO 1986; Rivera *et al.* 2001; Rivera and Alex 2008).

4. Institutional linkages (Van Crowder & Anderson 1996; Rivera 2006; Samy 2008; Rivera and Sulaiman V. 2009).

A survey study in Azerbaijan regarding development of an innovation system (Temel, Janssen, and Karimov 2003); Temel et al. concluded: “...there are many obstacles for instituting an AIS system in their production systems. The key obstacles are the absence of a framework to guide innovation activities and also the absence of initiatives to develop one (p. 12).” This finding emphasizes once again that policy initiatives and institutional frameworks are at the center of any development effort.

5. Physical infrastructure, equipment and technology (Alex and Byerlee 1999; World Bank 2005; Rivera 2006-- mission). The situation is abysmal at the university level and even more egregiously in outlying colleges and technical institutes.

For comparison and contrasting emphases, notable is the World Bank’s set of seven priorities. These include:

- *First*, political will must be generated in support of agricultural development by educating the public about its role in economic growth and poverty reduction, creating capacities for lobbying, joining forces with other stakeholders, and sustaining these efforts over two or three decades.
- *Second*, AET institutions should be integrated into the national agricultural innovation system by establishing better institutional and market linkages. Associated AET reforms ought to be grounded in an analysis of agricultural priorities and market requirements, and to recognize that changes in organization and management can provide opportunities and incentives for productive external linkages. Access to international knowledge sources is becoming increasingly easy, but it often requires external assistance.

- *Third*, it is desirable to assess and rebalance AET enrollment profiles away from secondary level vocational training and towards diploma, degree, and postgraduate levels.
- *Fourth*, curricula and pedagogy should be modernized by emphasizing analytical skills, problem solving, agribusiness processes, post-harvest technologies, and “soft” but essential skills such as communication and teamwork. Student interest in agriculture could be sparked by recasting programs in more modern and appealing terms, such as applied sciences and technology, and by educating the public on the full range of agricultural career possibilities.
- *Fifth*, it is essential to replenish human capital by strengthening and expanding national MSc programs, laying the foundation for PhD programs, and tackling the conundrum of incentives for staff retention.
- *Sixth*, finances must be managed proactively by making more efficient use of existing resources, mobilizing nonpublic resources, and persuading donors to finance operating costs.
- *Seventh*, much better gender balance must be achieved among AET graduates.

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## THE UNIVERSITY AND AGRICULTURE

A major issue for university policy, administration, schools, and departments to resolve regards the relationship of the university’s various schools with the subject of agriculture. The National Research Council for National Academies (NRCNA, 2009) recommends that academic institutions with undergraduate programs in agriculture implement a number of steps to better meet the needs of students, employers, and the broader society. It underscores the importance for universities to *initiate strategic planning and building strategic partnerships* by universities and to *broaden the treatment of agriculture in the overall curriculum of universities*. This second recommendation recognizes the interdisciplinary nature of agriculture. Disciplines related to agriculture are found in numerous disciplines, from engineering and technology to chemistry, biology, and the social sciences. As a consequence, the NRCNA recommends that faculty in various colleges should encourage discussion of agriculture in their courses and work with colleagues from other departments to develop cross-sectoral introductory courses that serve multiple populations and illuminate underlying themes shared by agriculture and other disciplines.

The various AET institutions and programs, formal and non-formal, as this paper highlights, benefit from being seen in the light of larger concepts and systems. These include:

- *Agricultural knowledge and information systems (AKIS)* presupposes close connection and cooperation among the national agricultural research system (NARS), the national agricultural extension system (NAES) and the national agricultural education and training system (NAETS).
- *Agricultural innovation systems (AIS)* calls for multi-institutional connections both external and internal with a view to developing and/or incorporating appropriate innovations.

- *Agriculture integrated into the university curricula as a whole* recognizes the subject and business of agriculture as extending beyond production agriculture, relating to numerous other disciplines (engineering, biochemistry, business, etc.).
- *Human resource development (HRD)* considers AET and education in general as a capacity building vehicle to meet the demands of the labor market, underscoring the importance of employment.

The NRCNA's recommendation to broaden the treatment of agriculture in the overall curriculum of universities is provocative and reflects the reality of agriculture as a global, inter-sectoral and interdisciplinary concern in the present globalized and continually changing 21<sup>st</sup> century. The interdisciplinary nature of agriculture, highlighted early on by the Bellagio conference in 1991 (Ruttan, 1994) and the Food and Agriculture Organization (1997), confronts the problem of defining agriculture. The narrow definition of agriculture as raising crops and animals for production appears to be one of the reasons for the backseat the subject tends to be given in academic circles.

The literature and personal experience point to the isolation of schools of agriculture from other schools within universities. This is a significant obstacle in advancing the development of agricultural development and innovation. *Bottom line is to initiate discussion of agriculture at university level and encourage university colleagues from other departments to develop shared introductory courses that serve multiple populations and illuminate underlying themes shared by agriculture and other disciplines.*

## Science, Research and the University

Given the importance ascribed in the literature to science, research, and the university, the issues involved run the gamut from policy development and execution to institutional governance (such as autonomy and accountability of the institution, to procedures for building the curriculum, capacity of faculty and the improvement of physical infrastructure (labs, equipment, computers, internet, etc.). Problems may involve bringing administration, leadership and staff up to normal standards, as is/was the problem at the University of Ghana, Legon, in 2006. Decisions according to category of country is counter the concept of situation analysis and resolving "best fit" given a country's circumstances.

Ultimately the challenges that countries confront include (1) productivity and the problem of linking farmers to markets, (2) sustainability, both the stewardship of natural and human resources and also of institutions, (3) ownership, meaning participation in decision-making, (4) partnership through networks among institutions and along supply chains, and (5) poverty alleviation through improvement of livelihoods from farm and non-farm income opportunity AET can have a major role in helping to meet these challenges.

The World Bank *Agriculture Investment Sourcebook: Agriculture and Rural Development* (2004) recommends the need to build agricultural policy and institutional capacity through Bank investment in higher education. Recommendations include:

- (1) Investments in agricultural science and technology,
- (2) Investments in agricultural extension and information services,
- (3) Investments in sustainable agriculture intensification,
- (4) Investments in sustainable natural resource management,
- (5) Investments in agribusiness and market development,

- (6) Investments in rural finance for agriculture,
- (7) Investments in irrigation and drainage,
- (8) Investments in land administration, policy and markets,
- (9) Managing agriculture risk, vulnerability and disaster, and
- (10) Scaling up agricultural investments in the (World Bank's) changing internal environment (can, in this case, USAID be substituted for the World Bank?)

A review of these investment recommendations suggests the need for renewal of curriculum in agricultural colleges at the university level.

Eicher's lessons (2006) also provide a series of starting points, including:

1. Mobilize and sustain political support for AET investments. (Eicher considers this to be the most important and most difficult issue to address in designing and financing a system of agricultural development institutions).
2. Recognize that time and learning from experience play critical roles in how to nurture the co-evolution of technology and institutions for a particular country.
3. Stay aware of the futility of promoting one model of agricultural higher education such as the Land Grant model (or one model of extension such as the Farmer Field School model).
4. Create incentives to develop research and to encourage employment in research in developing countries. --Institutional and individual grants can serve for this purpose.
5. Urge universities in Sub-Saharan Africa to cut the cost of training by adopting the sandwich model or by creating regional centers of excellence in graduate training.
6. Country studies can provide insights on how to extract more research output from African universities.
7. The seventh lesson derives from the rapid increase in the area planted to GM crops in Brazil, India and China. By contrast, South Africa is currently the only one of 53 countries in all of Africa that is growing GM crops. This is an important issue because of the widening technology gap between Africa, Asia and Latin America. Eicher asks: What essential equipment is needed for biotech research labs? How should GM research be organized so as to spread the fixed costs of labs and equipment over a number of countries? Also, what can be done to generate science-based information on biotechnology that can better inform African policymakers?

The World Bank report (2007) highlights four actions to be given priority attention at the university level, namely:

- Reforms in curriculum and teaching methods are the most immediately useful undertakings.
- Modify institutional governance structures for greater institutional flexibility and increased responsiveness to stakeholders.
- Balance agriculture enrollments between degree, diploma, and certificate to ensure adequate numbers of competent technicians.

**COVERING ALL THE ANGLES: USING A SPECTRUM OF IDEAS TO EXPAND AND TRANSFORM AGRICULTURAL EDUCATION AND TRAINING**

- Recruit more women students.

The lessons provided by EARTH University in Costa Rica are included in Annex 1 and might serve as a kind of working manifesto for university leaders.

## **A Vote for PS-ATET Investment**

Much emphasis is placed on funding national agricultural education and training (NAET) and in particular the major university(s). However, drawing on observations in four countries and a reading of the emerging literature there appears to be serious need for investment in practical PS-ATET institutions (Davis et al., 2008; Kroma, 2008; and Rivera, 2008). *Investment in PS-ATET has potential to provide a basic-practices approach to agriculture as a process in which production may be central but nonetheless only one aspect of the agriculture industry.*

This latter recommendation – to strengthen PS-ATET – also suggests review and possibly small investment in secondary school development of agriculturally related programs. Logic suggests that the AET (formal education) pyramid cannot be expected to upwardly provide students truly interested in agriculture and rural development if exposure to relevant courses has not prepared them through previous educational experiences.

*PS-AET vs. PS-ATET.* To a large extent, advocates for investment in universities abroad are themselves university researchers and support the advancement of science and research. While important, so is employment. Practical education in agricultural production and business can serve to slow the “brain drain” from developing countries (Rivera, 2007). Indeed, meeting the need for employment in the agriculture industry is central to any discussion of agricultural knowledge institutions. The need for entrepreneurs (or agri-entrepreneurs) is clear as is the need to prepare human capital for professional and industry-wide agricultural occupations.

*Brain drain.* With Africa operating in an increasingly competitive global economy, one of the most vexing issues facing its development as a whole is the 'brain-drain' syndrome. No one can ignore Africa's annual “brain drain” from African universities of some 23,000 academics, over 40,000 Africans with PhDs and 50,000 middle and senior management personnel leaving the continent for the more economically developed world (Odumasi-Ashanti, 2003; Price, 2004). This raises the issue of incentives. Certainly, as Eicher states citing M.S. Swaminathan, former Director of the NARS of India and Director General of IRRI, “What is important is to nurture and care for the brains remaining in the country” (2004:17). Nonetheless, the question is how to reverse the traffic of skills back to Africa.

African immigrants to the United States, for example, are more highly educated than any other native-born ethnic group including white Americans. Some 48.9 percent of all African immigrants hold a college diploma. This is slightly more than the percentage of Asian immigrants to the United States, nearly double the rate for native-born white Americans, and nearly four times the rate for native-born African Americans<sup>1</sup>. See also Reuters article on Africa's brain drain<sup>2</sup>.

Highly qualified faculty, committed and well prepared traditional postsecondary students, and material institutional resources will not in themselves enable agriculture and agribusiness. These positive conditions may only contribute to the current brain drain from Africa. Students are graduated from universities and other postsecondary institutions without assurance of positions in public administration or [private business, and in many cases there is not yet a private sector ready and willing to hire students

<sup>1</sup> <http://nigeriaworld.com/board/viewtopic.php?p=20793&>.

<sup>2</sup> [http://publicbroadcasting.net/wfcr/news.newsmain?action=article&ARTICLE\\_ID=90525](http://publicbroadcasting.net/wfcr/news.newsmain?action=article&ARTICLE_ID=90525)

whose academic background tends to be theoretical and unrelated to the skills and attitudes required by business. Some few are hired by international NGOs and bilateral programs. Unfortunately there is no follow-up data on students after they graduate, as PS-AET institutions do not maintain student tracking systems.

The challenge is to ensure that the professional people graduating from higher education institutions now and in the future are prepared in their profession and can find lucrative and meaningful employment whether in their own countries or within the region. *This is central to* discussion of AET, especially PS-AET. Employment that utilizes the professional expertise and provides further incentives to advance students in their chosen employment is one of the keys to success of PS-AET in SSA as well as in other developing countries. It is a further argument for working closely with the local and emerging business communities.

## AN EXPANDED AET CURRICULUM

The importance of agriculture for food is undeniable and certainly a number one concern evidenced by the vast literature on food security (and insecurity). However, agriculture produces numerous products aside from food. The production of natural fiber (e.g., cotton and wool) involves industries that “feed” designers, tailors, and clothiers. Natural fibers also play an essential and ubiquitous role in the form of natural biopolymers such as nucleic acids and proteins that are essential for life; and natural polymeric materials include such materials as shellac, amber, and natural rubber as well as cellulose, which is the main constituent of wood and paper.

Agriculture is also the source for ingredients that go into products of the pharmaceutical industry. The agriculture, pharmaceuticals, and health industries are closely associated. Brenner (2010) points out many medical products like ointments, latex gloves, x-ray film, gelatin for capsules, and heart valves come from the agriculture industry. Indeed, as Brenner states, there are new drugs still awaiting to be discovered that have the potential to cure AIDS, cancer, diabetes, arthritis, Alzheimer’s, and other illnesses (Brenner, 2010). This connection to the pharmaceuticals and health industries is one of the best examples on how many agriculture careers reach into other fields, and how industries outside the agriculture arena greatly depend on agriculture and agricultural professionals for their operations.

Forestry also is too often left out of discussion and planning for agriculture. Forests produce wood and rubber of course, but also a number of food products such as fruits and nuts, and provide a habitat for other edibles, such as mushrooms and honey. In addition, forest cover is often essential to protecting crops and animals and contributes to photosynthesis, the planet’s main source of oxygen.

The discipline of communications is an integral part of the knowledge and information exchange skills needed for promoting agricultural development at all levels—from the hen house to the state house, so to speak. The professions that can be associated with agriculture are much more numerous than higher-education institutions currently emphasize. Thus, the NRCNA has taken a major step in recommending that universities review and *broaden the treatment of agriculture in the overall curriculum of universities*, a recommendation long overdue.

Communication technologies, of course, present an unknown potential in the AET equation. ICTs, distance learning, are slowly beginning (e.g., in South Africa) but will likely soon be incorporated in university teaching programs globally, affecting approaches to faculty development and course delivery.

Finally, and perhaps most obvious is the importance of business education and training. Agricultural business involves a host of transactions, not the least of which is the business involved in the value-chain

sequence of steps in the process of delivering a product to market.<sup>3</sup> A vehicle for linking small businesses to markets, value-chain approaches are “essential for improving rural sub-Saharan Africa’s economies and reducing poverty” (Webber, 2009).<sup>4</sup>

But, business relating to agriculture is not limited to agri-business; it can and should include rural business and rural development in general. The next section builds on the concept of expanded AET curricula, concentrating on the introduction of *rural business*, (such as micro-enterprise) *development* into AET curricula.

## Emphasis on Rural Development and its Business Development

Conspicuous by its absence in AET literature is serious concern with *rural development* except as a general subject of study, often sociological in nature. Frequently in the literature rural development tends to be discussed in terms of rural ‘quality of life’ or in terms of basic (including adult) education. Agriculture is the only income-generating activity generally mentioned with regard to rural development. This has led some researchers (Janvry and Sadoulet, 2001) to outline pathways out of agriculture (i.e. the multi-activity path, the government assistance path, and the exit path).

Recently and increasingly, researchers have started to point out the importance of *non-farm activity* as sources of income generation in rural areas (Berdegú & Escobar, 2002). Berdegú and Escobar underscore the diversification of rural employment and income as a significant fact of life in the developing world. They argue the agricultural pathway out of income poverty is relevant for only a portion of the rural poor.

Orr and Orr (2000) illustrate a range of farmer income sources from agriculture to micro-enterprise. They noted a surge in micro-enterprise activity in Malawi during the 1990s although most enterprises were short-lived and did not develop into stable or growth enterprises. However, rather than specialize and maximize income in either agriculture or micro-enterprise, households began to optimize income by diversifying their livelihood strategies, in particular by combining minor cash crops with micro enterprise in order to increase their income security.

The point to be made nonetheless is that *microenterprise as well as other non-farm income-generating activities have untapped potential and are important components in rural development*—even though they are often combined with minor cash crops to ensure against food insecurity. Education curriculum at the middle and university levels tends to emphasize agriculture to the detriment of rural enterprise development, which seems a major oversight in higher education as well as in human-resource-development projects. Yet, the point needs to be made that rural development – microenterprise, education, services and health – in one way or another are supportive of agriculture and its development.

Aside from private company enterprise an outstanding potential in regard to agricultural development is the promotion of rural producer organizations RPOs) in the form of member-owned enterprises (Byrnes 2001; Rondot & Collion 2001). Training in how to organize and manage member-owned cooperatives merits inclusive in AET curricula. RPOs have a special value also for sustainable agriculture (Collion and Rondot 2001). They are a pathway *into* the prospect of profitable agriculture, as well as development of

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<sup>3</sup> See Michael Porter’s 1985 best-seller, *Competitive Advantage: Creating and Sustaining Superior Performance*.

<sup>4</sup> Webber notes the agricultural share of sub-Saharan Africa’s total exports has declined sharply in the last 40 years, although it remains the main source of export revenue for many SSA countries. Thus, he argues, “Without further improvement to their business environments and increased competitiveness of their exports, many SSA countries risk being trapped by continuing to produce low-skill, low-value products and services and will fail to secure a niche in competitive world markets” (Webber, 2009).

social capital, rather than the emphasis on pathways “out of agriculture,” enumerated by Janvry and Sadoulet (2001).

The PS-AET curriculum (and curriculum at all AET levels) deserves to be reviewed to include rural micro-enterprise business (including cooperatives) development and not be limited to subjects only specific to production agriculture. This would mean reaching out to students who might be interested in engaging in the business and other aspects of rural development as well as in business activities related to agricultural productivity.

## **Perspective is Important for Agenda Development and Strategic Planning**

The perspective adopted will make considerable difference as to which priority needs and opportunities will or should be brought to the fore. Therefore the questions in Objective category 1 will depend not only on a country’s specific circumstances but on strategic planning at national and institutional levels (assuming strategic planning exists in the country; if not then developing a strategic plan with government officials would likely be the first step to be taken with respect to AET development). Otherwise, initiatives might begin with USAID-funded programs already proven successful, such as partnerships.

## **LINKING THE AET SYSTEM**

An expanded AET curriculum demands a new consideration of a long-term problem in AET, linkages.

Linkages are crucial for AET system development. Primary and secondary schools would gain from contact with PS-AET programs and students. Agriculture and technical schools (ATS) would gain from knowing about the activities being carried out at other schools (cf, Swanson, Samy) to develop curriculum and faculty. Agricultural extension and other continuing education programs would benefit from closer connections with university research and middle-level technical training programs. Extension in particular is an important vehicle for transmitting innovation from research and also from farmers who have developed innovations.

To respond to the need for linkages among formal AET programs as well as in-service business and non-formal education programs, proposed is the urgent establishment in PS-AET institutions of *a special office for connecting, coordinating and supporting the programs of other AET institutions*. Aside from an administrative director and perhaps one staff member, the office could utilize the assistance of graduate students who would gain credit for their activities in visiting and reporting on the variety of AET and PS-ATET programs and recommending how best to coordinate and improve linkages with these institutions, including both formal and non-formal. Partnerships are valuable for several reasons and provide useful opportunities both for US institutions as well as AET institutions in developing countries (New Partnership for African Development 2006; Juma 2005; InterAcademy 2004; and Idabacha 2003). This is true for advanced and transitional economies and even more so for smaller, low-income countries with undeveloped AET systems. Eicher notes (2009), Africa has 51 countries but many are too small to finance high quality graduate programs and a critical mass of researchers.

To address the “small country” problem, most African governments and donors have tried for 50 years to organize and finance regional research programs, research networks and regional graduate programs. But many of the regional models are financially unsustainable. New models of private education are needed to develop the skills demanded by the market. But private investment in African research and training trails the expanding role of the private sector in agriculture in both Asia and Latin America. *The bottom line is that foreign aid will be needed for a period of decades to help craft and build global research and*

*educational partnerships to address the small country problem* (reviewer's italics; cf. also Tongoona et al. 2007).

The PS-AET offices would serve as central coordinating and planning bodies to assist in alerting their own faculty and students of activities and opportunities for research or other involvement. Such information would cover (1) the various levels of the formal AET institutions, (2) agricultural extension, continuing and basic adult education programs, and (3) the in-service training programs being carried out by agribusiness companies and other related agricultural institutions, including for example the private agricultural inspection companies that operate locally.<sup>5</sup>

Because it is not part of the formal education system, pre-service and in-service training that takes place within business arenas is often overlooked. As stated by Zubovic et al. (2009:6) "Agricultural schools have their programs, universities have their curricula, but it is not enough to complete school to be competitive. Education is a lifelong process which needs to be continued outside of formal education and training systems, through private and public workforce organizations (i.e., the shadow education system<sup>6</sup>), and the non-formal educational support programs, such as the acquisition and transmission of rural knowledge and innovation."

PS-AET institutions, as underscored in numerous documents cited in the Literature Review, need to promote meaningful linkages with other AET programs and with industry. In Uganda (Rivera, 2006 BTO mission report) interviews with the Private Sector Foundation<sup>7</sup> (PSF) revealed that the PSF's contacts and internal relationships with Makerere University are carried out with the Business School, the School of Economics, and the Economic Research Center, but *not* with the Faculty of Agriculture. Some 16 PSF associate members represent agricultural interests! Makerere faculty might well benefit from contact with the PSF and its members that have agriculture interests.

Also, another (overlooked) linkage involves an institution seldom discussed in the AET literature, the National Training College. NTCs represent an institution with significance for secondary and also post-secondary AET teacher training and should be included as a vital component in the AET system and in any linkage program.

In the final analysis, the key to advancing the development of the multiple AET systems lies most likely with efforts to be undertaken by universities, colleges and middle-level institutions. The establishment of PS-AET offices to develop and pursue linkages among AET institutions is a recommended initiative.

## **Primary and Secondary AET**

In the so-called 'pyramid' of formal AET institutions, primary and secondary AET are wither glossed over or cast aside as non-impactful investments. For example, the World Bank states (2007:xvi) in its third proposition (see herein p. 3) that it is desirable to assess and rebalance AET enrollment profiles away from secondary level vocational training and towards diploma, degree, and postgraduate levels. The report goes further, arguing that Upper secondary technical programs are most effective when they

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<sup>5</sup> Of possible interest, these agriculture inspection companies, of which SGS, Buenavere, ITS (UK), and COTECNA are the largest, are organized under the International Federation of Inspection Agencies (IFIA) which operates under the World Customs Organization (WCO).

<sup>6</sup> A misuse of the term, "the shadow education system" is to private tutoring. See: Bray, M. 1999. *The Shadow Education System: private tutoring and its implications for planners*. Paris: UNESCO, Fundamentals of Educational Planning, series no. 61.

<sup>7</sup> Discussion with Mr. Gideon Badagawa, Senior Policy Analyst, Private Sector Foundation, Kampala. (PSF is Uganda's umbrella private sector body comprised of some 73 business associations and corporate members, including the major public sector agencies that are supporting the growth of the private sector, such as the Uganda Investment Authority, the Uganda National Bureau of Standards, and the Uganda Export Promotion Board).

emphasize the acquisition of specific competencies for properly selected trainees and least effective when they serve as an alternative pathway to university admission. Greater flexibility in the length of courses would also enable secondary-level AET to meet the training needs of a wider range of potential students.

Secondary education schools could promote new visions of agriculture and rural development. A course could be offered on, say, “The Business of Agriculture and Rural Development,” introducing students to the opportunities in these fields, and encouraging them to pursue careers either at the technical level – in extension, community development, organizing cooperatives, creating rural business, etc., or as an enticement to continue on to college. Or, career days could be placed on secondary school agendas with a view to changing attitudes toward ‘agriculture’ and its potential as income-generating activities.

With respect to primary education school, USAID might cooperate with the Food and Agriculture Organization in its efforts to promote ‘school gardens.’ School gardens are good as long as they are used as a teaching tool and not as a means for food production, since the amount of food produced would never be enough to meet the demand of the students.

While the World Bank emphasis on higher education, research, and science carried strong weight, the bottom of the pyramid might well produce an increase of students who become interested in agricultural and rural development.

## Organizing Farmer Education Schools

Schools for training farmers can be productive, especially in areas where farmers are involved or want to be involved in factory farming or other productive enterprises. In this regard, the GIZ (formerly GTZ) is developing a public/private partnership in Gujarat, India to establish a new approach to foster market orientation and educational improvement of smallholder farmers (Rivera 2009 unpublished report). The approach -- known originally as Partnership Farming -- sets out to advance positive relationships with small farmers to improve their livelihoods and education. Partnership Farming goes beyond the traditional contract farming arrangement of enhancing market access to small farmers and pioneers a new semi-formal dimension to post-secondary technical agricultural education.<sup>8</sup>

Projects such as the GIZ experiment in India represent new ways forward in thinking about AET for agricultural and rural development. Functional literacy is one course offering.

## Human Resource Development

Capacity development in the agriculture workforce is a key factor in the success of agricultural and rural development. Without knowledgeable producers, trained research and extension workers, first class administrators, program managers and support staff, little impact can be achieved, even if all other major factors -- land, water, production inputs, finance, etc., are available. Producers and agribusinesses—large and small—must be able to operate in more complex and interrelated production and market chains. Agricultural education and training as a whole is an integral part of any agricultural and rural development effort (FAO 1986; Rivera *et al.* 2001).

Employment is a crucial consideration in discussion of AET (as a pyramid). In 2001, the Institute of Development Studies at the University of Sussex conducted tracer studies of 2,500 university graduates

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<sup>8</sup> The Partnership Farming concept grew out of a contract-farming arrangement developed between a Swiss-based venture-capital company, known in India as Contract Farming India (CFI), which has maintained since 2003 the management of Desai Fruits and Vegetables (DFV) – India’s leading sustainable partnership farming organization and largest Indian exporter of fresh bananas.

from 1980, 1987, 1994, and 1999 in Malawi, Tanzania, Uganda, and Zimbabwe. It found that unemployment rates among graduates were quite low and that most graduates were generally employed in their field of university studies. *Agriculture was the main exception* (reviewer italics) where between 25 and 50 percent of graduates reported that they were employed in non-agricultural jobs. This disconnect between training and employment was reportedly due to the limited number of attractive jobs in the agricultural sector, where public agricultural officers are frequently posted to remote rural areas (Samy 2008).

As already stressed, employment opportunities are to be considered in any country program for advancing AET. Practical education combined with employment opportunity in agricultural production and business can serve to slow the “brain drain” from developing countries (Rivera, 2007). Meeting the demand for employment in the agriculture industry is central to any discussion of agricultural knowledge institutions. First, the question must be asked about what types of formal agricultural education and training (if any) will enhance the productivity of workers in specific jobs? Second, what types of formal education and training (if any) are used by firms as well as the public services to recruit and promote workers into specific jobs? With respect to postgraduate education what opportunities exist in the NARS and at the management level in the NAES? In addition to issues of enrolment and retention, human resource planning will be required in practical efforts to develop AET agendas.

## Other Potential Partnerships

In response to the question 3:b in the Work Plan, new initiatives imply new partnerships with other than land grant universities (LGUs). *Other colleges and universities that indicate an interest in agriculture and rural development should be informed of possible partnerships with universities abroad. Pilot efforts utilizing the expertise of community colleges<sup>9</sup> and distance learning programs should also be engaged in promoting partnerships abroad.* – The United States would then gradually be seen not only as a significant funder in the AET/agriculture domain but as a leader in promoting agriculture and rural development across disciplines and institutions.

An expanded view of partnerships can be the key to success in promoting educational activities to meet labor market requirements. For example, businesses might partner with universities, agricultural colleges and vocational institutions to provide internships. This could aid students in gaining practical skills and businesses would acquire employees that they can train and possibly retain after the degree/certificate is earned.

## AN EXPANDED AET SYSTEM

At stake for the AET system is the advancement of careers in three main areas: (1) research and science; (2) employment in the public and private labor market; and (3) outreach that accommodates the continuing needs of farmers and professionals and thus moves ahead both agriculture and the AET system.

The first and most obvious career challenge is *to advance the dual needs for science education and agricultural demand-driven university research* (Lynam & Blackie, 1994; Alex & Byerlee 1999; World

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<sup>9</sup> HRD, as a field of practice, is dedicated to learning and development for work and workplaces, whether provided for the good of the individual, a particular employer, a nation, or society in general (Jacobs, 2006; Jacobs & Hawley, 2009; Lynham & Cunningham, 2006; McLean & McLean, 2001). Such learning and development takes the form of formal training, informal work-related learning, organization development, and performance improvement efforts.

Bank, 2000; Sawyerr, 2002; Michelsen & Hartwich 2004; Eicher 2004; World Bank, 2004; Bateman 2005; Byerlee & Pehu et al., 2005).

The second challenge is *to produce competent graduate students to take up available positions in the agricultural labor market* as well as 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).

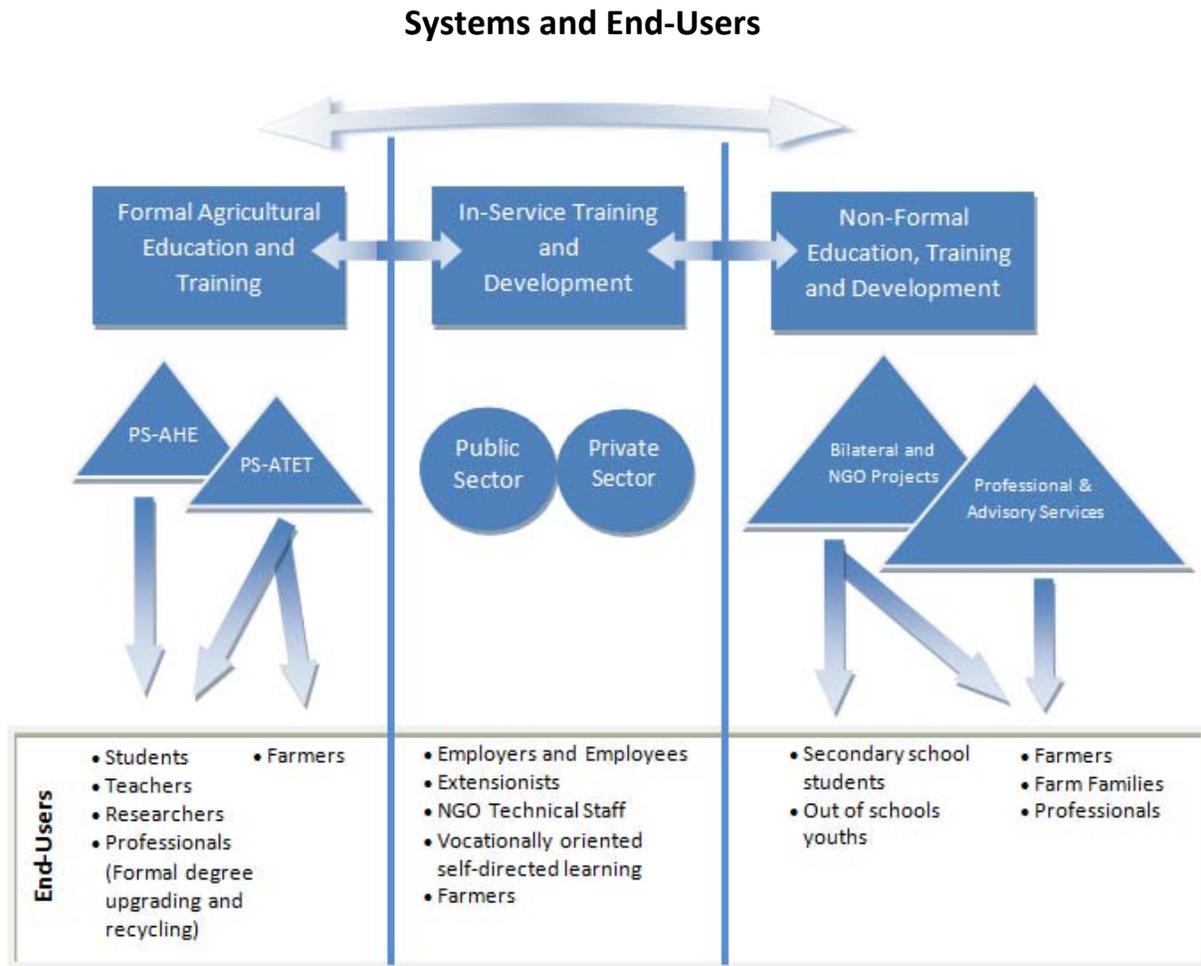
The third challenge is *to catalyze PS-AET institutions to foster national extension-type services, continuing education and community development by upgrading the skills of producers, professionals and communities* (Nindi, 1993; Bawden, 1996; Crowder & Anderson 1996; Wallace, 1997; Crowder, Lindley,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

These three challenges emerge as major goals for PS-AET institutions. These goals are continually brought up in the literature and are part of the reviewer's personal findings based on mission interviews carried out in connection with the World Bank study that resulted in the publication, *Cultivating Knowledge and Skills to Grow African Agriculture* (2007).

Figure 1 takes a broad (human resource development) 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 could be forged by the PS-AET and PS-ATET institutions in exposing students to various arenas of agricultural knowledge generation, exchange and development. In Figure 1, PS-AET post-secondary agricultural higher education and PS-ATET post-secondary technical education and training.

This broad view of agricultural education and training helps clarify the rationale in this concept paper for expanding the concept and practices of PS-AET systems. In its totality, Figure 1 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.

**FIGURE I: ELEMENTS OF AN INTEGRATED POST-SECONDARY AGRICULTURAL EDUCATION NETWORK**



Adapted from Rivera (1995)

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 non-formal “how-to” training program. In Uganda, for example, Sasakawa Global 2000 provides fellowships to community extension workers so that they can pursue degree education in agricultural extension at Makerere University. These fellowships are targeted at mid-career extension workers who possess practical skills but lack academic training. The fellows are released from their local (usually District) employment duties for two to three years 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 other mass media, as well as knowledge providers, such as district, bilateral and NGO professional and technical training programs. Some PS-AET institutions (through their continuing education centers and their community outreach programs) are also involved in training programs for agricultural professionals, vocational technicians and producers.

COVERING ALL THE ANGLES: USING A SPECTRUM OF IDEAS TO EXPAND AND TRANSFORM AGRICULTURAL EDUCATION AND TRAINING

One question is whether public sector traditional PS-ATET institutions can be reformed to accommodate smallholder farmers? If the public sector cannot do it, then perhaps private sector agricultural education may be the answer.

Access to knowledge is required for growth (Bozeman et al., 2003; Nagel, 1979), “but if the content is not right, or farmers’ access is not inclusive, such growth will not lead to well-balanced development and certainly not to pro-poor development” (Wennink, et al., 2007, p. 12). This kind of practical thinking has fallen by the wayside to a large extent because of the traditional international commitment to invest mainly in universities and to agricultural higher education schools within universities.

Policymakers are challenged to consider what would constitute an expanded view of post-secondary agricultural education and training. A new perspective might well link interchanges between formal, in-service and non-formal advisory systems, as Figure 1 suggests.

## CONCLUSION

Underlying the issues discussed herein, a number of in-country and external obstacles will need to be overcome if AET systems are to advance over next decades:

*In-country AET obstacles.* In addition to the agendas set forward at the start of this paper – outlining the elements of a strategy and five main areas analyzed as central to AET advancement -- a number of obstacles are detrimental to the success of AET. These include: agriculture’s bad image, especially in developing countries, lack of employment opportunities, universities reluctant to base admission on employment prospects, lack of investment in AET by local businesses, and lack of rural cities (not just national capitals).

*External AET obstacles.* These concerns are well known and relate to donor interest and funding for AET: (1) “On again, off again” donor investment patterns, (2) short-term strategies and funding patterns, (3) “authoritarian” approach to country negotiations, (4) investment in failures (see Eicher, 2006), (5) too much emphasis on one model (Land Grant Universities), and (6) difficulty and often reluctance to pursue ideas re “transformation of AET.”

To begin to confront the challenges presented in the preceding section, various actions are needed, including: (1) to relate the whole university (and other AET programs) to a new view of agriculture as multi-disciplinary, (2) to expanded the “agricultural” curriculum to include other disciplines and to coordinate with other schools to advance training in, for examples, business and rural development, (3) to strengthen AET institutional and program linkages, (4) to expand the AET system to include cooperative and developmental efforts with other formal AET institutions, business inservice education programs and much closer contact with agricultural extension managers and field personnel and with continuing education activities.

Additionally, the reviewer argues for three priority areas: (1) strengthen institutional linkages, (2) improve physical infrastructure, and (3) provide incentives to develop human capital. These priorities of course depend on the policy mandates and funding commitment of government and the establishment of effective governance structures both at the national and institutional levels. They are also crucial to developing PS-AET 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 paper, 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.

These recommendations are not intended to lessen other needs, e.g., leadership and management; programmatic and incentivizing initiatives; and AET physical facilities—that seriously need to be improved.

Inevitably, however, AET development will depend on the commitment of governments to establish proactive policy mandates and adequate funding; as well as, the establishment of effective governance structures both at the national and institutional levels. Donors can help by exploring with interested governments the needs and “best fit” for development initiatives in their countries.

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# ANNEX I – EARTH UNIVERSITY: A NEW APPROACH TO HIGHER AGRICULTURAL EDUCATION

EARTH University lists a number of lessons learned that are highly pertinent to higher agricultural education programs. Note lesson #3 below and its connection to the NRCNA proposal.

1. To graduate professionals capable of successfully promoting change and sustainable rural development, you must begin with young people with a vocational interest in agriculture, natural resource management, rural development and related areas. In too many universities, students end up in agriculture because they couldn't get into medicine, law and other more prestigious faculties. If and when they graduate, it is highly unlikely that many (or any!) of these individuals will be willing to return to rural areas and engage in the complex and difficult work involved in development.
2. Universities have to be engaged with rural communities. Too often universities are located in the capital city and there simply are not enough resources (or the will) to get faculty and students out to rural areas to engage directly with the farmers and their families. Frequent and direct contact with the realities of rural life and the challenges of agricultural production are essential in the formation of future change agents.
3. Higher education in agriculture has become increasingly specialized with the result that many graduates have great difficulty integrating knowledge across disciplinary boundaries. *The development of robust rural economies requires individuals capable of applying knowledge and skills from across disciplines, often in very practical and applied ways. Particularly at the undergraduate level, a generalist formation would seem to be more relevant to the needs of most developing countries* (reviewer's italics).
4. Faculty have to be willing to get their hands dirty, to engage directly with their students in production, in processing and marketing as well as in research and extension activities. Reward and promotion criteria have to be designed so that they encourage innovative teaching and engagement, as well as research. At the same time, teachers and professors must be provided a decent compensation for their service. Substandard salaries and working conditions only serve to drive the best out of education leaving the mediocre in charge.
5. Agronomists and other agricultural professionals are the true stewards of the land and there is nothing more important than producing the food and fiber required by all. Agriculture and rural livelihoods in general have become devalued in our society and must be dignified and encouraged. The challenges of feeding an ever expanding population and solving the immense environmental problems confronting the planet require the contributions of the best and brightest among us. Agricultural institutions, faculties and schools require investment and must be equipped with the latest technological advances.