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Skill Needs and Policies for Agriculture-led Pro-poor Development

Matthias Grossmann* and Mark Poston**

Poverty reduction is the mantra of development policies today. Three out of every four people in the developing world live in rural areas, either directly or indirectly depending on agriculture. Agriculture-led development strategies need to be at the core of any poverty reduction strategy, as agroindustralisation, i.e. the transition towards more commercialised agriculture systems, can bear positive effects for the poor, such as off-farm employment creation and stimulated economic growth in general. In order to reap these potential benefits, it is crucial to address the specific skill needs that occur at different levels of agroindustrialisation. Currently, agricultural education and training (AET) systems fail to respond to these challenges, which is reflected in a high fragmentation of AET systems in the developing world and a lack of donor initiatives in middle-level training projects. Evidence from developing and developed countries reveal that skill strategies need to be integrated into a coherent rural development strategy that aims at addressing the important constraints to agriculture-led development, which are widespread, especially in low developed economies.

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* Mattthias Grossmann
SKOPE, Department of Educational Studies
University of Oxford, Oxford OX2 6PY
Email: matthias.grossmann@qeh.ox.ac.uk

** Mark Poston, Department for International Development
Email: Mark-Poston@DFID.GOV.UK

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'It is in the agricultural sector that the battle for long-term economic development will be won or lost'

[Gunnar Myrdal, Nobel Laureate in Economics]

Introduction

This paper has grown out of a combination of commitment and interest in sustainable poverty reduction and at the same time a frustration regarding the role of education in the current development debate.

Currently, over a quarter of the world's population live on less than a dollar a day. The sustainable reduction of this number to half its 1990 level is the primary goal of development agencies around the world. "*Pro-poor*" development has become the current mantra of poverty reduction. The basic notion is that it is possible to find economic and public policy strategies which will unlock the capabilities inherent in the poor so that they might produce, process, market and trade their way out of poverty.

Backed by the overwhelming evidence that education plays a central role in sustainable poverty reduction, donors and policymakers alike pay much attention to the development of education sectors in developing countries. In a large number of developing countries, education retains the greatest proportion of national budgets. The goal of achieving universal primary education by the year 2015 has dominated the policy debate and has narrowed the focus of policy strategies to this area.
In addition, the policy discourse on skill development has been largely influenced by the challenges and opportunities brought about by globalisation. Inspired by the success of the East Asian 'tigers', anti-poverty strategies now emphasise the importance of moving away from traditional comparative advantages in resource based activities to new 'technological' comparative advantages in niche production, implying the massive upgrading of skill levels for advanced technology sectors (see Brown, P., Green, A. and Lauder, H. 2001; Lall, S. 2000; Lall, S. 2003 for discussion).

The rapid industrialisation experiences made by a few countries in East Asia, however, are not necessarily replicable in other developing countries, as the increasing gap in development between Asia and Africa highlights. Rather than favouring skill strategies to move into new technology sectors, donor and government interventions need to support strategies to exploit the full potential of the sector in which most developing countries have a traditional comparative advantage: agriculture.

Agriculture is the single most important sector in many low-income countries, with a large number of people depending directly or indirectly on it for their livelihoods. In about two-thirds of the low-income countries, agriculture accounts for GDP shares of between 30 to 60 percent and about ¾ of all poor people in the developing world live in rural areas (FAO 2001). Agriculture thus represents a key target for any successful poverty reduction strategy.
For instance, promoting agricultural growth does not only increase farmers' incomes, but it also creates new employment opportunities in the farm and off-farm sectors and can contribute positively to increased food security on the national level. In addition, globalisation opens up new opportunities in the sense of providing new markets and inflows of foreign direct investments, but at the same time, it also poses important challenges and dangers.

The agricultural sector, however, is not static but develops along specific stages. Starting from a low, subsistence-oriented base, the agricultural transformation (which we subsequently will refer to as agroindustrialisation) leads to more complex structures with increased and diversified outputs, which are first oriented towards regional and national markets. At a later stage, agricultural produce is increasingly geared towards global markets and production activities often become integrated in global production networks, which are controlled and expanded by multinationals.

The thesis underpinning this paper is that the pro-poor benefits of agricultural growth cannot be fully exploited unless national strategies on education and skill development explicitly take into account the specific requirements of the agricultural sector at different stages of its transformation. In addition, such an agriculture-led pro-poor skill strategy needs to be articulated in close relation to subsequent macro- and micropolicies, aiming at addressing the major obstacles for agricultural growth (e.g. market failures, weak infrastructure, access to credit).

The paper is structured in three parts. Part I reviews the linkages between poverty, agricultural development and skill development. The first section will start with an overview of the major theoretic bases to poverty reduction and pro-poor development policies. The second section will focus on the potential benefits of agriculture-led development for poverty reduction, including a discussion on the challenges that agroindustrialisation is faced with in the current context of globalisation. The third section analyses the implications for skill development strategies. As the discussion will reveal, skill requirements depend on the specific stages of agroindustrialisation, and they become more complex and differentiated at higher stages.

The second part provides an overview of policies for skill development strategies in agriculture. The first section presents an overview of the current trends in agricultural education and training (AET). This review reveals some doubts about the effectiveness of current approaches to skill development: there seems to be no coherent approach to AET in a large number of countries, as the provision of training is highly fragmented and geared largely to the tertiary sector and research. There is thus evidence for what Bennell claims to be a 'training crisis' in those sectors that affect the poor most (Bennell, P. 1999). Based on this discussion, policy recommendations are suggested that aim at creating a more coherent approach to AET.

The third part consists of case studies on AET in different parts of the world. Starting from cases in Africa, skill requirements and current policies to address those requirements are presented. As many countries in Africa are still at a low stage of agricultural transformation, these cases highlight well the specific skill issues at this stage.
A discussion on India follows, as it has already moved up the agroindustrialisation 'ladder'. On the one hand, India still has an important small scale base in agriculture, but, on the other hand, it has opened up to the increasing global competition in agriculture and, as a consequence, experiences an increasing involvement of multinationals in food processing, which has important consequences for skill strategies.
The last case is on Australia, and, although Australia is not a developing country, it has some distinct characteristics that make it a useful exercise to look at. Its advanced integration into the global economy bears important demands for the articulation of an appropriate skill strategy that has to respond much more to international influences than would be the case for lower stages of agroindustrialisation. In addition, the increased opening of its markets led to strains in the rural economy, which had to be addressed by additional policies. The insights

gained from this case might be valuable for countries moving along the agroindustrialisation process.

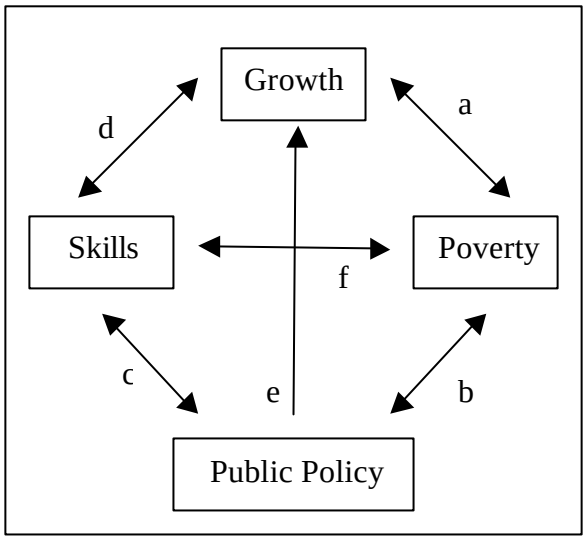
PART I Linkages between agriculture, poverty reduction and skills

1) An overview of some theoretical concepts to poverty reduction

Development has not always been about poverty. In the 1970s the theme of development was much more centred on modernisation, or national development. Only since the failure of the big project approaches of the 1970s and the subsequent failure of liberal market economics approaches of the 1980s has attention turned to more rounded notions of development which focus both on the individual and the state. Poverty has variously been alleviated, eliminated and most recently reduced showing to some extent how the idea of poverty has changed and how ideas have changed about what should be done to it.

The following figure graphically represents the major components that affect poverty and the linkages between them, which will be discussed in more detail throughout this part.

Figure 1: Poverty linkages



The most important change in development policy in recent years has been the attempt to harmonise development efforts under a single comprehensive planning process. For most of the very poor countries, international donor assistance (IDA) funding from the World Bank, IMF and debt relief programmes are increasingly linked the production of a national poverty reduction plan. Furthermore, many bilateral agencies are also channelling their support through the same mechanisms. So for most least developed countries, the need to produce such plans is unavoidable, and the interest placed in such plans by the international community means that considerable resources are channelled into their production. For this reason, nationally owned poverty reduction strategy papers (PRSP) now stand at the heart of public policy in most developing countries.

The need to generate PRSPs has forced governments to examine the relationships between public policy and their long term national development strategies. A key outcome of this has been the recognition that macro-economic policies, policies related to trade and national growth strategies, and sector level policies must form a single coherent strategy. The implementation of this strategy rests on sector level plans, and one of the strengths of this coherent planning process is the need to examine the links between sector level actions and the overarching strategies that governments are using to reduce poverty.

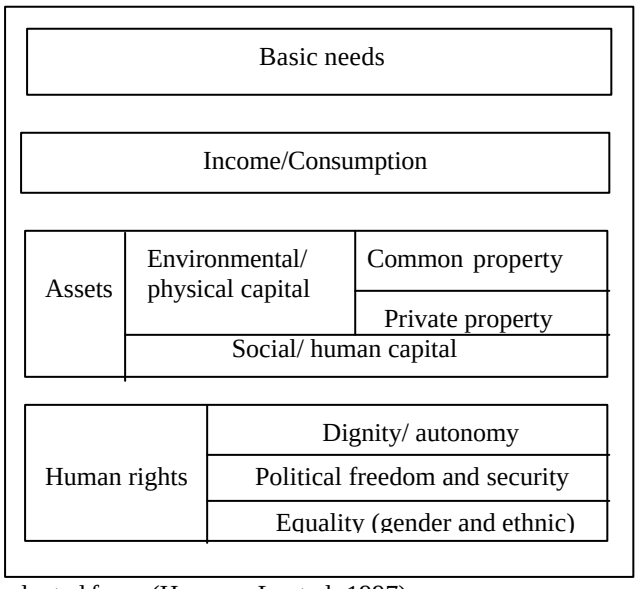
Underpinning these strategies is an understanding of poverty, which has evolved over time and today, comprises a broader understanding of poverty than only a decade ago.
A very important poverty measure that is still very influential in current policy discourses, is the income measure (of individuals or households). The number of people living below an

international poverty line (the most commonly used one is the $1 a day line) serves as an important poverty measure. This measure is reflected in the international development efforts to reduce poverty, which are currently focused on the Millennium Development Goals, agreed during the Millennium Summit in New York in September 2000. The first of the eight goals is a reduction of the proportion of people living on a dollar a day by one half of the 1990 level by 2015 (see DFID 2001 for overview). Translated into absolute numbers, achieving this goal would require lifting more than 300 million people out of income poverty above the $1 level (World Bank 2002).

Traditionally, growth plays a crucial role for poverty reduction and is at the heart of the debate on poverty reduction strategies. Growth has been considered the vehicle of poverty reduction itself, achieved through trickle-down effects (link *a* in figure 1). There is empirical evidence that distributions of income are relatively stable over time –thus if total income grows, the income of the poor tend to grow, too (for an overview of this literature see Li, H., Lyn, S. and Zou, H.-f. 1998). Using the income measure of poverty, growth of per capita GDP then is equal to poverty reduction and growth as such can be considered an end of poverty reduction itself. Policies aiming at supporting growth were at the heart of poverty reduction strategies, as the poor would automatically benefit from the creation of jobs and the increase in goods and services (link *e* in figure 1). The logic of structural adjustment and stabilisation programmes was based on this understanding to create and support a growth-promoting environment.

Empirical evidence suggests that the initial distribution of income is an influential determinant for poverty reduction. Growth seems to be less pro-poor in initially unequal societies (Hanmer, L. C., Pyatt, G. and White, H. 1999; Rodrik, D. 2000). One explanation is that structural rigidities constrain pro-poor effects of growth. For instance, if a farmer has limited access to land or credit, no productivity increases are possible, as production factors are not mobile and thus cannot move freely between traditional and modern sectors. There is thus an important role for a set of redistributive and structural policies to achieve positive effects of growth on poverty reduction.

Figure 2: A typology of poverty concepts



adapted from (Hanmer, L. et al. 1997)

Another important change in the poverty debate has been the broadening of the definition of poverty. One of the major critiques of income as a poverty measure –important as it is- is that income is an input factor rather than an output measure of welfare (Hanmer, L. et al. 1999; Hanmer, L. C., Pyatt, G. and White, H. 1999; White, H. 1999). Hanmer et *al.* (1997) suggest a broader concept of poverty. In this typology, income is only one component among others like basic needs (food, education, health services), assets (including environmental assets) and human rights. The implications of such a broader concept for the poverty debate is that growth is no longer considered an end of poverty reduction, but a means among other policies directly targeting specific areas, such as education, the

environment or human rights. As a consequence, public policies affecting poverty should be much broader than a policy focusing only on growth (link *b* compared to link *e* in figure 1).

The importance of these additional dimensions of poverty are recognised in the Millennium Goals. The remaining goals relate to improvements in the well-being of the poor and present targets for health, education and environment outcomes. They address perceptions of the poor as expressed in the highly acclaimed 'Voices of the Poor' (Rademacher, A. et al. 2000) report, which shows that the poor perceive poverty in terms of their own powerlessness, stigmatisation and social exclusion. The OECD/DAC provides guidelines on poverty and defines five dimensions of poverty (OECD 2001b): protective (security and vulnerability), political (rights, influence, freedoms), sociocultural (status, dignity), human (health, education and nutrition) and economic (consumption, income and assets). Strategies to reduce poverty need to take account of these multiple dimensions, and also need to examine ways that a failure to address each might undermine progress (Maxwell, S. 1999).

One important element for any successful poverty reduction strategy is the role of skills. The discussion above outlines the framework in which education and training interventions have to be placed in order to achieve successful poverty reduction. In a narrow poverty approach, skills mainly interact with growth (link *d* in figure 1), which can be explained with reference to the human capital approach, where better skills bear important returns for individuals (incomes), firms and society as a whole (for an excellent overview of new evidence on rates of return analysis see McMahon, W. W. 1999). Skill policies (link *c*) in such a framework mainly aim at remedying existing market failures in education and training (e.g. externalities) (Brown, P., Green, A. and Lauder, H. 2001; Keep, E. and Mayhew, K. 1999).
When using a broader poverty definition, however, the role of skills becomes much broader, too. Skills are not only limited to production activities, but they address a large range of sectors and activities (e.g. the need to address environmental issues, knowledge about legal structures, information on credit opportunities and health issues), which have direct impacts on poverty (link *f*). Education and training do not only play a crucial role in improving the economic opportunities of the poor, but they are also necessary to change socio-cultural structures and values. As a consequence, the role of possible and necessary policy interventions is much wider than in a narrow poverty approach.

We will return to these themes in greater detail in later sections of the paper, when we consider the skills required to support agricultural sector development.

2) Linkages between agriculture and pro-poor development

Implementing the global poverty reduction agenda will be achieved through national poverty reduction plans. A recent analysis of poverty reduction strategies highlights the importance of the agricultural sector (CGIAR and IFPRI 2002; Christiansen, K. 2002). Of six reviewed PRSPs from countries in sub-Saharan Africa, all put some emphasis on the importance of agriculture and rural development. Moreover, there is substantially more discussion about transition mechanisms in relation to the agricultural sector than there is with other proposed growth strategies outlined in the documents.

A number of public actions are identified to promote agricultural development. For instance in Uganda, public actions promoted in the Plan for the Modernisation of Agriculture fall under six core areas: research and technology, access to rural finance, access to markets, sustainable resource utilisation and management, advisory services, and agricultural

education. In addition employment outside agriculture is to be promoted by microfinance, advisory services and vocational training (Christiansen, K. 2002). Similarly, Ethiopia formulated an agriculture development led industrialisation (ADLI) growth strategy, where the improvement of rural incomes is expected to initiate additional demand for industrial consumer products and thus spur industrialisation in the off-farm sector (Poston, M. 2002).

These strategies reflect the perceived linkages between agriculture-led development and poverty reduction. This section discusses these linkages in more detail and will in particular focus on the skill requirements necessary to support agriculture-led development. Before looking at the role of education and training, the process of agroindustrialisation and its poverty implications will be discussed.

2.1) The mechanisms of agricultural transformation

Historical evidence suggests that the transformation of the agricultural sector is a necessary pre-condition for a country's economic development. The theoretical underpinnings of this transformation rest on a number of early models. Structural-change theories of the fifties and sixties focus on the mechanisms by which countries shift from a large agricultural base to a modern sector. The most well-known model is the Lewis two-sector model, which is based on the assumption that labour surplus from the traditional (agricultural) sector is transferred to the industrial sector, caused by the increasing expansion of the latter through higher savings and investments (Lewis, A. 1954). Later models of structural change emphasise the additional role of changes in economic structures, including increasing urbanisation, changes in the tastes and demands for goods and services, and the change in values and beliefs (see for example Chenrey, B. 1979).

A central pre-condition for agriculture-led industrialisation is the liberation of surplus labour from the agricultural sector, which requires productivity increases. Central to this mechanism is technology. Davis and Goldberg (1957) writing about the development of agriculture in the USA identify aspects of technological development on the farm in the areas of mechanisation and motorisation (various forms of labour saving farm machinery), and crop and livestock development. Such developments release labour from the land to industrial development. With increasing numbers of people moving from the land to urban industrial centres, the commercial demand for food rose and this new demand for food in urban centres drove the technological development of off-farm processes in the areas of processing, storing, preserving and distribution. These post-farmgate processes became businesses in their own right, as did the production of pre-farmgate inputs. Services (to farm machinery and to agricultural processes) as well as the production of agricultural factors such as soil improvement technologies, support for better feeding practices and livestock medication all developed as agribusiness.

These changes had structural implications. Firstly, the greater complexity of farming processes, the use of machinery and farm inputs, together with off-farm processing and other value adding activities, led to greater diversification of the agribusiness sector. The second significant change came as a result of this diversification, that is the greater decentralisation of agriculture based activities. As improvements were made in infrastructure the production of pre-farmgate factors and the processing of farm produce was undertaken away from the farm. These general trends can be traced out around the world. Reardon and Barrett (2000) present a comprehensive analysis of general trends in the agricultural sector which they term the general process of "agroindustrialisation". They provide three defining characteristics of agroindustrialisation (Reardon, T. and Barrett, C. B. 2000, p. 196):

1) "The growth of agroprocessing, distribution, and farm-input provision activities off-farm undertaken by what we shall call "agroindustrial firms" which are called agribusiness firms in the agribusiness literature.
2) Institutional and organisational change in the relation between agroindustrial firms and farms, such as increasing vertical coordination
3) Concomitant changes in the farm sector such as: product composition; technology and sectoral and market structures"

Pingali and Rosegrant (Pingali, P. L. and Rosegrant, M. W. 1995) draw on the experience of farmers in East Asia during the 1970s and 80s to examine how the structure of the agricultural sector including the off-farm agribusiness sector (which delivers farm-inputs or processes farm produce) has changed with increasing commercialisation. They identify three different stages of the agroindustrialisation process, which are presented in table 1.

Table 1 The three stages of agroindustrialisation

Level of market orientation	Farmer's objective	Source of inputs	Product mix	Household income sources
Subsistence systems	Food self-sufficiency	Household generated (non-traded)	Wide range	Predominantly agricultural
Semi-commercial systems	Surplus generation	Mix of traded and non-traded inputs	Moderately specialised	Agricultural and non-agricultural
Commercial systems	Profit maximisation	Predominantly traded inputs	Highly specialised	Predominantly non-agricultural

(Adapted from Pingali, P. L. and Rosegrant, M. W. 1995, p. 172)

The authors note that specialisation is only achieved after some time. Initially, as incomes rise and as a market is established for non-staple, higher value foods (such as meat and fruits), greater diversification is found on the farm without specialisation. After some time, on-farm diversification ceases as individual agribusinesses are established around a market advantage. At the national level, however, greater product diversification is the norm.
With respect to the sources of inputs, the move to more commercial systems results in greater use of machinery, chemical fertiliser and purchased fodder, and thus a reduction in draft or human power, farmyard manure and the use of crop residues as livestock feed.

General demographic and economic factors, which stimulate agricultural growth, include economic growth, urbanisation, and the withdrawal of labour from the agricultural sector. As people move to industrial centres, there are fewer people working the land, and as there is more money in the economy, so too there is greater demand for higher per-farmer productivity from the land, more investment to value added technology used off the farm, greater demand for diversified agricultural produce, and greater need for processing, storing and preserving technology if the produce is to reach the market. This in turn leads to a demand for greater amounts of farm input factors generated off the farm. Thus, agro-industrialisation itself stimulates the development of agribusinesses. General structures of agricultural development include (see also Timmer, C. P. 1988):

- Greater diversification of agricultural production
- Greater specialisation of agribusiness and the increased production and the use of tradable farm inputs
- Increased vertical coordination of enterprises in the agricultural sector
- Increased value added through off-farm processes

Clearly all these changes are interdependent and inter-related. It is a mistake to think that greater urbanisation will provide a demand that will unlock the remaining aspects of the

agroindustrialisation processes. Increased farm production unlocks the labour, which allows for urban industrial development. Increased agricultural production also fuels a domestic market for manufactured products. Acknowledging that agricultural development inevitably means changes to the structure of agricultural production systems, and that expansion of the majority rural sector has the potential to fuel massive demand for labour-intensive products means that the challenge for skills training to aid rural development must extend beyond the farm sector, and address the wide range of skills required in transformed rural economies.

2.2) The potential pro-poor effects of agroindustrialisation

Agroindustrialisation bears a number of potential pro-poor effects. A recent DFID consultation document outlines the main arguments supporting a focus on the agricultural sector as one major driver for pro-poor development (DFID 2002):

1) Agriculture provides the main source of savings for domestic investment in other sectors – especially at the level of the rural economy where other forms of financing are less available.
2) Farm inputs and agriculture processing lead other industrial development. An increased demand for agro-processing and agricultural inputs leads to production of other non-farm by-products. It generates skills and capital equipment, which are often converted to produce non-agriculture goods.
3) Agricultural development stimulates consumption of off-farm goods. Increased production by farmers in the rural economy generates farm surplus which, when sold, contributes to the wealth of the rural population. This greater wealth leads to demand for both goods that are produced in the rural areas as well as those in urban areas. Agriculture sector development thus has a high multiplier effect and stimulates growth in other parts of the economy.
4) Greater consumption of off-farm goods stimulates rural employment. Already some 40% of the rural economy relies on off-farm activity. Increased wealth (generated through farm surplus), generates greater demand for non-farm goods.
5) Food production is a necessary prerequisite for effective industrial development. Growth in one sector is quickly choked off if consumption and production of intermediate goods are inelastic.

The underlying theoretical links between agroindustrialisation and pro-poor development are largely based on the structural transformation that is taking place in rural areas. Mellor, one of the proponents of agriculture-led poverty reduction, notes that solving poverty in low income countries, and converting an economy from rural subsistence farming to a more urban industrial and service based economy requires rapid growth in output, income and employment (see Mellor, J. W. 1966, 1995). As incomes increase, the proportion of total expenditure spent on food decreases, and this holds as much for a rural, agricultural community as it does for industrial, urban centres. For most developing countries, the agriculture sector has the capacity to exploit productivity-increasing technological innovations that make large net additions to national income and hence to purchasing power. As incomes rise, there is greater demand for locally produced non-tradable goods, thus stimulating the rural labour market and raising productivity in both farm and non-farm goods and services.

In addition, agriculture sector development also offers improved livelihoods for poor people by:

1) Increasing food security. Increased food production, better processing and higher quality agricultural produce all reduce the amount of waste and increase the amount of consumable food. These various factors ensure greater levels of food security for the rural poor.
2) Improving environmental conditions. Environmental degradation is a result of over-farming or farming marginal spaces. With improved agricultural practices, and the increased use of farm inputs, agricultural yields can be increased without over-consumption of natural resources. Care needs to be maintained as more intensive farming often results in increased use of water resources. However, with increased awareness of environmental issues and better management, environmental damage can be reduced.
3) Reducing urban migration. If agricultural development can reduce wealth discrepancies between urban and rural areas this can contribute to the reduction of migration from rural to urban areas.

Irz et *al.* (2001) summarise the linkages between agricultural development and poverty reduction by considering changes that occur at different levels (table 2).

Table 2: The Benefits of Agricultural Growth

Farm economy

- Higher incomes for farmers, including smallholders
- More employment on-farm as labour demand rises per hectare, the area cultivated expands, or frequency of cropping increases. Rise in farm wage rates.

Rural economy

- More jobs in agriculture & food chain upstream & downstream off farm
- More jobs or higher incomes in non-farm economy as farmers & farm labourers spend additional incomes
- Increased jobs & incomes in rural economy allow better nutrition, better health & increased investment in education amongst rural population. Lead directly to improved welfare, & indirectly to higher labour productivity.
- More local tax revenues generated & demand for better infrastructure – roads, power supplies, communications. Leads to second-round effects promoting rural economy.
- Linkages in production chain generate trust & information, build social capital & facilitate non-farm investment.
- Reduced prices of food for rural inhabitants who buy in food net.

National economy

- Reduced prices of food & raw materials raise real wages of urban poor, reduce wage costs of non-farm sectors.
- Generation of savings & taxes from farming allows investment in non-farm sector, creating jobs & incomes in other sectors.
- Earning of foreign exchange allows import of capital goods & essential inputs for non-farm production.
- Release of farm labour allows production in other sectors.

(Adapted from Irz, X. et al. 2001)

A number of studies contain estimates of the effects of agricultural development on poverty reduction. On the national level, the World Bank estimates that a reduction of the number of the poor by two percent requires average annual GDP growth rates in the range of six to seven percent (World Bank 1997). Due to the large contribution of agriculture to GDP in many developing countries, these annual growth rates require average annual agricultural growth rates of between four to five percent (ibid). During the last two decades, annual growth rates in agricultural output ranged between 1.6 and 2.5 percent for least developed countries (3.6 percent for all developing countries), which, in the case of LDCs, is far below the four to five percent required for successful poverty reduction (FAO 2001). These shortcomings indicate that there is no guarantee that these pro-poor effects of agriculture will materialise, as a

number of factors influence the outcomes of agricultural development. The next section will deal with these challenges in more detail.
Quantitative studies on the multiplier effects of agricultural growth, i.e. the indirect income effects that results from a growth in agricultural income, are more reassuring. Delgado et al. find that an extra dollar of agricultural income was typically associated with an additional $0.80 of non-agricultural income from local enterprises, stimulated by the additional spending of farm households (Delgado, C. L., Hopkins, J. and Kelly, V. A. 1998). The Group on International Agricultural Research (CGIAR and IFPRI 2002) finds even higher multiplier effects for the whole economy: every new dollar earned by farmers in low-income countries increases the income of the whole economy by $2.60.
Other studies support the view that agriculture has important multiplier effects, which are even higher than those observed for industrial development (where multiplier rates are about half those in agriculture. (See Barrett, C. B., Reardon, T. and Webb, P. 2001; Tada, H. 1992; Thirtle, C. et al. 2001 for additional evidence).

2.3) Major obstacles and challenges for agroindustrialisation

There is much contention over how well the above findings can be generalised. Differences in the individual performance of countries indicate that there is no automatic link between agricultural growth and poverty reduction, as a number of factors influence the underlying linkages.

Some of the assumptions about the extent to which agriculture is able to stimulate demand and generate increased incomes in rural areas, depends on how well markets work and on the extent of existing entry-barriers to non-farm activities, such as access to finance and education.
In their analysis of the agricultural transformation from subsistence to commercial systems, Pingali and Rosegrant (1995) point out that the move from non-tradable to tradable goods might threaten the extent to which agricultural development will stimulate rural economies. Potentially, the move to greater use of tradable goods will push local producers out of the market. Other dangers that agro-commercialisation presents to rural development include the tendency for regional disparities to widen. This might be the case when labour does not move freely and poor producing regions can face greater relative poverty and even find that decreasing commodity prices (resulting from higher yields in high producing regions) put these groups in ever-greater poverty. Evidently, using agricultural development to stimulate rural development requires careful policy design and public policy action.

Another major constraint to agricultural development is insufficient access to capital/ finance. The World Bank estimates that only 10 million out of the 500 million people running a micro or small enterprise worldwide have access to credit (Global Development Research Centre 2001). Often, farmers only have access to local moneylenders, charging interest rates that are far above the market rates, as commercial bank services are rarely offered in rural areas (for detailed discussion see Harper, M. 1998; Hulme, D. and Mosley, P. 1996). As a consequence, micro-finance schemes to support rural development are crucial for successful agroindustrialisation.

A second limitation to the traditional way of improving productivity is the increasing awareness for environmental consequences of intensive farming methods. Especially in environmentally fragile regions the expansion of farming may lead to adverse effects, if it contributes to the increasing degradation of scarce resources, especially water. These

problems are aggravated by continuous demographic pressures, which put a strain on the use of scarce resources. Indeed, the adverse effects of population growth are multidimensional. On the one hand, increasing populations require increased food production. The FAO estimates that in order to maintain present per capita food availability by 2050, food supply would need to be nearly quadrupled in a number of low-income countries (FAO 2001). This requires either increased food imports or an extension of agricultural production, which, if possible at all, puts enormous constraint on resources. The recently released World Water Development Report notes that at worst, 7 billion people in 60 countries will be water scarce by 2050, at best, 2 billion people in 48 countries (United Nations 2003). Currently, 1.1 billion people already have insufficient access to water resources. Considering access to water as the most basic of all basic needs and as one element of the broader poverty definition, poverty reduction in this regard is largely at danger. This emphasises the urgent need to devise strategies for sustainable development.

Another constraint for agricultural development is often not taken into account when devising policy strategies, which is the reluctance of farming communities to change. In 1973, Griffin (1973) commented that *'if peasants sometimes appear to be unresponsive or hostile to proposed technical changes, it is probably because the risks are high, the returns to the cultivator are low –for example, because of local customs or land tenure conditions, or because credit facilities and marketing outlets are inadequate and the necessary inputs- including knowledge- are missing.'*
This observation, 30 years later, is still valid. Rapid technological change and the challenges imposed by the increasing integration into the world economy leave many rural communities in a state of uncertainty. For example, reasons for a rather static agricultural sector are uncertainty and risk aversion as the outcome of more advanced technologies and crop varieties is not well known. This is especially the case if current farming strategies have been proven to be more or less successful. The local knowledge base represents an important element, which needs to be integrated into agricultural development strategies.

One of the most important challenges that agriculture faces today is globalisation and the increasing integration of developing countries into the world market.
Although the process of globalisation has reached unprecedented dimensions today, agriculture is still one of the most protected areas. Whereas the average applied tariff rate for all WTO members for manufactured products is 4%, the average tariff rate for agricultural products is 14%, and in some cases, with exceptionally high rates for processed food products (Anderson, K. 2000). In addition, the agricultural world market is highly distorted by the enormous amount of agricultural subsidies: in 1998, the amount of agricultural subsidies spent by OECD countries amounted to an average of $362 billion per year, which is larger than the total of Sub-Saharan Africa's GNP in 1998 ($323 billion) (OECD 2001a)! Kevin Watkins (1996) remarks in this context, *'in the real world, as distinct from the imaginary one inhabited by free traders, survival in agricultural markets depends less on comparative advantage than upon comparative access to subsidies'.*

Not only does the limited access to developed markets represent a constraint for agricultural development of developing countries, but also the changing demand structure for agricultural and food produce. Demand shifts towards a wider range of products, higher protein and high fat foods, luxury foods and fibres as well as foods tailored to different lifestyles (e.g. convenience food) (Reardon, T. and Barrett, C. B. 2000). Moreover, food and fibres are no longer valued by their surface features. Increasingly they carry with them values associated with their production processes. The regulation of foods through sanitary and phytosanitary measures is now an essential element of international markets, and as Boehlje et. al. (1995)

note, "*the agricultural sector is coming under scrutiny because of its contribution to environmental degradation.*" Producers who want to enter export markets must attend to the use of inputs and agricultural practices, which respond to market demand. As international consumers put great emphasis on food quality and safety, international standards in this area become more important. Standards like the Hazard Analysis and Critical Control Point (HACCP) are commonly used by international food producers and their adoption is the basic price of market entry for emerging food enterprises, which, today, simply is not negotiable (Reardon, T. et al. 2001).

The reduction of trade barriers has also led to an increase in economic production activities across borders, as food processing and consumption is increasingly divorced from the source of production of the raw materials. A large part of this decentralised production network is now managed and driven by multinationals that operate on a regional or even global stage. A large number of multinationals from developed countries expand their activities to developing markets. For example, in the period between 2001 and 2004, 37% of investments planned by US agro-businesses enterprises are to be made in Latin America & Caribbean and 4% in South Asia, which demonstrates the attractive role of emerging and developing markets for the global agro-food industry (Mohan, A. M. 2002). Whereas in the 1960s and 1970s such investment would have been found mostly in the form of plantation-cum-processing for export enclaves, it is now common to find input supply firms, processing firms, traders and retail distributors. The increased competition from a wide range of producers has meant that all multinational corporations are now increasingly bundling their inputs and services together with credit and investments. This implies, however, that multinationals increasingly enter into direct competition with domestic processors, who often lose out against the operational and financial advantages of multinationals.

The increasing role of multinationals and liberalised markets simultaneously lead to changes in the structure of markets. Traditional purchasing of agricultural produce according to pricing is giving way to complex contractual arrangements. In many ways this is a reflection of the various changes that are occurring in global markets, technological development and increasing awareness of food safety and environmental issues. Spot markets do not provide the assurances that consumers demand concerning food safety, which has led to the increasing use of bundled inputs (fertiliser, pesticide, seed varieties, and the machinery to use and process the produce sold as a single package). The rise of contract farming is one expression of these changing relationships between the producing and the processing sector (Reardon, T. and Barrett, C. B. 2000).
Other organisational changes include an increasing decentralisation and division of production tasks. In order to enhance efficiency, many 'non-core' tasks such as marketing, retailing or management are out-sourced from classical processing activities. This leads to the emergence of new service providers that specialise in these peripheral tasks. However, these institutional changes also lead to changes within food processing firms and especially on the level of labour division, which, accordingly, becomes more specialised.

The challenge for developing countries is to capitalise from new international export markets following from the changes that globalisation brings, while at the same time, stimulating local markets and drawing on the development benefits of intermediate technology developments and the generation of increased rural incomes in stimulating domestic demand for tradable goods. Both changes stimulated by globalisation and those stimulated by increases in local demand need to be supported if developing countries are to be able to draw on agricultural development for poverty reduction.

This requires a number of supportive policies to address the various obstacles and challenges that agricultural sectors are faced with. One crucial requirement is that skills are developed accordingly –a task, which has often received less attention than other agricultural policies.

3) Major skill requirements for agriculture-led development

After having identified the major linkages between agriculture and poverty reduction and some of the most important obstacles and challenges for agroindustrialisation, it is now possible to focus on the various skill requirements needed to exploit the potential pro-poor effects of agriculture-led development. This section aims at analysing in more detail the links between skills and poverty reduction for agroindustrialisation as described in figure 1 in the first section.

For the purpose of our analysis it is useful to break down the changes and challenges discussed above in more detail and to group them into four distinct categories: 1) market changes; 2) technology changes, 3) financial changes; 4) institutional changes.

Table 3: The changes and challenges of agroindustrialisation

Type	Changes	Challenges
1) Market changes		
Market size/orientation	increasing market size (regional, national, global); export orientation	meeting global demands; ability to meet logistic (transport) requirements
Market participants	with increasing market liberalisation entry of foreign agro-industry firms	ability to compete and/ or co-operate with foreign firms
Consumer demands	demand shift towards new products (e.g. convenience/ luxury foods); importance of safety and health aspects	responding to shifting local (domestic) and international demands; adoption of safety/ health procedures
2) Technology changes		
Production technology	increasing importance of environmental sustainability; biotechnology; local knowledge	ability to adopt sustainable farming methods; access and use of new seed varieties; integration of local knowledge
Processing technology	with increasing commercialisation shift towards line production technology and quality ensuring processing methods	access and use of technology (local availability for small scale producers); ensuring quality/ health standards
Distribution technology	modern storage/ distribution technologies (e.g. refrigeration, preservation) for longer distances and minimum quality standards	access and use of modern storage/ distribution technologies
3) Financial changes		
Access to capital	larger role of foreign capital, e.g. through FDI and/or access to international capital markets	access to micro-finance (for small scale producers) and/ or formal capital markets is crucial for investments
4) Institutional / organisational changes		
Linkages to other sectors	deepening linkages with off-farm sector (e.g. suppliers, processors); outsourcing of administrative tasks (e.g. management)	ability to make use of new market opportunities in off-farm sector
Market structure	increasingly spot markets are replaced by (longer term) contractual relationships	ability to evaluate legal and commercial consequences of contractual relationship

Table 3 describes the major changes and challenges likely to occur during the process of agroindustrialisation. The degree of changes and challenges of course depends on the extent and speed of agroindustrialisation and the already achieved level of economic activity in rural communities. For example, small-scale farmers who predominantly produce for the local market are less exposed to global demand shifts than export oriented producers or processors. Also, processors for local markets are likely to use more locally available technology rather than modern processing plants that are geared towards efficient processing for export markets.

On the other hand, contractual relationships between farmers and food processors are more likely to be established between local farmers and international food processors.
However, certain changes and challenges affect rural communities equally, for example, the importance of using environmentally sustainable farming techniques and methods, irrespective of the market orientation. Similarly, access to capital –be it through micro-finance schemes for small-scale producers or through international capital markets- is crucial for a successful agricultural transformation.

Based on the earlier discussion of changes and challenges of agroindustrialisation, the following table summarises the major skill requirements likely to be needed to address these changes and challenges. It also highlights the likely impacts on poverty.

Table 4: Major skill requirements for agroindustrialisation and the likely impacts on poverty

Changes	Skill requirements	Poverty impact
Market changes	• use of new seed varieties/ new product development • marketing and advertising skills • business management skills • knowledge about safety/ health standards and export legislation	• creation of additional income/ consumption • creation of additional employment • increase of assets • meeting basic needs (e.g. food)
Technology changes	• use of environmentally sustainable farming technologies and methods • use of locally available and/ or sophisticated processing technologies • ability to integrate local/ indigenous knowledge • maintenance and IT skills • ability to assure quality/ health standards	• creation of additional/ higher income and consumption • creation of additional employment • better health standards • preservation of environmental and social capital • meeting basic needs
Financial changes	• business management skills • accountancy skills • knowledge about financial legislation and markets	• creation of additional/ higher income and consumption • creation of additional employment • access to physical capital (assets)
Institutional changes	• business management skills • labour management • knowledge of legal issues • networking skills	• creation of additional/ higher income and consumption • creation and diversification of employment opportunities • increase of assets

The different skills described in the table above are not confined to specific changes, but several of them are equally important for a number of activities (e.g. business management skills). In general, skills can be classified in core and non-core areas, which relate to the different sectors and linkages in the changing agricultural sector.

In order to profit from changes in markets, a number of different skills are necessary. This includes, for example, the ability to react to new market demands by recognising new market opportunities and by adapting existing production/ processing methods and technologies. The ability to evaluate future pay-offs of new crops or food products is crucial to reduce risk and uncertainty, which we have identified as a major obstacle to change in the agricultural sector. Responses to market changes include marketing and advertising skills, knowledge about current health and export legislations and basic knowledge in cost-benefit calculation. Basic management skills mostly involve the ability to set up a business plan and many micro-finance schemes now include training modules to improve the sustainability of small-scale business development (Fellows, P. 1998).

At the core of the analysis of skills is the debate on technological change. Responding to demand shifts, environmental and quality concerns require the adoption of new technologies

and methods. There is ample empirical evidence that better education of farmers leads to higher output as technologies and techniques are used more efficiently. The FAO estimates, for example, that a farmer in a least developed country with four years of elementary education is, on average, 8.7 percent more productive than one with no education at all (FAO 1997). There is also empirical evidence that the returns to education of farmers increase substantially as a country goes from traditional agriculture to modernizing, which itself becomes a continuing process. This is because new technologies become available and increasing productivity reduces the aggregate demand for agricultural labour (Huffman, W. 2001). This literature reflects the human capital approach of education and skills, where skills are necessary to spur agricultural growth by increasing productivity. Labour becomes available in other sectors and new employment and income opportunities are created.
Similarly, the new growth literature emphasises the importance of skill externalities for the innovation process of new technologies (see Bretschger, L. 1999 for overview of this literature). Confirming this link, Weir and Knight (2000), for example, found in a study on the adoption and diffusion of agricultural innovations in Ethiopia that educated farmers –due to education externalities- tend to innovate earlier than non-educated farmers and they are also better able to copy innovations than non-educated farmers (see also Bennell, P. 1999; Berman, E., Bound, J. and Machin, S. 1998).

Evolutionary approaches focus on the diffusion and application of new technologies, which recognise that the adaptation and use of technologies involve important learning costs and skill requirements, depending on the nature and complexity of technology. More complex technology requires better operating and maintenance skills. Moreover, some forms of technology (including, for example, management techniques or a specific form of labour organisation) cannot easily be transferred as they are tacit, i.e. internal to a firm or process and cannot be purchased on the market. The important role of FDI as a vehicle for technology transfer is increasingly recognised in this context. However, this approach requires the existence of minimum skills and capabilities prior to attracting FDI (see Lall, S. 1999; 2000; 2003 for extensive discussion of this literature).

The role of indigenous knowledge becomes increasingly important too, especially in the context of current debates on environmental sustainability. In many cases, farming methods and technologies are the result of local traditions and beliefs, which, over a very long time, have been adapted to local climatic conditions and local tastes. Often, these techniques and crop choices are better suited to local circumstances than techniques from abroad. Neglecting these local traditions might be one reason for the reluctance of local communities to change. Integrating local skills and knowledge into agricultural development strategies is a direct contributor to local development needs and thus can have a great influence on broader poverty dimensions. Participatory development approaches increasingly integrate local concerns (see for further discussion Reij, C. and Waters-Bayer, A. 2001).

Equally important are skills associated with financial challenges, notably the crucial necessity to obtain sufficient credit for investments. The creation of additional employment in the rural economy largely depends on the ability to set-up and run small businesses. Business skills and especially the ability to provide viable business plans and to carry out cost-benefit analyses are important to judge and prove the viability of investments. On the one hand, the ability to provide a sound business plan does not only enable small-scale entrepreneurs to gain access to credit at all, but it is also a means to reduce the entrepreneur's own risk and uncertainty.
With increasing size and commercialisation of the producer or processor, knowledge about financial markets and regulations become more important. On the large scale, business planning and the management of FDI are crucial. The theoretical background of these issues

is reflected by the agribusiness management literature dealing with cost-benefit analyses and resource base theory (French, C. E. 1989).

Specific skill sets are needed to deal with institutional changes and challenges in the agricultural sector. The deepening linkages between farm activities and the broader rural economy offer new business opportunities in a variety of areas, such as farm-input supply, maintenance and management services. All require a profound understanding of the market and the resulting business opportunities. Business management skills are crucial in this sense. With the increasing separation of peripheral activities (e.g. like maintenance and management) from core activities (production and processing), skills become more specialised and decentralised with individuals or firms. At the same time, relatively low skilled workers can carry out simple production/ processing tasks.

Institutional changes also affect the socio-cultural context in which they take place. In order to support successful rural development strategies, it is crucial to address these underlying socio-cultural relationships. As Huffman (2001) argues, individuals' education and training have important impacts on their occupational choice. There is evidence that more educated people have a higher mobility to move out of rural areas and that better educated workers remaining in farming are more likely to work part-time off-farm than less educated workers. This could be of significant importance to empower women in rural areas, as better education might help to open up new employment opportunities in the immediate off-farm sector (e.g. small scale food processing). Moreover, there is vast empirical evidence for the indirect effects of educating women, such as lower fertility rates and better health provision for children. Programmes to strengthen the role of women such as micro-credit schemes for women or training initiatives for women in small-scale food processing have been proven to be very successful in reducing gender inequalities and in empowering women in rural areas (for successful examples see Battcock, M. et al. 1998).

Addressing these different skill needs to support agroindustrialisation then links back to the poverty effects described in section two and summarised in table four above. As for the skills, many poverty impacts overlap.
Generally, poverty impacts can be divided into direct and indirect ones. For example, improving skills to react to market changes, by developing new niche products, better marketing techniques or business management skills can have a direct impact on income as they open up new employment and income sources in the farm and off-farm sector. At the same time, using new health standards in the production of food also has an indirect effect on the health standards for individuals and communities. Better production techniques leading to higher outputs do not only increase incomes but they also contribute to a better food security. Similarly, environmentally sustainable farming techniques help to preserve natural assets within a community.
Thus, the poverty impacts of better skills can be diverse, as they affect the different dimensions of poverty either directly or indirectly.

PART II Skill policies: current trends and future needs

1) Agricultural education and training: skills and target groups

The previous discussion revealed the importance of skill development for agriculture-led pro-poor development.
One major characteristic of agricultural education and training (AET) systems in developing countries is their high degree of diversity and fragmentation. This fragmentation is also due to different understandings of the meanings, functions and impacts of agricultural education and training, which have been promoted by international donors, NGOs and governments in a variety of ways.

The variety of understandings, however, makes it difficult to analyse skill strategies and policies. It is thus necessary to provide an overview of different approaches in AET in order to formulate policy recommendations. Current approaches in AET can be analysed from different perspectives, according to the objectives and target groups. This section will start with an overview of definitions and meanings of skills and AET.

In broad terms, skills incorporate the meaning of using knowledge/ capabilities to perform a practical (e.g. work-related) task. Education and training then is an instrument of transmitting this knowledge and capability. UNEVOC, the United Nations agency on vocational training, incorporated a technology centred understanding of education and training requirements for rural development. The purpose of AET is *'to prepare a competitive workforce in which workers are trained in technical skills to increase employer competitiveness as well as skills which foster flexible attitudes, horizontal decision making and technological adaptability'* (UNEVOC 1997, p. 6).
It is increasingly recognised that modern skill needs are not confined to narrow task, which require only a specific set of technological skills or knowledge. As the previous discussion revealed, skill needs for agricultural development are brought. The increasing diversification and complexity of production activities might lead to an increasing decentralisation of tasks, which require more specialised knowledge in key areas, like retail management or quality control. But these skill needs are also accompanied by new demands in personal and basic skills. In regard to pro-poor skills, Bennell (1999, p. 11) notes that *'training to overcome economic vulnerability embraces a much wider set of skills than just conventional technical and managerial competencies.'* Basic and personal skills and social competencies are crucial components of any skill strategy, too.

Similarly, the target group of skill strategies is brought, as there are various actors in agriculture. Traditionally, skill interventions focused on the farm sector and farmers, by providing new farming techniques mainly through extension work. With increasing agroindustrialisation, however, the rural economy changes and new actors emerge on various levels. This leads to a broadening of the target group that skill strategies have to address. Wallace (1997) offers a broad concept of agricultural education and training, providing for the leaning needs of:

- rural producers and all their household members;
- adults in the 'off-farm' sector who support primary production through e.g. provision of rural craft skills, small-scale enterprises and marketing services;
- professionals and sub-professionals who service the rural sector through research, extension, agricultural teaching, banking, cooperatives and NGO management;

- children in primary and secondary schools who learn either 'about' agriculture, or who are taught basic production skills through subjects such as agriculture, agricultural science, rural or environmental sciences;
- young people who undergo some form of vocational education for farming careers or off-farm employment

The variety in the target group for AET is likely to be reflected by a range of provision mechanisms. One possibility for classifying AET is to distinguish between the levels of provision. AET can take place in primary and secondary schools, in middle-level and technical/ vocational education and training (TVET), or through agricultural higher education. It is also possible to distinguish the nature of AET provision –be it in government/ public training centres or schools, by private providers, or which is the most likely case for poorer developing countries, in informal settings through on-farm training and informal networks.

2) An overview of the current state of agricultural education and training in developing countries

It is recognised that no single training system can equally fit the diversity of countries. Instead, education and training systems are always the product of socio-historic processes (Ashton, D. and Green, F. 1996). Education and training systems respond to a country's specific social and economic context and vary according to different stages of development. Training systems, however, are not static but adapt to changing realities and needs. Major internal and external trends influence the way education and training are provided. Even those transformations do not occur along a specific and linear path, but are heterogeneous in their nature.

Some general tendencies can be observed in developing countries nonetheless. Over a large range of countries, agricultural training and education is mainly concentrated within the higher education system, with a focus on agricultural research and extension. Lower levels of agricultural training in secondary schools or training colleges are much less articulated (FAO 1997). Among the reasons on the demand side is the fact that tertiary education is conceived of as providing better employment opportunities in the public sector, which traditionally absorbs a larger number of graduates in developing countries than the private sector would be able to absorb.

In many cases the higher valuation of tertiary education is also due to historic experiences under colonialism, where the majority of the white colonialists had received higher academic education. Many indigenous workers were trained to meet the colonialists' demand for low skilled labour. As a consequence, higher education was conceived of being the only way out of dependence, and many newly independent states promoted higher education at the expense of middle-level vocational training (Carnoy, M. 1974; Sifuna, D. N. 2001). Today, there is still a widespread perception that vocational training is worth less than higher education. Agriculture in particular receives less valuation across educational levels than other subjects. One reason for agriculture often being considered 'less worthy' is the perception that it represents a last option for those not good enough to enrol in other programs and that standards are thus lower and less valued (Kallaway, P. 2001; Wallace, I., Mantzou, K. and Taylor, P. 1996).This is also true for developed countries, as the case on Australia will demonstrate (see part III).

On the supply side, one important reason for a strong policy focus on the tertiary sector is that national and international interventions in the agricultural sector were largely dominated by

concerns over food security and the increase of productivity in agriculture. Experiences resulting from the Green Revolution in Asia have led other governments to imitate the largely research driven expansion of production by supporting research institutes and extension works of agricultural universities. It is those institutions that attracted the attention of school-leavers to tertiary courses in agriculture and related disciplines. Vocational and technical training was mainly confined to universities and colleges with a major emphasis on the provision of skilled workers for increasingly mechanised production methods in agriculture (e.g. machine and farm equipment maintenance). Today, the attention received by new approaches in biotechnology plays a similarly crucial role for the strong focus on tertiary education, research and extension.

Reviews of donors' lending activities in AET reflect this emphasis on tertiary education and research. As Maguire (2000) notes, 67 out of 135 World Bank higher education projects between 1963 and 1989 supported agricultural education. Willett (1998) noted in a World Bank review that the highest investments in AET between 1987-97 went into higher education ($108 million out of a total of $156 million). Similarly, DFID's natural resource database reveals that 1500 of 5000 natural resource projects have included an education component. Of those projects only 66 explicitly included an AET focus during the past 10 years (ibid).

With regard to the scarcity of financial resources, however, it is surprising that the supply of AET focuses so much on the tertiary sector and research. One important reason for this is, as Bennell (1999) notes, the difficulty of properly measuring the impacts of training programmes on the poor. Evaluation becomes even more difficult if training is combined with other services bundled as one package (e.g. credit provision, technical assistance, provision of tools, etc.). The difficulty of implementing training projects is also reflected by very low sustainability rates of donor projects. A review by the World Bank (1990) on 550 assisted educational projects revealed that only about half were sustainable in the long run. This observation also provides an explanation why, after the initial enthusiasm for technical training in the 1960s and 1970s, donors and governments thereafter preferred higher AET and research: because the direct benefits in terms of increases in output and food-security were much easier to assess (for discussion see Bennell, P. 1999; Kallaway, P. 2001).

Over the years, AET has been subject to different internal and external pressures of change. Important factors for change were the Structural Adjustment and Stabilisation programmes initiated by the international financial institutions (World Bank and IMF). One consequence of these programmes, which were used to stabilise balance of payment deficits and to carry out macro-economic reforms, was a considerable reduction of public services in many countries. As a consequence, AET systems came under increased financial pressure and graduates increasingly had to look for employment opportunities in the private sector. Due to the smaller absorption of the private sector, a higher education degree was no guarantee for employment anymore. Moreover, this demand shift also required skills to be more transferable and marketable. Pressures to adapt curricula on all levels of AET increased as a consequence.

In the 1990s, the number of non-state actors engaging in development work increased rapidly. As a consequence, greater attention was put on participatory approaches to rural development. This also led to the articulation of communities' and individual's formerly often unexpressed education and training requirements, the aforementioned Voices of the Poor project being one example reflecting their concerns. One particular issue that increasingly gained attention in this context is the specific role and needs of women in rural economic activities and the integration of local knowledge systems. Other issues introduced through outside intervention

were concerns with sustainability and demographic challenges. In addition, many projects and activities initiated by NGOs in rural areas either had a direct education/ training component or they indirectly led to new training demands. Examples are the microfinance schemes that target the rural poor and especially women to set up financially viable small-scale projects (e.g. food processing for rural markets). This stimulated demand for additional training in related areas, e.g. management and marketing training (Harper, M. 1998). Similarly, small-enterprise development projects led to new education and training demands in the rural economy. The rapid increase of training providers for computer and management courses in both urban and rural areas is one expression of this change currently taking place in a number of developing countries.
The advantage of NGO and community involvement in the provision of AET is their flexibility in addressing the needs of rural communities and especially the informal sector. These interventions, however, are limited in scope. Another problem is the sustainability of programmes. Without government support over the long-run, many projects will remain unsustainable. So far, formal AET provision in a large number of countries is not sufficient to meet the demands from within the poor. One reason for this limited provision of AET is a lack of financial resources, inadequate labour planning, weak institutions and institutional linkages in many countries.

The discussion highlights a major problem in the formulation and provision of AET strategies: the broader notions of poverty are more difficult to frame into policy strategies than would be the case for strategies focusing on output and economic growth variables only. As a consequence, however, there is a large discrepancy between the demands for AET services by the rural poor and the provision of AET as supported by governments and donors. It is in the light of this discrepancy that Bennell (1999) recognises a 'training crisis', which currently exists in many developing countries as the needs of the poor are seldom met.

The question that emerges then is: what are possible policy strategies for successful AET systems? What should and what can be done by governments and donors?

3) Policy strategies for AET in developing countries: what is needed?

One conclusion that can be drawn from the discussion above is that AET systems need to address the specific skill requirements of the poor in the context of internal and external change. A system can only be successful if it adapts to changes it is faced with. This means, however, that there cannot be one strategy for all countries at the same time. Instead, AET strategies need to respond to the specific country characteristics and the country's level of development. As was discussed above, skill requirements vary significantly with the level of agroindustrialisation. Skill strategies need to take into account these differences. The case studies in part III highlight in more detail these differences and the implications for skill strategies. There are, however, some general guidelines for policy strategies in AET development, which will be discussed below.

One crucial determinant for successful AET systems is cohesion. Evidence from East Asia has demonstrated that the training and education systems which tend to be more successful are integrated into the broader agricultural development strategy, and where linkages between the relevant institutions (government, training systems, local institutions and donors) are improved (APO 1999). In order to avoid the fragmentation of the AET system, it is necessary to clearly separate policy responsibility within key institutions (thus avoiding the overlapping of responsibility of several ministries) and to create and improve communication linkages

with all levels and actors involved in AET. This requires the building and strengthening of institutional capacities in rural areas, including the appropriate training of teachers and personnel, adaptation of curricula to changing requirements and development of policy objectives with regard to AET and rural development (see Maguire, C. J. 2000 for examples on successful institutional reform in AET).
These measures need to be integrated into a broader rural development strategy. As mentioned before, skill strategies are only one, although crucial, element for rural development. Other measures, especially on the meso- and macro-level (such as infrastructure measures, legal reforms and sufficient credit facilities), are important for the removal of barriers to rural development. Elements of both strategies need to be matched to each other in order to obtain successful development in rural areas.

The formulation of a coherent rural development strategy has to be based on the specific situation and needs of rural communities. Important instruments of policy planning in this regard are labour market studies, looking at the specific requirements and constraints that different sectors or the economy are faced with. More and more countries use labour market studies as a starting point for future policy strategies, but they require some minimum organisational capacities, resources and expertise. As such, this area represents a good intervention point for external assistance. Important elements in this context are participatory measures to map out skill requirements and possibilities of integrating local knowledge and technologies. In this way, skill strategies can be linked to these specific requirements. A number of these initiatives have been quite successful at the rural level, mainly through the work of NGOs in co-operation with local organisations. More support is needed to expand such measures on a broader scale.

Finally, the availability of financial resources is one –if not the- crucial factor in AET policy planning. For one common characteristic in developing countries is the scarcity of financial resources. Successful AET approaches require the concentration and channelling of scarce resources towards sustainable projects. New pathways to increased financial sustainability include the establishment of partnerships between different training providers and also between the public and private sector, where different actors should focus on key areas of AET.
Increased financial sustainability also requires renewed efforts by donors to target aid more efficiently and to link projects better with each other and to the overall AET strategy.

On the whole, what is needed is a comprehensive 'policy vision' towards AET that sets out need-based but realistic targets. Strong political support for the objectives of AET and rural development in general are crucial for this task. Often, this involves the need to change political and social values not only within institutions but also for society as a whole. Certainly, this task is one of the most difficult ones and –if feasible at all- will require effort and time.

Many of the proposed strategies already exist and are implemented in a number of developing countries, not least due to the large engagement of NGOs and other informal actors in rural development. Successful interventions include, for example, the combination of training programmes with small scale employment in the off-farm sector (microfinance schemes), which are tailored to the specific needs of rural communities. Due to this 'closeness' to local conditions, they are also able to address issues like the empowerment of women, the recognition of environmental concerns and the integration of local knowledge. One central question then is whether these micro schemes can be transplanted on a higher, broader level of AET development.

One concern is that the more a country moves up the agroindustrialisation scale, the more complex the policy environment and the planning requirements for AET get. Only those countries with strong political institutions and capacities are likely to be able to address the challenges for AET in a fast changing economic environment.

A large number of these issues will be revisited when looking at evidence from different countries in the last part. It will be shown that AET strategies and their effectiveness largely depend on the level of agroindustrialisation and on the way they are integrated in a larger framework of policies addressing agricultural development in general.

PART III Case Studies

1) Overview of cases

This last part highlights several of the aspects discussed so far with the help of selected case studies from the literature. These studies demonstrate a variety of approaches used by different countries to address the specific skill requirements of the agricultural sector and the difficulties and problems that emerge. Literature has been selected from Africa, India and Australia, because these regions roughly represent the range of agricultural development stages that occur under agroindustrialisation. As it is the case for Africa and India, the selected regions are very diverse and different countries/ states within Africa and India have had different experiences with agroindustrialisation and AET systems. As it is impossible to take account of this diversity in the context of this paper, we rather aim at selectively highlighting specific issues identified in the discussion above.

The first section will discuss evidence from Africa. Many countries in sub-Saharan Africa are still at the beginning of the agroindustrialisation process. Although African countries are also exposed to the influences of globalisation and the opening of markets, agricultural production is still largely geared towards local markets. Farming units are often small and worked on by families and communities. In these circumstances, skill strategies have to focus on the adaptation of new farming techniques and the support of small scale, off-farm employment creation.
Major obstacles to effective AET systems are the high degree of fragmentation of AET, a lack of financial and human resources and often weak private sectors unable to absorb large numbers of AET graduates.

India, by comparison, already moved to a higher level of agroindustrialisation. Although large numbers of the rural poor are engaged in small scale family or communal farming, India has a strong off-farm sector in food processing with increasing international involvement. Here, skill requirements are already more diverse than in many African countries, as global competitive pressures become more important (e.g. safety and quality standards). The linkages between the farm and off-farm sector are also under transition, leading to specific skill demands in the area of management and marketing.
Nonetheless, there are still constraints in rural areas, notably concerning the access to credit and the provision of training as needed by rural communities.

Australia, although not a developing country, was selected because it well demonstrates a number of issues that countries and AET systems face when moving towards the upper end of agroindustrialisation. Australia is fully integrated into the global market and foreign competition exercises a large pressure on the domestic agricultural sector and food processing

industry. There is thus continuous pressure to adapt to external changes, with quite important implications for the skill system. The AET system has to be highly flexible and responsive to these pressures. At the same time, higher levels of skills and education lead to a variety of new challenges in rural areas. The most important concern is the move of labour and skilled persons from the rural areas to urban regions. Agriculture, being considered a 'dying' sector, suffers under an increasing pace of de-skilling, which, in this case, is due to the existence of alternative employment opportunities in other sectors of the highly developed economy.

2) Agricultural education and training in Africa

2.1) Poverty and agriculture in Africa: an overview

Compared to other regions, the developmental levels of many African states are still far behind. Poverty is widespread, as nearly half of the total African population lives on less than a dollar per day, 80% of them living in rural areas. In 21 countries surveyed in the 1990s, more than half (56%) of the rural population lived below the national poverty lines. The average income of the rural poor is just $163 a year, which is about half the average regional poverty line for rural areas (World Bank 2000a). The developments varied in different countries. Whereas, for example, consumption poverty increased in Nigeria and Zimbabwe, Ethiopia, Mauritania and Uganda have experienced improvements in their economic performance.

Other dimensions of poverty are severe, too. Child mortality is still very high, with infant mortality being close to 10 percent. In many poorer African countries, mortality rates exceed 200 per 1,000 (compared to 53 in East Asia, 9 in high-income countries). Similarly, the persistence of AIDS is the highest in the world in Africa, and even primary enrolments dropped between 1980 and 1993 from 80 to 72 percent (World Bank 2000a). In terms of human development, the majority of African countries are situated in the lower third of the international ranking of human development indicators (according to UNDP 2002).

Looking at the development of agriculture during the last 30 years, growth in production has been disappointing. Sub-Saharan Africa is the only region where between 1965 and 1998, agricultural growth was lower than the overall population growth.

Agricultural Indicators

Agriculture value added (% of GDP), (Sub-Saharan Africa)	
1970	21
1998	17
Labour force in agriculture (% of total labour force), Africa	
1995	70
Agricultural production per capita index (1961-64=100), Africa	
1965-69	100
1975-79	92
1985-89	84
1995-98	87
Share of agroindustries in total manufactured value added (% of MVA), Africa	
1990	59.1
1995	61.3

Sources: (Kydd, J. et al. 2001; UNIDO 1997; World Bank 2000b),

The agricultural indicators demonstrate that between 1965 and 1998, the per capita production index fell below its 1961-64 level, as population growth was higher than growth in output. The share of agriculture value-added of GDP was 17% in 1995 and 70% of the labour force was working in agriculture. Agriculture is also the most important industry in Africa. In 1995, 61.3% of manufacture value-added (MVA) was obtained from agriculture. Food production constitutes by far the largest branch in MVA (with a

continental share of 25% of MVA in 1995), followed by textiles (9%), beverages (8.6%), clothing (4%), and other agro-related products (UNIDO 1997). There is some variation in the share of agro-related MVA in different countries. In Burundi, for example, the share was 94% in 1995, whereas in Gambia, the share was 53%. The average size of agro-related products in total MVA is about 80%, thus agriculture is one of the most important economic activities in Africa. Accordingly, the majority of incomes are generated from agricultural activities, and incomes obtained from off-farm activities are important, too. Some studies reveal average non- farm income shares of about 42% in Africa (45% in East and Southern Africa, 36% in West Africa) (Reardon, T. 1998). Bryceson (1999) finds even higher non-farm income shares of 55 to 80%. These numbers indicate that the rural economy plays an important role for poverty-reduction. As a consequence, agricultural education and training initiatives need to address the particular needs and problems of the rural off-farm economy, in order to achieve successful poverty reduction.

2.2) Agricultural education and training in Africa

Historically, rural development was high on the agenda of postcolonial policymakers in Africa, as it was identified with increased economic growth, higher agricultural output and with services (education, health) to the rural communities. Accordingly, education and training were regarded as important instruments in the development of rural areas, although there was a pronounced shift towards science and technical education in the wake of the Addis Ababa conference on African Education in 1961. Only a small number of countries regarded agricultural education as a priority for the upgrading of the national education systems. As a consequence, the majority of projects in the area of agricultural education and training took place in the higher education sector and in agricultural research.

In the 1950s and 1960s, major international donors have supported the establishment of universities and research centres for agriculture. Largely modelled on existing patterns in industrialised countries, institutions and organisational structures were transmitted to a number of African countries. One example of this donor involvement was the attempt by USAID to establish agricultural universities in Nigeria that were modelled upon the US Land-Grant model (Wallace, I., Mantzou, K. and Taylor, P. 1996).
It proved to be difficult, to implement institutional models from abroad, as the socio-cultural and economic context were quite different in Africa from those in the US. As a consequence, many projects in higher and vocational education lacked long-term sustainability. The difficulty of obtaining convincing outcomes also led to a decline in the interest and financial contributions towards vocational and higher education projects for agriculture. Inspired by achievements of the Green Revolution in Asia, the focus shifted towards research and extension services in agriculture.

Governments pursued different strategies to provide AET, depending largely on the general economic situation and the role of agriculture. Confronted with the problem of high unemployment rates among the youth, high dropout rates in primary and secondary education, a large number of governments tried to 'vocationalise' curricula in basic education. In Kenya, for example, agriculture was introduced into the primary school curriculum to guide students towards vocational education. In addition, around 650 youth polytechnics, technical training institutes, national polytechnics and several vocational training institutes provide formal agricultural education on different levels (Kerre, B. W. 1997).

One of the major problems that Wallace et al. (1996)observed in their review on AET systems in Africa is the high fragmentation of AET provision. Several different formal and informal

institutions exist to provide AET for varying target groups. In many countries, however, these institutions are under the control of different ministries and there is no or only little co-operation and communication between the different actors involved. As a consequence, there is no coherent training provision and often, the actual skill needs of the rural communities are not met. This is also reflected in the lack of labour market studies to elaborate the specific skill requirements within agriculture. These skills mostly involve low-level skills in farming techniques, processing methods using locally available technology and basic business skills which are needed to obtain much needed finance (microcredit).
National curricula, however, are often geared towards public sector employment at a time when public employment opportunities decline. They fail to provide for the specific skill needs and employment opportunities in the private farming and processing sector. One reason for this mismatch is a lack of political support and 'misunderstandings' in the policy discourse on agriculture-led development. In an evaluation report for DFID, Harris et al. (1995) cite the example of the Middle-Level Agricultural Education Project in Nigeria, which primarily focused on the training needs of a small number of modern, commercial farms, without addressing the specific needs of the large number of subsistence farmers in Nigeria. One reason for this was that the responsible government officials equated only the modern sector with agriculture and did not perceive the particular problems of subsistence farmers.

This lack of official support to address the needs of poor communities gave rise to a large number of training providers in the informal sector, either through NGOs, private training providers, or through informal farmer networks. These schemes directly target the specific needs of rural communities in the farm and off-farm sector, by providing business training, training for food processing or marketing skills. Similarly, training schemes to support self-employment are increasingly established within formal training programmes.
These schemes, however, are limited to the local level and there are still few efforts on a larger scale (e.g. through changing curricula in AET).

One particular concern for AET is the role of women in agriculture. Women's share in agricultural production and processing is very high in Africa. The UN (1998) estimates that 70% of African women are responsible for food production and nearly all food processing activities are carried out by women. The majority of off-farm generated income comes from resource-based activities (e.g. beer brewing, milling, oil extraction and food processing) and largely takes place in individual enterprises (self-employed family members). Important constraints on the rural level are insufficient access to financial sources, weak market infrastructure, and absence of marketing opportunities. Many food-processing activities are geared towards the low-income consumption of the rural population. For training to be successful in generating new income opportunities and jobs in the off-farm sector, AET needs to be linked to other interventions, such as microcredit schemes.

In addition, the issue of sustainability became very important within the agricultural development debate for Africa. Compared to other regions (Asia and Latin America), production increases in Africa were mainly due to an increase in the cultivated area. Kydd et. al. (2001) estimate that 70% of Sub-Saharan Africa's increases in cereal production are due to area increases, with, at the same time, a very low increase of fertiliser use. Due to the climatic conditions in many countries north and south of the tropical zone, production intensification through land increases need to be sustainable in the long run. Given the parallel population pressures that still exist in many parts, this issue is of great importance for the ecological and economic survival of Africa in the long run. Attempts to integrate sustainability issues outside extension work, visit schemes and tertiary education and research are still few, and more needs to be done on lower levels of education as well.

Another problem which AET generally faces in Africa, is the negative perception of middle-level agricultural education. One reason for this is the long-time emphasis of governments and donors on tertiary AET provision. More needs to be done in creating awareness among those already in primary and secondary education to offer alternative routes for employment through lower level AET and better involvement of the private sector.

3) Agricultural education and training in India

3.1) Poverty and agriculture in India: an overview

India is a large country, which is characterised by spatially uneven economic and social development. Poverty is still a widespread problem, especially in rural areas. More than 44% of the population has to live with less than a dollar a day, 2/3 of whom are situated in rural areas. With a human development index of 0.577, India ranks 124 out of 173 countries and in terms of human development, India shares the same low ranks as many African states (UNDP 2002). Nearly half of the children under the age of five are underweight, indicating the persistent problem of poverty in basic needs (food).
More than half (55.3%) of the population is literate, which compared to literacy rates in 1951 (16.7%) represents an important improvement, however. The Indian government spends about 11% of its total budget (which is about to 3% of GDP) on education. Net primary enrolment rates amount to 83% for males and 71% for females, indicating that girls still face disadvantages in accessing education.

Agricultural Indicators

Agriculture value added (% of GDP)	
1970	45
2000	25
Labour force in agriculture (% of total labour force)	
1970	71
1998	64
Agricultural growth rate (annual % increase in output)	
1981-1990	3.49
1991-2000	2.40
Agro-based industries (as % share of all industries, 1996/97)	
No. of agro-based food industries	16.69
Net value added (agro-based food industries)	5.85
No. of agro-based non-food industries	29.09
Net value added (agro-based non-food industries)	15.74

Source: (Deasi, M. 2002; Gandhi, V., Kumar, G. and Marsh, R. 2001; World Bank 2000b)

The data on agriculture indicates that agriculture is an important economic sector. In 2000, it contributed a quarter to the country's GDP. In 1998, nearly 2/3 of the population worked in agriculture, which is only a moderate decrease compared to 1970 (71%).
Agricultural growth rates were much higher throughout the 1980s than in the 1990s, but still positive, which is also one result of increased farm intensification.
The importance of the agricultural sector is also reflected in the size of agro-based industries. More than 45% of all industries are agro-based, with a value added of nearly 22%. Food processing industries account for 16.69% of all industries in India.

Traditionally, Indian agriculture is largely based on rural villages, as it draws most of its inputs from farms and village industries. Consequently, India's development efforts focus on strengthening the village economy as an instrument to increase food security and to reduce rural poverty by creating new employment opportunities. The Second Development Plan

(covering the period 1956-61) already stated the aim of creating *'immediate and permanent employment on a large scale at a relatively small capital cost, meet a substantial part of the increased demand for consumer goods and simple producers' goods, facilitate mobilization of resources of capital and skills which might otherwise remain inadequately utilized […]. With improvements in techniques and organization, these industries offer possibilities of growing into efficient and progressive decentralized sectors of the economy, providing opportunities of work and income all over the country.'* (Goyal, S. K. 1994)

In the 1980s, increased attention was paid to the promotion of agro-industries in India. Among the main arguments was that in spite of high poverty in India, there is an upper middle class of around 80-100 million with high demands for processed food products. Also, it was judged that India had a competitive advantage for processed foods on the largely unexploited international market and that processed food would contribute more value-added to the economy than unprocessed raw materials. This new interest for agro-based industries was accompanied by the gradual and controlled opening of India's huge internal market for foreign food processors, mainly with the aim of establishing joint-ventures and linkages leading to spin-offs for domestic firms.

India's agroindustrialisation is already more advanced than in many African countries. As a consequence, skill requirements are more diverse and also have to take into account the challenges brought about by the gradual opening of markets.

3.2) Agricultural education and training in India

All of India's development plans emphasise the importance of improving education and training schemes to boost agricultural output. However, detailed strategies to operationalise these education and training schemes were often not developed subsequently, especially comprehensive strategies that directly target the skill needs of rural communities. The general result was poor progress of village industries The Third Five Year Plan already (1961 to 1966) summarised the major problems as following: '*Rural artisans are usually dispersed in a large number of scattered villages and this, combined with their low standard of literacy and poor economic condition, is a considerable impediment to rapid implementation of development programmes. Among other factors responsible for the slow progress of village industries' programmes have been the general lack of previous experience in regard to the development of these industries, lack of trained and qualified staff, location of production centres in unsuitable places, lack of adequate funds and organization for procurement of raw materials in bulk and failure to introduce more efficient techniques of production'* (Goyal, S. K. 1994).

The main source of agricultural training is by and large the agricultural extension service, which was introduced in 1952 with the Community Development and National Extension Service. The Indian Council of Agricultural Research (ICAR) and the State agricultural universities (SAUs), which offered training programmes for farmers and officials, developed a number of initiatives. In the 1980s, most States introduced the World Bank funded Training and Visit schemes (T&V), which aim at transferring knowledge directly to farmers. A large part of extension services is carried out by input agencies, especially fertiliser companies.
Agricultural research has played a crucial role in the Green Revolution in the 1960s, where new seed varieties led to large increases in output. The yield of food grain crops per hectare doubled from 705 kg/ha in 1961/62 to about 1,450kg/ha in 1998 (APO 1999). These improvements, however, were only obtained in irrigated areas, leaving the 70% of India's rain fed and dry land areas unexploited.

The main characteristic of the extension system is that it is integrated into the tertiary education system. In 1996, there were about 90 educational institutions for agriculture and forestry (and a total of 172 constituent colleges in 1999) and the total number of graduates in agricultural science was 216,500 in 1998 (Government of India 2002). Although these agricultural institutions offer a broad range of courses in agricultural science and technology, animal husbandry and home science, admission is limited to a small number of students (annually, 15,300 students are admitted as undergraduates). This system is relevant for the improvement of agricultural research, but it fails to address the needs of the vast majority of the poor in rural areas, who often need basic skills for improved farming methods or job opportunities in the rural off-farm sector.
This problem is also sustained by the lack of adequate provision of agricultural education in secondary education. Agriculture as a course is not taught in primary and middle levels (exceptions are Uttar Pradesh and Rajasthan State where agriculture is taught at the 10+2 stage in High School). Due to the persistent problem of school dropouts, differences in educational standards (as education is under State responsibility) and high illiteracy rates among older farmers, the government has opened polytechniques with a large number of village extension centres throughout the country.

In many areas where village extension centres have been established, skill development measures were not accompanied by policies to address the broader challenges of rural development such as access to credit, lack of adequate infrastructure and persistent discrimination of women and lower castes. As a consequence, development is impaired.
Simmons and Supri (1999) provide detailed evidence of village industries in Punjab, which already experienced large advances in agriculture. In Punjab, rural development is impaired by what the authors call a catch 22 situation: on the one hand, access to formal credit requires that applicants possess sufficient business skills and, as a consequence, banks only disburse credits, if applicants have a formal qualification. At the same time, however, access to formal training is very limited. There are no lifelong learning programmes in place in Punjab and access to training institutes is limited for those aged between 18 and 25. In addition, the courses offered are not geared towards local needs (especially lack of business training). A large number of young people entered informal apprenticeship schemes, which were traditionally offered in occupations that had undergone little technical change. As a consequence, skills acquisition was confined to narrow and specific tasks, involving low levels of technology and technology transfer. However, this was often the only possibility for young people to obtain the skills necessary to open up their own business after completion of the apprenticeship. In addition, discrimination against women and families from lower castes, as well as persistent corruption in banks and community administration were identified as important obstacles to rural development.

Insufficient training is also one of the major problems affecting food processors. A study for McKinsey (DeBoer, K. and Pandey, A. 1997) on the potential of the Indian food processing industry in the context of globalisation identified the lack of skills as a major reason for Indian firms to loose out against foreign competitors. One of the problems is the lack of knowledge about international food security and health standards and a lack of appropriate technology to address these requirements successfully.

The current changes brought about by globalisation that affect the agricultural and food processing sector in India also have important implications on women's employment. In this context, skill levels are crucial determinants of women's empowerment. Differences in religion, social norms and land availability determine the involvement of women in agriculture. In India, women wage workers generally predominate in the South and East and

women cultivators predominate in most of the Northern and Western States (see White, S. 1999 for details). Demand for female wage labourers has increased with the introduction of modern agricultural technologies. Women with low levels of education are likely to work on traditional and low paying work. Female labourers working in food processing industries are likely to be displaced first if new technologies are introduced which require higher levels of skills. Low incomes, the lack of access to credit for women and to alternative training schemes often imply that they are locked in socially low status work with little opportunity to open own businesses.

Since the 1980s and increasingly in the 1990s, the provision of skills training tailored to local needs, and especially those of women, are provided by a number of NGOs and through aid funded projects. The majority of training approaches focus on rural community needs and on those of women in particular. Many training schemes are comprehensive as they include not only core skills to e.g. produce local food products, but they also address peripheral skills, such as setting up a business plan, obtaining necessary information on market opportunities (e.g. how to obtain credit, equipment and how to comply with health measures), marketing and management skills. These approaches try to address the existing institutional and administrative problems in rural communities directly.

4) Agricultural education and training in Australia

4.1.) The agricultural sector in Australia: an overview

Australia, which is an OECD member, has a highly developed agricultural sector. Compared to India or other developing countries in Africa, agroindustrialisation has fundamentally transformed the agricultural sector, as the modern value-added food sector of food processing is far more important today than the production of traditional agricultural produce. The processed food industry is Australia's largest manufacturing industry and the country is a major exporter of processed food products. As Australia is already at a high stage of agroindustrialisation, it's agricultural and food industries are also far more exposed to the influences and pressures of a globalising economy in which they have to compete with other developed and emerging countries. Accordingly, concerns about skills development in Australia's agro-industries are closely linked to these challenges.

Agricultural Indicators

Agriculture value added (as % of GDP)	
1970	6
2000	2
Labour force in agriculture (as % of total labour force)	
1970	8
1998	6
Average annual growth rate (%) of agricultural output	
1980-90	3.3
1990-98	1.1
Agro-based industries	
Proportion of food processing industry (as % of total manufacturing turnover, 2000-2001)	21.7
Food manufacturing value added (as % of GDP, 2000)	2.4
Labour force in food processing (as % of total, 2002)	1.74

Source:(Government of Australia 2002; World Bank 2000b)

As a developed country, Australia does not experience severe poverty as developing countries. Nonetheless, it represents an interesting case as it allows obtaining more detailed insights of skill requirements and delivery patterns at the upper end of the agroindustrialisation process. These insights are also relevant for poverty strategy for developing countries, as they demonstrate that in order not to be locked into a low level of agricultural development, it is crucial to integrate AET strategies into the wider rural and industrial development strategy.

The data indicates that

Australia's agricultural sector is relatively small (contributing 2% to GDP in 2000).
Accordingly, the share of labour employed in agriculture and the food processing industry is relatively small (6% in 1998), too.
The processed food industry, however, is Australia's largest manufacturing industry (accounting for 21.7% of all turnovers in manufacturing) although it contributes only 2.4% to GDP. The whole of Australia's food industry (including agriculture, food manufacturing, wholesale and, retail trade in food products, cafes and restaurants) accounts for 11% of GDP. The processed food industry is one of only two Australian manufacturing exporters (besides metal products) that are net exporters (in 2000/01, food products with a value of $16.3 billion were exported and $4.3 billion imported). Australia's share in world trade of food products is about 3% (Government of Australia 2002).

4.2) Agricultural education and training in Australia

Australia has a very diverse and complex education system with a strong VET sector. By international standards, Australia has very high enrolment ratios: in 1997, 80% of the relevant age group enrolled in tertiary education and 12% of the working aged population (i.e. around 1.5 million people) participate in any form of vocational or work-based training (for an overview of the Australian VET system see NCVER 2000).
One reason for high participation rates in VET is the high relevance of its content for employees and employers in Australia. Generally, training policies are formulated in close co-operation with all major stakeholders involved. One of the characteristic features of the Australian VET system is its diverse and comprehensive coverage, from short programmes to full degree programmes over a longer period and across a range of disciplines.
In addition, Australia has developed and implemented a competency-based training system, which shifts the focus away from curriculum and standard (time) modules to only assessing the competencies required for a specific trade. This increases the flexibility of training delivery considerably. Training is provided by a number of state (including agricultural colleges) and private training providers that are accredited with the training authority (to receive public funds). Training standards are formulated within so-called Training Packages that exist for all major occupations and trades.

Although Australia's VET system is highly successful in attracting and training large numbers of people, there are still major challenges and obstacles within agroindustries.
One major concern with rural agroindustries in Australia is underinvestment in training and a generally low level of qualification within this sector. A report commissioned by the Department of Education, Training and Youth Affairs (Rural Industry Working Group 2001) details evidence that the low qualification profile in Australia's rural industries inhibits the adoption of new technologies, which adversely affects productivity and profit. Only 20% of the agricultural workforce has skilled vocational or higher level qualification (compared to nearly 40% of the general workforce), which is also less than the qualification level of the agricultural workforce in other developed countries (US, Europe).
The survey also demonstrates that training investments can yield high returns for firms and small businesses, especially when training focuses on specific business problems and when it addresses the adoption of new technologies.

However, rural industries experience important obstacles that inhibit larger investments in training. One major problem is that smaller farms and businesses, which constitute the majority of rural industries, are unable to capture the long-term benefits of training investments, as they are unable (due to small profitability margins) to employ workers continuously or on long-term contracts. This indicates that the current provision of training

for rural industries is not yet flexible enough, a fact, which is also supported by the observation that 80% of rural businesses are involved in informal training measures (including seminars or 'field days') (Kilpatrick, S. 1997).

A second problem it that although VET in general is valued by young people, farming, by contrast, has quite a negative image in the public perception, and agriculture is often regarded as 'irrelevant.' This observation is also supported by a persistent labour migration of 15-24 years old from rural areas into near-metropolitan and coastal areas. Reasons are higher wages in the off-farm sector and a lack of knowledge about training possibilities and career paths in rural agroindustries. As a consequence, today nearly 50% of the labour force in rural agroindustries are older than 45 years (NCVER 1998). This, however, led to perceived skill shortages (i.e. inability to find appropriately skilled workers for a specific occupation), in a number of industries. For example, many viticulture businesses stated the difficulty of finding suitably qualified personnel for middle level management positions with up-to date skills in quality management and export legislation (Rural Industry Working Group 2001). The majority of businesses also experience skill gaps (i.e. need to upskill the existing workforce), especially in relation to the usage of new technologies.

Similar problems are also experienced within the food processing industry, especially those with a high export orientation. One training expert commented that *'unlike many of our trading partners, Australia has failed to sufficiently develop its AgriFood industries by adding value to commodities through processing and ingredient extraction. This is largely due to a lack of skilled people and a fragmented production and processing sector' (*Britz, M. 2001*).*
The perceived lack of skills range from skills needed to address new technologies and product development for new markets, skills for quality assurance to management skills related to labour management and work ethics within processing industries.

The reasons for such skills shortages are similar to those found in the rural agroindustry sector. According to a skills survey on the food industry in Victoria, the rate of students enrolling in the Food Technology VET course is currently 0.08% of all VET in schools uptake (ACIRRT 2002). Low wages, changing working shifts and low safety measures are one reason for apprenticeship retention rates that are way below industry standard. Changes in production technologies, especially the shift towards line production with lean staffing levels, have affected the quality of training within processing plants.

Some entrepreneurs hint at existing barriers between off-the job ('theory') training and application of that knowledge on the job. An enterprise survey on 306 firms, including 103 in-depth interviews with CEOs from food processing enterprises in Australia reveals that work ethics and labour management issues are important determinants of the firms export competitiveness (International Strategic Analysis Team 2000).
Managers who have gained experience outside Australia, especially those who have worked in Asian food industries, mention that the existing work ethics within Australian firms often hampers productivity improvements. According to one CEO (Ibid, p.30):

'*One problem is motivating staff: the work ethic. We have no serious industrial relation problems. We take pains to recognise the professionalism of our people and to help them to understand the scope and seriousness of the challenges ahead. One issue is how defensive they tend to be. The west has a 'culture of guilt' while Asia has a culture of 'face.' I am trying to teach our people to consider it a privilege when they are audited and problems are identified. I say 'The problem is not the problem –not admitting, raising and tackling the problem is the problem.'*

Globalisation thus does not only affect skills and skill demand, but it also puts pressure on the very way, skills are 'managed' within firms. Labour relations are increasingly altered, as they have to respond to these new competitive challenges by providing more flexibility and adaptability. Not only new technology but also new management techniques become important determinants for firms' competitiveness.

Conclusion

Poverty eradication is the mantra of today's donor initiatives and the ambitious aim is to halve the number of the poor living on less than a dollar per day by the year 2015. Poverty, however, manifests itself in a number of ways, requiring broad approaches to address poverty. Given the fact that three out of every four people in the developing world live in rural areas and directly or indirectly depend on agriculture for their livelihoods, makes agriculture the primary focus for any poverty reduction strategy. Agroindustrialisation offers many opportunities for employment and thus income creation in the farm and off-farm sectors, leads to increased food security and promotes general economic development. With increasing agroindustrialisation, new challenges appear to which policymakers have to react. Globalisation poses the most important factor of change, leading to the increasing involvement of foreign firms, changes in production activities and labour organisation.

The development of appropriate skills is crucial for agroindustrialisation to unlock the positive effects and to react to the challenges it faces. Different skills are needed at different stages of agroindustrialisation. At lower levels of agricultural development, these skill needs are largely concentrated on farming techniques and skills to run small businesses in the immediate off-farm sector (e.g. small scale food processing). The more a country's agricultural sector is exposed to the influences of globalisation, the more diversified and complex the skill requirements become.

The problems that AET systems across the world are facing are diverse. One observation emerging form the case studies is that during the agricultural transformation, the reason for skill deficiencies in the agricultural sector seem to shift from supply side problems to demand side problems. In India and many African countries, the problem is rather a supply problem, as the existing facilities do not appropriately address the skill requirements of the rural poor. In Australia, the problem is rather a demand problem, as occupations in agroindustries have a poor valuation compared to jobs in off-farm sectors. This shift can be observed with the increasing development of a country's education sector. Better education and training allows better life-choices in the off-farm sector. Demand problems for AET can be observed in developing countries, too, but to a lesser extent, as alternative employment opportunities are not yet as wide spread as in developed countries.

Moving towards greater market integration also puts important pressures on employees in the food industry and the AET system. The reason is that in order to benefit from a larger market size in the long run, the quality of labour and technology need to be close to the top competitors on the global market. Otherwise, there is the danger that unqualified labour will be locked into low skilled jobs that are directly linked to the usage of new production techniques. This danger is especially articulated in the case of women, who are the most likely to perform low skill jobs in poor countries. In the long run, sustainable skill development strategies must be able to offer skills that can be used in a broad area of employment opportunities. Globalisation implies rapid change in technologies, markets, products and, as a consequence, skills. Without the ability to adapt skills constantly, countries are likely to loose

out against their competitors, as the current discussion in Australia reveals. In many developing countries, however, even the basic skill needs in rural areas are insufficiently met.

In both cases, education and training are not only a matter of supply and demand, but the development of skills in agroindustries is embedded in the broader socio-economic and institutional 'web'. Market failures exist in all areas, although to a different extent. In Australia, constraints of the rural labour market (with its emphasis on rather short-term labour contracts) lead to consistent under-investment in training. In developing countries in Africa and India, by comparison, distortions of factor markets (especially credit markets) and low institutional, human resource and financial capacity impair agricultural development.

The lesson to be drawn from these observations is that agriculture-led pro poor development depends on a number of policy interventions in the AET sector, and also in form of policies to remedy factor market insufficiencies. Similarly, policies are needed to address the challenges and negative effects occurring during agroindustrialistaion (e.g. the effects on women, or effects on the environmental sustainability of production activities). In terms of figure 1 at the beginning of this paper, the different policies and instruments need to be integrated into a coherent strategy.

Agricultural education and training systems play a central role in such a strategy and the requirements they have to meet are huge, indeed. The evidence suggests, however, that in many developing countries, AET systems are far from performing the role they should do to promote agriculture-led poverty reduction. One reason is that AET systems are confronted with diverse objectives. This is also expressed in the high fragmentation of AET provision, as shared responsibilities reflect different (policy) concerns.
The performance of donors in this area is poor. Although the important role of agriculture is generally recognised for successful poverty reduction, very little is done for AET development, especially for middle-level AET. The main focus of education sector strategies is on primary education and tertiary level research and extension programmes. One reason for the neglect of middle-level AET and TVET is the difficulty of measuring the pro-poor impacts of training initiatives, whereas, in contrast, research and extension programmes are related to observable outcomes (e.g. productivity increases).

There are, however, a number of successful programmes that combine training interventions with broader rural development strategies. Successful approaches include microfinance schemes and community training centres, which are largely managed by NGOs. These strategies are generally limited to local areas. The current largely promoted poverty reduction strategy papers that put such a great emphasis on participatory development approaches would represent an instrument to formulate better the particular skill needs of rural communities. Combining these efforts into a broader rural development strategy might help to overcome some of the major obstacles that impair agriculture-led development.
Such a vision requires not only political will to reform, but also external support by donors to build and upgrade existing institutional and human capacities.
Certainly, the most difficult task is to change existing perceptions and practices for agriculture-led development. Therefore, a better understanding of how these changes might be implemented successfully is urgently required.

The aim of this paper was to map the major issues surrounding skill needs and policies necessary for agriculture-led pro poor development. The issues at stake are complex and more research needs to be done in terms of identifying successful strategies in different contexts

and how these can be adapted. So far, current policy initiatives in agriculture-led development and AET are far from exploiting their full potential.

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