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Innovation for Agricultural Training and Education



The Role of Agricultural Technical and Vocational Education and Training in Developing Countries:

A Review of Literature, Issues and Recommendations for Action

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This document was written as part of a series of InnovATE thematic studies. These research papers examine a particular AET system, cross-cutting theme, model, or technique and offer an analysis of the subject in question. These studies often highlight AET innovations in good practices. Case studies examine how agricultural education and training intersects with other development issues which are important to AET capacity building. The purpose of this series is to stimulate discussion on AET and share constraints to and examples of strategies for AET capacity development. We hope that you will share your comments and feedback with us.

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Executive summary

Agricultural technical and vocational education and training (ATVET) programs and institutions have played a consistent if limited role in approaches to agricultural development and economic growth in developing countries over the past 50 years. Vocational programs can be secondary or post-secondary in nature, and can focus on direct training for producers or training for individuals who support farmers and contribute to the post-production process. With the current focus on strengthening agricultural value chains and investing in workforce development, ATVET systems are being re-evaluated and assessed for their relevance in a changing agricultural and development setting. Increased access to primary and secondary education, as well as connections to urbanizing populations and international markets, has shifted the employment demands in many sectors of agricultural production and post-production. In order to build upon these changing agricultural realities, national governments, private enterprise and international donors must take stock of the current state of ATVET systems and approaches, and seek lessons and insights that are most appropriate to individual settings.

This paper provides an introduction to current trends in technical and vocational education (TVET) at the global scale and situates ATVET within this broader context. A review of the literature on agricultural education in developing countries provides history and context of current trends in various aspects of agricultural training, with a particular emphasis on more recent shifts toward value chain and workforce development frameworks. Based on both conceptual and case study literature, a strengths-weaknesses-opportunities-threats (SWOT) analysis is then offered to help focus efforts to strengthen and build ATVET systems in developing countries. From the SWOT assessment, best practices in the current field are offered, and two case studies, from Ethiopia and Kyrgyzstan, are used to highlight specific lessons learned. Finally, the paper highlights key areas in which innovATE could support ATVET development in countries with an interest in building their agricultural human capacity. The analysis presented here leads to conclusions that ATVET programs must be demand-driven and context-specific, and investments at the institutional level must promote flexibility and innovative programming in order to maximize the impacts of agricultural vocational training.

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I. Introduction and justification of study

TVET

Technical and vocational education and training (TVET) has, since WWII, provided an approach to education and job training in modern educational systems in both developed and developing countries. TVET is defined as “a comprehensive term referring to those aspects of the educational process involving, in addition to general education, the study of technologies and related sciences, and the acquisition of practical skills, attitudes, understanding and knowledge relating to occupations in various sectors of economic and social life” (UNESCO 2004: 7). With consistent emphasis on education for occupational skills, TVET programs in developed countries have been largely situated as either an addendum to secondary education or within the post-secondary education context, as an alternative to university training (Hoffman 2011). In developing countries, the situating of TVET has historically been less clearly defined, with programs and institutions ranging from alternatives to general primary and secondary education (including non-formal educational settings like field-based training), to job-specific skills training, to more traditional vocational colleges and certification programs (King 2011). Though ostensibly all of the approaches are focused on teaching occupational skills, combining these various types of education and training systems into the single category of TVET has complicated the assessment of which types of training are most appropriate and effective in which settings. This has in turn led to a lack of consistent best practice suggestions and frameworks for investments in vocational training.

The range of programs and approaches that could fall into the vague category of TVET, limited development funding for education is often either spread too thin to build stable programs or is so highly focused that systemic change is not addressed. Some critics have argued that vocational education is failing to evolve with and respond to the changing realities of agriculture and rural economies in developing countries. On the one hand, there is concern that an emphasis on specialization in many secondary TVET programs precludes a strong general educational base. Arguments against the ‘vocationalization’ of primary and secondary education suggest that particularly given the changing nature of rural livelihoods and labor markets, youth in particular are better served by a more general, adaptable education rather than a focus on skills for particular occupations (Bennel 2010). In contrast, other observers of trends in education investment in developing countries have noted that the emphasis on Millennium Development Goal 2 (Primary Education for All) has shifted educational priorities away from the end goal of job-readiness training for some individuals and toward a lower level of basic education that does not adequately prepare anyone in the population for contemporary employment opportunities (Hartl 2009; IFAD 2011a). Most observers agree that regardless of the potential for TVET as a contributor to economic development, investment in TVET systems and institutions has been decreasing in line with their seeming obsolescence.

ATVET

Agricultural technical and vocational education and training (ATVET), as a subset of TVET approaches and institutions, has been particularly hard-hit over the past few decades, as many developing country governments cut their public spending throughout the 1980s and 90s. In addition, many countries experienced rapid urbanization that took people and resources away from rural areas. Throughout this time period, agricultural education was increasingly disparate, with post-primary vocational education aimed at “the sons of traditional farmers,” whereas post-secondary education was designed to “lead the sons of the middle class into public employment” (Johanson and Saint 2007: 13). In other words, ATVET provided static skills training for agricultural systems that were mostly disconnected from more dynamic or growing sectors of national economies and the labor demands of those sectors. Atchoarena and Gasperini (2003) highlight another aspect of this phenomenon, arguing that following Green Revolution research and technology development, international and national interest in supporting agricultural development moved away from a skills-based approach for individual producers and toward a science-based approach that focused on tertiary education, research for technology transfer and non-formal rather than technical training for farmers. Over the past ten years, however, there has been growing emphasis on agricultural value chains to stimulate economic growth (Maguire 2011). These modern value chains, in turn, demand skilled workers to fill a variety of roles that relate to agricultural development but that are not directly related to traditional roles of production and small-scale sales.

II. Problem statement

Though interest and investment in agricultural value chain development has seen a resurgence over the past ten years, there remains a lack of consensus on if and how best to support vocational training for contemporary agricultural skills and occupations. If, as Vandebosch (2006) and Atchoarena and Gasperini (2003) suggest, ATVET is an outdated approach to supporting agricultural change and rural development, how can national government and international donors shift the framework within which to invest in occupational skills for agriculture? In the broader context of education and training systems, many development agencies and practitioners have moved away from discussing vocational versus formal training, and toward the more inclusive goal of workforce development (Olenik and Fawcett 2013; Jacobs and Hawley 2008). In the context of agricultural workforce development, there is still a lack of agreement on the types of occupations needed and how best to prepare and train individuals for those roles. Rivera and Alex (2008) suggest a two-tiered agricultural system, with individual farmers directly engaged in agricultural production while a second level of businesses and individuals provide them with the support and services necessary to succeed. Agribusinesses and self-employed farm entrepreneurs also play roles in this vision of the agricultural system. If we take the tiered vision of contemporary

agricultural systems as a useful heuristic to understand how best to target education and training to a range of individuals, what role, if any, does ATVET have in the 21st century?

The remainder of this report will explore some of the key issues currently facing agricultural education systems in general, but will focus mostly on the changing role of ATVET in contemporary approaches to agricultural and rural development. The educational level at which vocational and workforce development programs operate, the range of skills and knowledge included in “agricultural” training, and the delineation of agricultural occupations are all open questions in the current discussions around ATVET and agricultural workforce development, and so will be the central focus of discussion here. Much of the current literature and scholarship on agricultural education and training in developing countries focuses on sub-Saharan Africa, and so some specific arguments about the current field are likely to be more directly focused on that continent. However, the discussion presented here takes a global perspective, by focusing on common themes seen across the literature in regard to ATVET in developing countries. A compendium of recent ATVET projects, as well as two case studies, will highlight the breadth of approaches and emphases of current efforts to update agricultural education to meet the needs of individuals in contemporary agricultural systems and rural areas.

III. Background and key issues in ATVET

As mentioned in the introduction, the definition of TVET uniformly accepted throughout the past several decades is that of the United Nations Educational, Scientific, and Cultural Organization, which focuses on education for occupational skills (UNESCO 2004: 7; UNESCO 1989: 4). The United States Agency for International Development (USAID) includes this definition of TVET in recent documents discussing workforce development (Olenik and Fawcett 2013) and so we take this definition as common ground from which to both describe past efforts at supporting TVET as well as to assess current trends and future possibilities in this report. In addition to this parsimonious understanding of TVET as general and skills-based education related to future employment, UNESCO (2004) broadens the scope of possible elements of TVET, including education for sustainability, improved civic participation and poverty alleviation. In general, USAID keeps to a more narrow view of TVET, situating it within the broader context of workforce development (Olenik and Fawcett 2013). Though the implication is that TVET oriented toward workforce development will alleviate poverty by providing individuals with skills that increase their employability and therefore their income, the multiple steps in the process from defining labor market demands to implementing TVET programs to actual individual employment require further explication.

By focusing on agriculture as a subset of the national economies of many developing nations and conceiving of the agricultural workforce as just like any other wage-labor pool, we can define ATVET as simply “the educational process involving, in addition to general education, the study of technologies and related sciences, and the acquisition of practical skills, attitudes, understanding and knowledge relating to occupations” in agriculture. However, agriculture as a vocation has historically not been incorporated into the wage-labor economy of many developing nations, and so the concept of skills training for agricultural occupations becomes less clear. In many places, agricultural extension has historically provided information to farmers about new production techniques and technologies, and especially with the move toward more training-based agricultural services, the lines between agricultural extension and ATVET are not always clear-cut (Rogers 1988; Davis 2008). Farmer Field Schools, which will be discussed further below, are one example of an approach to agricultural training that draws on aspects of both extension and vocational training in order to provide relevant and timely skills and learning experiences to producers. Though the distinction is not always neat and tidy, agricultural extension in general focuses on providing specific and targeted information-based training to producers. ATVET takes a more education-based training approach to provide skills for different types of agricultural occupations, though the identification of which skills and which occupations fit into ATVET can change depending on the context.

Should ATVET focus on skills for producers, recognizing that many of those individual farmers are self-employed and so in some senses are outside of the traditional purview of ATVET (IFAD 2011a)? Should we broaden the description of ATVET to ‘vocational training for rural development,’ recognizing that the integral role played by agriculture in rural livelihoods is changing with changing demographics and global economic integration (Atchoarena and Gasperini 2003; Vandenbosch 2006)? As will be explored below, the current focus on rural poverty alleviation through the development of agricultural value chains adds another dimension to this discussion, by broadening the scope of occupations considered to be agricultural in nature. Value chains can be considered in some sense an expansion of Rivera and Alex’s (2008) argument for a two-tiered agricultural system, which includes producers and those in support services for them. By expanding the chain to include all aspects of preproduction, production, and post-production (through to food processing), we see a multi-tiered agrifood system emerging that provides myriad occupational opportunities requiring a range of technical skills and educational arrangements.

ATVET and educational level

The question of what types of skills should be included in ATVET leads fairly quickly to the question of at what educational level those skills should be taught. As previously mentioned, ATVET historically focused on production systems and those working in them, with vocational training considered mainly

post-primary or as an alternative to formal education (Johanson and Saint 2007). Some major agricultural development organizations still consider farm and farmer-level trainings (non-formal or non-classroom based) to fall within ATVET (see IFAD 2012 and Guerra and Olenik 2013 for examples of Farmer Field Schools). When talking about vocational training as a specific approach to skill development, it seems appropriate to include such non-formal educational activities. However, TVET as a means for occupational skill development has generally been placed within the formal education system, though there is a range of conflicting opinions about the appropriate level at which it should be incorporated. For ATVET in particular, some education scholars worry that a focus on vocational education as an alternative to general primary and secondary education actually weakens the positive impacts of vocational training by not equipping students with the background knowledge necessary to implement the specific technical skills they gain in vocational training (Brooks et al. 2013). Other observers of development trends have, as previously mentioned, raised recent concerns that MDG2, with its focus on primary education for all, has prioritized primary education to such a degree that vocational training is in fact no longer a priority in the traditional educational system (IFAD 2011a; Hartl 2009). In the context of workforce development and increasingly specialized agrifood systems, still others have argued for a shift in ATVET away from primary and secondary education and toward post-secondary degree or certification (Johanson and Saint 2007; UNESCO 2006a).

ATVET and workforce development

Assessments of which educational level is most appropriate for ATVET programs can be facilitated by incorporating more dynamic approaches to agricultural workforce development. Foundational to the idea of orienting educational opportunities around labor market demands is an assessment of those labor market demands, and by extension, the skills necessary to meet them (ILO 2008; Rivera and Alex 2008). This “client-oriented” approach to ATVET is intended to address the demands of both employers and future employees, by providing pathways for individuals to gain skills for which there is demand in current agricultural systems. As many observers of agricultural development over the past decade have noted, agricultural production and the many occupations that support and build from it increasingly require technological skills as well as ‘soft skills,’ like communication and leadership, and entrepreneurial training. UNESCO (2006a) argues that agriculture is moving from a non-skilled field to a knowledge-based one, where “future farmers, fishers, foresters and miners will require at least fourteen years of education” in order to run computer-operated machinery and perform technical tasks (11). UNESCO (2012) has also highlighted the role that ATVET can play in sustainability and the emerging green economy, again arguing that higher education levels will be necessary to prepare individuals for agricultural and environmental occupations. In addition to a focus on technology, other actors in the TVET arena have focused heavily on the need to build entrepreneurial and financial expertise. Rivera

and Davis (2008) emphasize the growing place of the small, entrepreneurial farmer and the need to provide vocational training that includes a heavy emphasis on business and managerial skills. Many of the specific projects highlighted below include a strong entrepreneurship component, with USAID in particular incorporating business training into many ATVET projects (USAID 2013b, 2013c).

In the past, with ATVET focused primarily on production skills and producers themselves, many programs were based either at secondary schools (requiring only primary education) or offered as an alternative to traditional primary and secondary education in a non-formal setting. Tertiary ATVET, conditional upon completion of lower grade levels, has consistently had a smaller impact than other types of ATVET programs (for a history of ATVET in sub-Saharan Africa, for example, see Johanson and Saint (2007)). With recent critiques arguing that this approach to ATVET is perhaps obsolete in the context of increasingly technical 21st century agricultural systems, there have been many arguments for shifting the emphasis of ATVET to post-secondary programs and institutions (Johanson and Saint 2007; Brooks et al. 2013). In the context of demand-driven agricultural workforce development, ATVET is increasingly being supported through vocational colleges and certification programs based at universities, as well as through private-sector institutions and job-based training programs (Jacobs and Hawley 2008; Rivera and Alex 2008). This range of programs are diverse and allow for flexibility in instruction and prerequisite education, as well as potentially help to bridge the historical separation between ATVET and other types of technical knowledge and occupational training programs (Atchoarena and Gasperini 2003). There is, however, a potential exclusionary effect of transitions ATVET training to only the post-secondary level, particularly for women and minority groups, who are less likely to have the opportunity to complete traditional secondary school and who might lack language or other skills necessary to engage in more standardized educational settings (Hartl 2009). For this reason, non-formal or alternative programs will remain an important component of overall approaches to ATVET. In short, as the skills necessary for agriculture-related occupations become increasingly diverse and potentially technical, it is clear that no single approach to ATVET will be able to address the needs of all employers and potential employees. Instead, the scope of both the skills offered and the means of acquiring those skills must follow the client-driven approach and be tailored to specific situations and demands of those being served.

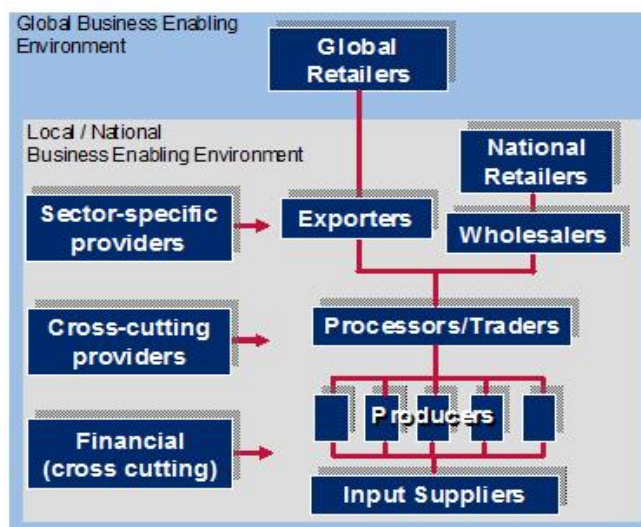
The analysis presented above might seem to be putting the cart before the horse. For which jobs do people need ATVET, what are the required skills and therefore the appropriate educational level at which to teach them? In fact, the background presented here offers an overview of two of the main issues currently facing the ATVET field: 1) what agricultural skills count as vocational, and 2) what type or level of agricultural education counts as vocational? The answers, of course, will differ depending on the geographic, political and economic setting in which vocational education is being discussed. The

framework of value-chain agricultural development, as well as labor market assessments and demand-driven skills development, starts from the assumption that agriculture-related jobs will also differ depending on place (Bennel 2010). Delineating a standard or comprehensive list of agricultural jobs depends on the type and extent of the value chains – that is, are production, transport, processing and marketing connected in such a way that it is appropriate or meaningful to consider all of the links in the chain as ‘agricultural?’ Within the context of national ATVET approaches, are the labor demands at different links in the value chain being made within country or outside? Is there opportunity for job creation that could be supported by more diversified vocational training, or is it necessary to push for university and post-graduate training in order to capitalize on employment opportunities? The general consensus has been that an increase (over the past) in average educational level is necessary for workers to compete in all sectors, including in agriculture (UNESCO 2006a). As will be discussed below, this shift toward increased training levels for all occupations present both a challenge and opportunity for ATVET programs, since much agricultural education continues to be overly science-based (and therefore less adaptable to changing employment demands), rather than focusing on skills that can be immediately applied in a work setting (Atchoarena and Gasperini 2003).

Jobs, skills and education in agricultural value chains

Given all of these caveats and conditions, then, what types of jobs should we consider to be agricultural? Figure 1 offers a schema of the links and levels of agricultural value chains. Within each link of the chain there are many possible jobs, the nature of which will vary depending on the context. As the figure shows, there are also institutions and occupations that exist in the broader economic context but that can be focused to support agricultural systems.

Figure 1. Links and levels of agricultural value chains



From USAID 2013d

Clearly producers – farmers, fishers, herders, foresters - whether self-employed or on contract, work in the agricultural sector. In addition to support in production practices, there are increasing calls within the ATVET literature to provide entrepreneurial training for these individuals who can ‘create’ their own jobs (Rivera and Alex 2008). Beyond immediate producers, those occupations that support the production process are also considered agricultural (Rivera and Alex 2008). These include seed and fertilizer salespeople (increasingly referred to as agrodealers in development literature (see Scoones and Thompson 2011)), extension agents, research scientists, lab technicians and loan officers at agricultural banks. Moving up the value chain, we have bulk buyers, wholesalers, food processors, and marketers. These form the bulk of what have historically been considered to be agricultural occupations (IFPRI 2013). In addition, with the increasing standardization of both production and food sales in developing countries, there is an emerging additional tier or layer of agricultural occupations related to certification. Seeds, production practices (like organic), on-farm activities (related to Global Good Agricultural Practices), and processing techniques (phytosanitation) all can, and sometimes must, be certified by an outside organization to gain market access or legal status. The mechanization of agriculture has also provided new types of occupations, including machine maintenance and computer-based skills (to facilitate access to production or market information). Finally, the links in the value chains must in fact be linked, mostly by transport and logistical services that moves agricultural outputs from rural areas to urban markets or for export (Brooks et al. (2013) and IFPRI (2013) offer fairly comprehensive and updated lists of agricultural occupations).

From a workforce development standpoint, it is important to first assess which of these jobs, as well as others not mentioned here, fit into the agricultural sector in a given country. The skills necessary to fill those jobs will vary depending on the country. For example, in the case study of Ethiopia’s ATVET system offered below, the skills necessary to be employed as an extension agent within the national system were the type that could be obtained in a post-secondary institution, and this is where much of the government and international support was focused. In other countries, alternative education practices like Junior Farmer Field Schools (FAO 2013) and training for young farmer-trainers occurs in the field or at institutions unaffiliated with the traditional educational system (AfDB 2002). A full review of current ATVET projects across the world, with the specific skills and educational level upon which they focus, will follow in the good practice section of this report.

Case Study: Ethiopia

Much has been written about Ethiopia's moves to revitalize and modernize their ATVET system over the past ten years, and as a case study Ethiopia offers the rare opportunity to examine the process by which a country identifies their agricultural education needs and implements appropriate projects and programs to support change. A government report on sustainable economic development from 2006 (MoFED 2006) situates agriculture within the context of poverty alleviation and rural development, and much of the identified need includes improved access to inputs, information and markets to increase the value realized on production. By first identifying these needs in the agricultural system, the government then determined that building human resource capacity (in the form of government-employed extension agents) to support producers in improving their agricultural practices was the highest priority. The skills necessary include veterinary training, business and cooperative services, knowledge of post-harvest techniques, as well as more general soil and water conservation (MoFED 2006). Once the needed skills and employment opportunities were defined, the Ethiopian government, in conjunction with several international donors, focused on developing an ATVET training system that could provide the needed training. Agricultural colleges were established across the country, with programs to train Development Agents (DAs) that required a 10th grade education. Within the Ethiopian educational system, this situated ATVET at the supplementary secondary level of education, and distinguishes the DA training from university-based programs.

DA training takes three years, and from there, agents are placed at Farmer Training Centers (FTCs), which were also established and strengthened through international and national support. In effect, the Ethiopian government has created a labor market for DA graduates, and the synergy between the identification of job opportunities (through the need for DAs to support agricultural development and poverty alleviation), skills training and job placement has allowed for a very streamlined approach to ATVET. Initial reports have been mostly positive, in terms of the impacts of the DA training program and subsequent employment. Over 20,000 DAs have been trained and placed in Farmer Training Centers (MoFED 2006). One constraint of the rather closed process through which DAs are trained and placed in jobs, however, is that their skills are not necessarily transferrable to other agricultural employment opportunities. As jobs within the extension service become increasingly, there will be more graduates of the ATVET program than jobs (Davis et al. 2010). The strong infrastructure built by this program provides the opportunity to diversify the training opportunities, and it will be necessary to assess other employment options and required skills in order to capitalize on both the expertise within the ATVET system and a potential wide range of agriculture-related occupations.

An additional level of ATVET is also occurring in the Ethiopian case through relationship between DAs, trained at a post-secondary level, and the trainings they in turn provide to individual producers when stationed at a Farmer Training Center (FTC). As farmers receive skills-based trainings through extension services and on-site demonstrations, FTCs are a vital component of the ATVET system in Ethiopia. However, given the emphasis on vocational training occurring at the post-secondary level, FTCs do not seem to be included in assessments of the current state of ATVET. Disconnect between formal and non-formal types of vocational training has been highlighted elsewhere (UNESCO 2006b), and remains important to keep in mind when considering overall assessments of a country's ATVET system.

IV. SWOT analysis of ATVET institutions and systems

Figure 2 provides an overview of the strengths-weaknesses-opportunities-threats analysis of ATVET in developing countries. In the following section, several themes within each dimension of the SWOT framework are characterized and discussed.

Figure 2. SWOT analysis of ATVET

Strengths	Weaknesses
Relative cost	Lack of continuity with TVET systems
Responsiveness to demand	Overly narrow and technical focus
Provision of relevant skills	Marginalization of diverse groups
Accessibility to diverse populations	Irrelevant or inaccessible training
Experiential learning	
Incorporation of sustainability	
Opportunities	Threats
Value chains create new types of jobs	Lack of institutional support
Increased integration of educational levels	Changing education priorities
Emphasis on rural livelihoods	Outdated pedagogy
Emphasis on agricultural entrepreneurship	Out-migration from agriculture
	Stigma of vocational education

Strengths

Relative cost

An overarching strength of TVET is apparent in the generally accepted definition: TVET provides skills and training oriented around employment. This means that the educational level and the duration of such programs can vary in part with the type of job for which an individual is preparing, and can dispense with some of the time and cost associated with broader, more theoretical education. Certainly at the post-secondary level, TVET is usually cheaper than enrolling in a formal higher education institution, both because of the relatively shorter duration of programs and the lower educational requirements for instructors (Maguire 2011; Davis et al. 2010). Post-secondary TVET programs generally function in parallel to other types of educational institutions, which allows government oversight and certification of the intended and actual outcomes of this training (UNESCO 2012; IFAD 2011b).

Responsiveness to demand

One aspect of TVET consistently mentioned in the literature is the relative flexibility in programming and the ability to respond to changing demand in the labor market and national economy. Given the current consensus that agriculture is a rapidly changing, increasingly specialized sector of many developing

country economies, ATVET has the potential to offer timely skills training to a new generation of agricultural workers (Rivera and Alex 2008; UNESCO 2006a). In part, this means incorporating new jobs (as mentioned above) into existing ATVET programs. For example, an International Fund for Agricultural Development Project in Mongolia is currently teaching driving skills to traditional herders, in order to support the local development of livestock value chains (IFAD 2010).

Provision of relevant skills

In addition, as rural areas are increasingly connected to non-agriculture job opportunities, agricultural skills and background can be incorporate into other types of TVET (Atchoarena and Gasperini 2003). Supporting linkages across different types of TVET, including but not limited to agricultural skills, could reduce out-migration from rural areas by providing young people with a broader range of marketable skills, both on and off farm (Herren et al. 2011).

Accessibility to diverse populations

In addition to the more conventional approaches to TVET, which generally focus on secondary or post-secondary education, alternative types of ATVET programs can reach populations not able to access the formal education system. This is particularly important in rural areas in many countries, where levels of primary education are lower than in urban areas, and is also important for women or minority groups (FAO 2010). The rich history of field-based non-formal ATVET has been recently updated to focus on youth vocational training through USAID-run Junior Farmer Field Life Schools (Guerra and Olenik 2013).

Experiential learning

An additional benefit of non-formal ATVET is the ability to provide hands-on, experiential training for more focused and immediate skill acquisition (Songhai 2013).

Incorporation of sustainability

Finally, several development organizations have highlighted the potential for ATVET to address concerns for sustainability and to incorporate skills training with which to address environmental change (ILO 2008; UNESCO 2006a).

Weaknesses

Lack of continuity with TVET systems

As previously mentioned, one common theme in the ATVET literature is the disconnect between agricultural education and other types of TVET training. As it currently stands, ATVET is often not included in national-level reporting of TVET programs, and so is often overlooked in workforce development programs (UNESCO 2006b). Though this could be seen as a weakness of the more conventional TVET system as well as of ATVET, in this context it is important to note that ATVET has

generally not moved as quickly as other sectors in terms of technology, pedagogy and direct connections to labor markets.

Overly narrow and technical focus

A related weakness of many current ATVET programs is that they are often too narrow in focus, emphasizing the second part of the UNESCO definition of providing technical skills for specific occupations, while not necessarily prioritizing more general, less employment focused, basic education (Bennel 2010). Especially with the increasing professionalization of many agricultural occupations (as identified earlier in this report), employers expect not only technical skills but a more general foundation from which employees can learn on the job and make connections to other related fields. A related critique of many current ATVET systems is that they take an overly narrow view of agricultural jobs and focus only on training in agricultural production, rather than situating agriculture in the broader context of rural development and agricultural systems (Vandenbosch 2006).

Marginalization of diverse groups

The response to one weakness, that ATVET is not connected enough to current, changing labor markets and demands, has been to increase the education level of ATVET programs and to standardize both the curriculum and types of skills being taught. This move, however, highlights another weakness of many past and present ATVET systems – the marginalization of groups of people whose work and educational lives do not fit the traditional education mold. Despite the potential strength of ATVET, that it can be flexible enough to include these groups, the current trend toward a workforce development orientation could exclude groups who might otherwise benefit from some type of skills training for poverty alleviation. Chamel and Hartl (2011) highlight the difference between the long-term time frame inherently taken in post-secondary type education (including ATVET) and the often more immediate demands in many rural and agricultural areas for very specific skills or knowledge that can be incorporated into existing systems, rather than used to change them.

Irrelevant or inaccessible training

Returning to one of the strengths of ATVET, that the provision of appropriate skills can stem out-migration from rural areas, there is an inherent weakness in programs or skills that are not relevant or accessible to certain groups, particularly youth without much formal education. Hartl (2009) extends this critique to argue that many traditional ATVET programs are inaccessible to women, who often lack primary education, and to minorities or other adults who do not speak either a European or primary local language in given country.

Opportunities

Value-chains create new types of jobs

Given the current emphasis on value chains as a path to agricultural and rural development, there is a great opportunity for ATVET to play an integral role in training individuals for a wide range of agriculture-related jobs (ILO 2012). ATVET has the potential to be demand-driven, responding to the current needs of both employers and employees in the changing field of agriculture, and the combination of agricultural value chain growth and workforce development will provide myriad opportunities (Maguire 2011). New, specific skills are increasingly necessary for agriculture-related jobs, and many ATVET programs have the human resource capacity to offer training in these areas (Jacobs and Hawley 2008). Also related to value chains is the possibility to incorporate many formerly informal or non-formal economic and occupational sectors in the agricultural system, and ATVET programs will have the opportunity to leverage their experience working with a range of students at a range of educational levels (Chamel and Hartl 2011).

Increased integration of educational levels

With the increasing connections between different levels and types of educational institutions, there is the opportunity as well for ATVET to utilize existing infrastructure in order to keep overhead costs down (UNESCO 2012).

Emphasis on rural livelihoods

Agriculture is a growing and diversifying aspect of many developing country economies, which provides the opportunities for ATVET to contribute to changes in livelihoods for rural people and communities (Brooks et al. 2013). As agriculture changes and in many cases expands in breadth and intensity, there is a coinciding concern for the environmental effects of expansion. ATVET can provide an opportunity to educate both producers and others in agriculture-related jobs as to the impacts of their decisions and how to best balance current needs with concerns for the future (UNESCO 2006a). The second part of the UNESCO (2004) definition of TVET includes education about sustainability, and with increasingly sophisticated understandings of natural system and accessible technologies with which to track changes, there is an opportunity for ATVET to expose new groups of people to this knowledge and technology.

Emphasis on agricultural entrepreneurship

Finally, opportunities exist for ATVET to systematically support entrepreneurial activity among small-scale producers themselves, by providing basic business and management training not traditionally incorporated into ATVET programs (Vandenbosch 2006). This training could take place within more traditional ATVET settings or could build on the long history in agricultural development approaches of field-based trainings. One example of non-formal field-based agricultural education are Farmer Field Schools, which are increasingly being considered a type of vocational training, despite not historically being incorporated into ATVET programs (IFAD 2012). The methodologies and experiences of other

types of agricultural development practitioners and organizations could complement or be incorporated into existing ATVET systems to expand the levels and types of training offered (see the Songhai Centre in Benin as an example (Songhai 2013)).

Threats

Lack of institutional support

As is often the case in this type of analysis, the threats to ATVET are both numerous and yet not necessarily insurmountable. Some are inherent in the nature of governmental funding and international donor support. With limited funding for ATVET, focus areas of investment must be targeted to the given context – formulaic approaches to ATVET will likely spread scarce resources too thin to be meaningful (Bennel 2010). Assessing the best or most promising focus areas is often difficult given the lack of policy guidelines or existing goals for ATVET systems in many developing countries (Maguire 2011). The Ethiopian case study offered above provides a nice counter-example for how national governments can make concerted efforts to focus resources for maximum effect. In contrast to the lack of formal framework in some countries, in others TVET does not incorporate informal sectors, such as agriculture, into vocational education structures, so that the very notion of ATVET has not yet been established (UNESCO 2006b). Even if ATVET does exist in these countries, it is often housed in a different ministry than other TVET programs, and so is not necessarily the recipient of workforce development efforts or funds (Atchoarena and Gasperini 2003).

Changing education priorities

ATVET systems can also face internal threats, in terms of irrelevance or lack of interest, which leads to long-term financial instability. In some settings there is a concern about the vocationalization of primary education and an early focus on ATVET undermining more flexible general education, which has led to a push against primary and secondary ATVET (Bennel 2010; Johanson and Saint 2007). As previously mentioned, some development observers have also noted a trend away from investment in TVET in general because of a renewed emphasis on primary education in the Millennium Development goals (IFAD 2011a).

Outdated pedagogy

An additional threat to ATVET is a lack of internal dynamism or response to changing rural and agricultural realities. Some see this threat stemming from an ongoing pedagogical approach that prioritizes science-based agricultural development over skills-based training, leading to increasingly irrelevant curricula (Atchoarena and Gasperini 2003). Others argue that the reality of any type of ATVET is that there still simply not enough jobs to absorb the number of people with access to ATVET (Vandenbosch 2006). Though this threat is not entirely internal, since ATVET systems are not creating

jobs, they could strengthen their position by engaging with the workforce development approach to labor market assessment in order to better tailor skills trainings to current and actual job demand.

Out-migration from agriculture

Another set of threats to ATVET is the human movement inherent in a dynamic economy, of which agriculture is often a part. Trainers come and go as better job opportunities present themselves (a common problem in developing-country education systems in general, since the private sector can often offer more compelling employment), leaving little continuity in programs (World Bank 2012). Current students often also become future private sector employees, which is in some way a threat created by ATVET systems themselves, since their orientation is generally toward labor markets outside of their own often extensive systems (AfDB 2002). Ethiopia again provides a useful counter-example to this threat, as state-organized agricultural colleges trained individuals to enter the state-run extension system. In addition to those actually involved in the ATVET system, the long-term viability of ATVET depends on a consistent student body. Particularly as agricultural workforce development increasingly focuses on youth (see Olenik and Fawcett 2013), ATVET will have to compete for students and future educators with urban employment opportunities (AfDB 2002).

Stigma of vocational education

Finally, a little-mentioned threat to ATVET is the general stigma associated with vocational education, non-traditional certification and unclear educational attainment (Chamel and Hartl 2011). Though more of a sociological characteristic than concrete threat to be addressed, it bears noting that vocational education in both developed and developing countries remains, at least in some cases, a less-desirable educational option than more traditional post-secondary programs.

V. Good practices and ATVET examples

The outline provided in the background section of this report, linking jobs to skills to educational level, creates the framework for an overview of good practices in developing ATVET programs and systems. The recommendations are clear, from both abstract literature and numerous case studies: when ATVET is connected to workforce development, as is increasingly the case in agricultural development projects and goals, a labor market assessment offers a foundation from which to develop the ATVET system. Once the scope of current and potential agricultural jobs is clear, the skills required for each job or type of job must be taken into consideration, in order to clarify whether the ATVET system could be a possible venue for acquiring them. Finally, if the skills or knowledge being demanded can be considered vocational in some sense, by providing skills for a specific occupation within the agricultural system, then the appropriate educational level for acquiring these skills must be assessed. As previously mentioned, in countries with limited resources, it might be necessary to focus on only one educational level at which to develop the ATVET system, thereby limiting the scope of skills and trainings offered.

In addition to the workforce development approach to ATVET assessment, another approach to developing ATVET systems can focus more on primary producers and non-formal, field-based trainings. USAID (Guerra and Olenik 2013), FAO (FAO 2013) and IFAD (IFAD 2011b) have all incorporated some elements of traditional Farmer Field Schools into their youth agricultural workforce development programs, which allows a broader range of youth to participate by decreasing the formal educational requirements and increases students' comfort level by providing training in a familiar, local setting. These FFS programs are increasingly oriented toward entrepreneurial training, and can in a way be seen as a corollary to other types of workforce development, where here students are being trained to assess and create their own employment opportunities (Rivera and Alex 2008).

Table 1 provides a range of examples of current or recently finished ATVET projects, by national governments and international organizations. Though most project documents do not explicitly discuss the educational level at which the ATVET occurs, the framework of occupation-skills-educational level is followed as much as possible. Examples are organized by continent, with Feed the Future countries highlighted in bold.

Table 1. Characteristics of recent ATVET projects

Organization	Country	Occupation	Skills	Educational level
WFP	Global	Business	Output market connections	Non-formal
NIFA (Cardwell 2011)	Haiti	Education	Trainers Curriculum	Post-secondary
IFAD (IFAD 2011b)	Ghana	Machinery Processing	Equipment maintenance Agro-processing	Post-secondary
World Bank (World Bank 2001)	Mauritania	Education Machinery	Curriculum development Agricultural mechanics	Secondary
USAID (Olenik and Fawcett 2013)	Liberia Sierra Leone	Business	Agribusiness	Non-formal
Songhai Centre (Songhai 2013)	Benin	Production Processing Machinery Business	Primary agricultural occupations, including: Crop production Livestock Poultry Fisheries Processing Machinery Agro-industry	Secondary Post-secondary Professional development
AGRA	Burkina Faso	Certification	Soil science lab technician	Post-secondary
AfDB (AfDB 2002)	Burkina Faso	Production Education Business	Young Farmer Trainings Training of trainers Training of managers	Non-formal Secondary Post-secondary

Organization	Country	Occupation	Skills	Educational level
FAO (FAO 2013)	Malawi, Tanzania	Processing Production Business	Agro-processing Junior Farmer Field and Life Schools (includes business training)	Secondary
USAID (Guerra and Olenik 2013)	Mozambique	Production	Junior Farmer Field Life Schools	Non-formal
IPA (Blattman et al. 2011)	Uganda		Cash transfers to youth to pay vocational training fees	
AfDB (MoFED 2006) World Bank (World Bank 2012) (Davis et al. 2010)	Ethiopia	Education	Extension/Development Agent in: Animal Science Animal Health Agricultural Cooperatives Natural Resources Plant Science	Secondary
USAID (USAID 2013c)	Egypt	Education	Curriculum development that fits within a value chain approach	Post-secondary
IFAD (Chamel and Hartl 2011)	Bangladesh Madagascar Rwanda	Production Business	Livestock rearing Fish hatcheries Microenterprise	Secondary
Land O'Lakes (Land O'Lakes 2009)	East Timor	Business Management	Agribusiness Farm management	Post-secondary
IFAD (IFAD 2010)	Mongolia	Transport Machinery	Driving Welding	
USAID (USAID 2013a, 2013b)	Afghanistan	Production	Use of inputs Skills Training for Afghan Youth	Non-formal Secondary
TES (Kazbekov and Qureshi 2011) Helvetas (Acker and Gasperini 2009)	Kyrgyzstan	Production Education Production	Training and Extension System - Training services to farmers for a fee Advisory Training Center for training of trainers Agricultural Vocational Education Project	Non-formal Secondary Alternative secondary
Texas A&M/USDA (Nichols et al. 2008)	Georgia	Business Management Technology	Agribusiness Managerial skills, Computer English	

Case study: Kyrgyzstan

In contrast to many developing countries in the tropical world, former Soviet republics have faced the challenge of redirecting strong but obsolete ATVET systems and programs in the face of changing economic and agricultural realities following independence. Both Kazbekov and Qureshi (2011), and Acker and Gasperini (2009), offer an overview of the strengths and weaknesses of centrally-planned agricultural production and education systems, and highlight several efforts in Kyrgyzstan to adapt and expand ATVET approaches to meet the current demands of privatized, market-oriented agriculture. Because the management of agricultural production decisions was almost completely centralized during the Soviet era, individual farmers were trained to be highly specialized in certain types of production, with a corresponding narrow focus on skills and technical training. With the privatization of former collectively owned land, individual farmers are now facing the necessity of diversifying their production and taking responsibility for the entire production-to-marketing process (Acker and Gasperini 2009). As market-oriented agriculture and value chains began to develop, it became clear that a range of types of ATVET were necessary for different individuals within the Kyrgyz agricultural system. Two separate projects have been undertaken over the past ten years to address the variety of skill types and educational levels demanded of ATVET. The Agricultural and Rural Vocational Education Project (AVEP), directed by Helvetas (a Swiss development organization), has established agricultural training centers in order to provide several levels of ATVET (Acker and Gasperini 2009). In addition, the Training and Extension System (TES), a rural advisory service coordinated by Osh State University and the German development organization GIZ, provides agricultural training to farmer organizations for a fee, in essence offering non-formal, highly specific technical training in areas demanded by farmer-clients (Kazbekov and Qureshi 2011).

AVEP takes a particularly unique approach to ATVET, by incorporating multiple levels of education and training into newly developed agricultural training centers. These centers provide what might be seen as alternatives to primary and secondary education, though it is unclear how much formal education is required to attend. Programs range from “farm laborer” certification, which takes one and a half years to achieve, through “farmer” (three years) and “master farmer,” the last of which includes business management training and the ability to provide field training to other farmers. The tiered system of skills taught and time invested in the ATVET process provides multiple options for individuals depending on their interests and other resources available. It also takes into account the view of workforce development, in which some individuals will go on to contract as wage-laborers and so require a different skill set than those farmers with the resources necessary to work and run their own farms. AVEP incorporates experiential and field-based learning in order to reach a wide range of learners and educational backgrounds (Acker and Gasperini 2009).

In addition to the more organized ATVET of the AVEP approach, TES offers highly focused field-based training by connecting qualified freelance trainers to farmer organizations requiring specific expertise. TES utilizes a modified FFS approach, where a leader from the farmer organization received training at a TES field center, which he or she then shares with the rest of the group in conjunction with more specialized input from the consultant trainer (Kazbekov and Qureshi 2011). The TES approach offers focused, non-formal ATVET that compliments the AVEP approach, as the latter offers broader skills over a longer time frame.

VI. InnovATE contributions to ATVET

Given the range of goals and approaches to ATVET across the developing world, it is important that innovATE develop a framework within which assessments and planning with individual countries and organizations can be undertaken. An overview of literature, in combination with the broader goals of workforce development, identified three key aspects of the agricultural and economic setting that must be incorporated into ATVET project planning. Labor market analysis must be undertaken, and should incorporate knowledge of existing and future agricultural value chains, in order to identify and include a wide range of agriculture-related jobs, beyond those in traditional production and support systems. Once job types have been identified, the skills necessary for those jobs and the educational level at which those skills can and should be obtained must be differentiated, so that ATVET systems can focus on those jobs and skills best suited to the vocational educational setting.

InnovATE can work with countries to implement the type of systematic analysis of current and potential ATVET projects that is demonstrated above, in the overview of existing ATVET projects around the world. Developing a needs assessment framework that links labor market demand with required skills and appropriate educational level, innovATE can then work within and across countries and regions to provide linkages and knowledge sharing at the level of ATVET programming and development. In addition, innovATE can work in broaden understandings of ATVET by including an assessment of which groups of individuals will not be served by or have access to different types of ATVET projects. One possibility is that ATVET continues to move in the direction of secondary and post-secondary education, and that innovATE can work with the Modernizing Extension and Advisory Services (MEAS) program to develop alternatives to ATVET that focus on non-formal, short-term types of agricultural education that meet the needs of producers and workers with very little access to basic education or time for lengthy trainings. Farmer Field Schools and other types of non-formal experiential learning might be better considered as compliments to ATVET, and so prioritized in their own right, but separately from the ATVET system. InnovATE and MEAS can collaborate on country-level agricultural education and training development by identifying the appropriate institution to addressing different types of agricultural training needs.

In short, the innovATE project has the opportunity to synthesize lessons learned from specific projects around the world, as well as to incorporate TVET history and educational theory, into a project assessment and implementation framework that fits within the broader trends of workforce development and agricultural value chain development. Connecting ATVET systems to these two agricultural development approaches will revitalize the relevance of ATVET and could provide the impetus for integrating investment in ATVET into more general economic development platforms and approaches.

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