

Increasing Productivity and Competitiveness in African Agriculture and the Role of Agricultural Economists

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Background

Poverty is increasingly assuming an African face, and eradicating it has become a predominantly African challenge. Although the region currently accounts for only 10% of the world's poor, it now accommodates 30% of the world's poor (Ndulu *et al.*, 2007). Africa's slow and erratic growth performance, particularly when compared with the other developing regions, has been identified as the single most important reason it is lagging in eradicating poverty. In response, African Heads of State and Government through the New Partnership for Africa's Development (NEPAD) have set an ambitious target of 7 percent annual growth rate in Gross Domestic Product (GDP) to eradicate poverty, achieve food security and build the foundations of sustainable economic development on the continent. NEPAD further puts agriculture at the forefront of delivering the desired growth target given its fundamental role in economic development in Africa. The sector provides an estimated 60-90 percent of all employment, is still the largest contributor to GDP, the biggest source of foreign exchange, still accounting for about 40 percent of the continent's hard currency earnings, and the main generator of savings and tax revenues. The agricultural sector is also still the dominant provider of industrial raw materials with about two-thirds of manufacturing value-added in most African countries being based on agricultural raw materials. The sector's contribution to GDP has been on an upward trend as is shown in Figure 1.

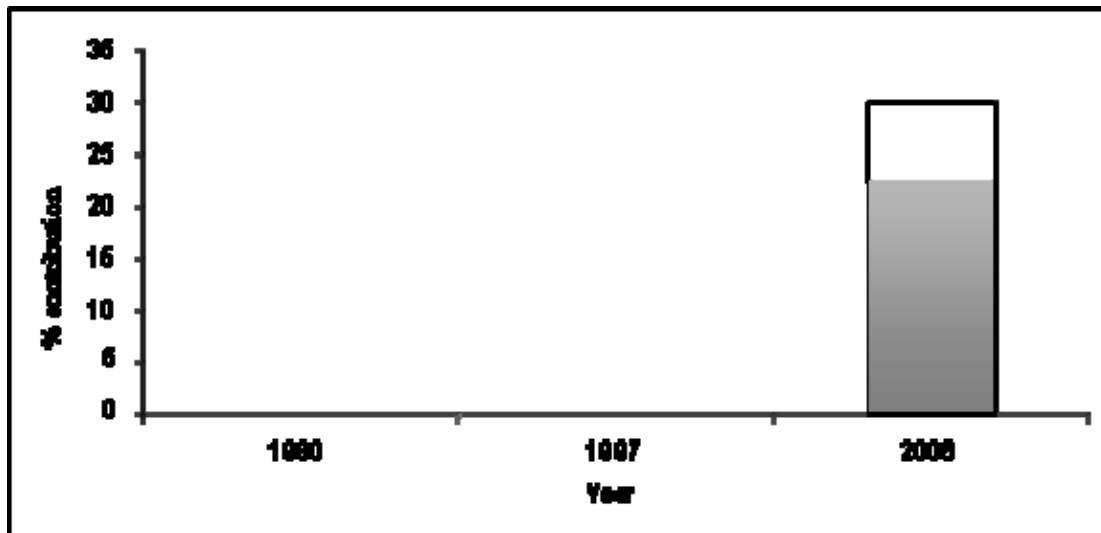


Figure 1: Trend of Agriculture sector contribution to GDP in Africa

Source: World Development Indicators Online, Fran and Saurkar (2006), Center for Environmental Economics and Policy in Africa (CEEPA), online.

In Sub Saharan Africa (SSA), agriculture contributes at least 40 percent of exports, 30 percent of GDP, up to 30 percent of foreign exchange earnings and 70 to 80 percent of employment (Commission for Africa 2005). The sector is also the dominant provider of industrial raw materials with about two-thirds of manufacturing value-added in most African countries being based on agricultural raw materials (AU/NEPAD, 2003). To tackle poverty therefore, the major growth driver is agriculture. In addition, the rural areas, where agriculture is the mainstay of all people, support some 70-80 percent of the total population, including 70 percent of the continent's extreme poor and undernourished. Improvement in agricultural performance therefore has a potential to increase rural incomes and purchasing power for large numbers of people. Thus, more than any other sector, agriculture can uplift people on a mass scale. With greater prosperity, the consequent higher effective demand for African industrial and other goods would induce dynamics that would be a significant source of economic growth. Adequate efforts should therefore be directed towards increasing agricultural productivity and competitiveness, and in the distribution of the realized growth to tackle poverty. This paper addresses ways of tackling this critical issue.

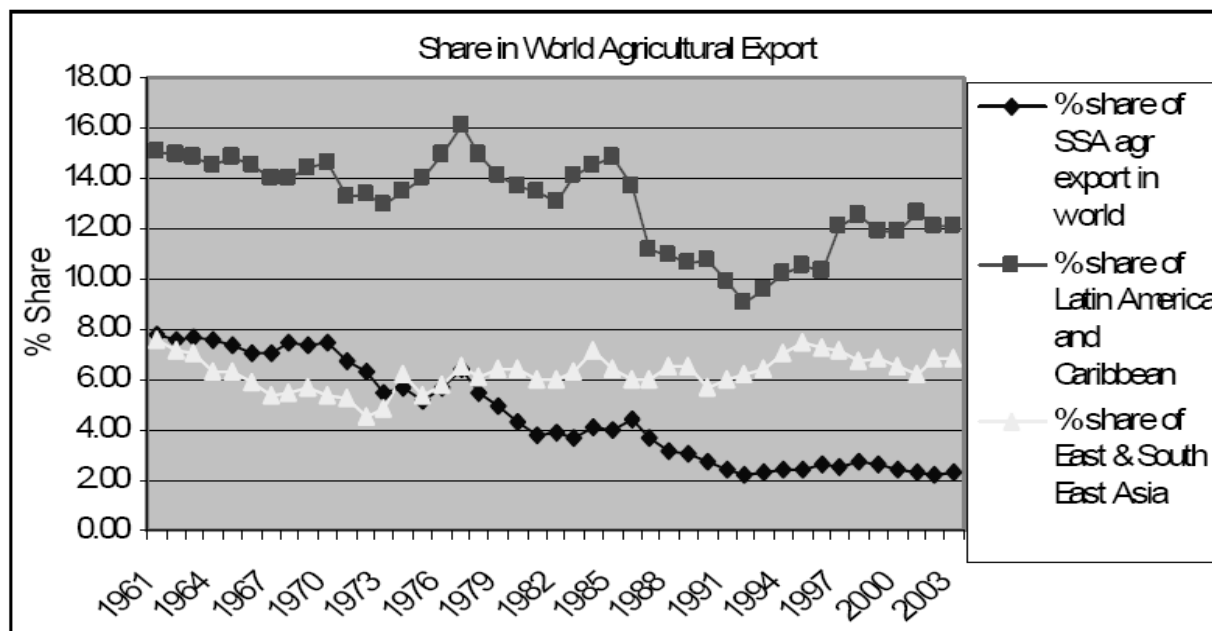


Figure 2. Percentage share of world trade by region

Source: FAOSTAT

Structure and trends of Agriculture in Africa, an overview

African agriculture is dominated by small scale farming units. Up to 90 % of African farmers are engaged in smallholder diversified farming systems. However, in some African countries, there is a tradition for large-scale (commercial) farming, and a plantation system, basically based on a colonial heritage of large farming properties. At the same time, a traditional structure of small-scale farming has predominated, on a communal land tenure system.

Small-scale farming and its future. Small scale farming provides most of the food produced, as well as a substantial share of cash crops. Encouraging a development from subsistence farming to small-scale entrepreneurship is considered a major strategy to increase the productivity and income of the African peasant farmer, thereby uplifting much of Africa's poorest population, and at the same time contributing greatly to overall economic growth. Parts of the small-scale sector will play a major role in Africa's economic growth; others have limited potential to contribute, other than at the household and village level, to improving food security and reducing poverty. Recent changes have brought additional challenges, but are also opening opportunities for some African farmers, though they may exclude the smaller producers. Large supermarkets are playing an increasingly dominant role in controlling access to international and also to domestic retail markets, and buy at conditions which are often difficult to fulfill by smaller farmers. In general, markets have become more demanding in terms of product quality and safety, are increasingly differentiated, are more concentrated and are increasingly consumer driven. For farmers that have insufficient control over production and marketing processes and little investment capacity to respond rapidly to changing demand, access to the emerging markets is difficult. Contract farming has created links for smallholders to the international markets and facilitated quality improvement, but also created new forms of dependency and obligations. These novel relationships risk becoming factors of market exclusion for many (small) farmers, unless farmers and their organizations build capacity to benefit from them. This requires therefore that institutions have to be right, to enable these farmers to be more responsive to these changes in the emerging markets structure. This is the only way they will survive.

Exports and imports. African exports are dominated by agricultural produce. The relatively heavy reliance on export of cash crops creates economic insecurity both at the national and local level – for the trade balance of the state and the income level of the farmer. At times, the world markets for Africa's crops have been unfavorable, with

reduced income as a result. For some countries, the dependence on one of just a few commodities (either from agriculture or mining) is extreme, making them – and the producers – even more vulnerable. For instance, in the second half of the 1990s, just three commodities (cocoa, coffee and cotton) provided about 55% of the total agricultural export earnings in sub-Saharan Africa. One of the most extensively cited facts of African trade performance is that the continent's share in world merchandise trade, measured in value terms, has declined steadily since 1980, from around 6 percent to around 2% in 2002 (Oyejide, 2004). However, as Morrissey and Mold (2006) argue, this does not mean that trade is unimportant for Africa. Compared to other developing country regions, sub-Saharan Africa (SSA) tends to have high export/GDP and import/GDP ratios. In simple terms, exports are very important to African countries even if African exports are not very important in the world market. This component forms an important foreign exchange base, which determines the balance of trade of most countries in the continent, and especially Sub Saharan African countries. Evidence however indicates that the declining share of the value of Africa's exports is due to the fluctuations of the world market prices for the primary commodities exported. When analyzed in volume terms a different picture of African export performance emerges. To cite a few examples, between 1990 and 2002, Mozambique increased the volume of its exports more than nine fold, Lesotho, eight fold, Uganda and Sudan, five fold. On average, for non-oil exporters, export volumes increased by over 130% (Morrissey and Mold, 2006). This therefore presents an opportunity for African countries to increase revenues from agricultural exports through investment in value addition strategies. Figure 2 indicates the trend of the value of Sub Saharan Africa's share in world agricultural exports.

This suggests that Africa has a comparative advantage in producing these crops, but the specialization has not enabled African countries to maintain, or expand, previous shares of the world market. At the same time, there has been a progressive growth in food imports in the last years of the 20th century, with Africa spending an estimated US\$18.7 billion in 2000. Africa's share of global agricultural imports in 1998 was 4.6 percent. Its share of developing country imports was 16.3 percent. Agricultural imports account for about 15 percent of total African imports. It is of particular concern that the share of gross export revenues needed for importing food has increased from 12 percent to over 30 percent in East Africa. Part of Africa's "imports" is food aid, with the continent receiving 2.8 million tons in year 2000. In the mid-1990s, out of the world total of 32 million victims of disasters receiving relief assistance from the World Food Program (WFP), 21.5 million were living in Africa. In 2001, the number of people suffering from food emergencies ranged between 23 and 28 million. In terms of exports too, agriculture has generally performed poorly, with the relative share of African agricultural exports in world markets falling from 8 percent in 1971-80 to 3.4 percent in 1991-2000. The value of agricultural exports, which amounted to US\$14 billion in 2000, is growing extremely slowly, having been US\$12 billion in 1990 (AU/NEPAD, 2003). Expenditure on food import is clearly undesirable since the money can best be used to enhance imports of the needed inputs for agricultural productivity growth.

Agricultural production/Output. The sector's growth performance was particularly poor during the 1970s and early 1980s when agricultural output per capital actually declined. Thus, the average annual growth rate of the volume of production fell from 2.5% during 1960–1970 to 1.4% during the following (1970–1980) decade. Correspondingly, average annual growth rate of per capita production, which was a mere 0.2% in 1960–1970, fell further to -1.1% during 1970–1980. Over the 1980–1990 decade, Africa's agricultural growth rate averaged less than 1.5% per annum. This performance compares rather poorly with the 4.7% achieved by the East Asia and Pacific countries, the 3.0% average annual agricultural growth rate of South Asian countries, and the close to 2% average annual growth rate achieved by the agricultural sector of Latin America and the Caribbean region. In the 1990s, the growth performance of African agriculture showed some improvement over the previous two decades. In particular, the agricultural sectors of many African countries achieved real average annual growth rates of over 2% during the first half of the 1990s, and by the late 1990s as many as 18 of these countries achieved agricultural growth rates of at least 4%. The trend for Sub Saharan Africa (SSA) has however been worse as shown in the Figure 3.

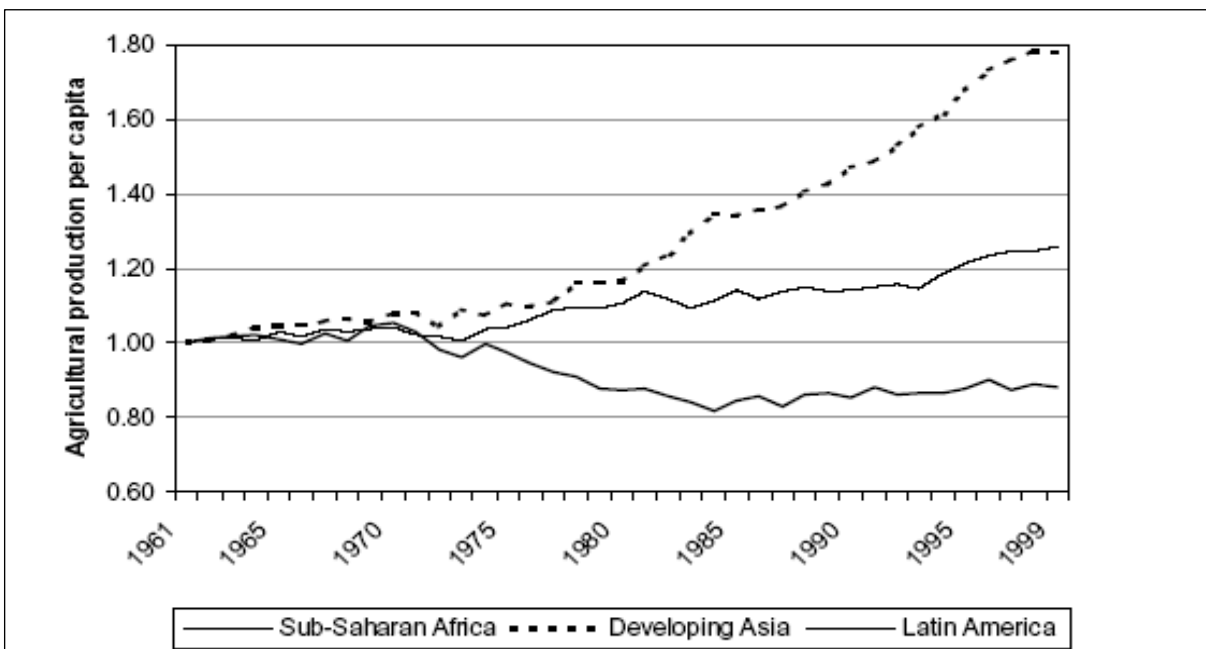


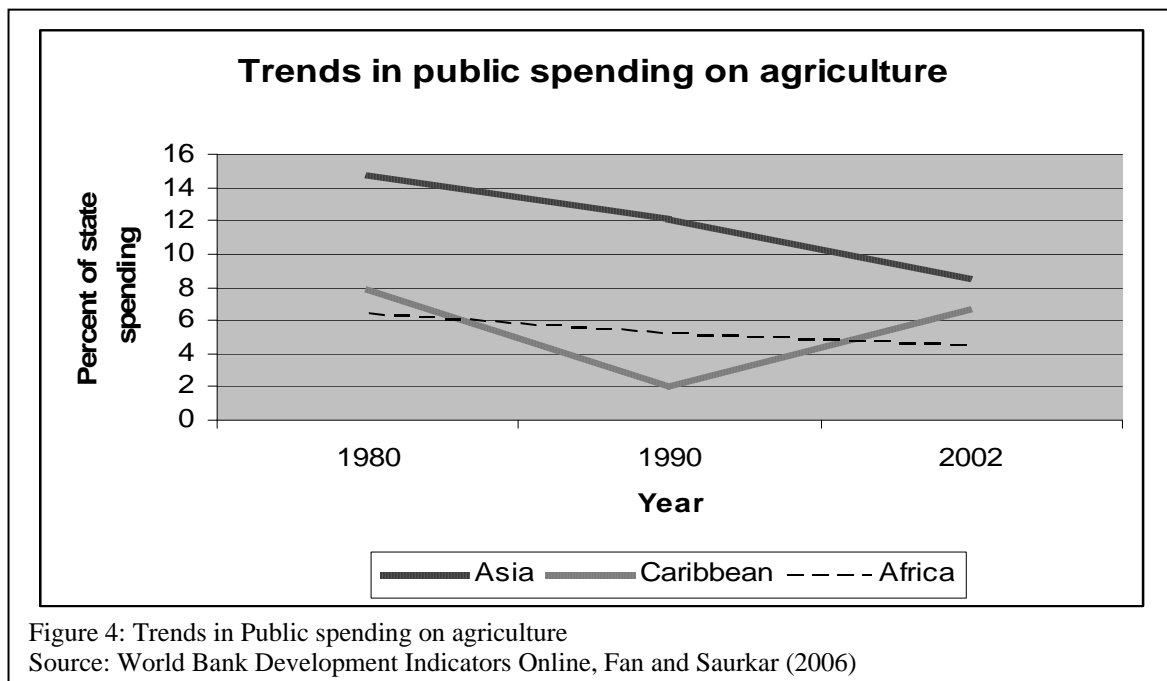
Figure 3: Trends in Agricultural production per capita by region, 1961 – 2002
Source: FAOSTAT

Marked increases have been observed in the recent past, with recorded increases in agriculture sector growth of 2.7% in 2002; 3.0 percent in 2003 and 5 percent in 2004 (European Commission, 2007). Although recent data show that the proportion of malnourished individuals in sub-Saharan Africa fell slightly from 35 percent in 1990–92 to 33 percent in 1999–2001, a longer-term perspective reveals that this share has remained within the 33–35 percent range since around 1970. Even more discouraging, the absolute number of malnourished people in Africa has increased substantially with population growth, from around 88 million in 1970 to an estimate of over 200 million in 1999–2001 (FAO 2003). This record is in stark contrast to that of other developing regions such as South and East Asia, which have made significant strides in combating malnutrition over the same time frame. This food shortage is a source of enormous concern. It is estimated that if the self-sufficiency ratio in Sub-Saharan Africa is to stay the same in 2015 as in 1995-97 (about 85 percent), the sub-continent will have to meet 118 million tons of its projected needs of 139 million tons of cereals through increased production in the region itself, requiring a substantial increase of output. These stark realities highlight the huge scale of the problem. It is, however, also possible to look at the food gap as a tremendous opportunity. The existence of such large shortfalls provides a potential market for small farmers, amongst whom poverty and hunger are concentrated, to expand their output and improve their livelihoods, in turn enabling countries to reduce their import dependence. For this to happen in a situation of increasingly liberalized international markets, however, farming within the Region must become more competitive.

Public Spending on Agriculture. Spending on agriculture can be important for promoting economic growth and alleviating poverty in rural areas (Fan and Saurkar, 2006). However, in most African countries, public spending on agriculture has been stagnant or declining. Total expenditure allocated to the sector has also been considerably lower compared to other developing regions as indicated by Figure 4 below. State spending on agriculture relative to agricultural GDP is also considerably lower in Africa than in Africa than the other two regions. However, there are significant variations within countries in Africa. Public spending on agriculture in 2002 ranged from 73% of agricultural GDP in 2002 in Botswana, to just 0.8% in Cameroon and 0.7% in Ghana (Fan and Saurkar, 2006). For the agriculture sector to realize the 4% - 6% growth target that NEPAD projects for Africa to realize its big agenda, increased public spending on the sector, to the tune of 10% of total public expenditure is required.

Increasing Agricultural Productivity and competitiveness in Africa: Key to poverty reduction

Empirical evidence shows that agriculture growth in Africa remains fundamental to growth and poverty reduction on the continent. A one percent increase in crop yield reduces the numbers living in poverty by six and a quarter



million, with 95 percent of these in Africa and Asia (Thirtle, Lin and Piesse 2003). Agricultural growth is thus essential for improving the welfare of the vast majority of Africa’s poor. Roughly 80 percent of the continent’s poor live in rural areas, and even those who do not will depend heavily on increasing agricultural productivity to lift them out of poverty. As consumers, all of Africa’s poor—both urban and rural—count heavily on the efficiency of the continent’s farmers. Farm productivity and production costs largely determine the prices of basic foodstuffs, which account for 60–70 percent of total consumption expenditures by low-income groups. Consequently, significant reductions in poverty will hinge in large part on the collective ability of African farmers, governments, and agricultural specialists to stimulate and sustain broad-based agricultural growth. Given Africa’s relatively high population growth rate, averaging more than 2.7% over the last four decades, its farmers and agricultural policymakers will face the most difficult challenge of any developing region until its demographic transition is complete. Africa has contended with population growth rates of 2.7 percent per year over the past 40 years, compared with 2 percent in developing Asia and 2.2 percent in Latin America. For this reason, in recent decades the numbers of malnourished and poor people have risen more rapidly in Africa than in any other region. In the face of current demographic trends, Africa will simply have to run faster than the rest of the developing world to keep up with its growing population. It is difficult to imagine how significant poverty reduction in Africa can occur without a vibrant agricultural sector that provides income, employment, and affordably priced staple foods. Only rising agricultural productivity can simultaneously reduce food prices, which govern real incomes and poverty in urban areas, and increase the incomes of the 70 percent of Africans who work in agriculture. Agricultural growth provides a central thrust around which the battle against African poverty must be waged and won.

Drivers for Improved Productivity and Competitiveness. *Recent literature (Rukuni, 2002; Commission for Africa, 2007; IFPRI, 2003; IAC, 2004; AU/NEPAD, 2003) have identified the major factors affecting the performance of African agriculture to include the following:*

- Investment climate / Policy environment
- Institutions and good governance
- Innovations and Investment in various kinds of productivity enhancing technologies
- Infrastructure
- Information (Information and Communication Technology)

African governments have generally not invested adequately in all the areas, although the last couple of decades have seen a major emphasis on policy reforms. In this section, each of these areas is discussed to establish status and

future implications. Case studies of particular countries are highlighted to show the benefits realized from investment in these areas.

Policy environment/Incentive structure. Active private sector participation in an economy is one of the key pillars for economic growth. Markets have proved effective in creating opportunities for increasing incomes through productivity growth. Functioning markets are thus a critical mechanism for poverty alleviation. The challenge is therefore to harness private initiative delivered through markets for sustained growth and development. The key requirement in this regard is the overall quality of the investment climate, and Africa has fallen short in this respect (Ndulu et al, 2007). Empirical evidence indicate that poor policies account for between one quarter and one half of the difference in predicted growth between African and non African developing countries (Collier and O’Connell, 2006; Ndulu and O’Connell, 2006a; Ndulu et al, 2007). The state of the investment climate has presented major impediments to economic growth. While the deficiencies in African economies are to some extent influenced by geographic aspects, they are largely the outcomes of ill advised government policies. A weak investment climate inhibits the effectiveness of the private sector and also results in prohibitive costs of doing business. Institutions, policy and regulatory frameworks, business regulations and their enforcement have been weak. Infrastructure and general conditions in which markets operate have been inadequate and of low quality. Sound investment climate also includes a stable macro economy that facilitates decision making, well defined property rights, an effective judicial and contracting system, and a functioning financial system. All of these have been weak. African governments therefore need to do more in terms of putting in place adequate incentive structures to enhance and promote private investment in the agricultural sector. This, as can be observed in policy reform in rice milling in Mali (Box 1), can greatly increase productivity and competitiveness in the sector.

Institutions and Organizations serving farmers. Underdevelopment has traditionally been attributed to deficiencies in factor endowments, particularly of capital (physical, human and of foreign exchange to buy essential and intermediate capital goods. In the last couple of decades, it has been increasingly recognized that the escape routes out of poverty lies in correcting the various kinds of institutional impediments that go far beyond the deficiencies in factor endowments. These institutions include those in the form of legal structures, customary rules, property rights, implicit or explicit contracts and governance systems. These define the framework in which factors of production are utilized and developed. One major reason why reforms initiated during the Structural Adjustment Programs (SAPs) era have been slow and halting in many developing countries is that some of the real problems which provided the rationale for government intervention in the first place have not yet been fully resolved. In particular, there are many market failures (particularly in the provision of credit, insurance, information, and infrastructural services) which remain unaddressed even as the state withdraws itself. It has been quite common, for example, to find some African countries. According to estimates by Townsend (1999), the Malmquist productivity index in agriculture showed negative growth over 1980 – 96 in Botswana, Tanzania, Rwanda, Madagascar, Cameroon, Burkina Faso, Mali, Sudan and Senegal. that under the fiscal austerity programs, agricultural productivity has stagnated or declined, as state support to producers (in credit, output procurement, and input subsidies) has shrunk, and the private sector has not quite filled the gap, particularly in activities involving remote regions and vulnerable groups. The following have seriously impacted on the sector in the continent.

a. Access to credit/Finance. A disproportionately small fraction of the African population is served by formal financial systems, with farmers especially finding it difficult to access loans for production purposes. In Kenya, although there is a legal requirement that banks should lend between 17% and 20% of their loan portfolio, the banking system has remained conservative in lending to agriculture, probably due to risks in agricultural production. The total public credit provided to agriculture is on average estimated at 10% of the total credit provided through the domestic financial system. In agriculture, small holders are at a distinct disadvantage. It is estimated that only about one third of total rural credit is allocated to small farmers (Karugia, 2003). Further the liquidity constraints limit demand for key productivity enhancing inputs. The result has been a rapid growth of informal financial institutions largely supporting consumption activities at the expense of activities which promote higher productivity.

Box 1: Success story on incentive structures

Increased rice production in Mali. Policy reform in rice milling and marketing has radically altered opportunities and incentives for Mali's rice producers over the past decade and a half. Beginning in 1987, the Malian government initiated a gradual set of reforms. These included price deregulation together with the dismantling of the monopolies on paddy assembly, milling and rice marketing held by the Office du Niger (ON) and Office des Produits Alimentaires du Mali (OPAM). As a result, small private dehuller mills, operating at one-fourth milling cost of the cost of the large state mills, began to appear in the Malian delta region. And these private millers and retailers began to offer higher prices for preferred varieties and for more carefully processed grains. The subsequent 50% devaluation of the CFA franc, in January 1994, further boosted producer incentives. Import prices doubled overnight pulling up domestic rice prices sharply in their wake. Producers responded rapidly to these new options and incentives and Malian rice production has more than tripled since 1985, growing by 9% annually over past 20 years (Diarra et al., 2000).

b. Market institutions. For African agriculture to be competitive/profitable, farmers have to be linked to markets. This requires the existence of adequate market institutions. Inadequate market institutions have been identified as a factor that impacts negatively in the sector. Recent studies on market behavior in Africa underline the important role of institutions in promoting trust, protecting property rights, reducing transaction costs and enabling exchange critical to market efficiency (Fafchamps and Minten, 1999; Gabre-Madhin, 2001). Significant productivity gains have been credited to properly functioning market institutions, and especially market information systems in Mali and neighboring sahelian countries. Other successful market institutions are the case of warehouse receipt systems in Ghana, the dismantling of parastatal institutions engaged in market procurement and distribution, as well as the subsequent introduction of commodity market exchanges in some countries (Kherallah et al, 2002). Mechanisms for aggregating and improving the quality of the products of smallholder farmers and providing relevant and timely market information will enhance market efficiency. This will prove necessary in enabling rural farmers to compete in increasingly concentrated domestic, regional, and global markets.

c. Tenure systems. Tenure systems e.g. land tenure rights of people is an issue that is assuming considerable significance in every African country. Tenure systems have been a problem in raising productivity in African agriculture. There is growing evidence that agricultural growth is determined to a considerable extent on efficient management of administrative capabilities of rural communities to determine their own future and to protect their land and land-based natural resources and other economic interests. The lack of this power is translated into insecure tenure rights; abuse of common property and resources; disenfranchisement of rural people, particularly women; and the breakdown or weakening of rural economic institutions. The management of the environment and the effectiveness of community-based natural resources management are all dependent on clearly defined land rights and support systems for rural communities. However, the notion of ownership is not as important as access to land. Access to land should further be accompanied by access to complimentary inputs/productive resources. This can best be illustrated by the Zimbabwe situation, where land redistribution alone has not resulted in increased agricultural productivity. There should be concerted efforts in the continent to ensure that access to land is accompanied by access to other productive resources.

d. Farmer organizations. Farmer organizations, spontaneous or induced, act as vehicles of providing an array of collective services including common property management, technology development and testing, design, financing and management of rural infrastructure and marketing of key production inputs or farm outputs (Smale and Ruttan, 1997; and Merrill-sands and Collion, 1994). As market integration advances, there is an associated increase in market risks, in the need for credit for investment in crop production, storage and transportation, and in coordination among different branches of a more specialized production and marketing process. Farmers' organizations and cooperatives can play a significant role in group lending schemes (as they can overcome the inherent enforcement and information problems facing credit agencies), in input and output marketing activities, in collecting and disseminating market information or technical knowledge, and in enhancing the collective bargaining power of small farmers in markets.

e. National Agricultural Research and Extension. Research institutions are the vehicles that enable the expression of science and technology potential, thereby contributing to the improvement of agricultural productivity and food security. Virtually all of the successes identified involve some form of improved technology: biological, agronomic,

mechanical, or organizational. Therefore, governments must elevate funding for agricultural research and extension, to boost agricultural productivity in Africa.

According to AU/NEPAD (2003), achieving a 3 percent annual growth rate will require: (a) acceleration of adoption for the most promising available technologies so as to support immediate improvement of African production by way of linking, more efficiently, research and extension systems to producers; (b) technology delivery systems that quickly bring innovations to farmers and agribusinesses so making increased adoption possible, notably through an appropriate use of new information and communication technologies; (c) renewing the ability of agricultural research systems to efficiently and effectively generate and adapt to Africa new knowledge and technologies, including biotechnology, needed to increase output and productivity while conserving the environment; and (d) mechanisms that reduce the costs and risks of adopting new technologies.

Public investment in agricultural research has been on the decline in many African countries in Africa. Given the undoubted complementarities between public and private investment in this field, it is not surprising that private investment has been slow to make up for this deficiency. In particular, falling public investment in agricultural research and development in many countries is slowing the rate of technological progress in agriculture. Recent IFPRI projections for China suggest that each Yuan invested in the coming decades in research and irrigation could yield returns of between 3.6 and 4.8 Yuan. The issue of public investment will be increasingly important also in the case of biotechnology research to develop in plant and livestock breeding and in native crops suited to local conditions, a need that is likely to be neglected by the patent-protected multi-national biotechnology companies. Given the emerging challenges of climate change, which directly affects agricultural productivity, greater investment in research to respond to the changes is clearly crucial.

In 2000, Africa invested \$0.70 for every \$100 of agricultural output (in international dollars)—lower than the 1981 level of \$0.95. Ratios ranged from 0.20 percent or lower in The Gambia, Niger, and Sudan to over 3.00 percent in Botswana, Mauritius, and South Africa. In 1995, the latest year for which global data are available, SSA's average agricultural research intensity ratio was slightly higher, at 0.79 percent—greater than the average ratio for the developing world (0.62 percent) but lower than the global average (1.04 percent). There is no official recommendation on preferred intensity ratios for agricultural R&D investments. In the early 1980s the World Bank set a 2 percent target, which has been widely quoted since. Others, however, have found an intensity ratio of 1 percent to be a more realistic objective, but few countries in SSA have achieved even this lower target.

The research outputs (the new technologies) should be accessible to the users. Evidence indicates that while some countries have very low research outputs, and therefore no information to pass to farmers, in some, there is a lot of information but on the shelf. For instance, in Kenya, the state was responsible for providing free regular extension services during the pre SAP period. Currently however, extension services are absent in most villages and where they are available, they are often irregularly provided. A number of farmers get the services from private providers at a cost, while cash crop farmers get extension services from their out grower companies (of which none exists for maize and other food crops), or the buyers of their produce. As most maize farmers do not access this essential service, they are unaware of the many of the yield improving farming techniques. African governments should therefore strengthen research – extension – farmer linkages, otherwise, the net investment in research and development is lost. Governments can play at least a catalyst role in the initial stages in pump-priming agricultural finance and in underwriting risks. It can take the initiative in establishing commodity exchanges, generating and disseminating information, allowing for contingent contracts, and arbitration in contract disputes. Investment in national agricultural research institutions will therefore play a pivotal role in enhancing sector productivity in the continent. Box 2 illustrates some of the benefits that may be realized from investing in agricultural institutions.

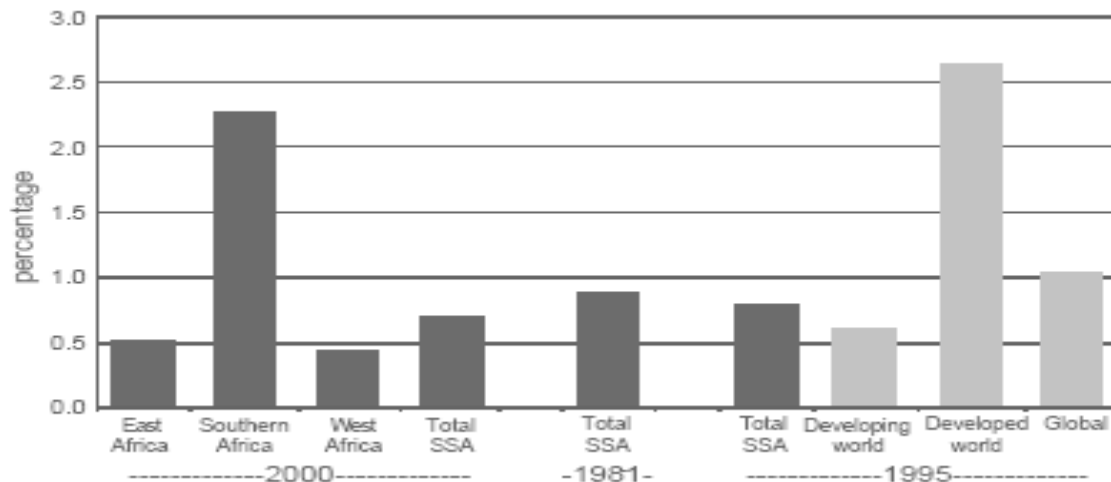


Figure 5: Agricultural Research Intensity Ratios over time and compared globally IFPRI Africa 2020, Brief 8.

Innovation

Investment in knowledge, especially in the form of science and technology has featured prominently and consistently in most strategies to promote sustainable and equitable agricultural development at the national level. Although many of these investments have been successful, the context for agriculture is changing rapidly, sometimes radically. Much of the knowledge and many of the technologies developed in the past decades, have not been successful at the farmers level and have faced insufficient adoption rates due to lack of dissemination and/or to inappropriateness, which in turn was due to a “supply driven” approach. In order to enhance the productivity level of smallholders, there is need to shift the research paradigm towards a more demand driven one. Six changes in the context for agricultural development heighten the need to examine how innovation occurs in the agricultural sector (World Bank, 2007):

- Markets, not production, increasingly drive agricultural development
- The production, trade, and consumption environment for agriculture and agricultural products is growing more dynamic and evolving in unpredictable ways
- Knowledge, information and technology are increasingly generated, diffused and applied through the private sector,
- Exponential growth in information and communications technology has transformed the ability to take advantage of knowledge developed in other places or for other purposes
- The knowledge structure of the agricultural sector in many countries is changing markedly
- Agricultural development increasingly takes place in a globalized setting

As the context of agricultural development has evolved, ideas of what constitutes “research capacity” have evolved along with approaches for investing in the capacity to innovate. More recently, attention has focused on the demand for research and technology and on the development of innovation systems, because strengthened research systems may increase the supply of new knowledge and technology, but they may not necessarily improve the capacity for innovation through out the agricultural sector

To succeed, Africa's efforts to boost agricultural output must rely on greater use of science and technology. Africa urgently needs to embrace the green revolution to increase agricultural productivity and competitiveness. Currently, only about 20 per cent of cropland in Africa is sown with improved cereal varieties. Many new varieties of maize and rice have been developed in laboratories, but must be better adapted to Africa's environmental conditions. Research has shown that improved varieties of maize, millet, rice, sorghum and other traditional African grains can also significantly boost yields. Beyond seeds, farmers need access to animal health remedies, safe pesticides and other inputs, as well as training in agro-forestry and various skills. New innovations in disembodied technology, that is, knowledge, techniques and management practices that increase productivity and largely transmitted through extension and advisory services are also needed. Energy and power for smallholder farmers represent a major

Box 2: Success story on Institutional support

Rapid growth of cotton production and exports in West Africa. Since independence in the 1960's, West African cotton production and exports have both grown rapidly, at a compound annual rate of about 6.5% per year over the past forty years. The most robust growth has occurred in the four West African countries of Mali, Benin, Burkina Faso and Ivory Coast which, together, produce 70% of total cotton production in francophone Africa (Bérout, 1999). A fully integrated model of government and semi-government institutional support for research, input supply, production, processing and marketing has underpinned this sustained growth. Since independence, the model has taken various forms in different francophone countries. With this support, cotton yields quadrupled between 1960 to 1999 as the use of fertilizer increased to over 75% in the major producing countries and use of animal traction equipment rose from near zero to 50% in Burkina Faso and Ivory Coast and to 90% in Mali and Cameroon. Following the devaluation of the CFA franc in 1994, production in francophone Africa has nearly doubled, growing from 500,000 to 980,000 tons (Bérout, 1999). Over the past forty years, francophone Africa's share in world exports has grown from near zero to 16%, making them the world's third largest cotton exporting block after the USA and former USSR (Bocchino, 1999). Like the case of maize, this success needs to be qualified by the large volume of subsidies that underlies cotton production and the financial difficulties that have emerged in the 1990s with the overall push for liberalization.

drawback to productivity. The continued decline in draft animals, coupled with a lack of appropriate small machinery, means that farmers' yields are held back. Because most of the increase in production is from new areas opened up, as opposed to technological breakthroughs, this means greater pressure on the environment.

African agriculture faces technological stagnation and needs to exit from excessive reliance on unpredictable weather conditions. It needs to increase the research and development effort as well as extension outreach. The Integrated Agricultural Research for Development (IAR4D) Initiative holds promise in achieving the desired result. Farmers and their organizations need to be fully involved in the research to development continuum, from the setting of research priorities to technology dissemination and adoption, including monitoring and evaluation and impact assessment. In other cases, e.g. for many African staple foods, scientific breakthroughs are needed, requiring a reversal of the underinvestment in public sector research and the need for establishing targeted partnerships with the private sector, international agencies and research centers. A focus on food staple production is called for as increases in level and stability of yield for these products (including cereals, roots, tubers, and traditional livestock products) generally have a significant effect on poverty reduction, both rural and urban.

Soil health. In many parts of Africa, the natural resource base for agricultural production is being affected by processes of soil degradation (erosion, soil depletion, and desertification), water scarcity, water quality reduction, siltation, deforestation, over fishing and overgrazing. Too often natural resources are being used in an unsustainable manner, resulting in production systems that show declining returns to input. Land degrading is a case in point – it is affecting up to two thirds of Africa's productive land, while nearly all of the continents land is vulnerable to being degraded (European Commission, 2007). Some 75 to 80 percent of Africa's farmland is degraded at an annual rate of 30 – 60 Kgs of nutrients per hectare (Roy, 2006). Yet fertilizer use in Africa is the lowest in the world. Unlike other regions where excessive use of chemical fertilizer is raising environmental concerns, Africa suffers from the opposite problem. In 2002/03, SSA used 8 Kgs of fertilizer per hectare compared with 80 Kgs for Latin America, 98 Kgs for North America, 175 Kgs for Western Europe, and 202 Kgs for East Asia (Roy, 2006). With fallow periods getting shorter in many African countries, the absence of fertilizer has meant that soils are being leached of essential minerals (Roy, 2006). SSAs consumption of fertilizer, at 2 million tons is less than what Bangladesh alone consumes, at 3.4 million tons a year (Roy, 2006; Versi, 2006). This gap in fertilizer use exists notwithstanding the fact that Africa (including North Africa) has the highest endowments of principle ingredients for making fertilizer, including phosphates and nitrates. Innovation however needs to be supported by the necessary institutions if such research outputs are to yield long term benefits, as shown by the following example.

Infrastructure

Investment in Africa is relatively more expensive, with the highest cost of doing business in the world. The cost of infrastructure services make up a disproportionately large part of production and trade costs. Barriers to trade raise the cross border transaction costs, and bureaucratic red tape and inefficiencies raise these costs further.

Sub Saharan Africa (SSA) in particular has weaker infrastructure than other developing regions. Costs of power, transport telecommunications, and security are higher than other regions.

Box 3: Failure of Innovation due to lack of support

Maize is an important food crop for almost everyone in Kenya. It accounts for more than 20 percent of all agricultural production and 25 percent of agricultural employment in Kenya. The development of new technologies and farming methods during the 1960s and 1970s saw large improvements in production, but this growth has not been sustained. What caused this decline in maize production and what can be learnt for the global fight against poverty and hunger? The growth in maize production during the 1960s and 1970s was due to an increase in land used for farming and government and donor support for new methods of crop production. These included improved techniques for land preparation and weed control, the use of better seeds and the introduction of fertilizer. More recently, crop yields have decreased. Unfavorable weather conditions have been a problem, but inadequate policies and weak agricultural institutions are the main reasons for this fall in production. Central to this is a reduction in government involvement and expenditure on agriculture, resulting in low investment and support for farmers. Maize is still cheaper to produce than buy, but production is far below national consumption, meaning Kenya imports maize in most years. (Oluoch-Kosura and Karugia, 2005)

Rural infrastructure. Obtaining a rewarding price for marketed produce, remains a major challenge for African farmers. There are several components to this challenge. Transporting the produce to the market is hampered by poor transport infrastructure and high transport costs, taking a high share of the market price and creating prohibitive barriers for many perishable products, which in turn makes entering into higher value products (dairy, meat, fish, horticulture) prohibitive. Import costs for fertilizers are very high, amounting to \$ 600 per ton in some landlocked African countries in contrast to \$150 per ton in the United States, a factor that could explain its low usage in production in the continent, with transport costs being a dominant proportion of the cost difference. The combination of transport time, the numerous controls along the way and poor storage facilities, affect the timeliness of marketing as well as the quality of the produce at the marketing stage. At the same time farmers often lack market information and bargaining power in comparison to buyers who are in an advantageous position in this respect.

In the next decades, most agricultural produce from Africa will continue to be brought to regional and domestic markets. Population growth and urbanization will increase demand in quantity and types of products demanded and regional integration may facilitate the flow of products from other parts of the continent. Priority will therefore be to improve marketing processes at the national and regional levels, linking producers to remunerative markets – which may not be the geographically closest- and ensuring that marketing structures are favorable to passing on fair prices to producers. The rapid emergence of supermarket chains point to the urgency of developing efficient marketing channels from producers to producers. With the emergence of supermarkets, consumers will no longer go to the farm. Consumers are increasingly getting concerned with quality of produce. Farmers therefore need to know which areas to exploit, including what consumers need, in order to increase farm incomes.

In order to capture the various opportunities open to African farmers a range of issues should be addressed. These include improving the physical accessibility of markets, strengthening producer organizations, facilitating chain organization, spreading up to date market information to producer organizations and their members, (re-) organization of marketing and revision of market regulations. They also include improving produce quality and quality assurance arrangements (including standardization, classification and SPS – issues), at the level of producers and at national and regional levels

Irrigation. Many wonder why Africa, despite recurring droughts, has not developed an innovative and locally appropriate means of small-scale irrigation that supports rain-fed agriculture. The irrigation infrastructure in Africa is thin and its role in a future agricultural revolution, albeit being small in area, can be significant in terms of productivity increases, diversifying crops into higher value ones and supplying lucrative markets at their time of shortage. Currently, only 3.7 per cent of total arable land is irrigated, against 33% in Asia and the Pacific, and 29% in the Middle East and North Africa (European Commission, 2007). Initial investment in irrigation infrastructure – dams, etc. – is essential from African governments. However, emphasis has to be placed in better local management of irrigation systems under some form of community control to improve the effectiveness and sustainability of investments. This will involve formation of effective Water Users Associations (WUAs) to regulate their usage.

Capacity building. Governments, together with donors, must ensure the training of staff capable of mastering new biological research technologies. Given the growing role of private research in biotechnology and hybrid breeding,

governments must develop partnerships and protocols for making new technologies developed in the private sector available to smallholder farmers. In addition, to increase competitiveness, agriculture should be knowledge based. Farmers need to know what technologies to use in production, processing and in market access. Governments, through extension and advisory services, therefore need to pass to farmers' knowledge, techniques and management practices that increase productivity.

Information/ Information Communication and Technology

In addition to roads and other “hard” infrastructure, farmers need “soft” infrastructure: communications and accurate price and market information in order to take the best advantage of changing market opportunities. Emphasis is now shifting to the use of Information Communication and Technology to generate and pass on information to end users regarding market information. A case in point is the use of Short Message Service (SMS) to pass on market prices in major markets in Kenya.

Other Issues

HIV/AIDS pandemic and agriculture. Empirical evidence indicates that HIV/AIDS undermines the sustainability of development in Africa. According to the FAO, AIDS undermines the productivity and competitiveness of agriculture because of its toll on the labor force:

- In Kenya's Ministry of Agriculture, 58 percent of all staff deaths are caused by AIDS, and in Malawi's Ministry of Agriculture and Irrigation at least 16 percent of the staff are living with the disease. One study found that up to 50 percent of agricultural extension staff time was lost through HIV/AIDS in sub-Saharan Africa.
- AIDS has killed around 7 million agricultural workers since 1985 in the 25 hardest-hit countries in Africa. It could kill 16 million more before 2020.
- More than a third of the gross national product of the most-affected countries comes from agriculture.
- In contrast to other diseases, AIDS mostly devastates the productive age group -- people between 15 and 50 years.
- Up to 25 percent of the agricultural labour force could be lost in countries of sub-Saharan Africa by 2020.
- AIDS reduces productivity as people become ill and die and others spend time caring for the sick, mourning and attending funerals. The result is severe labour shortages for both farm and domestic work.
- Labour-intensive farming systems with a low level of mechanization and agricultural input are particularly vulnerable to AIDS.

Efforts therefore need to be put in controlling the spread of the disease to ensure that the continent achieves its growth targets.

Conflicts and agriculture. Armed conflict and civil strife were major sources of food insecurity in the 1990s and will continue to be in the new century unless the trend is stopped. For all conflicts, as for all natural disasters, the most important losses are labor losses, as a result of deaths; output; means of production and infrastructure. These losses undermine the ability of conflict survivors to subsist and recover. This is most obvious in agriculture, in which destruction of crops and livestock results at the least in reduced food security, and at the most in famine and death. Ongoing conflicts in the continent will therefore undermine efforts to improve productivity and competitiveness of the sector.

The role of Agricultural Economists

Agricultural Economists serve two decision-makers. The first is a public decision-maker who is primarily concerned with dysfunctional markets. They think that the market has failed and policy must save the day. The second is a private decision-maker—farmers, agribusiness sector leaders up to the retail level, including consumers. A series of private decisions have to be made. As agricultural economists, first we need to understand the firm's strategic behaviour. The firm is no longer being controlled by the structure of the market, but it is attempting to change that market by changing its product. We have been trained in an era where the competitive market rules, but now we are in an era where we have a competitive and strategic market. Secondly, we need policy analysis, not only economic analysis. Policy Analysts have to be good economists and equipped in the process. Other disciplines such as Political

Science, Law and human behavior need to be incorporated. Third, there are natural factor endowments and associated changes which must be understood. Given this environment, our challenge is the continuing need to guarantee and provide information, evaluate institutions, create and design institutions, and to provide governance and guidance to public and private decision-makers. Ralf Christy (2002) observes that our profession has difficulty in keeping up with the changes that we see. The changes have not been appreciated by agricultural economists. Although there is an increasing need for expanding what the profession needs to do, there is some kind of inward looking tendencies. Some people think that the profession is dying because of the inward looking tendencies

Agricultural Economics; a discipline or a profession?

A discipline is designed improve logic and internal working of a science in which you apply decision-making. A profession is a practice, which is influenced by many disciplines. A profession is concerned with application. Economics is a discipline while business, is a profession (Christy, 2002). Agricultural Economics is set between the two. We are between the discipline and the profession. Because we are in the middle, there is a constant need to define, redefine, and evaluate. We hold that ground in the middle and that is why there is a continual need for discussion and debate, because we are constantly redefining ourselves. Economics occasionally enters Agricultural Economics, as they want agricultural economists to behave as disciplinarians. By definition, a profession is multi-disciplinary. For the last fifty years, the profession of agricultural economics has been fighting this battle in the middle (Christy, 2002). We have sub-disciplines, such as Agricultural and Applied Economics; Environmental and Resource Economics; Farm Business Management and Finance, Agribusiness Management and Food Distribution and Management. Agricultural Economists have aligned themselves on a spectrum from applied to management. We try to solve the world's problems with these sub-disciplines, but the world's problems do not fit into the sub disciplines, but combine them! How does business make a product that is environmentally consistent with sustainable development? How will they combine? The more exciting processes will take place between the disciplines. We therefore need to seriously think about expanding the frontiers of agricultural economics to be able to effectively address the Africa agricultural productivity and competitiveness challenges. Otherwise, if we continue to stay in the middle, we shall be crushed.

Leading Our Way into the Future

There has been a lot of discussion about the discipline of agricultural economics dying. Kirby wrote an article entitled "*Is Economics Dead?*" Bill Dobson wrote an article in Choices entitled "*Agricultural Economics is a Declining Industry*" and Steven Blanc recently published a paper entitled "*The End of Agriculture in the American Portfolio*." Theodore Levitt says the following about a declining industry: "Every major industry was once a growth industry. But some that are now riding a wave of growth enthusiasm are very much in the shadow of decline. Others which are thought of as seasoned growth industries have stopped growing. In every case the reason growth is threatened, slowed, or stopped is not because the market is saturated. It is because there has been a failure of management. The failure is at the top." (Levitt 1995, p. 3). Those managing agricultural economics institutions must use techniques to look at a wider set of problems. We have missed some opportunities—we have failed to use our diversity, including women. However, Agricultural Economics is not declining. It is expanding. It is how we define it and how we use it which will provide all the opportunities. As social scientists, we must understand and adjust to the current environment, predict the future environment, and then put forward solutions that will enhance the wellbeing of all nations in the continent. We should be concerned and be involved in land reform programs. We should play a role in resource protection as well as in resource development. We can and should play a leading role in leading African agriculture back to good health, for economic growth and development. This requires that we embrace the new sector challenges and not confine ourselves into a box. We need to expand to other disciplines and be relevant. If we do not re examine our role, then agricultural economics will die. I am glad one of the panel sessions in this conference will address the issue.

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