

## **Prospects of agricultural development in Africa: Implications for agricultural education and training**

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### **Abstract**

The status of both food security and human development in Africa is affected by the performance of agriculture. Agriculture does not only determine the availability of food which is the key element for attaining food security; it is also the main source of livelihoods for majority of Africans, especially the poor. Currently, the share of economically active population in agriculture over that last decade has reduced by about 6%; from 72 to 66%. The key driver of progress in agriculture on the continent is higher farm productivity which requires human capital among other factors of production. Productivity growth (especially, but not exclusively, in small-holding farms) generates farm employment, decent wages for both skilled and unskilled labour, and for rural non-farm income and enhances food purchasing power of both the rural and non-rural poor. These can also translate into more public and private resources for investing in improved infrastructure, services, research and social protection, which further improve three key elements; agricultural productivity, food security, and human development. Education and training must work to sustain these three crucial and mutually reinforcing elements in Africa. How can education and training contribute to Africa's agricultural growth potential? This paper examines the role of education to increased agricultural productivity and the key areas in which education and training policies, reforms, programmes and investments combine to set Africa firmly on the path to sustainable agricultural development.

**Key words:** Africa, Agricultural development, capacity development, education and training, food security, human development

### **Résumé**

L'état de la sécurité alimentaire et du développement humain en Afrique est affecté par le rendement agricole. L'agriculture ne détermine pas seulement la disponibilité de la nourriture qui est l'élément clé pour atteindre la sécurité alimentaire, mais elle est aussi la principale source de subsistance pour la majorité des Africains, en particulier les pauvres. Actuellement, la

contribution de la population économiquement active dans l'agriculture au cours de cette dernière décennie est réduite d'environ 6%; de 72 à 66%. Le facteur clé du progrès réalisé en agriculture sur le continent est la plus grande productivité agricole qui nécessite le capital humain parmi d'autres facteurs de production. La croissance de la productivité (particulièrement, mais pas exclusivement, dans les petites exploitations agricoles) génère des emplois agricoles, des salaires décentes à la fois pour la main-d'œuvre qualifiée et non qualifiée, et pour le revenu non-agricole rural et accroît le pouvoir d'achat des aliments à la fois des pauvres ruraux et non ruraux. Ceux-ci peuvent aussi se traduire davantage en ressources publiques et privées pour investir dans l'amélioration des infrastructures, les services, la recherche et la protection sociale, qui en plus améliorent trois éléments clés : la productivité agricole, la sécurité alimentaire et le développement humain. L'éducation et la formation doivent s'efforcer de maintenir ces trois éléments cruciaux et mutuellement soudés en Afrique. Comment l'éducation et la formation peuvent contribuer au potentiel de croissance agricole en Afrique? Cet article examine le rôle de l'éducation pour accroître la productivité agricole et les principaux domaines dans lesquels les politiques d'éducation et de formation, les réformes, les programmes et les investissements se combinent pour mettre l'Afrique fermement sur la voie du développement agricole durable.

Mots clés: Afrique, développement agricole, développement des capacités, éducation et formation, sécurité alimentaire, développement humain

## **Background**

Productivity increases and associated benefits were hallmarks of the green revolution that swept Asia between 1960 and 1990. In the last decade, African governments have committed to supporting programmes to increase productivity as a means to obtaining food security and economic development. On the whole, Africa produces enough food that will provide the required calories for basic physical functioning for all Africans. However, local agricultural production of food staples that largely determines the availability and security of dietary energy are often not produced or available in the places that most need it in Africa. It is therefore easy to see why food supply through imports or food aid have not helped in providing food security on a sustainable basis as these are not driven by increases in land and labour productivity, especially of small farmers and

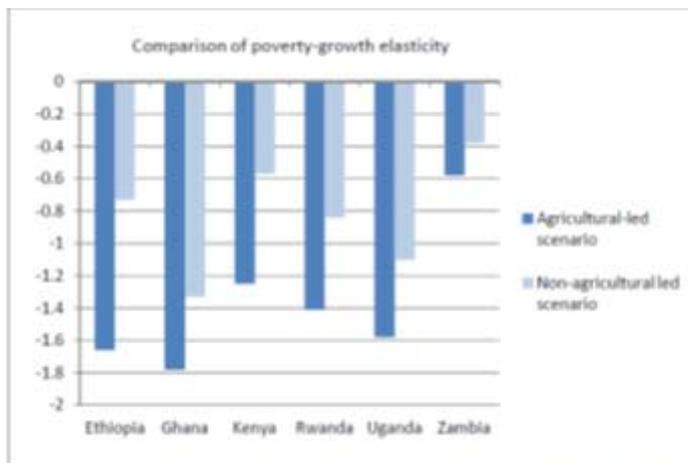
therefore do not generate the inclusive social and economic progress essential for food security and human development.

To improve agricultural productivity in Africa, a holistic solution rather than a mechanical, view of what drives agricultural productivity needs to be taken. Agricultural production depends on climate and the amounts and quality of factors of production - farm land, water, labour and technology. Productivity depends on how efficiently and effectively these factors of production are used. As Africa adapts to climate change and conforms to the sustainable stewardship of natural resources, technology will become even more important. This adaptation to changing climatic conditions can be accomplished through scientific and technological developments that take into account the diverse agro-climatic conditions found across Africa, and it will require local learning and the 'translation' of more general scientific principles and technologies into particular contexts. Policies and processes of enhancing agricultural science, speeding its delivery to farms and closing the feedback loop back to researchers will be of utmost importance.

This paper draws on key documents, reports, reviews and data including the FAOSTAT, Framework for African Agricultural Productivity (FAAP) (2006), the African Human Development Report (2011), Series of FAO and World Bank discussion papers and data to examine the role of higher education in improving agricultural productivity for sustained food security.

### **Agriculture and socio-economic Development**

**Growth in Agriculture can lift food security and human development.** The contribution of agriculture to GDP reduces with economic growth and industrialisation, as primary products are transformed through value addition. The number of people directly associated with farming also reduces due to mechanisation. Advances in human development are generally accompanied by a progressive reduction of the economic importance of agriculture, with people moving out of farming, thus cutting down the proportion of the populace and the amount of time required for obtaining food in order to use it for other economic activities, or leisure. However this does not mean promoting other sectors over agriculture in order to accelerate human development in Africa. This argument simply ignores the sheer magnitude of the importance of agriculture to Africans, especially the poor.



Source: Xueshen Diao, Peter Hazell, James Thurlow (2010) Role of Agriculture in African Development, World Development, 38(10): 1375-1383.

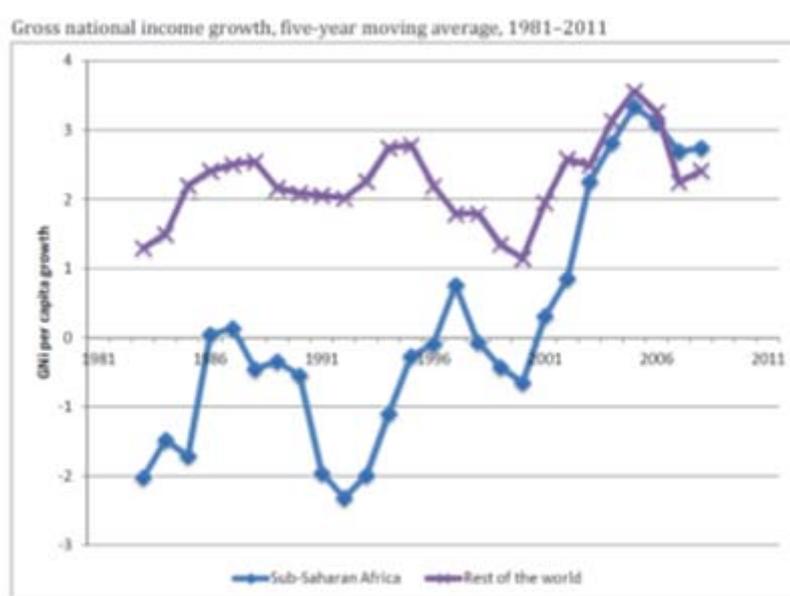
**Agricultural growth is more effective in reducing poverty than non-agricultural growth.**

Three main reasons account for this: First, more farm production implies more and cheaper food as well as higher income from sales of cash-crops or livestock. Both gains result in higher purchasing power, which is important given that food purchases take a large share of the budgets of the poor. Second, land, which is the main asset in farming, is typically much more equally distributed than human and physical capital, which is required for non-farm production. Third, where farming is carried out in small, labour-intensive units, this structure of production has productivity advantages that large mechanised farms, which are capital, rather than labour, intensive.

**Africa's unutilised land:** There is uneven availability of resources; particularly, land and water in Africa which comes with varying characteristics of soil and agro-ecological conditions and impacts on the pattern of food production. African agriculture has diverse systems for cultivating crops, producing livestock, fishing and forestry. Though challenging, these characteristics present opportunities—in the form of unused and underused arable land and the potential to boost agricultural productivity. About one billion hectares of land in Africa are considered suitable for rain-fed cultivation of at least one crop, but just a little more than 200 million hectares are in use, leaving four-fifths (800 million hectares) unused. The balance of suitable unused agricultural land is about 200 million hectares, which, if brought into production, would double the amount of cultivated land in Africa (Table 1).

**Table 1. Harvested area for main crop groups in Africa, 2008–2010 average.**

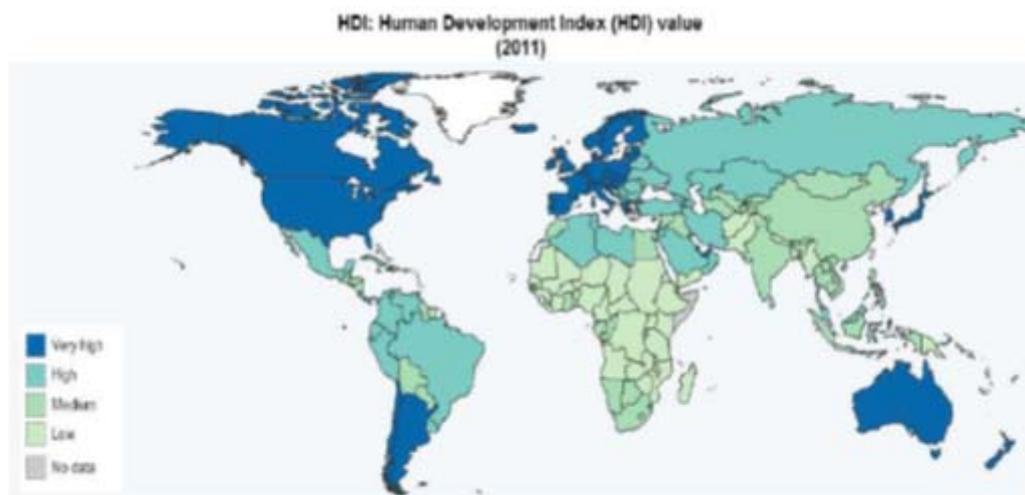
	Africa	Eastern	Western	Middle	Southern
Area harvested, Million ha, average 2008 - 2010					
Cereals	83	29	43	8	4
Fruit	9	4	3	1	<1
Roots and tubers	23	7	12	4	<1
Fibre crops, primary	4	2	2	<1	<1
Oil crops, primary	25	7	14	3	1
Pulses	20	7	11	2	<1
Vegetables	5	2	2	1	<1



**Note:** Rest of the world excludes China and India Source: Africa Human Development Report 2012 based on FAO data.

Africa's gross national income (GNI) per capita rose more than 35% between 2001 and 2011 in 13 sub-Saharan African countries (Fig. 1). Increased commodity prices contributed in part, with natural resources and related government spending accounted for just 32% of Africa's growth over 2000–2008 with remaining two-thirds coming from retail, transportation, telecommunications, services, manufacturing and other sectors (AfHDR, 2012).

**Africa's demographic bonus.** Africa's population has expanded at a 2.5% average annual rate for the past six decades, from 186 million people in 1950 to 856 million in 2010 (a 4.5-fold increase (Fig. 2)). While the growth rate has slowed and



Source: Data from the HDRO database.

Figure 1. The status of human development around the world.

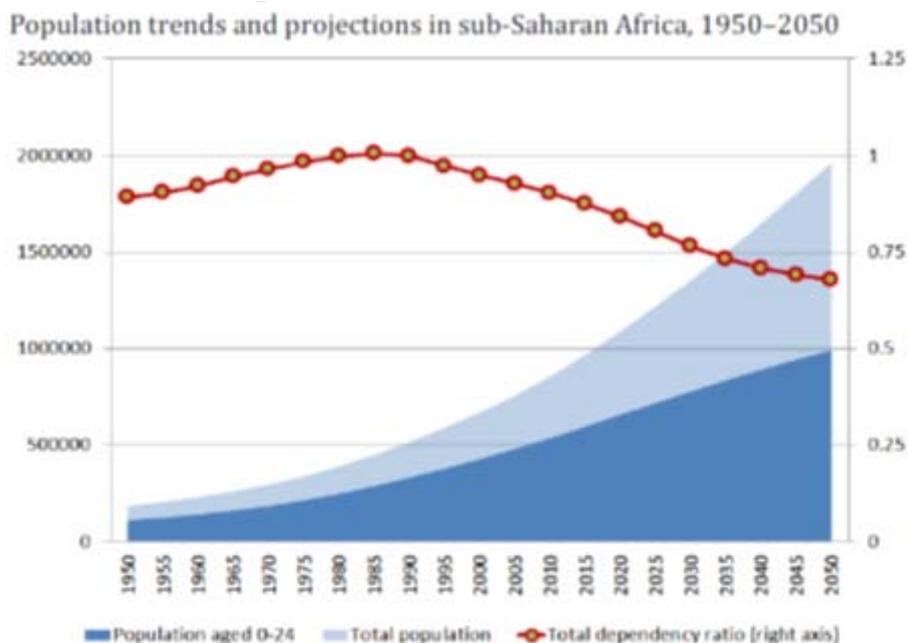
Improvements in:			
Rank	HDI	Non-income HDI	Income
1	Afghanistan	Afghanistan	Timor-Leste
2	Rwanda	Rwanda	Afghanistan
3	Sierra Leone	Niger	Azerbaijan
4	Ethiopia	Burundi	Turkmenistan
5	Mozambique	Mali	China
6	Mali	Yemen	Equatorial Guinea
7	Burundi	Tanzania	Myanmar
8	Niger	Ethiopia	Angola
9	Tanzania	Sierra Leone	Belarus
10	Congo (DR)	Mozambique	Armenia

Note: The table reflects improvements as measured by average annual change in HDI and nonincome HDI and annual percentage growth rate for income (measured as GNI per capita in constant 2005 PPP\$).  
 Source: Calculations based on data from the HDRO database.

Figure 2. Top movers in HDI, non-income HDI and income.

will continue to slow as gains in human development lead to smaller families, Africa will still have the fastest growing population in the world. In the years after 2050 its population is estimated to reach 2 billion. By then, 1 in 5 people on the planet will be African, almost triple the 1 in 14 proportion in 1950. The question that keeps being asked, is that if Africa cannot provide food security for its people today, how will it do so when its population more than doubles by 2050?

Africa's very young population, with 37% and 46% under the age of 14 in North and Sub-Saharan Africa, respectively, presents



Source: Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, World Population Prospects: The 2010 Revision.

an opportunity to feed the growing population as it can provide the bulk of farm workers. It has further implications for education and training in achieving literacy among the new generations and guaranteeing employment or self-employment of working-age populations in agriculture and other support services.

**Sustainable increases in agricultural yields in Africa are feasible.** Farm yields are low and even doubling the current yields on existing farm lands can provide enough food for sustenance. Evidence that a sharp increase in staples yields in Africa is feasible can be found by comparing yields in Africa not only with other regions, but within Africa itself. In South Africa, the surge in maize yields resulted from better water control (including through irrigation), fertiliser use, and the development and delivery of better seeds. These were also the factors behind Asia's green revolution, and it is feasible to apply the same principles to Africa.

**Increasing adoption of Agricultural Inputs.** Adoption rates are low in Africa and increasing adoption rates will lead to higher productivity. The constraints inhibiting adoption needs to be examined. If more use of agricultural inputs would increase yields and income, why is it that African farmers have not

adopted them? The preceding section established that such increases are feasible and possible within the limits of today's technology. The obstacles, then, must lie elsewhere. Fertiliser contributes substantially to yields and this has been achieved elsewhere. Africa needs to close the gap to realise potential yield. Fertilisers are more effective (and often profitable only) when used in conjunction with other inputs. Without timely rain or irrigation, fertilisers can burn the crop. Thus, farmers without proper water control may find the use of fertiliser unproductive, or even damaging. Market access, which enables farmers to trade their surplus output and which facilitates the delivery of fertilisers on time and at affordable prices, is also key.

**The infrastructure gap.** The poor road network, telecommunication and irrigation infrastructure in the Africa adversely affect agricultural productivity. The poor road network adds to the cost of transportation in and out of the farm, poor communication in infrastructure means delays in responding to emerging problems on the farm and lack of irrigation makes African agriculture higher susceptible to inclement weather conditions. Addressing the infrastructure gap requires long term, sustained, public investment. For example, the differences between Asia and Africa in the adoption of fertiliser and high-yield varieties can be attributed to the gap in water management, and particularly in the share of cropland that is irrigated. In weighing investment considerations, African governments need to recall that, with current levels of irrigation, few countries can achieve sustained yield increases, even with excellent rainfall, because, as noted earlier, few farmers will take the economic and practical risks of increasing fertiliser use.

**Access to markets.** Without market access for both agricultural inputs and outputs, farmers cannot achieve sustained increases in yields. Addressing this need, calls for appropriate market development policies and sufficient investment in rural roads, railways and warehousing capacity, as well as in information and communication technologies. The implications of insufficient input market integration are relatively obvious: it is evident, for example, that fertilisers are more expensive for farmers in many African countries than in the US. But the implications of not having access to output markets and how this can impact farmers' incentives for higher productivity are often not appreciated. If access to local, national or regional markets is fraught with obstacles for Africa's small farmers, the road to global markets often appears impassable.

**Agricultural and Rural Finance.** Access to credit helps farmers to increase their productivity. Credit for consumers allows families to maintain their consumption patterns should their income decline; for producers, it allows them to cope with shocks without selling off their assets. But well-known problems of information cause credit rationing and undermine smallholders' access to finance. Although governments have supported small producers and consumers by providing them with credit, such intervention has often proved unsustainable owing to its high cost and the information problems just mentioned. Innovative financing mechanisms such as the FARA proposed Innovative Fund for Agricultural Transformation (IFAT) holds promise to strengthening integrated agricultural research for development (IAR4D).

Africa's prospect for agricultural development is not only feasible but also opportune. This is because it is supported with a continental vision and commitments by African Heads of States. African leaders have affirmed their commitment to agriculture in the Maputo Declaration, and about 35 countries now subscribe to the principles of the Comprehensive Africa Agriculture Development Programme (CAADP) led by AUC-NEPAD PCA (NEPAD, 2003) and its partners and the huge support from development partners. What Africa now needs, is to strengthen its capacity to turn this opportunity and commitment into concrete results.

Having clarified the prospects for agricultural development the third and final section of this paper explores policy directions that will take advantage of Africa's prospect concentrating on the implications for agricultural education and training. Other authors discuss this issue in detail (see Eicher, 1990; Bonnen, 1998; Beintema *et al.*, 1998; Byerlee and Gay, 1998; Gary and Byerlee, 1999; BIFAD, 2003; Bloom *et al.*, 2005; Beintema and Stads, 2006).

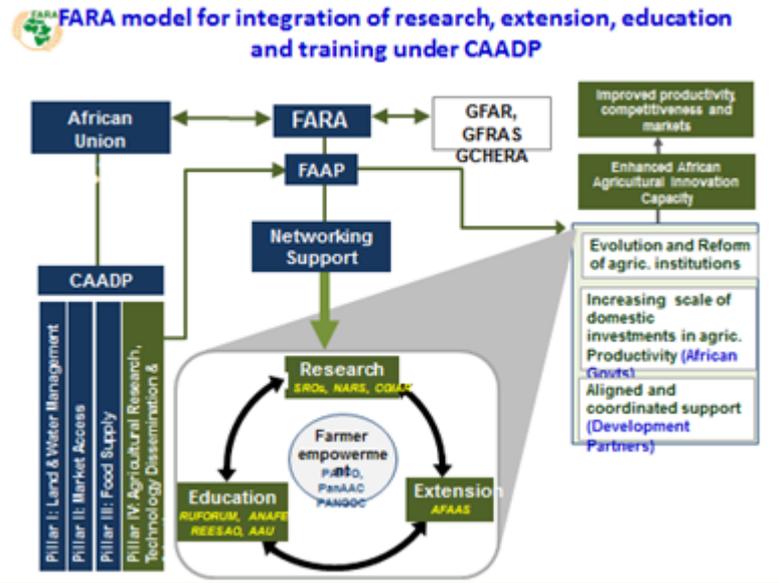
## **Implications and Policy Directions**

The first set of policies are those relating to increase yields up to the cutting edge of science, which includes higher rates of adoption of better and available technology; second, are policies to expand this frontier to enable continuous growth in agricultural yields. In Asia, the green revolution was kept going by a regular flow of improved crops and farming technology, which resulted from steady and consistent public support to research institutions. These institutions delivered for farmers, which generated demand for their services, more results, and more value to

farmers, in a virtuous cycle that is absent in Africa. In contrast, African research institutions have suffered from meagre and intermittent support, are not able to meet farmers' needs consistently, creating a cycle of low expectations that undermined farm science in Africa.

**Generating Knowledge: Research and Development.** In order to leverage R&D to achieve and sustain fast growing agricultural yields, African countries will need an adequately and reliably funded system of maintenance breeding, which responds to farmers' varying and changing needs such as new crop locations and evolving pests. Some breeding breakthroughs have been achieved - such as NERICA, hybrid maize in Zimbabwe and Zambia or Uganda's cassava varieties that are resistant to mosaic virus and spider mite – although most have not been sustained, continuous varietal research that supports farmers across different regions and natural conditions and that can be applied widely is the key to usable knowledge. Given the relatively small size of a number of sub-Saharan African countries, cross-border agreements for multi-country trials can be a cost-effective and valuable approach. But in all cases, sufficient and predictable research funding is a pre-requisite for progress.

**Establishing the Knowledge Triangle: Agricultural research needs to integrate with extension and education.** A major priority for governments is to integrate research with extension and education systems ( Gary and Derek Byerelee, 1999; World Bank, 2002; Bollag, 2003). Linkages and coordination among research and extension institutions and education institutions remain weak. In many African countries, agricultural research institutes, extension organisations and education operate under different ministries, creating difficult institutional barriers. A further wedge between the services consists of pay: research staff often receive higher compensation than extension workers. There is very little interaction between these three important components of the sector. All too often, even when research produces useful results, the technology does not reach the farmer as a result of bottlenecks or frequent changes in the downstream delivery system, poor infrastructure and a shortage of **well-trained experts versed in the local characteristics of communities and nature**. There should be room for cooperation across academic institutions, international agencies, regional bodies and national governments.



### Implications for Education and Training

It was stated 30 years ago that “It simply is not possible to have the fruits of a modern agriculture and the abundance of modern industry without making a large investment in human beings”. This is as true today as it was then. Studies on the benefits of investment in education have found good rates of return for investment in higher education in Africa, for example, of 14 percent at the social level and 33 percent at the private or individual level. There have also been perceptible improvements in educational attainment. Between 2000 and 2010 expected years of schooling increased more than five years in Burundi and Rwanda and three years or more in other countries.

Notwithstanding the recent rates of progress, most African countries have low HDIs (Blackie, 1984; BIFAD, 2003; Beintema and Stads, 2006). Of the 187 countries with an HDI for 2011, the 15 lowest ranked were in sub-Saharan Africa (Fig 1). Among the 30 countries ranked at the bottom, only Afghanistan and Haiti were outside the region. Of the 45 sub-Saharan African countries with an HDI, only Mauritius and Seychelles were in the high HDI category and only nine in the medium HDI category (Botswana, Cape Verde, Congo, Equatorial Guinea, Gabon, Ghana, Namibia, South Africa and Swaziland). These low levels of achievement were registered in all three dimensions of the HDI—health, education and income.

The last ten years has marked a turning point for Africa. The performance of a large number of African countries over the last 10 years offers grounds for renewed hope. African countries have pulled back from the brink of collapse . Nine of the ten countries with the largest gains in HDI are in sub-Saharan Africa (Table 2). In economic growth terms, Africa has been converging with the world over the last decade. And while its growth performance has been impressive, the region has shown the strongest rates of positive change in the non-income dimensions of the HDI—health and education—with 8 of the top 10 performers on these indicators in sub-Saharan Africa (AfHDR, 2012). Sub-Saharan Africa is now the fastest moving region on HDI (Fig. 2).

Agricultural education and training is needed for the training of skilled professionals to support agriculture through education, extension, information, research and entrepreneurship. Non-formal (extension) education is needed for training farm families. Furthermore, promoting indigenous knowledge and farmer-to-farmer sharing of information is essential for achieving the goal of food security. Numerous studies have shown that farmer training has important effects on agricultural production. A 1992 study on the value of education in small-scale agriculture in Nigeria found that an increase in the average education of a farmer by one year increases the value added to agricultural production by 24 percent.

In many developing countries, higher education in agriculture seems to be at a crossroads. Financial constraints are severe; at the same time the demand for higher quality education has never been greater. There is a need for greater educational relevance and higher quality graduates. There is a need to enrol more women and to produce students who are prepared for positions of leadership and fit-for-purpose. The Framework for African Agricultural Productivity calls for a radical transformation of education and training in Africa and espouses 14 key principles for achieving this (FARA, 2006)

**Policies and Investments in agricultural education and training.** Post-secondary agricultural education and training (AET) in Africa developed considerably between 1960 and 1990. The output of graduate agricultural researchers quadrupled. However, domestic investment in AET collapsed in the 1990s in the wake of structural adjustment. This impacted negatively on tertiary teaching, on research and on extension services. At

the same time, the reforms associated with structural adjustment led to the liberalisation of agricultural markets, further reshaping the demand for agriculturalists. The period since 1990 has also seen the rapid growth of private AET provision, now offered by more than 100 institutions in Africa.

During the 1990s, development assistance to Africa declined in parallel to reductions in government funding of AET. Over this period, donor support for the three components of the agricultural knowledge triangle (education-research-extension) became highly imbalanced, with education receiving very little donor support. For instance, between 1997 and 1997, support to AET was only 2% of Bank investment in agriculture and rural development.

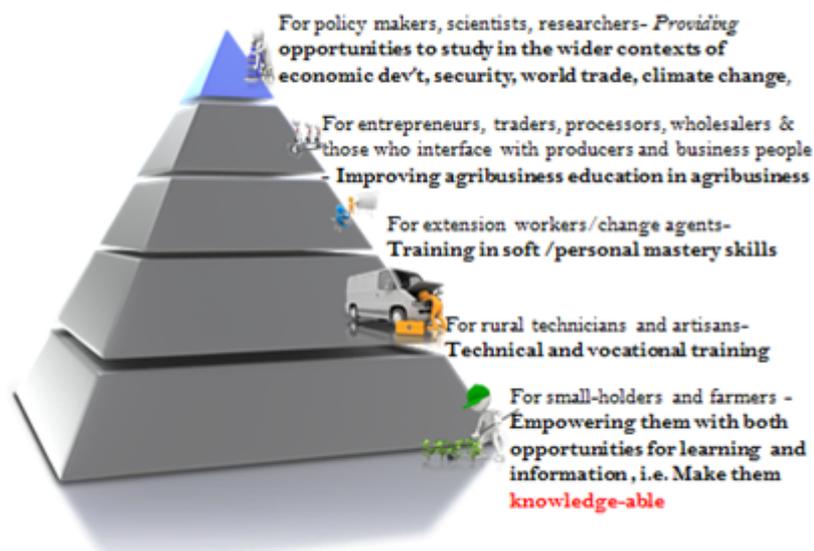
If education is to make a significant contribution to social and economic advancement, it has to be perceived as a long-term investment. Unless there is sustained human resource development through investment in education, the goal of sustainable economic and social development will not be realised. Education and training should therefore be perceived within a national innovation system which is a web comprised of: 1. knowledge-producing organisations in the education and training system; 2. a proper macro-economic and regulatory framework; 3. innovative private enterprises and NGOs; 4. adequate communications infrastructure; and 5. other factors such as access to global knowledge resources and market conditions that support innovation. Tertiary education institutions are important for such systems, both as developers of high level skills but also as information hubs (Herdt, 2006).

## A Way Forward

**Strategic and policy options.** Reforms in agricultural education and training are required across the board for all levels, disciplines and skills because weaknesses in one impede the effectiveness of workers in other aspects of the industry. For example irrigation schemes need engineers and pump mechanics as well as agronomists and business managers, etc. However, the corrections will have to be carried out sensitively because, whereas there has been underinvestment for all levels of the *human capacity pyramid* (Fig. 3), some levels, technicians and vocational levels in particular, have been particularly severely neglected. This means that the focus now has to be on restoring the essential equilibrium of the *human capacity pyramid*.

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### Building the Human Capacity Pyramid in Africa



**To balance the human capacity pyramid - No level is dispensable !**

Source; FARA, 2011

The Comprehensive Africa Agriculture Development Programme (CAADP) provides a framework for coordinated programming from local to continental levels based on stocktaking, roundtable negotiations and country and regional compacts involving governments and development partners (NEPAD, 2003). However, while the Agriculture and Food Security Investment Plans (AFSIPs) have not shied from identifying capacity deficits, the corrective actions have not been concerned with correcting the origin of the weakness in the tertiary institutions. Thus the deficits will inevitably reappear in the next generation of AFSIPs and similar agricultural development initiatives.

Radical transformation is required and a lot of efforts are being directed at ensuring such transformative processes lead to improved quality of education systems. Reforming the TVET sector is principal to rural and agricultural development and would require a greater insertion of agriculture-related and rural development skills within TVET and higher education policies. This approach assumes that TVET provision can be transformational in contributing to rural economic regeneration and should concentrate also on agricultural education. A number of development agencies are advancing and supporting approaches that promote articulating TVET programmes with rural development projects and developing a specific AET

strategy, including rural skills interventions in poverty reduction strategies. Country Investment Plans should make special reference to TVET as a critical component of capacity building.

**Preparing the new generation for agricultural professions.**

The new generation of scientists and managers will have to drive a difficult transformation where farms in the rural areas are adapted to meet the requirements of an emerging market context. The great challenge of the farming sector for the years to come is the preparation of its youth to lead this process of farm transformation. Faced with the extent of the training needs of rural stakeholders, the agricultural education system is clearly ill-prepared. The current system trains more engineers than technicians and few producers, and no longer meets the requirements of a profoundly-changed farming profession- *the New Agriculture*. The implementation of a mass training strategy should involve (i) refocusing on producers through “post-primary” training systems that can swiftly train a critical mass required to transform the profession; (ii) re-balancing flows of graduates based on the new sectoral needs; (iii) redefining educational content that takes farming into account in its overall environment and schemes for change; (iv) regionalising the system to make its integration easier in the framework of decentralisation measures; and (v) securing sustainable funding for these reforms.

This type of “re-establishment” has to be part of a national strategy, determined by all the stakeholder groups, itself a product of an agricultural framework orientation. The vital necessity of re-establishing agricultural and rural training by the yardstick of the new century’s challenges is a matter of urgency. It requires joint and coordinated consideration and support from bi- and multi-lateral cooperation agencies.

**Winning over young people to Agriculture.** There is the need to create openings for young people to take full part in society and the economy. Agriculture, the largest sector in most African economies, is a natural place to increase youth employment. New ideas and technologies can enable youth to channel their creativity, transfer knowledge, information and ideas, and also stay connected. With entrepreneurship, these ideas can create tangible value in the agricultural sector. The *UniBRAIN* initiative, aims to support the establishment of agribusiness innovation incubators with emphasis on the youth across the agricultural value chain. Other innovative programmes

## Promoting Women Engagement

such as the Junior Farmer Field and Life Schools (JFFLS), offers holistic training in agriculture techniques, but also life and business skills.

Innovations have historically marginalised women; the adoption of technology must therefore aim for gender neutrality. Because Africa's agricultural sector has multiplier effects in many sectors of the economy, the modernisation of the sector across its value chain offers different kinds of opportunities for women.

### **Investing in AET: International and regional initiatives.**

The need to invest more in building capacities for AET has been acknowledged in a series of current World Bank strategy documents. The Bank acknowledges that many studies have shown high economic returns to improving farmers' information and skills to enable more efficient use of technologies. Rapidly changing market conditions require a major shift in the content of agricultural education from a production to a market orientation. Thus, the Bank's agricultural strategy recommends that it should recommit to AET. This is echoed by the Bank's Africa strategy, supported by the IDA funded African Centres of Excellence (ACE) programme. This stresses the importance of agriculture to African development and recommends the strengthening of AET, with a particular focus on women farmers. Similar sentiments can be found in a range of regional documents, linked to the NEPAD process and championed under the *Framework for African Agricultural Productivity* (FAAP). To support the FAAP, and as its main vehicle for carrying forward the strategies noted above, the Bank has put forward an African Agriculture Productivity Programme (AAPP) including the West Africa Agricultural Productivity Programme (WAAPP), The East Africa Productivity Programme (EAPP) and a similar operation for Southern Africa. These initiatives anticipate significant investment in post-secondary agricultural education.

## Concluding Statement

Governments and donors should strive for better balance when investing in the agricultural knowledge triangle of education, research and extension, where agricultural education is often under-resourced. Short cycle study programmes with a practical orientation are needed to produce the greater diversity of skills sought by the labour market. Post-secondary agricultural education needs and support for TVET to complement its existing disciplinary programmes with inter-disciplinary offerings that address the rising needs for specialists in agri-business,

post-harvest processing, marketing, policy analysis, trade promotion, and environmental management. Specific incentives are necessary to increase the number of women who study and work in the field of agriculture and rural development. Development partners should join with the governments of smaller countries in multi-country collaboration to produce agricultural graduates in important specialised disciplines for which there is a limited national employment demand.

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