



Innovation for Agricultural Training and Education



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Cambodia: Desktop Study

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Contents

Executive Summary	3
Background.....	4
Introduction.....	4
innovATE - Cambodia	4
Purpose of this report	4
Current education and training systems in Cambodia	5
Supply-side	5
Workforce profile	5
Pre-university education	5
Higher Education	6
Royal University of Agriculture	6
University of Battambang	7
Prek Leap National School of Agriculture	8
Institute of Technologies in Cambodia and other institutions.....	8
Non-formal education and TVET	9
Challenges facing agricultural education and training supply in Cambodia	9
Labor market and employer needs	11
Demand-side	11
Agricultural industry.....	11
Skills shortages/gaps	12
Growing demand.....	12
Skills that are lacking.....	12
Reasons that skills are lacking	12
Ways to address the skills gap	13
SWOT Analysis.....	14
Methods indicative of good practices	15
innovATE: potential next steps in Cambodia.....	15
Appendix A: Figures.....	19
Appendix B: Tables	33
Appendix C: Summary of RUA student focus group discussion, June 21, 2013	40
Appendix D: Photo gallery	42
Appendix E: References.....	48

Executive Summary

Agriculture is and will remain an important industry to Cambodia's development, as the agriculture sector contributes 30% of Cambodia's GDP and employs the majority of Cambodia's population. However, agricultural and technical training is of an uneven quality and quantity, despite the importance of agriculture to the economy. There are weaknesses in Cambodia's education system, at the pre-university and university levels as well as in the vocational and non-formal education sector. The needs for increased English language capacity, upgraded agricultural curricula, teacher training, lower repeat/drop-out rates, infrastructure development, and up-to-date equipment all remain obstacles to improvement.

These challenges have resulted in a significant gap between the skills with which students graduate and the skills that are being demanded by employers. In Cambodia, a priority for innovATE may be able to help connect vocational and technical schools and agricultural university graduates with potential employers by identifying pathways through which increased dialogue can occur and by informing educational institutions of the skills demanded by employers. InnovATE may also be able to work in conjunction with faculty at Cambodian educational institutions, in particular the Royal University of Agriculture, in order to update and upgrade agricultural curricula, develop a "teaching & research" culture and create English language certification programs.

Background

Introduction

As a largely agrarian society, with 80% of the population living in rural areas and 70% depending on agriculture for a living, the development of the agricultural sector in Cambodia remains a priority to reduce poverty and inequality (USAID). Currently, about a third of Cambodia's population of 15 million lives under the poverty line (USAID). Developing human and institutional capacity to meet the challenges of rural poverty, unemployment, and food insecurity in the aftermath of the genocidal Khmer Rouge regime will require an effective and resilient education system. Core to this education system is the contribution of agricultural training and education from primary to tertiary levels and the linkage of this education and training to the performance of the agricultural sector as a whole. The government of the Kingdom of Cambodia has clearly laid out priorities of human and institutional capacity building and development of agricultural research and education in its 2010-2013 Strategy for Agriculture and Water and its "Rectangular Strategy" for growth, employment, efficiency, and equity. Building capacity in agricultural training and education (ATE) will help to stimulate innovation, entrepreneurship, and knowledge-sharing in Cambodia, which in turn will contribute to wider development goals of improved food security and poverty reduction.

innovATE - Cambodia

innovATE seeks to strengthen the full range of institutions that train and educate agricultural professionals in developing and emerging economies. This capacity building will serve to build an equipped agricultural workforce that can lead to increased social and economic growth. innovATE is conducting preliminary background research into the agricultural education and training capacity needs of key institutions in Cambodia, a focus country under the US government's Feed the Future initiative. The first steps for innovATE program involvement in Cambodia include a country study highlighting best practices and ATE capacity building needs. A literature review and associated research was conducted during of the early months of 2013. Next, an initial data collection visit was conducted in Cambodia from June 16-23, 2013, in order to build trust and relationships with stakeholders, to validate and update information found in literature reviews, and to establish an ATE network in-country. The ultimate goal of this trip was to build an informed scope of work for a full scoping visit in 2013/early 2014.

Purpose of this report

1. To outline current state of ATE in Cambodia, both from the supply side and demand side
2. To identify key institutions in the ATE system in Cambodia and the roles that they play
3. To assess critical challenges facing the ATE system in Cambodia
4. To identify potential ways forward for innovATE to build capacity in ATE in Cambodia

Current education and training systems in Cambodia

Supply-side

Workforce profile

In 2007, Cambodia's workforce was comprised of 8.8 million people who were 15 years and older (employment age) (Economic Institute of Cambodia, 2008). About three quarters of these people are engaged in unskilled labor and are either self-employed or work in family businesses in the informal sector (Table 1), and 81.2% of employed people live in rural areas. Most unpaid family workers have low levels of education (Table 2). Cambodia attracts low-skill, labor-intensive industries due to its large supply of unskilled labor and low wages and labor costs.

The agriculture sector is extremely important in Cambodia; it comprised 30% of Cambodia's GDP in the years from 2004-2007. The majority of Cambodia's workforce (59% of the population) is employed in this sector (Table 3). The agriculture sector in Cambodia is highly natural resource-based and very volatile, as production is tied to weather conditions (i.e. there is not much use of irrigation systems or other types of technology to manage for weather disturbances). Because of low efficiency in agriculture compared to other sectors, there is much room for improvement in productivity and output per worker (Table 4).

Pre-university education

The pre-university education system in Cambodia is perceived to be of low quality, especially in math and science (Tables 5 & 6). There are a number of pathways that a student may take in the Cambodian school system, which is loosely based on the French schooling system (Figure 1). Not all students complete pre-school, primary, secondary, or tertiary education, however, and there are students who repeat grades and/or drop out at all levels. A typical pathway that a student might undertake in pre-university schooling may be to start with pre-school or primary school, and then enter lower secondary school, followed by upper secondary school (Figure 2).

Many students do not attend pre-school, but most do experience some type of primary schooling. The primary level of education in Cambodia is comprised of students in grades 1-6. Learning achievement among primary school students is low, due to issues of teacher availability (the student-teacher ratio in Cambodian primary schools is 49:1) and teacher qualifications (World Bank, n.d.). The Ministry of Education, Youth and Sport (MOEYS) in Cambodia has stated that it would like to “strengthen and expand CFS [Child Friendly School] programs with activities such as effective learning and teaching, social emotional learning, special education, inclusive education, multi-grade teaching, bilingual education, minimum curriculum standards, library programs, local life-skills, HIV/AIDS prevention, health issues, scholarships, school feeding and block grants for school improvement, especially in border and triangle areas.”

The next step after primary school is to go through general secondary. There are two levels that comprise a complete general secondary education: lower secondary (grades 7-9) and upper secondary (grades 10-12). The MOEYS website states that “the program objective for upper secondary education is to [en]sure equitable access to upper secondary education after students have successfully completed lower secondary education,

especially in rural and disadvantaged areas. These students will comprise the human resource for enrolment in technical and vocational education and higher education.”

There are other types of schools that a student may go to after primary school. Colleges (grades 7-9) may be entered after primary school as a lower secondary equivalent. A lycee (grades 10-12) may be entered as an equivalent to an upper secondary school. A student may also have the option to go to a lycee (grades 7-12) which encompasses all grades that comprise a general secondary education.

Higher Education

There are 34 public and 57 private higher education institutes in Cambodia, which include universities, institutes or technical institutes, and a royal academy (World Bank, 2012b). Currently, only ~5% of Cambodians enroll in tertiary education (lowest GER in the SE Asia region), compared to ~70% of people in OECD countries (World Bank, 2012b). The MOEYS website declares a goal to “develop a curriculum development framework taking into consideration the capacity of Cambodian higher education lecturers, the job market, and national needs by 2012,” so as to improve employment opportunities for those who obtain a tertiary education. The MOEYS website also states that “some priority will be given to students enrolling for less market-oriented and more socially beneficial programs, especially education, health, agriculture, technology, engineering, science and mathematics,” so that more graduates will have the skills needed to succeed in the job market.

Royal University of Agriculture

There are a number of universities in Cambodia that teach agricultural programs (for university governance: Table 7). One such university is the Royal University of Agriculture (RUA), a semi-autonomous public education institution located in Phnom Penh. Founded in 1964, it is the leading agricultural university in Cambodia (and the only exclusively agricultural higher education institution in Cambodia), and has 5000-6000 students. There are four different degree types offered: an Associate Program (80 credits), a Bachelor’s Program (144 credits, 4 years), a Master’s Program (54 credits, 2 years), and a Doctoral Program (72 credits). It is important to note that women are under-represented in enrollment at RUA; of 304 current Master’s students, only 40 are women, and only 4 of the 288 Master’s students who have graduated so far are women.

RUA has ten faculties (and each faculty is composed of three departments): Agronomy (where courses are taught on subjects such as water for crop production, crop ecology, and soil and water management); Animal Science; Veterinary Medicine; Forestry Science (which has courses on topics including watershed management); Fisheries Science (which includes courses on aquaculture, water quality, and water contamination and treatment); Agricultural Engineering (which includes courses on hydrology, irrigation and drainage systems, groundwater, and pumping for agricultural production); Agricultural Economics and Rural Development; Agro-Industry; Land Management and Land Administration; and Rubber Sciences. However, many of these faculties lack the proper equipment and lab space to be fully effective programs.

RUA’s Graduate School of Agricultural Sciences has five departments (Agricultural Science; Animal Science and Veterinary Medicine; Renewable Natural Resources; Aquaculture and Aquatic Resource Environment; and Agricultural Economic Development), and offers a PhD program, the GIDAR Master, a Special Bachelor Program, a Special Associate Program, and an Associate Program in Agri-education for Extension (AEE). PhD

students can choose between 24 specializations and must complete 72 credits and create an original work of research. The GIDAR Master Program (in English it is called the Integrated Management of Agricultural and Rural Development (IMARD) Master Program) is comprised of 54 credits and takes two years to complete. The Special Bachelor Program is intended for government officials with over ten years of experience. It is comprised of 44 credits and takes 1.5 years to complete. The Special Associate Program is also for government officials with over ten years of experience. It is comprised of 44 credits and takes 1.25 years to complete.

RUA has one research division, called the Hun Sen Research Center, also known as the Division of Research and Extension (DRE). The goal of the Center is to build capacity in the agriculture sector. There are a number of laboratories in the DRE: the Lab of Parasitology (under construction), the Lab of Microbiology (under construction), the Lab of Crop Quality, and the Lab of Soil Analysis.

RUA has experience with other donor/funded projects. The institution has been involved with the UC Davis/U-Hawaii Hort CRSP, the USAID-Michigan State extension evaluation, a USDA project for developing an MS in Animal Production and Welfare, FINTRAC/HARVEST, and a CDC collaboration.

In speaking with RUA administrators, faculty and students on the June 2013 data collection trip, it is clear that there are specific challenges/needs/priorities at RUA:

- English language proficiency needs to be developed in staff and students to increase regional integration. There is an English language center at RUA that could be strengthened to address this.
- Curricula need to be upgraded. RUA has been run under several different systems in the past (Russian, Japanese, French, Khmer, etc.), so curricula is disjointed and outdated.
- Facilities and labs need to be upgraded. The facilities need new equipment, and staff members need to be trained on how to properly utilize new equipment.
- Pre-university education needs to be better linked with university-level education. Secondary schools in Cambodia typically have a “life-skills” program as part of their curricula, under which agricultural knowledge could be taught, but often is not. There is a need to develop methods to integrate agricultural education into pre-university-level education in Cambodia so that all students entering RUA (and other universities for agricultural programs) have some standard agricultural knowledge prior to university education.
- Practical skills and research skills are lacking in students and staff. There is a need to incorporate theoretical courses with practical projects, as well as to pair research methods courses with opportunities for research.
- Cambodia faces pressure to catch up with other ASEAN nations. The agricultural education system in Cambodia needs to be updated to a similar level of surrounding countries quickly, and RUA is a key part of this system.

University of Battambang

The University of Battambang (UBB) is another prominent Cambodian university with agricultural curriculum. The university opened in 2008, and the degree types offered at UBB are Short Course training programs, a Bachelor Program (4 years) and a Master’s Program (2 years). Notably, if a person who has already entered the workforce decides to return and pursue a degree, they may count their experience in the workforce toward their degree and can graduate in 2.5 years. UBB has a main campus, a store, restaurant/cafeteria (on campus), and

two farms, among other facilities. There are ~5000 students currently enrolled, but the maximum capacity is really around 2000.

There are five faculties at UBB. These are: Business Administration and Tourism; Arts, Humanities and Education; Science and Technology; Agriculture and Food Processing (majors under this faculty: Horticulture, Animal Science and Veterinary Medicine, Fisheries/Aquaculture, and Food Processing); and Sociology and Community Development (majors under this faculty: Economics, Agribusiness, Rural Development, and Law). UBB also has an Institute of Foreign Languages, which typically takes four years to complete.

In 2008, there were only 30 students enrolled in agriculture; now, there are over 200. UBB has pretty well-equipped lab facilities, including the largest tissue culture lab in Cambodia, where they have produced 20,000 banana plantlets.

On the data collection trip, the rector stressed further developing the MS program in Sustainable Agriculture as a priority, as well as the need for more technically and practically trained faculty and staff in topics like plant production, soil science, and pest management.

Prek Leap National School of Agriculture

Prek Leap National School of Agriculture (PNSA) in Phnom Penh is another Cambodian institute of higher learning that offers degrees in Short Course training programs, an Associate Program (2 years), and a Bachelor Program (4 years).

The Short Course training programs are offered for 22 different specialized agriculture courses. Specialized courses include topics like “Agricultural Extension,” “Disease and Treatment for Chicken, Pig and Cattle,” “Integrated Pest Management,” “Rural Credit Management,” and “Vegetable Growing Techniques,” among others.

Eight degrees are offered under the Associate Program. These are: Agribusiness/Economics; Agricultural Extension and Rural Development; Agronomy; Animal Health and Production; Fisheries; Food Processing; Forestry; and Horticulture.

Nine degrees are offered under the Bachelor’s Program. These are: Agricultural Economics; Agricultural Extension and Rural Development; Agricultural Management; Agronomy Science; Animal Science and Veterinary Medicine; Aquatic Resource Management and Aquaculture; Forestry Science; Horticulture; and Food Technology.

Institute of Technologies in Cambodia and other institutions

The Institute of Technologies in Cambodia (ITC) in Phnom Penh offers programs related to rural engineering and hydrology. Course topics include rural infrastructure improvement and maintenance. ITC is one of the only universities in Cambodia to offer courses related to water.

Other institutions that have some agriculture courses include Kampong Chham National School of Agriculture and Moharussey Vedic University.

Non-formal education and TVET

The non-formal and vocational/technical education systems can be improved in Cambodia. The MOEYS website describes how MOEYS would like to “increase support for the provision of local life skills and vocational training and basic/required professional skills responsive to the needs of the social and labor market.” MOEYS is hoping to place a strong focus on literacy and partnerships with NGOs, community centers, and other organizations in order to obtain this goal.

Only 1% of employed Cambodians have formal technical and vocational education and training (TVET), and less than 6% of Cambodians ages 20-24 have attended TVET schools (World Bank 2012a). TVET can be understood as the study of technologies and technical sciences, as well as the practical skills and knowledge that are related to such studies. When compared regionally, Cambodia has one of the smallest shares of students currently enrolled in TVET at the upper-secondary and tertiary levels (Figure 3) (World Bank, 2012b). Existing TVET programs are of a limited quality due to a lack of skilled trainers, a lack of proper equipment/technologies, and poor building facilities. However, private schools/centers are perceived to be better as they likely have better-quality trainers and facilities.

In the 2005-2006 year, 27,487 students graduated from 40 public technical/vocational institutes and 170 NGO or private training centers. In the public schools, only 50% of students receive technical training, and the other 50% learn management and computer skills. Those enrolled in private schools mostly learn English, business, and computer applications, and those at NGO training centers can learn any variety of skills, including agriculture, business, mechanics, and handicrafts.

A number of agricultural research institutions are at work in Cambodia. Some of the most important are RUA (discussed in the “Higher education” section), the Cambodian Agricultural Research and Development Institute (CARDI), and the Centre d’Etude et de Développement Agricole Cambodgien (CEDAC), also known as the Cambodia Center for Study and Development in Agriculture. CARDI is involved in research plant breeding and protection, soil and water sciences, agri-engineering, socio-economic development, and agronomy and farming systems. CEDAC takes part in work relating to local development, training and research, and health and the environment. CEDAC’s Local Development Program is its largest program, and encompasses projects on linking small farmers to markets, ensuring that children have access to primary schools, and creating community-based solutions for climate-smart agriculture and resource management. CEDAC’s Training and Research Program activities involve providing consultancy services on topics related to agricultural production, agricultural cooperatives, and community organization. The Health and Environment Program at CEDAC has the roles of monitoring Cambodia’s agro-chemical situation, to educate the public about the negative effects of overuse of chemicals in agriculture, and to develop organic standards (Centre d’Etude et de Développement Agricole Cambodgien, 2012).

Challenges facing agricultural education and training supply in Cambodia

Some of the most prominent problems facing agricultural education and training in Cambodia that were identified in the literature review include:

- The need for further curriculum development and staff capacity-building
- The uneven quality of educational institutions

- There is a need for a respected certification/accreditation system to assure employers of the quality of students/programs
- A misunderstanding about the potential returns on investment to education
- The need for the development of proper infrastructure
- The need for up-to-date equipment and teaching materials
- An inadequate budget allocated for institutional development/low expenditures on education by the Cambodian government
- Cambodian students are disconnected from the market and fields of study
 - Only 2.3% of students study fields related to agriculture, despite agricultural activities contributing 30% of Cambodia's GDP and agricultural and off-farm rural activities being Cambodia's main industries that need to be improved (World Bank, 2012a)
- Tertiary graduates in fields of education (including teacher training), engineering, manufacturing, and agriculture are low, especially when compared regionally and when considering the demand for these types of skills (Figure 5)

After meeting with key Cambodian stakeholders on the in-country data collection trip, other prominent problems facing agricultural education in Cambodia were identified. These additional key problems are:

- The need for improved competency in the English language
- Little exposure to agricultural education before the tertiary level,
- The need for a practical/hands-on educational experience that can complement the theory learned in classes

Labor market and employer needs

Demand-side

Agricultural industry

The main agricultural commodity in Cambodia is rice, and therefore the rice market is important in the Cambodian agricultural sector. Other important commodities include maize, cassava, sweet potato, and some types of vegetables (World Food Programme, n.d.). Types of produce that could become increasingly important include including mangos, bananas, oranges, and chili peppers (Fresh Studio Innovations Asia, 2009).

There is little information available regarding agricultural employers/employment outcomes for agricultural students. Based on the literature review and the June 2013 data collection visit, some important employers in agriculture include, but are not limited to:

Private Sector

- Cambodia Biologicals Co., Ltd
- Emerging Markets Consulting (EMC)

Non-Governmental Organizations

- Aphivat Strey
- Centre d'Etude et de Développement Agricole Cambodgien (CEDAC)
- Environmental Protection and Development Organization (EPDO)
- Farmer Livelihood Development (FLD)
- GERES Cambodia
- IDE Cambodia
- JVC Cambodia
- Lom Orng Vocational Training Centres
- Prom Vihear Thor Organization
- Skill, Knowledge, and Information for Life (SKIL)
- Srer Khmer
- Village Support Group (VSG)
- Wathnakpheap Organization (WP)

Educational Institutions

- Royal University of Agriculture (RUA)
- University of Battambang (UBB)
- Prek Leap National School of Agriculture (PNSA)
- Institute of Technology Cambodia (ITC)
- Build Bright University (BBU)

Research Institutes

- Cambodian Agricultural Research and Development Institute (CARDI)
- Inland Fisheries Research and Development Institute (IFReDI)

Skills shortages/gaps

Growing demand

There is a growing demand for skilled labor (people with technical skills) in Cambodia. In 2007, 15.5% of firms reported skills as a major constraint to growth (Table 8); 22% of foreign firms said skills were a “severe” or “very severe” constraint to growth. Employers identify a structural imbalance in skills supply, including a shortage in TVET graduates as compared to those who graduate from a university. In 2011, 73% of employers said that those graduating from a university are graduating with the wrong skills, and in the same year 62% of employers also said that vocational training graduates do not have the right skills.

Skills that are lacking

Soft skills are noted as the most important skills that are lacking by employers. These skills include management, analytical thinking and decision-making, and so forth. Employers also value skills in literacy and numeracy, as well as behavioral skills. These skills are learned in a school setting and in early development, reinforcing the need for good nutrition and pre- and primary schooling programs that are effective during early childhood development as these programs have a high payoff. There is also a skills gap related to technical skills in Cambodia: there is a lack of training in technical competencies (including skills related to agriculture and technology), a lack of proper facilities and equipment to upgrade and develop such technical skills, a lack of up-to-date curricula to teach cutting-edge material and technologies, etc.

Reasons that skills are lacking

There are a number of causes of Cambodia’s skills gaps and employment mismatches. First, Cambodia’s current primary education system has issues with completion rates and learning more generally, as many students repeat or drop out. This is an obstacle to early childhood development, as many skills are formed early in life in a school setting. Acute malnutrition is another major obstacle to early childhood development, as early developmental setbacks (mental and skills-related) from malnutrition are difficult and/or impossible to remedy later in life.

Additionally, less than one half of students actually complete secondary education in Cambodia. Some primary reasons for dropping out or skipping include chores, poverty, and the need to make additional income. Also, technical/vocational training systems are undervalued and suffer from low attendance and poor-quality resources (perhaps as a result of social bias) even though returns to post-secondary TVET are nearly equal to the returns from tertiary education (Figure 4). There is a need for household interventions to promote school attendance and retention, as well as a need for more consistent basic education and improved vocational programs.

Another cause of the skills gap is misinformation/miscommunication among higher education institutions and a multitude of other actors. Employers lack appropriate channels within which to make their desires known for certain skills in successful future job candidates, and there are no labor market information systems/institutions to survey labor market demand and connect it with supply (i.e. coordination mechanisms, employment services, quality assurance, accreditation, licensing, and regulation). To rectify this, schools and companies need to be

brought together to promote quality and relevance to the demands of the market. The National Training Board needs to better allow for firms to convey their needs to the government and the provider community, because currently the Cambodian economy is focused on low-skill production (surplus) but the unmet need/gap is for higher-level skills (shortage).

A fourth reason that the skills gap exists is that students often base their decision on what subject to study in tertiary schools on the advice, wishes, and interests of their parents rather than on their own future labor market prospects, opportunities, and outcomes. A 2008 survey by BDLINK Cambodia Co. shows that only 20% of graduating secondary seniors based their decision on what to study on the labor market, while 70% followed their parents' advice, and only a third of university and TVET students chose their subject because of market demand. Additionally, there is no reliable report of employment outcomes of recent tertiary graduates.

The results of the mismatch between graduate supply and market demands are high structural unemployment, productivity and economic growth constraints, and the stifling of Cambodia's attempts to diversify its sources of growth.

Ways to address the skills gap

To advance Cambodia's economy, disciplines in the hard sciences are necessary (i.e. engineering, science, and math) but they aren't receiving the needed resources throughout the education system. Only a small proportion of graduates have these types of degrees (Table 9) but they are the most in-demand. Low numbers of graduates in engineering and sciences along with low numbers of TVET graduates with post-secondary training will limit Cambodia's ability to upgrade its agricultural and industrial sectors. A World Bank study indicates that Cambodia will see an over-supply of higher-education graduates in business and law but shortages will persist in science and engineering. Progress in training and education will remain limited by continued weaknesses in teacher training and a lack of graduates in education-related disciplines. To try to rectify this skills gap, the World Bank has developed a plan of action and proposed solutions to overcome skills shortages (Figures 6 & 7).

To try to address the gap in the unmet demand in workers with a mix of hard and soft skills, many employers have started to attempt to provide formal training, despite the fact that almost a third of employers also reported that it is hard to train or upgrade their workforce. Employers pursue the following in formal training: technical skills, decision-making and problem-solving, communication, teamwork and leadership, and marketing, sales, and customer service skills.

Notably, 80% of economic activities in Cambodia take place in the informal sector. "These activities do not really require skills in the field of social sciences - including accounting, finance, and management - as provided by the universities, but rather call for skills provided by vocational training institutions" (Sopheap, 2012).

SWOT Analysis

Based on the June 2013 data collection trip and the literature review, below is a SWOT analysis of the current state of the Cambodian agricultural education and training system:

Strengths

- Strong annual GDP growth (~7%)
- Continually high enrollment rates at the university level (i.e. increasing enrollment at RUA)
- Faculties has experience working with other collaborators/donors
- Good leadership and trust amongst faculty (RUA)
- Much of the population is involved in an agriculturally-related field

Weaknesses

- Students are often studying the wrong topics
- Poor English language skills
- Insufficient funding for labs, equipment, scholarships, salaries, etc.
- Poor infrastructure
- Busy faculty
- Lack of upgraded curriculum
- Disconnect between theory classes and practical education
- Not much agricultural education/training available pre-university
- CEDAC – need to produce more documents in Khmer for local outreach
- Need to improve the ability of private sector input suppliers to provide services

Opportunities

- Develop/strengthen English courses – maybe create certification process?
- Introduce agriculture into high school education via life skills courses – train high school teachers in short-term programs so they are qualified to do this
- Seed grant program to conduct research in conjunction with training in research methods – no sense in just providing research methods training without giving RUA staff/students the opportunities to put these new skills into practice
- Connect faculty members at universities to resources from consortium (or other) partners/faculty – US researchers and Khmer researchers can collaborate on research projects, develop practical training components to courses, upgrade curricula, etc.
- Financial and grant administration to help make Cambodian institutions/universities more self-sufficient/profitable so that they can re-invest in their programs/people
- Connect schools with companies that may potentially hire graduates to create internship programs
- Further develop short-term training courses and TVET programs

Threats

- Change of governance
- Consistent funding/support from donors

For a SWOT analysis related to Cambodia's agriculture and water management strategies, see Figure 8.

Methods indicative of good practices

Dr. Murari Suvedi of Michigan State completed a short-term training program on monitoring and evaluation (primarily of donor programs/initiatives, like HARVEST and programs from JICA) at RUA at the same time as the Cambodia June 2013 data collection trip. This program was attended by 26 participants, who were competitively selected from over 80 applicants from a wide range of public and private sector institutions in Cambodia. This program entailed a week-long preliminary research training in January 2013 at RUA, after which the participants (who worked in small multi-disciplinary groups of 2-3 people) spent the next few months collecting evaluation impact survey data from farmers across the country using small seed grants. They then returned to RUA for Dr. Suvedi's final week-long workshop on how to analyze the data using statistical software. They presented their results in presentations at the end of this week, and during the closing ceremony they received a certificate for their accomplishments. The success of this program in teaching research methodology, evaluation, and data processing was evident, and the potential for similar programs using small seed money in the future is high.

innovATE: potential next steps in Cambodia

“Cambodia has more than enough workers to supply emerging sectors, but thus far demand and supply have been mismatched due to the low quality and capacity of the labor force” – Economic Institute of Cambodia, 2008, p. 28

The general constraints to agricultural development in Cambodia are the limited capacity of civil society and public and private institutions, poor financial services, inadequate infrastructure, and too few experienced professionals and technicians (Cambodia has a low share of students enrolled in secondary and tertiary education when compared regionally, and 70% of the population is under 35). (For a complete summary of issues in higher education in Cambodia, see Figure 9.)

The Cambodian government's “rectangular strategy” calls for improvement to and enhancement of the agricultural sector as one of its strategic “growth rectangles”, which indicates that there is a demand for and government support for agricultural development (Figure 10). Each growth rectangle has four sides, and the four sides of the “enhancement of the agricultural sector” growth rectangle's four sides are: improved productivity and diversification of agriculture; land reform and clearing of mines; fisheries reform; and forestry

reform. Another “growth rectangle” in the Cambodian government’s rectangular strategy is capacity building and human resource development. The four sides of this growth rectangle are: enhanced quality of education; improvement of health services; fostering gender equity; and implementation of population policy (Royal Government of Cambodia, 2004). This indicates that the government also supports institutional and human capacity-building and education reform.

According to the World Bank, there are 5 disconnects in higher education that need to be addressed (Figure 11):

- 1. Between higher education and employers (skill users)
- 2. Between higher education and companies (research users)
- 3. Between higher education and research institutions (research providers)
- 4. Among higher education institutions themselves and between these institutions and training providers (horizontal disconnect across skill providers)
- 5. Between higher education and earlier education (schools) (vertical disconnect across skill providers)

The types of skills required of Cambodian students need to be more concretely defined in the near future. Next steps that could be taken by the Cambodian government and institutions in order to achieve this include:

- Increasing English language competency by creating certification programs/courses
- Increasing dialogue between higher education institutions and private companies/employers so that programs, curriculum, and teaching methods are in line with demand by employers (Figures 12 & 13)
- Increasing investments by Cambodian government in education and research
 - There is a need for a fruit and vegetable research institute and export firm
 - Potential to create export/domestic markets/value chain development for mangos, bananas, asparagus, melons, sweet corn, etc.
- Improving early childhood development programs
- Upgrading curricula in universities by encouraging practical skills training
- Improving quality control measures for education (accreditation, etc.)
- Developing school and career counselling services so that students have access to information about opportunities in agriculture
- Improving teacher training and retention as well as helping to upgrade agricultural curricula/research capacity
 - RUA example: as a result of inadequate incentives, there is a high staff turnover, loss of skilled staff, and/or little motivation for high-quality work by staff
 - Potential solution: invest in performance-based management and incentive systems
 - Need to build a culture in faculty to look for outside sources of income (i.e. research grants)
- Creating tracer studies of employment outcomes for recent graduates
- Incentivizing TVET and agriculture/science/engineering programs in universities because they are undervalued and underutilized (Figure 14)
 - Curtail impressions that TVET is a “second-class” education
 - Possibilities:
 - Follow Korea’s example - <http://unesdoc.unesco.org/images/0013/001394/139459e.pdf>

- “The ultimate challenge lies in keeping abreast with technological change. To keep curricula relevant, the plan is to tighten links to the private sector” (UNESCO, 2005, p.6)
 - Emulate Germany’s 2+1 dual system (2 years studies, 1 year apprenticeship)
- “Vocationalize secondary education”
 - Incorporate practical subjects (i.e. agriculture, management, etc.) into academic curricula; in Cambodia, there is strong potential for this by linking with life skills courses at the secondary level
 - In Cambodia, MOEYS is launching a “Technical Orientation Department” to focus on integrating technical subjects into secondary education
- Increasing government support and funding for TVET programs because training programs are often expensive for students

The World Bank has further summarized the causes of skills gaps and mismatches in Cambodia by analyzing the constraints/challenges related to the demand and supply of skills (Figure 15) as well as how to develop the appropriate/lacking skills in the life cycle (Figure 16).

In order to construct a comprehensive menu of challenges with potential ways forward, **we recommend a formal scoping visit to Cambodia be undertaken by an innovATE team ASAP**. This scoping visit could have more in-depth discussions with both USAID-Cambodia and RUA, a likely focal point of innovATE activities, as well as initial face-to-face discussions with government ministries and other organizations that we were unable to meet with during the June visit, due to the imminent elections or for other reasons.

We recommend a week-long scoping visit of a team of 2-3 people from the innovATE consortium at a time that is well suited for both USAID-Cambodia and RUA. We recommend the scoping team visit with the following organizations in order to gather more information on how to better match the agricultural sector skills supply to the demand. Also, it is of critical importance that a visit involve further assessment of synergies between potential innovATE activities and current USAID programming, along with further documentation of good practices or models from which lessons can be learned for future agricultural education and training activities in Cambodia.

Draft itinerary for the next innovATE-Cambodia trip

Day	Organization
Monday	1. USAID-Cambodia in-brief 2. RUA
Tuesday	3. RUA
Wednesday	4. Government <ul style="list-style-type: none"> • Ministry of Education, Youth, and Sport • Ministry of Agriculture, Forestry, and Fisheries
Thursday	5. ITC 6. Lom Orng Vocational Training Centres/TVET schools 7. Agricultural research institutions <ul style="list-style-type: none"> • Inland Fisheries Research and Development Institute (IFReDI) • Cambodian Agricultural Research and Development Institute (CARDI)

Friday	8. Potential private sector/NGO employers (to interview about skills needs/skills development) <ul style="list-style-type: none"> • CEDAC • IDE Cambodia • Cambodia Biologicals Co. Ltd. • East/West Seeds Cambodia
Saturday	9. USAID-Cambodia out-brief

Justifications for visiting each of the organizations listed for the next innovATE-Cambodia trip

Organization	Reason for visit
USAID	To keep informed about findings and to discuss potential ways forward to use innovATE to enhance Cambodia's ATE system in synergy with ongoing AID Cambodia programs
RUA	Primary/priority institution in Cambodia for agricultural education
Government	Did not get to visit in June; key employer and critical policy-maker in agriculture and education
ITC	Simeth Beng of World Bank-Cambodia recommends a visit to ITC due to their successful model for institutional sustainability, accountability, and transparency. According to Beng, ITC receives funding from multiple sources and spends resources wisely, links well with the private sector, conducts a lot of research, and has highly-motivated faculty on supportive salaries.
Lom Orng/TVET	Did not get to visit in June; important to understand technical and vocational training in agriculture
Research institutions	Important to understand how AET can be effectively linked to research endeavors
Private sector and NGOs	Potential employers of agriculture graduates; need more information about skills training and development from these organizations

Appendix A: Figures

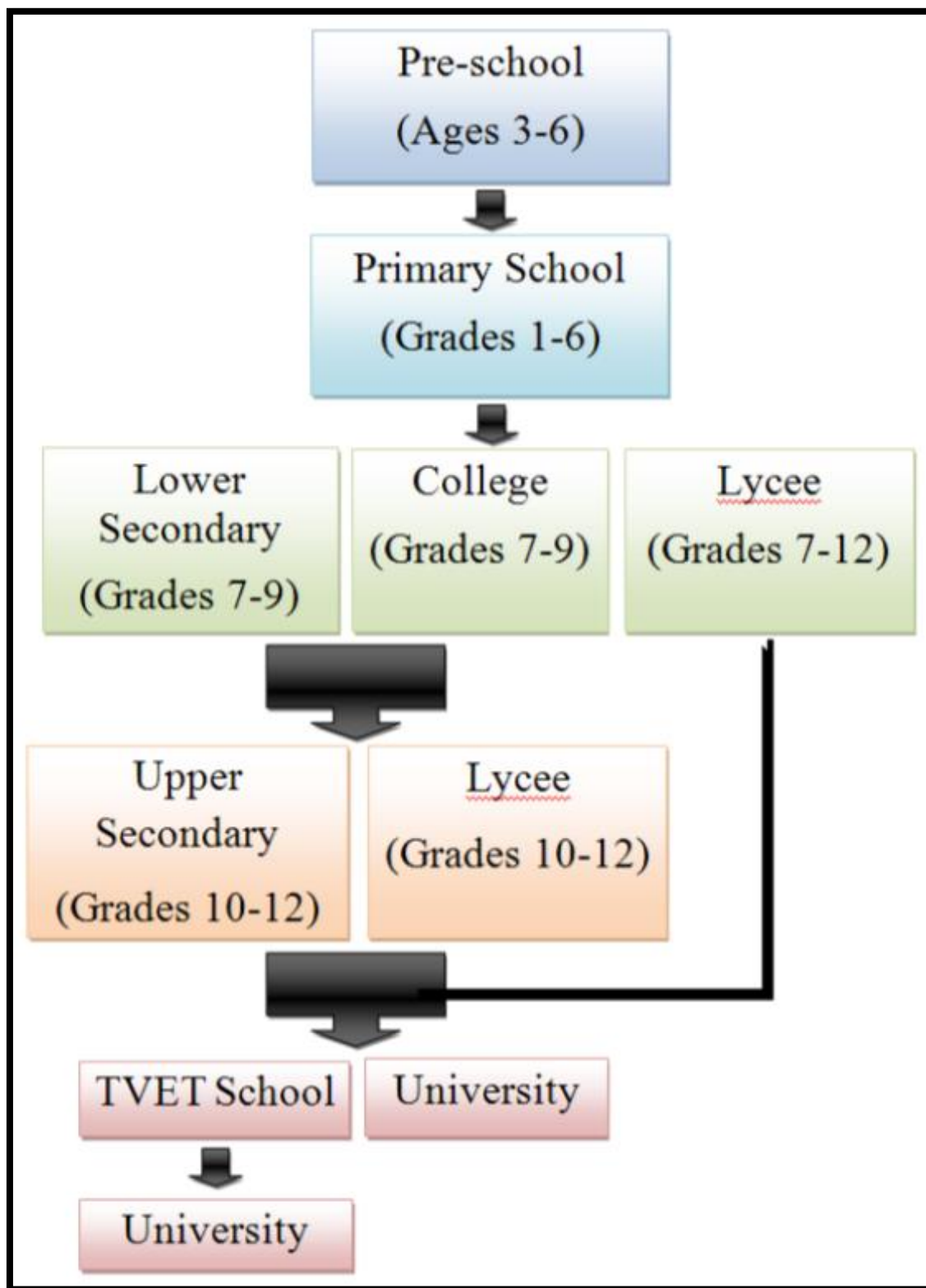


Figure 1. A flow chart of some possible education pathways for Cambodian students, from pre-school to tertiary education. Students may repeat/drop out at any level.

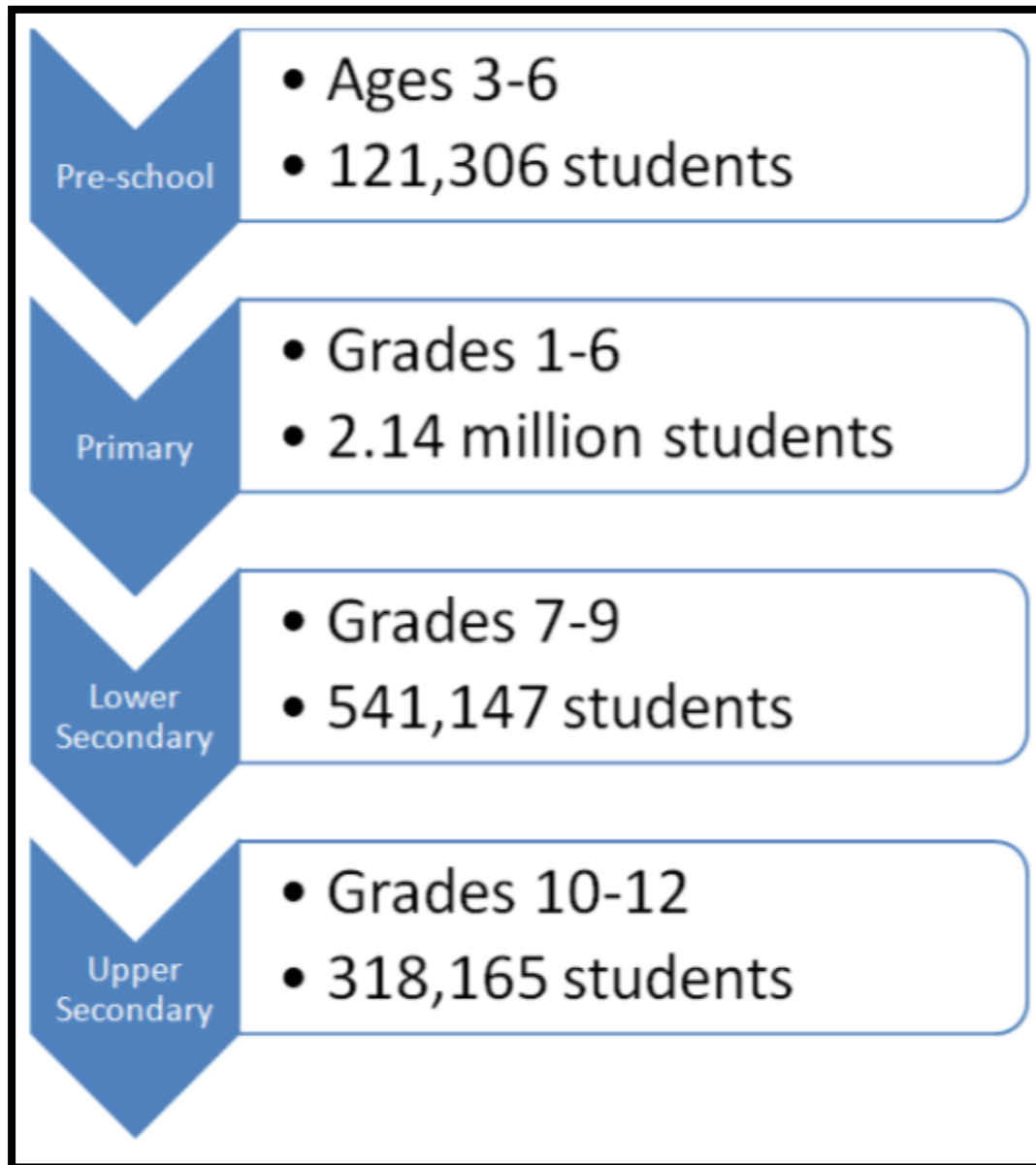


Figure 2. A flow chart of what could be considered a somewhat typical pre-university education pathway for a Cambodian student, along with how many students were enrolled at each level in 2011/2012. It is clear that many students have some primary schooling and that enrollment rates decline as students drop out at secondary levels. Mean years of schooling, according to the CIA World Factbook (2013), for students in Cambodia is 10 years.

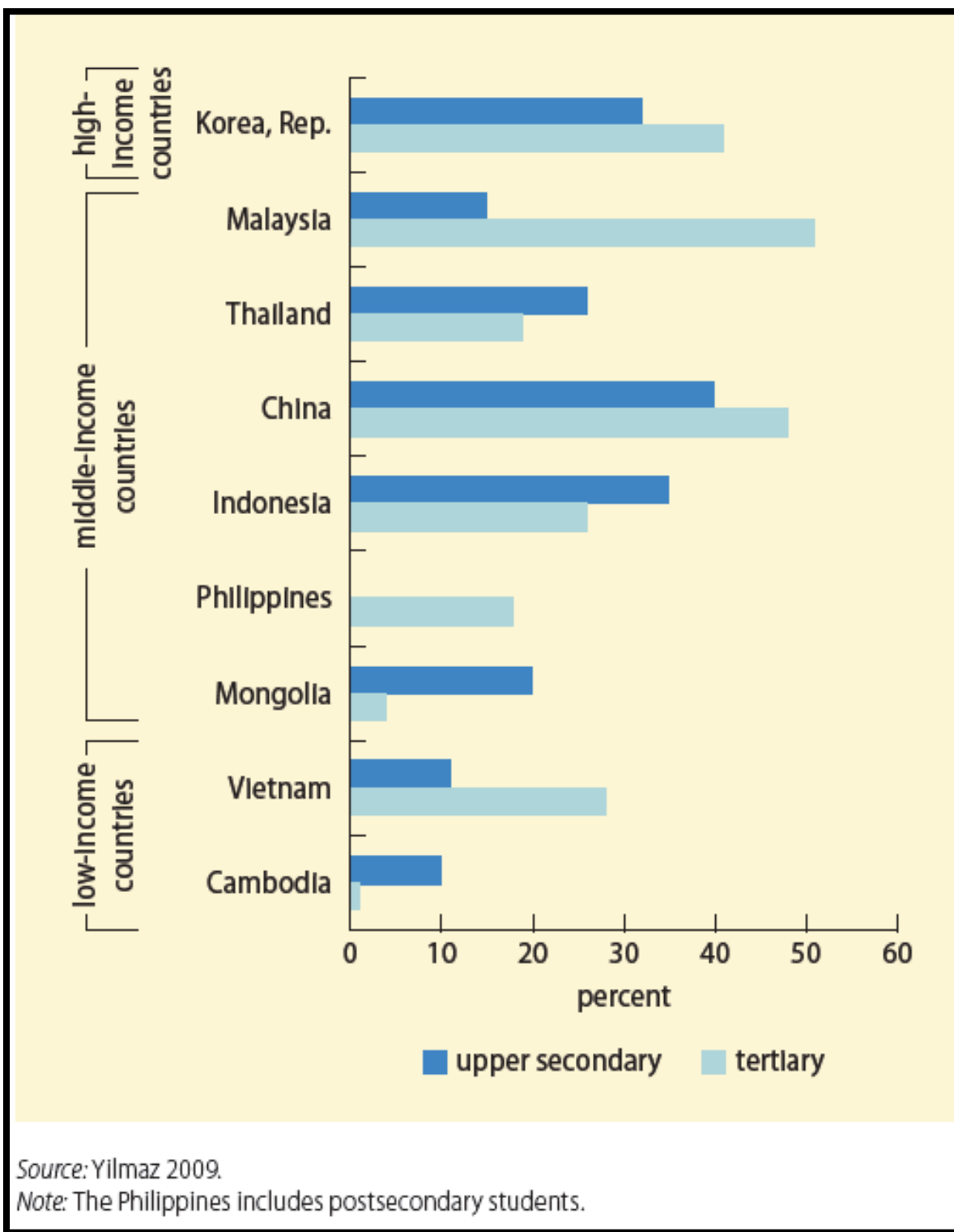


Figure 3. Share of upper-secondary and tertiary students enrolled in TVET in Cambodia. Taken from the World Bank (2012b) p. 71.

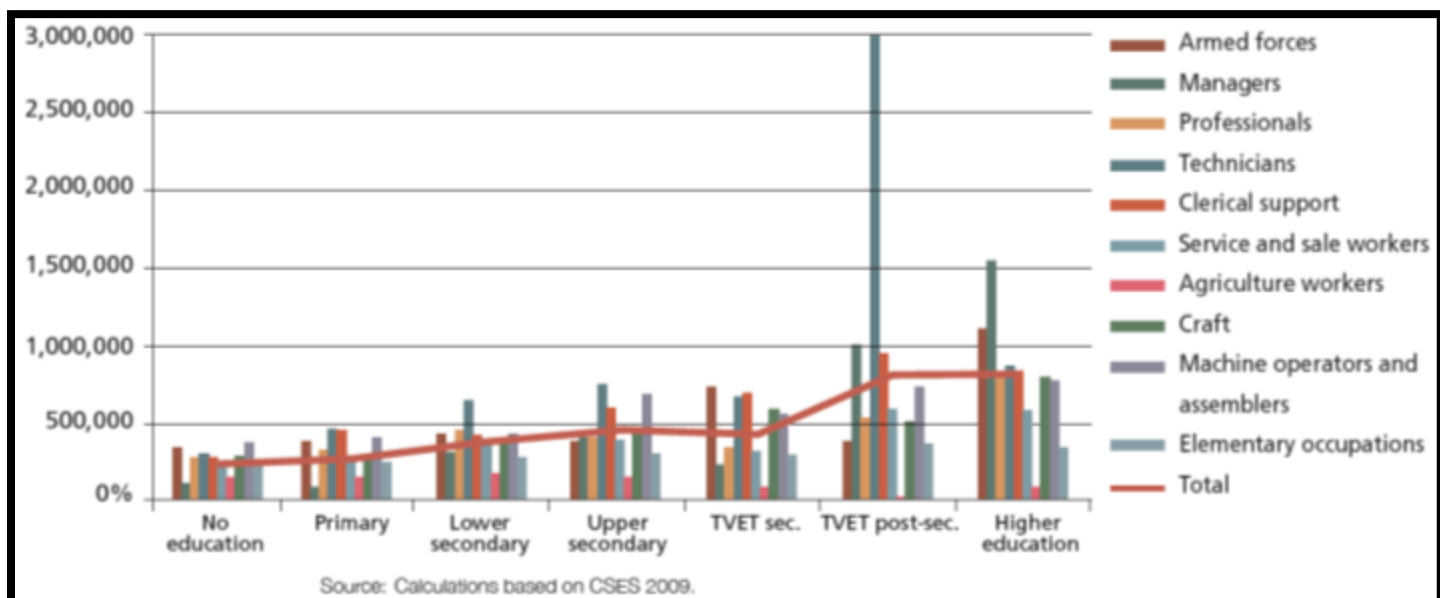


Figure 4. Monthly wages by level of education and occupational groups, 2009. Taken from the World Bank (2012a) p. 14.

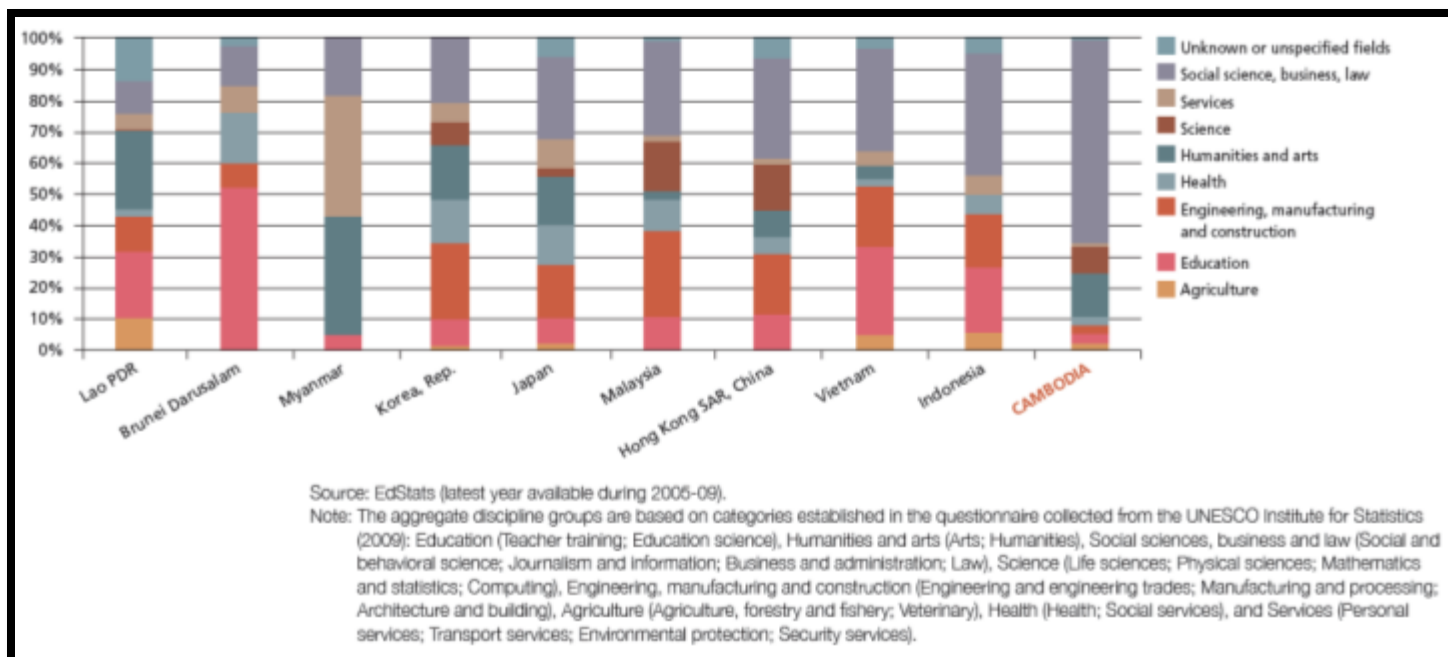


Figure 5. Share of tertiary graduates by discipline internationally. Taken from the World Bank (2012a) p. 16.

Objective	Skills supply	Laying the foundation for the future
1 Information access	<ul style="list-style-type: none"> Enhance employment counseling and job search services Use media to show study and career opportunities, promote TVET 	<ul style="list-style-type: none"> Enhance the NEA's capacity and partnership with the private sector
2 Coverage in the "missing middle"	<ul style="list-style-type: none"> Mainstream good TVET programs 	<ul style="list-style-type: none"> Strengthen the capacity of the NTB to deliver employer-focused reform of education and training Consider ways to encourage employers to invest in training their workforce
3 Quality and market relevance	<ul style="list-style-type: none"> Begin upgrading a small number of skills providers, including non-formal training centers, in collaboration with local industries 	<ul style="list-style-type: none"> Reform secondary curriculum to improve the teaching of science, math, engineering and other technical disciplines, entrepreneurship, and soft skills Strengthen accountability of communities and schools as part of the D&D process
4 Financing efficiency	<ul style="list-style-type: none"> Expand household-oriented financing instruments for school retention 	<ul style="list-style-type: none"> Increase expenditure on cost-effective interventions early in the life cycle Explore different financing tools to promote incentives toward good results among skills providers, including higher education institutions

Figure 6. Skills development action plan: Immediate priorities and laying the foundation for the future. Taken from the World Bank (2012a), p. 3.

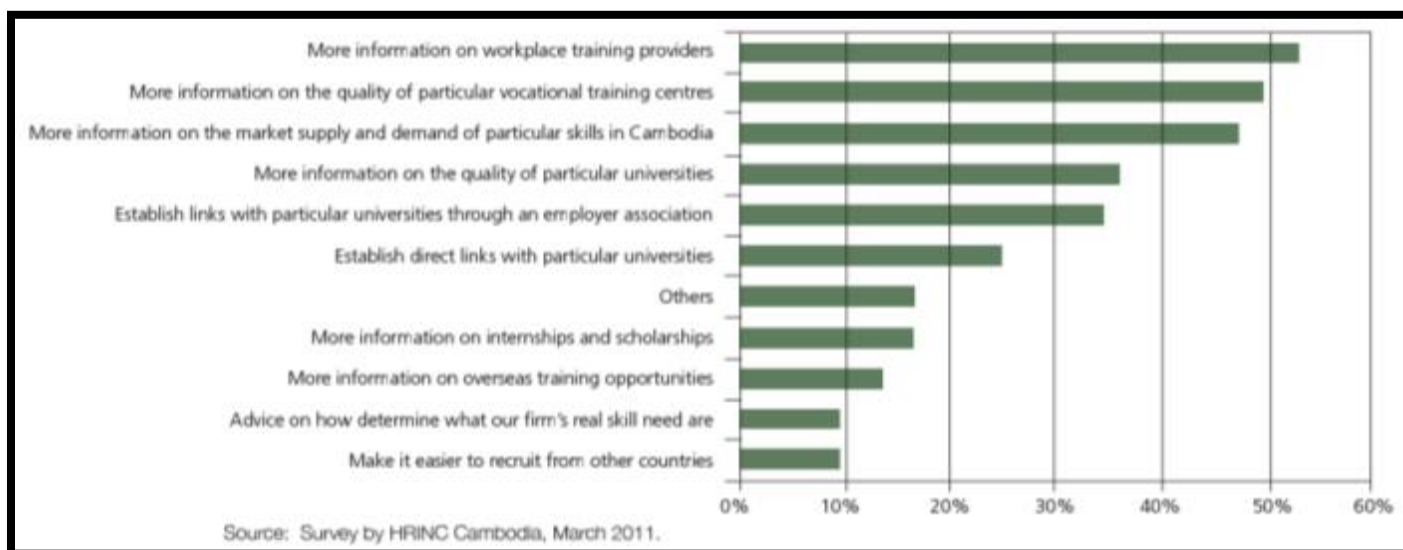


Figure 7. Employers' proposed solutions to overcome skills shortages in the Cambodian workforce. Taken from the World Bank (2012a), p. 10.

Agriculture and Water Management: summary SWOT Analysis	
Strengths <ol style="list-style-type: none"> 1. Land resources are available 2. Water resources are available 3. Abundant manpower is available in rural areas at low labour cost 4. MAFF and MOWRAM have good human resources potential 5. Policy and/or strategic frameworks are developing for MAFF and MOWRAM 6. Stakeholders are committed to and recognise the importance of the sector (Government, EDPs, NGOs and farmers) 7. Diverse agro-ecosystems are available, with many land-types and cultivars 8. Developing focus on community empowerment and engagement, through inter alia Community Councils, FWUCs and FOs 9. Agri-business is developing 	Weaknesses <ol style="list-style-type: none"> 1. Institutional capacity, management and project implementation by MAFF and MOWRAM are weak 2. Water resources are highly variable in time and space, and agricultural water management technology is poorly developed 3. There is limited investment capacity or interest in investing in agriculture 4. Technology transfer is weak and farmers and extension workers have a low level of knowledge, access to technology, and skills 5. Soil fertility is low in many the areas. 6. Socio-cultural weaknesses include low community solidarity, vulnerability of farmers to landlessness, a cultural focus on subsistence agriculture: "Rice first, fish second" 7. Information asymmetry (inconsistency) among stakeholders 8. The productivity of agricultural labour, land and water is low (resources are used inefficiently) 9. There is weak access to markets 10. Legal instruments for A&WR are inadequate.
Opportunities <ol style="list-style-type: none"> 1. Improvement of governance, including RGC commitment (the GAP), policy definition and political stability. 2. Market development and integration with the regional and global economy. 3. Strong support from External Development Partners for investment in A&W 4. Science and new technologies 5. More fully exploit natural resources (water and land) that presently are under- or un-utilised 6. Availability of investment funds, including incentives, private funds, and rural credit services 7. Decentralization and de-concentration policy 	Threats <ol style="list-style-type: none"> 1. Market changes, including highly competitive international markets 2. High cost of oil and gas. 3. Political circumstances, including competing demands for RGC funds from other sectors 4. Legal circumstances, including continued failure to enforce laws on land, water, forests etc. 5. Natural disasters 6. Degradation of the environment 7. Failure to implement governance, judicial and other reforms 8. Social and political changes, e.g. social conflict over access to water and land, Labour migration. 9. Decreasing EDP support for A&W

Figure 8. SWOT analysis related to agriculture and water in Cambodia. Taken from the Kingdom of Cambodia (2007), p.6.

Access	<ul style="list-style-type: none"> • Number of fee paying students has been increasing significantly, while ratio of scholarship students has been reduced. • In 2008 the national HE enrolment rate was 11.1% which is low compared to other developing countries in South East Asia (Thailand (31.9%), Malaysia (28.3%), and the Philippines (29.4%)). This is still considered insufficient to yield significant improvements in economic competitive.
Equity	<ul style="list-style-type: none"> • Disparities persist between urban and rural areas, male and female and rich and poor. Although the gender gap has declined in recent years, inequalities have proven fairly resistant to interventions.
Quality	<ul style="list-style-type: none"> • Low proportion of doctor degree holders among teaching staff/researchers across all fields. • Rapid expansion of the HE system over the past decade creating a 'compressed' time dynamic, has had a negative impact on the quality of some institutions. • The science and engineer curriculum needs to be further strengthened and expanded. • Accreditation system needs to be streamlined and overall monitoring of the quality of institutions needs more attention.
Financing	<ul style="list-style-type: none"> • The share of Higher Education budget was 3.3 percent of total public education expenditure. • Public expenditure for HE is estimated at 0.09 percent of GDP, while private expenditure accounts for 0.49 percent. Combined the total expenditure ratio reaches 0.58 percent, still well below the world average of 1 percent.
Governance/ Management	<ul style="list-style-type: none"> • Ministry of Education has limited power to governance and steer the higher education sector due to the lower portion of public financing. • There is a need to have a strategic framework to guide the development of the sub-sector which link between growth, labor market, and skills required. • There is need to develop and strengthen a higher education management information system to bring higher education administration, registration, and information systems up to an international standard.

Figure 9. Issues in Cambodia's higher education system. Taken from the World Bank (2010), p. 2.

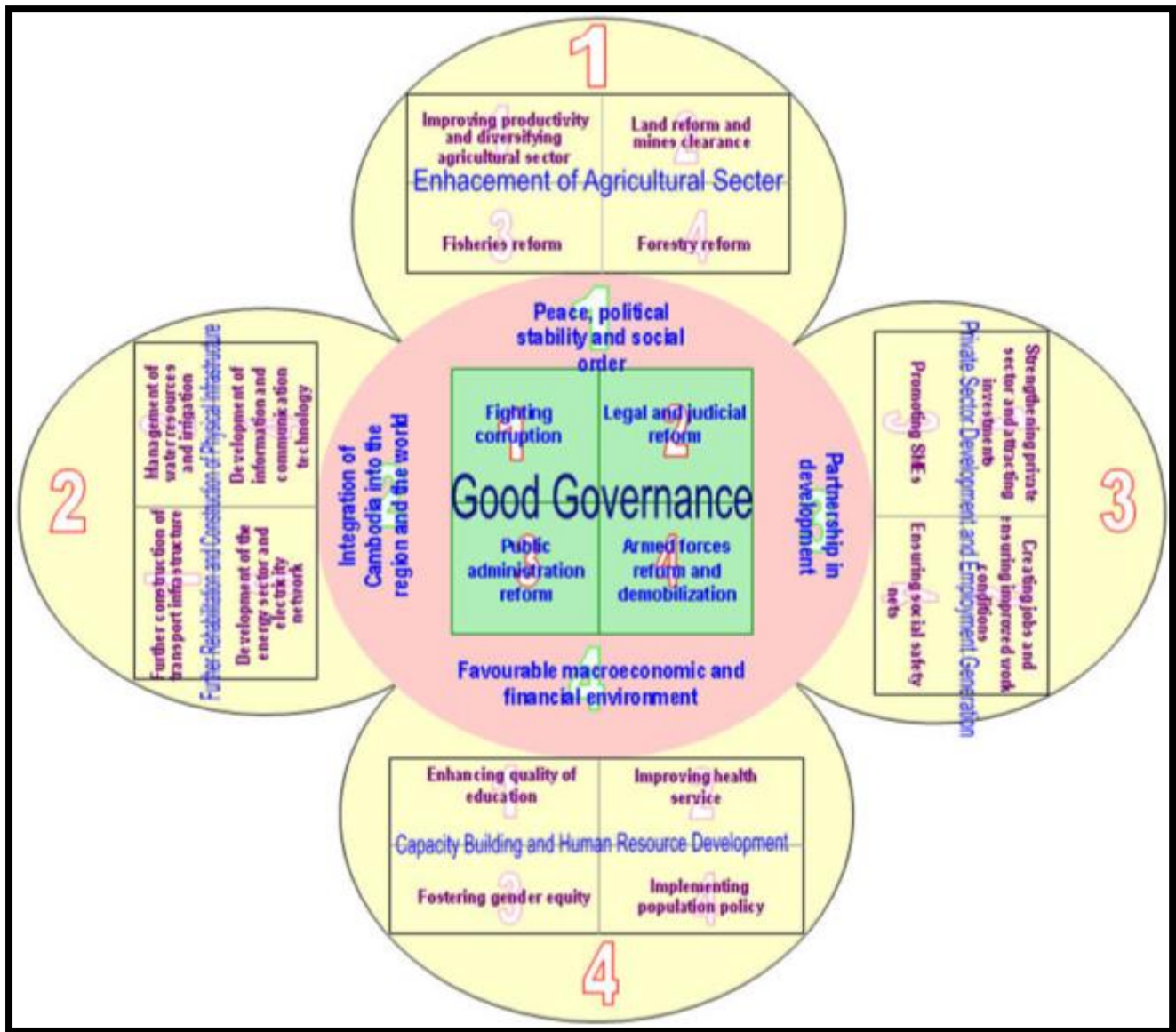


Figure 10. Cambodian government's "rectangular strategy" – pillars 1 (enhancement of the agricultural sector) and 4 (capacity-building and human resource development) are very relevant to USAID and innovATE's missions. Taken from the Royal Government of Cambodia's "*Rectangular strategy for growth, employment, equity, and efficiency in Cambodia.*"

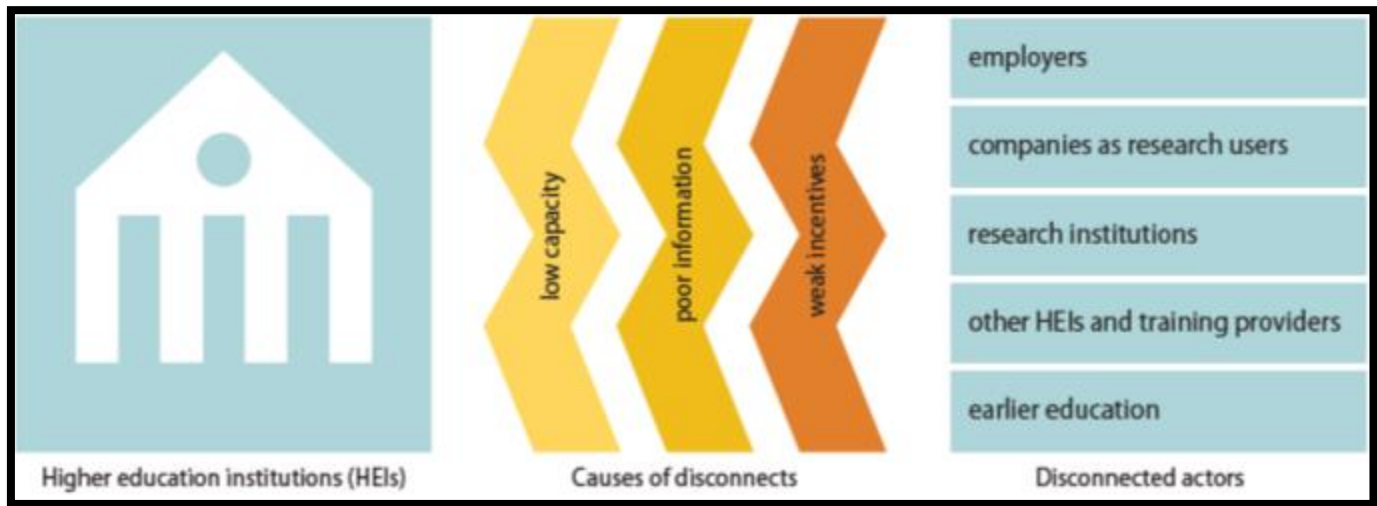


Figure 11. Five disconnects in higher education. Taken from the World Bank (2012b), p. 68.

Activities

- Develop methods to adapt the curriculum and possibly create new programmes according to the job market
 - Define mechanisms and periodically implement tracer studies in every faculty
 - Develop a consortium gathering the main employers for RUA graduates and involve them in regular meeting and survey
 - Organize periodical workshop for curriculum development involving both the consortium of main employers and the alumni association
- Set up an internal accreditation committee for RUA programmes
 - Set up minimum standard according to the recommendations of the Ministry of Education, Youth and Sport and ACC.
- Plan a student intake in synchrony with the absorption capacity of the job market
 - Regular back checking with the consortium of main employers about their current number of professionals and their perspectives of employment
 - Regular analysis of government and donor policies related to agricultural development
 - Assessment of the budget and the human resources at RUA (capacity to provide a given quantity of graduates)
 - Enforce government quota for females, poor students and remote-area origin.
- Integrate professional and practical skills in teaching methods
 - Increase practical trainings in the RUA curriculum (including in particular lab/station/in-class practical trainings as well as visits/collective field trips/study tours, short-term apprenticeships in the farm)
 - Increase cross-cutting capacities (communication, organization, planning, job research...)
 - Increase the number of guest lectures/modules given by external experts by developing links with the consortium of employers and other external stakeholders.
 - Implement a project-based teaching approach for RUA programs enhancing team work, project management and other professional capacities
- Progressively drive curriculum toward international standards
 - Improve mechanisms for students evaluation by defining strict rules for student assessment and graduation that guarantee academic quality of graduates
 - Select a credit system and academic requirements used by universities that are most likely to exchange students with RUA: gradually develop parallel standards in collaboration with these partners.
- Rationalize RUA educational system at the University level
 - Rationalize the training in the faculties by identifying common core skills that could be addressed jointly and the resources saved to be used to develop more practical training
 - Revise the curriculum of the foundation year by including all cross-cutting and common capacities required for the Bachelor studies.
- Diversify the training at the Msc. level toward fisheries, aquaculture, animal production, animal health and veterinary, natural resources management, environment, and food processing
- Improve the language skills of RUA graduates (English and French)
 - In particular, design the new integration of French language in RUA curriculum and programmes
- Develop and implement a teacher capacity assessment and development through continuous training

Figure 12. A depiction of potential activities that universities (RUA specifically) could adopt to improve curriculum and teaching method development. Taken from RUA Strategic Development Workshop.

Activities

- Increase appropriate interactions and network with private companies, NGOs, donors, national and international academic and research institutions, government bodies and extension services, farmer groups
 - In particular, RUA will integrate itself within value-chains of agricultural products and develop links with MSM enterprises
- Establish regular and close links with stakeholders working at the field level i.e. more farmers and private sectors and local authorities
 - Organize regular meetings with PDAs, NGOs, farmer organizations to understand and assess local issues
- Communicate about RUA
 - Importantly, RUA will share its strategy and planned activities with appropriate partners (RGC, donors, scientific community) and communicate about its needs
 - Improve website
 - Publish annual activity report
 - Organize and participate in symposia/workshops for presentation of research results
 - Publish a scientific journal
 - Publish fields of expertise of RUA staff
 - Participate in online journal networks
 - Organize regular events such as open-house, farmer and student fair...
 - Organize national day for research for agriculture and related field
- Involvement of RUA's partners in its regular activities and decisions
 - Involvement with RUA Research Development Team
 - Participation in RUA regular curriculum development
 - Involvement with RUA board of directors
 - Development of joint research projects
- Define clear responsibilities and provide appropriate resources (both human and financial) for bodies involved in RUA relations with external stakeholders
 - Research Development Team
 - Planning and International Cooperation Office
- Write proposals and submit to partners for both research and education
- Develop and formalize or join specific networks
 - Alumni association
 - Consortium of RUA graduates' main employers
 - Research network with national and regional universities
 - Lab network for research sample analysis
 - Network for education activities with regional and international universities
- Include criteria related to networking activities in the performance-based promotion system to enhance participation of RUA staff in communication and networking activities
- Improve the information and knowledge sharing within RUA by designing a realistic system, easy to update

Figure 13. A depiction of potential activities that universities (RUA specifically) could adopt to improve networking and communication development. Taken from RUA Strategic Development Workshop.

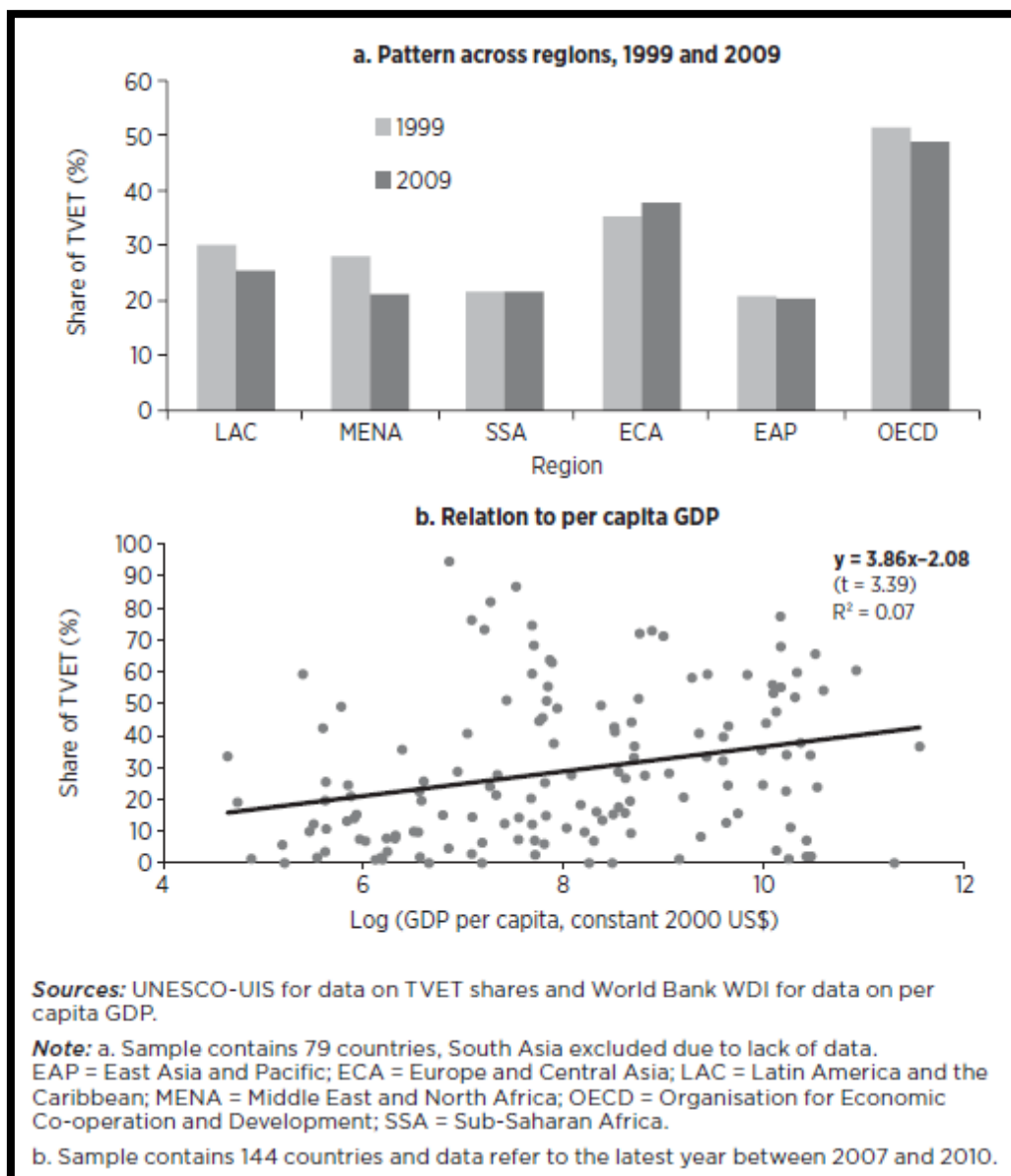


Figure 14. Share of TVET enrollments at the upper secondary level, by region and in relation to per capita GDP. Taken from the World Bank (2012c), p. 70.

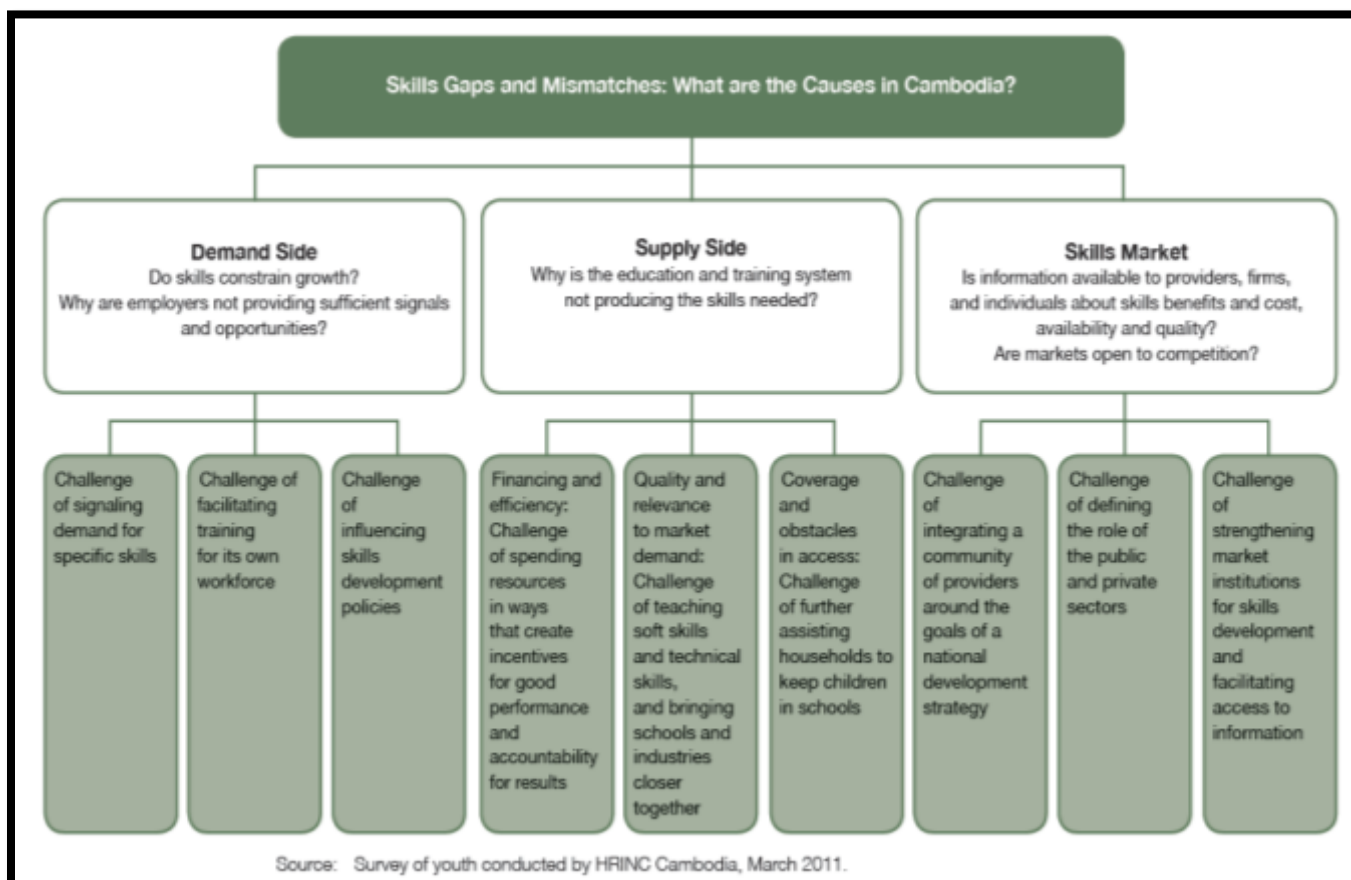


Figure 15. A depiction of the skills gaps and mismatches and their causes in Cambodia. Taken from the World Bank (2012a), p. 18.

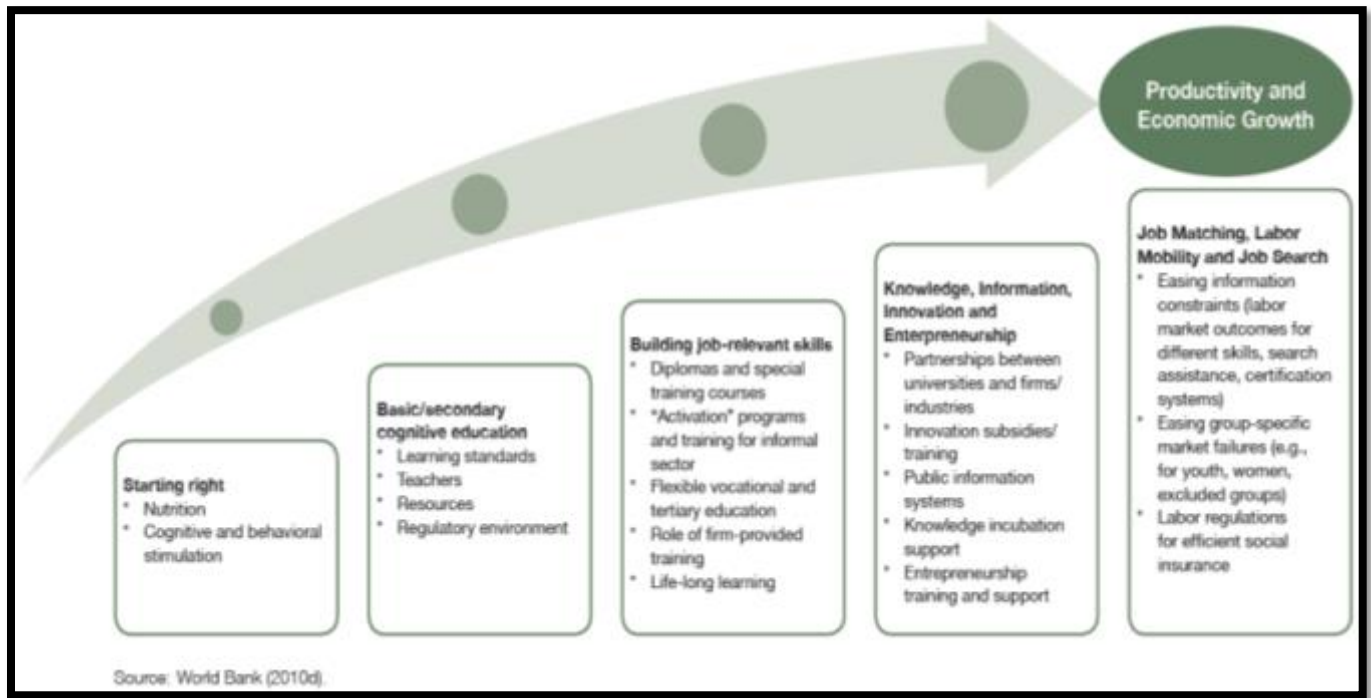


Figure 16. A flowchart that depicts a pathway through five stages that will lead to skills development and therefore increased productivity and economic growth in Cambodia. Taken from the World Bank (2012a), p. 27.

Appendix B: Tables

Table 1. Share of employment by employment status in certain regions of Cambodia in 2004 and 2007. Taken from Economic Institute of Cambodia (2008), p. 13.

Employment Status	Cambodia		Phnom Penh		Other Urban		Rural	
	2004	2007	2004	2007	2004	2007	2004	2007
Paid Employee	22.5%	25.0%	50.2%	50.8%	29.0%	39.3%	18.8%	20.4%
Employer	0.1%	0.1%	0.1%	0.1%	0.2%	0.5%	0.1%	0.0%
Own Account Worker	38.7%	38.7%	28.4%	27.2%	37.8%	38.2%	39.9%	40.1%
Unpaid Family Worker	38.2%	36.2%	20.5%	21.8%	32.8%	21.9%	40.8%	39.4%
Other	0.5%	0.1%	0.8%	0.0%	0.2%	0.1%	0.5%	0.1%
Total	100%	100%	100%	100%	100%	100%	100%	100%

Source: Data compiled from CSES 2004 and CSES 2007

Table 2. Share of employed Cambodians by educational level in each employment status in 2004 and 2007. Taken from Economic Institute of Cambodia(2008), p. 16.

Level of Education	Paid Employee		Employer		Own Account Worker		Unpaid Family Worker	
	2004	2007	2004	2007	2004	2007	2004	2007
Never/Some Education	0.4%	0.1%	0.0%	0.0%	0.7%	0.8%	0.6%	0.3%
Primary	46.3%	47.2%	52.8%	31.8%	65.5%	64.8%	65.6%	61.1%
Lower Secondary	30.1%	27.7%	16.5%	1.2%	26.0%	26.6%	25.5%	28.7%
Upper Secondary	16.1%	15.3%	30.7%	53.7%	6.2%	6.9%	7.3%	8.9%
Technical/Vocational Trainings	3.0%	3.2%	0.0%	6.8%	0.3%	0.2%	0.4%	0.0%
Post-Secondary Education	3.5%	6.4%	0.0%	6.5%	0.2%	0.3%	0.2%	0.9%
Others	0.6%	0.1%	0.0%	0.0%	1.2%	0.4%	0.5%	0.1%
Total	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %

Source: Data compiled from CSES 2004 and CSES 2007

Table 3. Employment by sector in certain regions of Cambodia in 2004 and 2007. Taken from Economic Institute of Cambodia (2008), p. 13.

Sector	Cambodia		Phnom Penh		Other Urban		Other Rural	
	2004	2007	2004	2007	2004	2007	2004	2007
Agriculture	58.7%	58.1%	2.3%	1.1%	39.3%	30.9%	67.0%	67.8%
Industry	13.8%	14.7%	20.2%	13.5%	11.5%	15.4%	13.4%	14.8%
Service	27.5%	27.2%	77.5%	85.3%	49.2%	53.7%	19.6%	17.4%
Total	100%	100%	100%	100%	100%	100%	100%	100%

Source: Data compiled from CSES 2004 and CSES 2007

Table 4. GDP, employment, and output/worker by sector in 2007. Taken from Economic Institute of Cambodia (2008), p. 28.

Sector	GDP	Employment	Output/worker(US\$)
Agriculture	31.9%	58.1%	511
Industry	26.8%	14.7%	1,691
Service	41.3%	27.2%	1,417
Total	100.0%	100.0%	931

Source: Data compiled from NIS and CSES 2007

Table 5. Schools, classes, students, and staff statistics for the Kingdom of Cambodia. Taken from the Kingdom of Cambodia (2012), p. 2.

Particulars	Number of Schools	Disadv. Schools	Number of Classes	Classes in Pagoda	Enrollment		Repeaters		Teaching Staff		Non-Teaching Staff		Total Staff	
					Total	Girl	Total	Girl	Total	Female	Total	Female	Total	Female
<i>Whole Kingdom</i>	11,046	138	81,601	260	3,123,082	1,491,344	144,545	57,797	86,404	39,299	17,376	4,325	103,780	43,624
<i>By Area of Location:</i>														
- Urban Area	1,239	13	14,537	25	561,072	265,947	18,557	6,698	22,094	12,379	3,351	1,321	25,445	13,700
- Rural Area	9,807	125	67,064	235	2,562,010	1,225,397	125,988	51,099	64,310	26,920	14,025	3,004	78,335	29,924
<i>By Type of School & Edn. Level:</i>														
- Pre-School	2,575	30	4,006	70	121,306	60,643	0	0	3,881	3,703	151	141	4,032	3,844
- Primary School	6,849	103	58,594	140	2,142,464	1,021,591	127,068	52,352	45,296	21,772	11,048	2,856	56,344	24,628
- College (Grade 7-9)	1,196	5	7,120	36	304,484	149,588	4,775	1,647	14,348	5,408	2,717	519	17,065	5,927
- Lycee (Grade 10-12)	25	0	385	0	19,703	9,035	668	212	648	197	113	32	761	229
- Lycee (Grade 7-12)	401	0	11,496	14	535,125	250,487	12,034	3,586	22,231	8,219	3,347	777	25,578	8,996
- Lower Secondary Level (Grade 7-9)	1,597	5	12,251	36	541,147	263,593	10,005	3,215	27,067	10,815	4,631	963	31,698	11,778
- Upper Secondary Level (Grade 10-12)	426	0	6,750	14	318,165	145,517	7,472	2,230	10,160	3,009	1,546	365	11,706	3,374

Table 6. Enrollment by level of education in the Kingdom of Cambodia, 2011/2012. Taken from the Kingdom of Cambodia (2012), p. 14.

Province	Number of Schools	Pre-school		Primary		Lower Sec.		Upper Sec.		Total		% Female	
		Total	Girl	Total	Girl	Total	Girl	Total	Girl	Total	Girl	Primary	All Level
Banteay Meanchey	707	9,923	4,991	104,609	50,433	25,026	12,608	13,796	6,690	153,354	74,722	48.2	48.7
Battambang	882	7,865	3,954	172,380	82,677	38,092	19,665	22,892	11,280	241,229	117,576	48.0	48.7
Kampong Cham	1,272	14,390	7,194	283,270	135,301	63,918	32,145	30,834	14,766	392,412	189,406	47.8	48.3
Kampong Chhnang	416	4,690	2,240	77,297	37,343	20,646	10,397	11,551	5,475	114,184	55,455	48.3	48.6
Kampong Speu	495	5,247	2,661	124,729	59,526	29,249	13,318	13,374	5,323	172,599	80,828	47.7	46.8
Kampong Thom	711	7,169	3,605	112,049	54,255	25,235	13,032	14,490	6,726	158,943	77,618	48.4	48.8
Kampot	538	5,020	2,533	98,425	46,441	28,170	13,570	15,904	7,222	147,519	69,766	47.2	47.3
Kandal	680	10,982	5,383	155,517	73,093	46,241	21,877	31,803	14,660	244,543	115,013	47.0	47.0
Kep	44	559	266	5,733	2,693	1,802	899	1,038	511	9,132	4,369	47.0	47.8
Koh Kong	142	1,306	641	20,612	9,552	4,509	2,097	2,509	1,139	28,936	13,429	46.3	46.4
Kratie	337	2,197	1,084	56,783	27,454	10,855	5,455	5,846	2,855	75,681	36,848	48.3	48.7
Mondul Kiri	105	474	261	11,637	5,607	2,021	931	794	332	14,926	7,131	48.2	47.8
Otdar Meanchey	244	1,199	588	36,247	17,121	6,597	3,259	2,863	1,260	46,906	22,228	47.2	47.4
Pailin	75	572	298	10,536	4,997	2,288	1,089	1,422	653	14,818	7,037	47.4	47.5
Phnom Penh	353	9,235	4,529	133,120	63,251	50,801	23,622	46,007	21,591	239,163	112,993	47.5	47.2
Preah Sihanouk	134	1,377	721	29,230	13,860	7,525	3,547	5,459	2,365	43,591	20,493	47.4	47.0
Preah Vihear	315	1,921	1,006	36,054	17,738	6,926	3,578	3,462	1,549	48,363	23,871	49.2	49.4
Prey Veng	790	5,884	2,909	166,263	78,709	42,573	20,137	20,130	8,430	234,850	110,185	47.3	46.9
Pursat	439	4,306	2,151	66,488	31,999	14,922	7,695	9,442	4,613	95,158	46,458	48.1	48.8
Ratanak Kiri	224	740	379	33,123	14,990	3,518	1,463	1,455	584	38,836	17,416	45.3	44.8
Siemreap	864	13,425	6,815	170,509	82,048	36,048	18,870	17,795	8,758	237,777	116,491	48.1	49.0
Stung Treng	177	564	298	20,184	9,688	3,508	1,795	2,219	1,031	26,475	12,812	48.0	48.4
Svay Rieng	434	3,925	2,039	76,649	36,365	23,434	10,608	12,441	4,899	116,449	53,911	47.4	46.3
Takeo	668	8,336	4,097	141,020	66,450	47,243	21,936	30,639	12,805	227,238	105,288	47.1	46.3
Whole Kingdom	11,046	121,306	60,643	2,142,464	1,021,591	541,147	263,593	318,165	145,517	3,123,082	1,491,344	47.7	47.8
- Urban Area	1,239	27,421	13,546	309,162	147,091	112,982	53,632	111,507	51,678	561,072	265,947	47.6	47.4
- Rural Area	9,807	93,885	47,097	1,833,302	874,500	428,165	209,961	206,658	93,839	2,562,010	1,225,397	47.7	47.8

Table 7. University governance in East Asia. Taken from the World Bank (2012b), p. 139.

Economy	Leadership of board selected by	Members of board selected by	Vice chancellors, presidents, rectors selected by	Senior management of universities selected by	Composition of board
<i>High-income</i>					
Japan	Governing board (public universities) Presidential selection committee (national universities)	Governing board	Internal selection	Appointed by vice chancellors, presidents, or rectors and internal selection	Academic staff, nonacademic staff, external stakeholders
Singapore	Governing board	Government	Governing board	—	Academic staff, nonacademic staff, external stakeholders
Hong Kong SAR, China	Government	Mixed ^a	Professional selection	Professional selection and appointed by vice-chancellors, presidents, or rectors	Academic staff, nonacademic staff, external stakeholders (2:1 ratio of external stakeholders to university members)
Korea, Rep.	Boards not allowed by law (in public universities)	n.a.	n.a.	n.a.	n.a.
<i>Middle-income</i>					
Malaysia	—	Mixed ^b	Government	Vice chancellors, presidents, rectors	Academic staff, nonacademic staff, external stakeholders
Thailand	Governing board	Mixed ^c	Professional selection	Professional selection	Academic staff, nonacademic staff, external stakeholders
China	Internal university bodies	Internal university bodies or government	Government	Professional selection	Academic staff, nonacademic staff, external stakeholders
Indonesia	Governing board	University senate	Internal selection ^d	Vice chancellors, presidents, rectors	Academic staff, nonacademic staff, external stakeholders
Philippines	Government	Mixed ^e	Internal selection	Vice chancellors, presidents, rectors	Mix of government officials and private citizens appointed by the president; students, and faculty
<i>Low-income</i>					
Vietnam	Government	Government	Professional selection	Professional selection	—
Lao PDR (National University of Laos)	Government	Government	Government	Government	—
Cambodia	Mixed ^f	Government	Mixed	Mixed	Academic staff, nonacademic staff, external stakeholders

Sources: Raza 2010 based on Expert Survey; OECD 2008b.
Note: Most institutions are public. — = not available; n.a. = not applicable.
a. Some members are selected by the chief executive (often the chancellor) of the university, and others are elected.
b. Members of the governing board are appointed by the government and the governing board.
c. Differs by institution.
d. Internal election involving the entire university community.
e. Members of the governing board are appointed by the government and university.
f. Appointed by the government (public) and the university owner (private).

Table 8. Comparative skills gaps among professionals in select Asian countries. Taken from the World Bank (2012b), p. 54.

	Creativity	Information technology	English	Leadership	Communication	Problem solving	Work attitude	Technical skills	Numeracy/literacy
Cambodia	—			Decision making		Lack of analytical skills			
Vietnam	—	—		—		—			
Mongolia									
Philippines									
Indonesia									
Thailand									
Malaysia									

Source: Appendix J (employer and employee surveys).

Note: The darker the shade, the stronger the gap (within each country only). Dotted cells indicate gaps that become less serious, and hashed cells indicate gaps that became more serious, in relation to the current demand for that skill.

— = not available

Table 9. Disciplines studied by bachelor students in Cambodia, academic year 2009/2010. Taken from the World Bank (2012a), p.17.

Discipline of study	Share	Number of students	Share of female students
Accounting, and Accounting and Finance	13.0%	20,978	74.7%
Finance and Banking	11.0%	17,760	41.1%
Business Management and other Business and Management	10.3%	16,694	36.4%
English Language and Literature	11.3%	18,325	54.4%
Management and General Management	7.2%	11,640	28.2%
Computer Sciences and other computer related sciences	6.4%	10,323	7.4%
Medicine, Nursing, Pediatrics, Dentistry and Pharmacology	5.8%	9,407	46.8%
Law, and Law Science	5.4%	8,787	22.4%
Economics and related disciplines	5.3%	8,485	34.9%
Education and related disciplines	2.4%	3,808	29.1%
Agriculture, including Fishery and Forestry Sciences, and Rural Development	2.3%	3,753	29.1%
Khmer Literature and Science	1.7%	2,794	43.6%
Marketing and Marketing Management	1.7%	2,694	26.5%
Tourism, Hotels and Hospitality	1.7%	2,771	39.3%
Civil Engineering	1.5%	2,371	1.7%
Other Social Sciences (Public Administration, Political Science, and Sociology)	1.4%	2,310	39.5%
Architecture and Design	1.3%	2,058	21.3%
Mathematics	1.3%	2,071	21.5%
Biology and Chemistry	0.9%	1,386	40.8%
Engineering and related disciplines	0.9%	1,399	4.5%
Arts, Humanities and Languages, and Philosophy and Religion	0.8%	1,306	30.9%
Human Resources Management	0.6%	991	17.0%
Physics	0.6%	908	24.3%
Animal Science and Veterinary Medicine	0.5%	879	19.1%
Other languages (Korean, Japanese, French, and Thai)	0.5%	873	47.1%
Geology	0.3%	476	39.9%
History	0.3%	558	32.8%
Science and Technology	0.1%	201	6.0%
Other disciplines (Military, Police Academy etc.)	3.4%	5,510	33.0%
<i>Total</i>	<i>100.0%</i>	<i>161,516</i>	<i>39.4%</i>

Source: Calculations based on EMIS data.

Appendix C: Summary of RUA student focus group discussion, June 21, 2013

6 students in focus group; 4 girls/2 boys; 4 from provinces/2 from Phnom Penh

How did they become interested in ag?

- Through family members; growing ornamentals; fish farming in her home area; homegarden interest

Programs they are studying?

- Agronomy x3, Ag tech and management; Fisheries, Ag Econ and Rural Development

Strengths of RUA programs

- Experienced instructors
- Practical fields for Agronomy training
- Study tours (e.g. to Kampong Thon province to study mulching for erosion control; e.g. Siem Reap visit to Israeli greenhouse and dragonfruit farm)
- Opportunities to study abroad (one student went to Japan for 10 days)
- Many international partners with RUA – visiting faculty teach about new techs
- RUA staff can be helpful in placing students in summer internships

Challenges

- Faculty lack technical skills
- Instructors too busy – sometimes have to have make-up classes on Saturdays
- Not enough lab opportunities or other practical skill-building opportunities
- Sometimes knowledge is not clearly communicated
- English classes only in years 1 & 2 and not in years 3 & 4
- Students were not well prepared for their programs following high school

What do they want to do following graduation?

- MS programs (farming systems; ornamental plants – Thailand; environmental science – Thailand; ag development – Thailand or Vietnam)
- Ag administration job while running own fish farm business
- Work for organization in agriculture for a short time before graduate studies

What else are you involved in at RUA?

- Volunteer teach English part-time
- Teach Thai
- Work @ the Cambodian student association

What would they do as Rector of RUA with \$ to invest in capacity building?

- Start international class for students to encourage them to learn English
- Encourage opportunities for students to study abroad
- Upgrade labs and equipment
- Train teachers/staff (abroad?) on how to use labs and equipment
- Train students at MS level abroad with condition that they return to RUA and teach for 5 years
- Upgrade/restore English language center

Appendix D: Photo gallery

Select photos from the June 16-June 23, 2013 data collection trip to Cambodia by a group of Penn State researchers. All photos courtesy of Dana James and Tom Gill.



Research/trial fields on RUA's campus, located in Phnom Penh. (Dana James)



A new, under-construction facility being built on RUA's campus. (Dana James)



Student focus group discussion undertaken at RUA. (Dana James)



Facilities on UBB's campus. (Dana James)



The Food Processing laboratory at UBB. (Tom Gill)



Penn State researcher Rick Bates (left) talking with UBB Rector Touch Visalsok in UBB's Tissue Culture laboratory, which houses thousands of plantlets, including orange and banana plantlets. (Tom Gill)



UBB's outdoor greenhouse facilities. (Tom Gill)



A variety of Cambodian fruits in the Battambang central market. (Dana James)



A fish and seafood stand in the Battambang central market. (Tom Gill)



Flooded rice paddy fields. (Tom Gill)



Flooded rice paddy fields with seed transplant stations in the foreground. (Tom Gill)



The researchers visited the Choeung Ek killing field outside of Phnom Penh in order to better understand the context of Cambodia's development in light of the genocidal Pol Pot regime of 1975-1979. Pictured here is the memorial stupa at the site. (Dana James)

Appendix E: References

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