ADB Asian Development Bank

Improving Transitions

From School to University to Workplace

HIGHER EDUCATION IN DYNAMIC ASIA

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Abbreviations

ADB	Asian Development Bank
A-NET	Advanced National Education Test, Thailand
ASEAN	Association of Southeast Asian Nations
CSAT	College Scholastic Ability Test, Republic of Korea
DMC	developing member country
GCE	General Certificate of Education
GDP	gross domestic product
GER	gross enrollment ratio
GPA	grade point average
HEI	higher education institution
ICT	information and communications technology
IT	information technology
Lao PDR	Lao People's Democratic Republic
MOET	Ministry of Education and Training, Viet Nam
NCTUA	National Center Test for University Admissions, Japan
NCUEE	National College and University Entrance Examination, PRC
NSAT	National Secondary Achievement Test, Philippines
OECD	Organisation for Economic Co-operation and Development
O-NET	Ordinary National Education Test, Thailand
PRC	People's Republic of China
QA	quality assurance
R&D	research and development
SEAMEO	Southeast Asian Ministers of Education Organization

SPM	Sijil Pelajaran Malaysia (Malaysian Secondary School Certificate = O-level certification)
STI	science and technology innovation
STPM	Sijil Tinggi Pelajaran Malaysia (Malaysian Higher School Certificate = A-level certification)
TVET	technical and vocational education and training
UK	United Kingdom
UPCAT	University of the Philippines College Admission Test
US	United States

Foreword

Quality education is essential for creating a sustainable human resource base upon which to build a country's development. Asia is experiencing a growing need for skilled managers and professionals in a variety of fields. Investing in higher education will help developing Asian countries build high-income economies, with the innovation, knowledge, and technology needed to thrive in an interconnected, competitive world.

ADB has accumulated significant experience in providing support for improving education systems in its developing member countries. In response to the growing needs of these countries, ADB is boosting its support for higher education. The changing landscape of higher education requires new thinking and updated practices. Questions central to the issue include: What are the strategic and operational priorities for higher education in the region? How should support be targeted to achieve a high, sustainable impact? How can ADB best assist its developing member countries to substantially raise the quality of and expand access to higher education within a reasonable, yet ambitious, time frame?

To provide insights into the kinds of changes demanded in higher education, ADB financed a major regional study drawing on the views of subject experts, higher education leaders, regional stakeholders, and participants of an international conference on higher education in Asia.

Higher Education in Dynamic Asia is the result of this study. I am confident that it will provide valuable input into the process of higher education reform across Asia. It will also provide critical input into ADB's work in assisting the region to develop the full potential of its people.

Bindu N. Lohani
Vice-President (Knowledge Management and Sustainable Development)
Asian Development Bank

Preface

The number of colleges and universities in developing countries in Asia is increasing, which has the potential to improve the prospects for economic development and better quality of life. If Asia is to achieve the vision of becoming the world's economic driver, it will need to provide high-quality higher education for a sufficient number of secondary school graduates, especially in the fields of science and technology. More importantly, its universities at all levels will need to graduate creative thinkers who can respond to changes in global circumstances.

When colleges and universities expand rapidly, external efficiency—the alignment of higher education with the external environment—can weaken. This happens when (a) too many secondary school students are unable to pass university entrance examinations, and those who manage to proceed to university are unprepared for the rigors of higher learning; (b) too many students graduate from university without adequate skills to enter the changing workplace; and/or (c) too much university research is irrelevant for generating new products and services.

Moreover, top-tier universities continue to benefit from government support to aim for world-class ranking. Yet second- and third-tier higher education institutions (HEIs) lack adequate capacity and remain functionally undifferentiated. They can improve their alignment by contributing to the development of their local communities, as well as by acting in concert with the larger higher education system to drive national development and economic competitiveness.

This publication, *Improving Transitions: From School to University to Workplace,* stresses the importance of tackling three key challenges in strengthening the external efficiency of higher education in developing Asia: First, as more students enter colleges and universities, there is a greater need to improve their readiness for higher learning. Senior secondary schools need to acknowledge the changing nature of higher learning in universities, and specifically to learn how to provide a curriculum and pedagogy that foster creative thought, problem solving, critical thinking, and entrepreneurial spirit. In some countries, this calls for increased readiness in specific subjects like science and mathematics. In other countries, it also requires aligning the school curriculum more closely with university entrance examinations. However, across all of developing Asia, it means improving the readiness of students from underrepresented communities.

Second, as more families make greater investments in their children's higher education, they have rising expectations about the outcomes of that education—notably better jobs and rising incomes. Governments and higher education leaders should not wait for unemployment rates to increase among graduates before they address the changing demands of the globalized workplace. They must pursue higher education reform, which helps to foster in graduates the knowledge and skills that will drive productivity in a rapidly changing labor market. As technological innovation continues to drive economic development, the next generation

of university graduates will have a key role to play. Moreover, globalized workplaces require university graduates with generic skills that include, among others, cross-cultural competencies and communication.

Third, the growing number of universities also means increasing competition for funds for scientific research. Top-tier universities will continue to have an advantage in attracting funding. However, there is a need for fresh strategies for productive research partnerships, particularly to help second- and third-tier HEIs forge partnerships and attract funding for research that will benefit their local communities. Partnerships between HEIs across borders can provide opportunities for opening access to higher education programs applicable to the wider subregional and regional labor markets in Asia. This can also be a way to provide students with opportunities to strengthen their cross-cultural competencies and communication skills, and to build long-term social capital networks for prospective leaders in commerce and industry across the region. Investment in advanced information and communications technology can boost research productivity by linking remote universities to their national counterparts and to other universities across national borders. Finally, cross-border collaboration can help improve regional centers of excellence in higher learning and research.

The publication draws on study material prepared by Gerard A. Postiglione. Stephen Banta provided editorial advice. Dorothy Geronimo coordinated the typesetting and publication process. Hazel Medrano and Sheila Marie Mariano provided administrative support. Many thanks to all for their contributions.

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Making Globalization Work for Higher Education Efficiency

Gaining Comparative Advantage with Increased Enrollment Rates

A major part of a country's success in a globalized world rests on gaining a comparative advantage in knowledge economies. This includes how available knowledge can be assimilated and converted into better prospects for faster economic growth and social development. It also includes using technology to solve problems in, e.g., environment, health, and agriculture (Lin and Pleskovic 2008). Higher education can stimulate innovations in areas such as alternative energy for improving the natural environment and delivery services for community health.

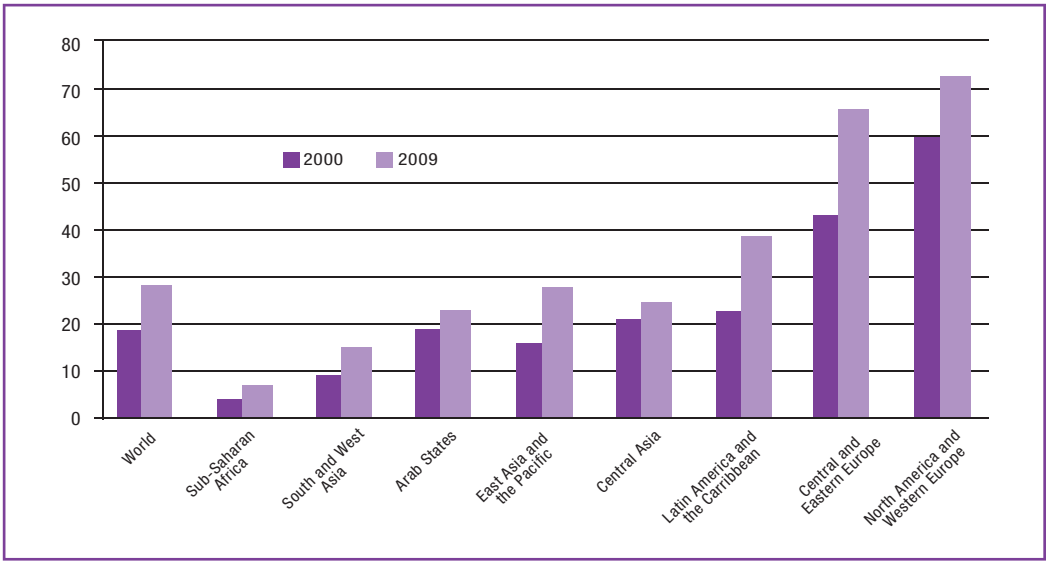
Enrollments in basic education in the Asian region have increased steadily over the past several decades. There has also been a substantial increase in technical and vocational education and training (TVET). Moreover, there are publicly funded elite universities, several of which are aiming for world-class status. Private colleges and universities have captured much of the overwhelming demand for higher education from the expanding middle classes in many countries.

In some cases, private providers have saturated the market with college programs in business administration, finance and accounting, information technology (IT), and English language, to the detriment of knowledge programs in science and technology. Some developing countries in the region have promoted policies that allow foreign providers to enter their higher education sectors. When foreign providers put up quality programs, in partnership with local higher education institutions (HEIs), in needed fields such as advanced science and technology, it helps to ease the demand, as well as to develop capacity.

Yet, access rates for higher education in Asia still pale in comparison with those in North America, Europe, and Latin America (Figure 1).

Asia's gross enrollment ratios (GERs) remain low by comparison with most parts of the world. Yet, some regions with higher GERs are now beset with challenges to external efficiency. Since Asia's GERs will continue to grow in the coming years, it is timely to emphasize the importance of improving the external efficiency of Asian higher education systems.

Figure 1 Gross Enrollment Ratios in Higher Education by Region, 2000 and 2009



Notes:
1. In UIS (2011), Arab States include Algeria, Bahrain, Djibouti, Egypt, Iraq, Jordan, Kuwait, Lebanon, Libya, Mauritania, Morocco, Oman, Palestine, Qatar, Saudi Arabia, Sudan (presecession), Syrian Arab Republic, Tunisia, United Arab Emirates, and Yemen.
2. Gross enrollment ratio is measured by the average of gross enrollment from countries in each region.
3. Number of countries by region: Sub-Saharan Africa (45), South and West Asia (9), Arab States (20), East Asia and the Pacific (33), Central Asia (9), Latin America and the Caribbean (42), Central and Eastern Europe (21), North America and Western Europe (29), and World (208)

Source: UIS (2011).

Strategic Alignments of Economies and Higher Education Systems

The long-term success of institutions and systems of higher education hinges upon a high degree of external efficiency—best captured by a strategic alignment of colleges and universities with the changing local, national, regional, and global environments. This is true for all HEIs, but especially so for the rapidly increasing number of second- and third-tier (provincial and private) colleges and universities. A key aspect in the context of second- and third-tier HEIs is a local economy that is usually less prosperous than that in major urban centers and relies on innovation and technological change to be driven forward.

While the demand for higher education continues to grow, Asian developing countries will strive to diversify their economies and make them more competitive. Therefore, it is imperative to create conditions for efficiency. This includes having a clearly differentiated system of HEIs. Individual colleges and universities, especially second- and third-tier ones, can initiate partnerships with local government and industry to improve production and innovation in agriculture, energy, communications, health care, and transportation, as well as in service sectors such as finance, law, security, and tourism.

The growing multiplicity of public and private colleges and universities necessitates more ways to increase partnerships that permit them to take advantage of periods of national economic

growth, while also being able to weather occasional unforeseen global economic recessions. Moreover, as economies become more integrated across the Asian region, regional partnerships in higher education can help spur innovation and technological development.

Diversity Amid Levels of Economic Development

The remarkable diversity across Asia overlays three economic categories: developed, emerging, and developing (Table 1). For *developed economies*, which have massive amounts of capital to invest, universities have become leaders in transforming industrial productivity. For *emerging economies*, universities have taken a greater role in absorbing and adopting ideas from other parts of the world. For *developing economies*, universities can anchor economic globalization for urbanization and strengthen industrial capacity. In *all economies*, universities should ensure that learning environments align with specific developmental needs, and at the same time promote student engagement, personal development, and entrepreneurship.

Table 1 Focus Economies

Grouping/Economy	Salient Characteristics
Developing Economies	
Cambodia Lao PDR Mongolia Viet Nam	Lower and low-middle income countries in which the higher education systems are focused primarily on system expansion, increasing enrollments, and infrastructure development
Emerging Economies	
PRC India	Giant emerging economies with largest higher education systems in the world and fastest growing systems in Asia; higher education policies and practices closely watched and influential across other higher education systems in the region; they have several world-ranked universities, though most continue to need quality improvement
Indonesia Malaysia Philippines Sri Lanka Thailand	Other emerging economies with well-established and growing higher education systems; now increasingly focused on quality improvement
Developed Economies	
Hong Kong, China Singapore	Small developed urban economies with mature, highly respected higher education systems characterized by slow growth
Japan Korea, Republic of	Large developed economies with mature higher education systems of respected quality but now facing declining student enrollments

Lao PDR = Lao People's Democratic Republic, PRC = People's Republic of China.
Source: Adapted from Table 1 in ADB (2011b).

The developed economies already produce quality products based on their superior technological prowess. They continually create new products that are in demand and raise export levels. Their universities are incubators of research, novelty, production, and growth. The emerging economies have begun to innovate, and their universities are able to provide the conditions for learning and adoption of existing technologies. This requires support for improving mathematics and science, as well as learning environments that promote divergent thinking and entrepreneurship. The developing economies rely more upon resource extraction, assembly, and light manufacturing. Their universities can support development by providing a high-quality learning environment. They can also support applied research that can attract investment from the private sector. Their colleges and universities can place more emphasis on graduates that possess leadership and entrepreneurial skills. Higher learning in these countries can support the applications of new technologies from other parts of the world, and better legal frameworks that support their business environments. This can lead to the basic conditions for the growth of technological innovation.

At present, higher education systems in developing economies in Asia face the daunting tasks of making the best use of limited resources to prepare more of their citizens for an increasingly knowledge-based economy. The ability of Asian countries to compete in a globalized world depends upon the readiness of students entering university, the availability of qualified graduates for the labor market, and the application of science and technology for creating new products.

For second- and third-tier colleges and universities, strengthening external efficiency would require that they (a) work closely with schools to ensure that students are ready for the rigors of higher learning, (b) define their missions and uniqueness within the larger system, (c) prepare students through a relevant higher education for a changing workplace, (d) graduate a sufficient number of scientists and technologists who can find new ways to improve production across diverse communities, (e) partner with the private sector to produce research that helps local communities respond effectively to economic globalization, and (f) capitalize on ways to build effective partnerships across borders. The following chapters take a closer look at these requirements.

Increasing Efficiency while Widening Access: Aligning Schools with Universities

As higher education becomes less of a pinnacle at the top of the education system and more of a prerequisite for human development, the role of senior secondary education in supporting its students' transition to higher education becomes ever more important.

Degrees of Expansion

The *developed economies* of Japan and Republic of Korea have already experienced rapid expansion of their higher education systems, as also have the tiny economic powerhouses of Hong Kong, China and Singapore. Enrollments in most Asian systems of higher education continue to grow (Table 2).

Table 2 Gross Enrollment Ratios (%) in Higher Education in Selected Asian Economies, 1999–2010

Economy	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Cambodia	-	3	2	3	3	3	3	5	6	8	-	-
PRC	7	8	10	13	15	18	19	21	22	22	24	26
Hong Kong, China	-	-	-	-	31	31	32	33	42	56	57	60
India	-	9	10	10	11	11	11	12	13	15	16	18
Indonesia	-	15	14	15	16	16	17	17	17	20	22	23
Japan	47	49	50	51	52	54	55	58	58	59	59	60
Korea, Republic of	74	79	83	86	88	90	93	98	102	104	104	103
Lao PDR	2	3	3	4	5	6	8	9	12	16	-	17
Malaysia	23	26	25	28	32	31	29	31	33	37	40	-
Mongolia	27	30	34	36	38	41	45	47	47	48	51	53
Philippines	28	-	30	30	29	28	27	28	-	29	-	-
Singapore	-	-	-	-	-	-	85	86	87	89	90	90
Sri Lanka	-	-	-	-	-	-	-	-	-	-	-	15
Thailand	33	35	39	40	41	42	44	44	47	46	46	46
Viet Nam	11	10	10	10	10	16	16	16	18	19	20	22

- = data missing, Lao PDR = Lao People's Democratic Republic, PRC = People's Republic of China.
Note: Gross enrollment ratio is the ratio of total enrollment of International Standard Classification of Education (ISCED) levels 5 and 6 except Singapore. ISCED level 5 means "short cycle higher education or equivalent," and ISCED level 6 is "bachelor level education or equivalent." Singapore data: Higher education is Type A (university) education and Type B (practical/technical/occupationally specific programs) education.
Sources: UIS (2011). Singapore Education Statistics Digest. UIS Singapore. Singapore Education Statistics Digest_online.

The *emerging economies* have already begun to widen access, though gaps remain. The GER in tertiary education has increased in all selected countries or regions across the years except in the Philippines. In Indonesia, only 3.3% of students from the lowest 20% in income (and only 4.8% from the next quintile) attend university (Triaswati and Roeslan 2003). While Malaysia has expanded enrollments, a gender gap of 65:35 exists at public universities and is also acute in the private sector (Sirat 2006:106). In Thailand, enrollment rates in higher education for females reached 55% in 2007, higher than elsewhere in Southeast Asia, but almost 50% of students from the highest income quintile and fewer than 5% from the lowest quintile are enrolled (World Bank 2011). As is the case in Thailand, women in the Philippines are now more likely to be enrolled in higher education than men (Gonzales 2006:141).

In *developing economies*, university access is still the reserve of graduates of urban more than rural secondary schools (Cambodia), of those from provincial centers more than from the districts (Lao People's Democratic Republic [Lao PDR]), and of those from less remote ethnic minority areas (Viet Nam) (Chet 2006:15; Phou 2006:75; Hayden and Thiep 2010:24).

As demand increases and higher education systems respond by growing, governments are unable to shoulder the larger financial burden. Students begin to pay more, especially at the increasing number of private colleges, and HEIs are pressured to find more efficient ways to source and use scarce resources.

Top-tier and national flagship universities continue to attract the best students and academic staff. However, second- and third-tier colleges and universities are taking in an increasing number of less prepared students. They often do this without sufficient resources. Therefore, it becomes more important for secondary schools to improve the preparation of students for higher education.

While some developing countries in Asia need to strengthen preparation in science subjects in secondary schools, overall, the developing countries in the region need to recognize and respond to the growing diversity of the learning abilities within the expanding student base that will enter higher education. Are secondary schools preparing students for higher education? Are colleges and universities prepared to educate them? The rising proportion of students having aspirations to enter higher education presents secondary schools with the task of orienting the school curriculum toward university requirements, including higher learning styles. Even for students who do not plan to pursue university studies after secondary school, readiness for higher learning remains important, because many such students will continue their education later in life through distance or on-line higher education programs.

As the road to mass higher education opens, a proportionally smaller share of new students is likely to be prepared for it (if student readiness is not tackled). At the same time, faculties in HEIs also need to recognize that the diversity of intellectual abilities requires new methods of teaching and learning on campus. In addition, the secondary school curriculum has to turn its attention more toward the required entrance examinations for university. Shadow schools—fee-paying centers that hold classes after regular school hours—are already doing so throughout the region (Bray and Lykins 2012). However, shadow schools are singularly focused on cramming for university exams, too often to the detriment of the kind of learning that builds creative centers of thought for globally competitive societies. Finding appropriate ways to improve the readiness of secondary school graduates for higher learning will improve the efficiency of colleges and universities in educating them.

In many countries, much of the senior secondary school curriculum remains focused on "getting students through their course, covering the course materials, giving tests, and expecting right-or-wrong answers" (Wang et al. 2009). However, university curricula require students to think critically and analytically. As a result, many secondary school graduates become unable to cope in university classrooms. Countries prosper when students are adequately prepared for a higher education, both in expectations and in abilities. If not, university teachers tend to "dumb down" courses, students' dropout rates increase, completion rates fall, extension rates rise, and students who manage to graduate are less prepared to enter the labor market and to contribute productively.

Given the increasing public expenditures for higher education, there is good reason to be concerned about the readiness of secondary school students for higher learning. Misalignment between secondary education and higher education systems can be a key factor contributing to a nation's largest waste of educational resources. Countries in Asia are making changes to help secondary school students become more prepared for higher education. Yet, there is still heavy reliance on one or more examinations. In the following sections these trends are analyzed in more detail in the context of the focus economies presented in Table 1.

Transition Developing Economies: Cambodia, Lao PDR, Mongolia, and Viet Nam

In Cambodia, the pathway to higher education has been relatively inflexible. The prime access route is successful completion of senior secondary school or an associate degree, plus the university entrance examination. Both the standards and access rates in higher education are low by international measures. Participation rates in higher education are low (402 per 100,000), but the urban–rural gap is significant: 45% of students are from the capital city, and 40% are from urbanized provincial regions (Chet 2006).

In some universities, for example Paññāsastra University of Cambodia, prospective students are also required to take an examination organized by the university itself, and only students with passing scores are accepted (Paññāsastra University of Cambodia 2010). Students in urban areas have access to supplemental and tutor schools, which help them cram for university entrance examinations. For example, Phnom Penh produces half of the entrants to higher education (Chamnan and Ford 2004). As Cambodian students enter higher education in greater numbers, both in-country and across the borders, there is an increased need to consider how to align secondary school education with university learning.

In the Lao PDR, students gain access to universities in two ways (Xaysomphou 2008). The first channel is entrance by quota. Quota students are selected and assigned to different universities by the Ministry of Education, which scrutinizes students' secondary school transcripts and the results of their secondary school leaving examinations. Students who do not gain access through entrance quotas can take the national entrance examination and be selected by colleges and universities. The national entrance examination is centrally administered in the national capital and the capital city of each province. Although college access rates have increased rapidly in the past several years, women and ethnic minorities are still disadvantaged.

In Mongolia, the Master Plan for 2006–2015 stresses the importance of better coordination of enrollment in higher education (Government of Mongolia 2006, World Bank 2010). The government hopes to broaden the services provided by HEIs and make them more open, as well as to coordinate the activities of HEIs with the national economic structure and labor market demand. In particular, there is an effort to provide support for those studying engineering, technology, biology, natural science, teacher education, and agriculture. The aim is to increase the number of higher education students in these disciplines with the help of a policy that provides soft loans and grants for students from the State Training Fund (ADB 2011c).

Final national secondary school examinations are subject based and administered by the Education Evaluation Center, an independent body under the Ministry of Education, Culture and Science. Results from these examinations are used by HEIs for initial screening of potential candidates for admission. HEIs are supposed to employ additional selection instruments such as essays and references when making final decisions about admission. However, lack of capacity to handle the additional selection steps efficiently hampers the efforts. There is still a long-term tradition that only secondary school final examination results should be used for selecting new entrants.

Viet Nam has also grappled with the problem of school–university alignment (Dai 2006). The entrance examination system for higher education has undergone significant changes, and the process has been characterized by certain back-and-forth steps. Initially, a unified examination system was modified into a multiple entrance examination format to align with Viet Nam's higher education heritage from the Soviet era, which included a range of specialized institutions. However, the examination system has since become reunified, and universities no longer have their own entrance examinations.

Entrance to higher education is highly competitive, due in part to Viet Nam's Confucian heritage, which imposes stress on students, as well as on the university staff who mark the entrance examination papers. The Ministry of Education and Training (MOET) has tried to reduce this pressure by publishing examination items in various subjects (viz., mathematics, physics, chemistry, biology, literature, history, geography, and foreign languages). This helped students to prepare, but also fostered rote learning and stifled creativity. Therefore, MOET began to call for commonality across standards of admission, examination items, organization, and use of results. For this purpose, MOET established an examination board and a standard examination for all colleges and universities.

Three entrance examinations have been established: one for testing knowledge in mathematics, physics, and chemistry for students aiming to major in engineering, computer science, or natural science; one that tests knowledge in either (a) mathematics, chemistry, and biology for students who aim to major in agriculture, medicine, or natural science; or (b) literature, history, and geography for students set to major in humanities or social sciences; or (c) literature, mathematics, and foreign languages for students who will major in foreign languages, foreign trade, or international relations; and a third examination for those who will enter community colleges. There has been a move to use objective tests, rather than written tests, which have relieved some of the marking pressure on university academic staff.

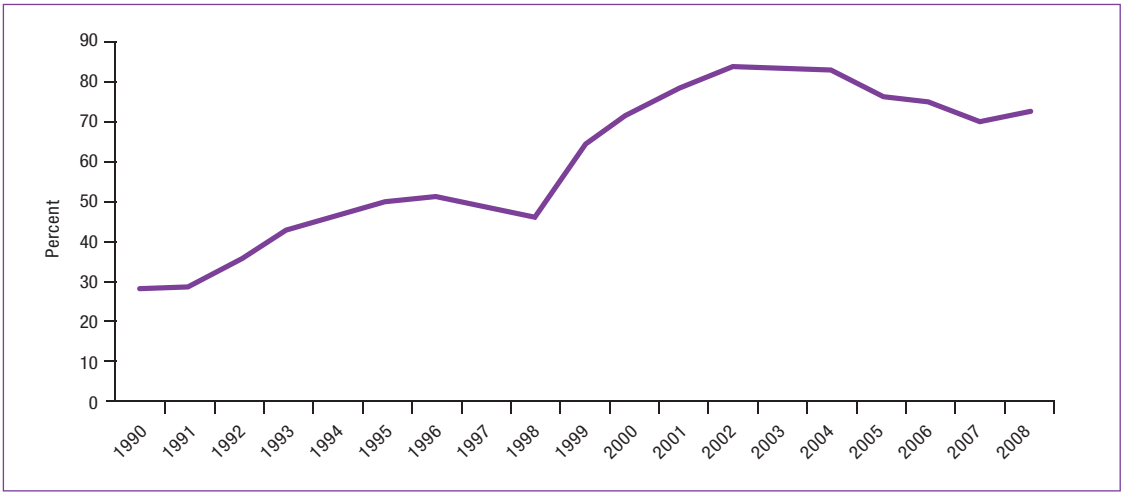
Overall, the back-and-forth steps experienced in Viet Nam to realign college entrance examinations with school subjects have been counterproductive; however, the process reflects the dynamics of Viet Nam's expanding economy.

Asia's Giants: People's Republic of China and India

The People's Republic of China (PRC) has the largest higher education enrollment in the world. India has the most colleges and universities in the world. Together, they may one day graduate more students than the rest of the world combined. In the long run, the higher education systems of the PRC and India will increasingly have an enormous effect on other Asian systems of higher education. In particular, together they can influence the possibility of establishing a harmonization process for degrees and quality assurance (QA), similar to the so-called Bologna Process in Europe,[1] which will further help integrate the region for human resource and economic development.

As the PRC loses its labor cost advantage, maintaining its economic ascent rests heavily upon boosting the access rate to its higher education system, including the link between schools and universities (Figure 2). In 2009, the PRC's service industry comprised only 42% of its gross domestic product (GDP), while it was 64% in India and 77% in the United States (US) (World Bank 2009). Generating new products and services will require universities to foster creative and innovative thinking. It is easier for this to happen in universities if schools align their curriculum to prepare students for such higher learning, and universities' curriculum is geared to develop these learning areas.

Figure 2 The PRC's Increasing Promotion Rate of Senior Secondary School Graduates to Higher Education Institutions



Note: Promotion rate of senior secondary school graduates is the ratio of the total number of new entrants admitted to higher education institutions to the total number of graduates of regular senior secondary schools.
Source: Educational Statistics Yearbook of China 2008:16.

[1] In the Bologna declaration of 1999, European ministers with responsibility for higher education initiated the Bologna Process by setting out the goal of establishing the European Higher Education Area by 2010. After a decade of reforms, at their Leuven/Louvain-la-Neuve Summit in April 2009, the ministers reaffirmed their commitment to continue the Bologna Process and expressed the need to consolidate reforms in the period towards 2020 (EUA 2011).

The recently promulgated National Outline for Medium- and Long-term Education Reform and Development (2010–2020) targets a higher education enrollment rate of 40% by 2020, by which time 20% of the working-age population should have university degrees. Given its demographic profile, the PRC should foster talent in the shrinking proportion of youth who will have to support an increasingly ageing population in the future. The country will reach its peak demographic period in 2015–2020, when the working age population will account for about 71% of the total; it will decline to 61% by 2050 (Hu 2011).

The National College and University Entrance Examination (NCUEE) remains the main determinant for entering higher education in the PRC. Depending on the number of applicants each year, provincial- and national-level institutions adjust their intake of secondary school students, while also providing preferential access and sometimes remedial education to ethnic minority students. At the same time, the NCUEE is under constant revision, with increased emphasis given to students' ability to think creatively, which more closely approximates the nature of learning in higher education (MOE, PRC 2010). The secondary school leaving examination system is also being reformed to encourage schools to build a complete dossier for each student, including course transcripts, teachers' evaluation of students' moral fabric, and students' experience in community service.

Senior secondary school graduates are encouraged to apply to top universities and to take the examinations organized by individual universities. The exams held by these universities can be more flexible and focused on students' abilities in innovation and adaptability to the learning styles in HEIs. Students are still required to take the NCUEE, however, even if they pass the examinations held by individual universities. Students can be accepted to specific universities if they earn "cutoff scores" in the NCUEE, which are usually lower than the scores actually needed to apply to these universities. The government is attempting to decrease the influence of the NCUEE, which is still viewed as encouraging rote learning and reducing capacity to innovate. Moreover, professors are also encouraged to offer courses in secondary schools to help students gain more of an understanding about studying and living at a university (Zeng 2010).

In 1950, India had 263,000 students in 750 colleges affiliated with 30 universities. In 2005, 11 million students were enrolled in 17,000 colleges affiliated with 230 universities and non-affiliated university-level institutions. In addition, about 10 million students attended more than 6,500 vocational institutions. The enrollment rate has been growing at 5.1% per year (Kaul 2006). Nevertheless, only 6% of the relevant age group (18–23 years old) were in higher education (University Grants Commission 2003). In 2010–2011, around 16.9 million students were enrolled in 564 universities and 33,000 colleges (University Grants Commission 2012).

Students are admitted to university based on scores in one or more secondary leaving or entrance examinations administered by a variety of entities: the national government, provincial governments, individual institutions, and groups of institutions (e.g., management- or IT-focused institutions in a particular province). Institutions or consortia set their own requirements. This includes the specific examinations required, the weighting of each, and cutoff scores. Prospective students can apply to individual institutions or groups of institutions as part of a centrally coordinated process. A certain proportion of seats in public institutions is set aside for members of specific social castes (Agarwal 2006, Helms 2008).

Admission requirements vary among universities and subjects. They are known to be extremely high for India's very prestigious science and technology universities; students who apply for these take the Joint Entrance Examination organized by the Indian Institutes of Technology (established through an Act of Parliament for fostering excellence in education). There are 15 Indian Institutes of Technology, and these have created world-class research platforms (Agarwal 2006).

Other comprehensive universities recruit their students based on their own admission policies. For instance, admission to undergraduate programs (except the professional programs) at the University of Delhi is carried out by each college. Scores of higher secondary school examinations are taken into consideration. The colleges decide the cutoff percentage (minimum marks required) for their courses, and students with the requisite percentage can approach the college and seek admission (University of Delhi 2011).

Adjoining Emerging Economies: Malaysia and Thailand

Both Malaysia and Thailand have taken steps to reform the alignment between their schools and universities. They share approximately similar proportions of their economies dedicated to agriculture, industrial production, and services (40%) (Yilmaz 2010). In recent years, they have lowered the path for entry into higher education, have emphasized multiple paths to degrees, and have paved the way for private HEIs to take a larger role. Malaysia and Thailand differ in student intake to academic programs and higher TVET. Academic enrollments account for about 52% in Malaysia and 84% in Thailand.

Students attending pre-university and wishing to gain entry to public universities in Malaysia will have to pass matriculation exams. Those students who attend sixth form must pass the Malaysian Higher School Certificate or Sijil Tinggi Pelajaran Malaysia (STPM) examination. Still, excellent examination scores are no guarantee of admission. Although enrollment quotas have been decreasing since 2002, they continue to play a role and may undermine the transparency of admission policies in public universities in comparison with private universities, which are generally more transparent. Private colleges offer a range of nontraditional paths towards the degree qualification, for example through Malaysian public university degree franchised programs or external professional and semiprofessional examinations. Another option for students is to attend colleges or polytechnics that lead to a certification (Yilmaz 2010).

Ethnic quotas also play a key role in admission (Lee 2004b). For example, there is a pre-university matriculation program designed to admit *bumiputra* (indigenous) students into the scientific and technical fields in universities, as well as matriculation catering for Malaysians of Indian origin. Such programs are equivalent to Form 6 or A-level. Since 2003, admission to public university has been based on merit. Top public universities enrolled a high proportion of Malaysians of Chinese origin, particularly in competitive courses such as medicine, pharmacy, dentistry, and law. Private universities and university colleges enrolled a high proportion of international students. Malays, who are more concerned with graduate employment and competencies in the English language, prefer to send their children to private HEIs.

The minimum requirement is an SPM (Sijil Pelajaran Malaysia—like O-levels after 11 years), an STPM, or a matriculation certificate (for *bumiputras* and other ethnic minority groups and only science or accounting streams, equivalent to the A-levels). The first two examinations are administered under the Ministry of Education. In the past, each university had its own matriculation program. After 2000, they were centralized under the Ministry of Education (Lee 2004a).

For public *universities*, admission is open to students who complete pre-university level matriculation, or Form 6, with the STPM. Although preferential admission for bumiputras continues, it has had less influence since 2002. In private universities, there are multiple paths to a degree, and twinning is increasingly popular. There is open enrollment at polytechnics and community colleges. Higher weighting may be given to the underprivileged and marginalized groups.

In Thailand, after completing the upper secondary track (academic or TVET), students can opt for a postsecondary nondegree program or a vocational education diploma (or a technical bachelor of arts degree), or go through a more traditional general education program. Students can pursue higher education through a number of routes: public universities, autonomous universities, technology universities or institutes, community colleges, or private universities (Bovornsiri 2006). Thai students have access to 12 years of free basic education, which has increased the demand for higher education. Transition rates from secondary to higher education institutions (excluding open university enrollees) increased from 75.9% in 1999 to more than 80% by 2004. Enrollments in all higher education programs grew by 47% (or an average annual rate of 6%) between 1999 and 2008 from approximately 1.6 million to 2.4 million students (Yilmaz 2010).

Thailand's dual system of university entrance (central and regional) under the Commission of Higher Education provides flexibility to the diverse array of receiving institutions. In the Central University Admission Scheme, students can apply to as many as four institutions and four fields of specialization. Results are weighted, including performance in secondary school (10% on grade point average [GPA], 20% for the GPA of core subjects [which increases year by year to 40%], 35%–70% for the results of the Ordinary National Education Test [O-NET], and 0%–35% for the Advanced National Education Test [A-NET]). Results of interviews are also considered but not weighted. The weighting of the results is still changing. The National Institute for Educational Testing Service (established in 2005) is responsible for the O-NET and A-NET examinations. Thailand also has a direct admission system more focused on local institutions. In this scheme, each HEI sets up a quota for students from the province where it is located, which may be as high as 60%. This provides flexibility for regional universities to address needs specific to their provincial growth and development (Bovornsiri 2006). Nevertheless, there is a substantial popular uproar over the effect of these competitive examinations on fostering local wisdom and creativity of Thai students.

Both Malaysia and Thailand hope to expand access and guide graduates of colleges and universities into the workplace in a way that will satisfy both student aspirations and national development plans. They aim to provide quality learning environments, and knowledge and skills relevant to the workplace. This will require more efficient resource allocation with a sustained focus on equity, and a continually strengthened system of QA and accountability. Social and cultural factors continue to play an important role in these richly diverse systems of higher education, while personnel and resource decisions also continue to gain closer alignment with performance based-results.

Emerging Island Economies: Indonesia, Philippines, and Sri Lanka

In Indonesia, upon passing their final secondary school examination, students can take the State University National Entrance Examination (Jakarta Post). However, the increasing high rate of failure in the final secondary school examination is a concern and has been blamed on low-quality teachers. This trend brought the secondary school graduation rate down to 90.7% in 2010 in the capital city, Jakarta, which is only slightly higher than the national average graduation rate of 89.8% (Setiawati 2010).

There is considerably more demand for public rather than private HEIs in Indonesia. While there are only 82 public HEIs (3.1% of total), 63.7% of high school graduates applied to these institutions in 2007, with only 27.5% gaining acceptance (Susanti 2011). The low admission rate of public universities and high competitiveness of college access increased the competition for high-quality secondary schools and private tutoring. As a result, students from urban areas and high-income families are advantaged in access to public universities, while those from low-income families are more likely to go to private universities (Buchori and Malik 2004).

Nizam (2006) argues that the students need access to a high-quality senior secondary school and extra, special training in a "private study center" (*bimbingan belajar*) to pass the entrance examination. High-quality secondary schools and bimbingan belajar are located mostly in urban areas, and only students from middle- and high-income families can pay for the extra training. Furthermore, based on the last survey, only 3.3% of students from the lowest 20% of income groups successfully passed the entrance examination. On the contrary, the proportion of students from the highest income quintile who get university seats reached 30.9% (Nizam 2006).

In theory, all students in the Philippines can gain access to higher education if they meet the admission criteria (and can meet the tuition and living costs). However, admission requirements remain dependent upon individual HEIs. Entrance to HEIs is dependent on the possession of a high school certificate of graduation and in some cases on the results of the National Secondary Achievement Test (NSAT), or in many HEIs the results of their own entrance examinations. The NSAT is administered to fourth-year high school students to gauge the quality of the individual institutions they attend; it was not designed as an admission test, but has nonetheless served that purpose for some institutions. Privately administered testing programs through the Center for Educational Measurement are also widely used by colleges for admissions purposes. The two most common ones are the College Scholastic Aptitude Test and the Admission Test for Colleges and Universities (World Education News and Review 2004).

From 1973 to 1994, the National College Entrance Examination was used for admission to postsecondary degree programs; it was abolished and replaced by the NSAT, because it was considered by many not to be effective enough in differentiating student applicants. In addition, the Philippine Education Placement Test is a national examination designed to evaluate the grade level of students returning to the school system or seeking admission to college based on knowledge and skills gained through formal and nonformal methods (World Education News and Review 2004).

Admission to public universities can be very competitive in the Philippines, in particular, at the University of the Philippines campuses, which usually accept fewer than 20% of

applicants, where performance in the University of the Philippines College Admission Test (UPCAT) and the weighted average of final grades obtained in high school are required for entrance. The top-ranking applicants, based on the quota and cutoff grade set by each campus, qualify (University of the Philippines 2011). Other universities maintain their own admissions criteria, which may include a school-administered admissions test, secondary school grades, an interview, and a medical examination.

In Sri Lanka, students have to take the General Certificate of Education (GCE) Advanced Level examination, and universities use the scores as a criterion for recruiting new students (ADB 2011b). There are 15 universities in Sri Lanka. Public universities provide free undergraduate education to students. Fewer than 16% of those qualified attain access to state universities. This low admission rate leads to an exodus of around 8% of qualified students leaving Sri Lanka to study overseas in the United Kingdom, India, Australia, the US, and the PRC, among others. The low state university admission rate also leads to increased applicants to the Sri Lanka Open University and local private HEIs. However, the high tuition fee in private HEIs causes some students to drop out. Relying on the GCE also places students from remote and rural areas at a substantial disadvantage in college access. Urban students are more likely to have higher scores in the GCE Advanced Level test and thus have more chances to gain access to state universities (NEC 2009, Coomaraswamy 2010).

Small Globally Integrated Urban Economies: Hong Kong, China and Singapore

In the case of Hong Kong, China and Singapore, the secondary school curriculum provides graduates with increased capacity to enter university. The students are bilingual and have become better able to communicate, collaborate, and work effectively across national borders. Despite the traditional Chinese cultural emphasis on rote learning, secondary school students from these two economies score near the top of international rankings on the Program for International Student Assessment, a paper-and-pencil evaluation that measures 15-year-olds' capabilities in reading, mathematics, and science literacy (OECD 2011b).

Hong Kong, China's "Learning to Learn: The Way Forward in Curriculum" and Singapore's "Thinking Schools, Learning Nation" and "Teach Less, Learn More" programs are examples of how education systems prepare students for higher learning in university and to be broad-minded and independent thinkers (Hong Kong Education Bureau 2001, Singapore Ministry of Education 2012).

In 2012, Hong Kong, China is moving in secondary and university education from a 3+4+3 to a 3+3+4 system, with 3 years of junior secondary school and 3 years of senior secondary school, followed by 4 years of university. The new system introduces a liberal studies curriculum in senior secondary schools, plus a foundation year of general education in the universities. The Education Bureau administers A-level examinations and provides accreditation. However, each university is autonomous and self-accrediting. The Curriculum Development Institute assists secondary schools in aligning their curricula with higher learning.

Singapore also ensures that there will be a strong alignment between schools and universities, with a clear focus across the system on specifically stated outcomes and coordinated attention to alignment among curriculum, examinations, and assessment. There are incentives for students to learn, while teachers and principals remain accountable (OECD 2011a). Scores on secondary school leaving examinations, which qualify a student for the General Certificate of Education, Advanced Level, are the primary indicators used in the university admission process (SEAB 2011). Reforms in recent years also saw a substantial increase in universities' autonomy in the admission process. Students who desire to apply to the National University of Singapore or Nanyang Technological University are also required to sit for examinations held by these two HEIs. To encourage students to prepare more for their higher education, faculties in the universities are also encouraged to establish their own criteria for admission.

Hong Kong, China and Singapore broke away from their elite systems with similar schemes. The former channeled a large number of senior secondary school graduates into self-funded community colleges for associate degree programs. Likewise, Singapore addressed the need to expand higher education by providing a wider array of study opportunities in polytechnics, institutes of technology, and other HEIs with business and management programs, the arts, science, and software engineering programs.

Developed Economies with Universal Higher Education: Japan and Republic of Korea

In Japan, the pathway for high school graduates to colleges and universities has become more diversified since the 1990s. The scores earned in the National Center Test for University Admissions (NCTUA) are used by many universities as one of the criteria for selecting students. State universities also hold their own tests for recruiting new students, and passing the NCTUA is supposed to be a prerequisite for taking these institutionally held tests. Some private institutions also use the test they give as the only criterion for admission. Although the NCTUA is under the management of the National Center for University Entrance Examinations, students can still choose the subjects for the test according to the requirements of the prospective universities. To alleviate the pressures on students and their parents, the NCTUA is designed to cover only the knowledge learned in classrooms. The NCTUA has five sections (Japanese, mathematics, social science, science, and foreign languages) and covers 31 subjects. Candidates can choose five subjects from each of the five sections for testing according to the relevant requirements for admission (NCUEE 2012).

The rapid development of higher education in Japan has to a large extent been achieved through the expansion of private HEIs, which already in the early 1990s accounted for more than 80% of HEIs in the country (Ichikawa 1991). The overall expansion of the private sector and the competition for prospective students drove many private institutions to lower their criteria for admission and, in some cases, only secondary school records and reference letters from principals are needed for admission. The evaluation of students' preparedness for college education is still under question.

In the Republic of Korea, access to top universities is very competitive, since it engenders an academic pedigree and a guarantee of the best jobs. Prospective college students are

required to take the College Scholastic Ability Test (CSAT), which has five sections: Korean language/reading, mathematics, English, various "elective" subjects in the social and physical sciences, and foreign languages or Chinese characters and classics. Each section except English and Korean language/reading covers different subjects tailored for candidates from either humanities or sciences and engineering. Universities then determine whether or not to accept a student according to the CSAT results and their high school records. Students' high school records can account for 40% of the overall admissions decision. Universities can also organize examinations and interviews for their special needs (KICE 2010).

Some admission programs are also available for students with special needs. For example, students from farming and fishing villages and handicapped students can apply to universities through this special screening process (National Report of Republic of Korea 2008). The Ministry of Education sets the dates for these special examinations, and students can apply to many universities at once if the dates of the examinations organized by the universities are different. The competitiveness of the admission system puts much pressure on students and their parents, which increases the demand for tutoring schools for examination preparation. To alleviate the pressures, the government plans to launch a new program in 2014 to reform the college entrance system. In the new system, the CSAT will be held two times each year, and students can decide whether they will take one or both exams. In this way, they may choose the better of the two scores they receive (Chosunilbo 2010).

Variations and Commonality in Admission Procedures

Across Asia, admission to higher education is based on some combination of secondary leaving exam, matriculation exam, and other entrance exams. These are also used in other parts of the world, where a variety of types of standardized aptitude tests, as well as student GPAs in secondary school, are used in admission exercises. A student's relative academic rank compared with other students in his/her class is also used in some countries. When we place them in the global typology we can see how Asian countries compare with those in other parts of the world (Table 3).

Most Asian countries still rely heavily on entrance examinations. Admissions offices of colleges and universities in other parts of the world also consider the specific courses that a student has taken in secondary school, including their depth and breadth as well as their academic rigor. As part of admission criteria, some colleges and universities in Organisation for Economic Co-operation and Development (OECD) countries have begun to consider leadership experience, including participation in student government and civic organizations; volunteer work in the community; as well as participation in sports, artistic endeavors, and after-school clubs, and relevant part-time employment. The reputation of the secondary school may play a role in admission, as well as after-school programs that specifically help students prepare for university life and study. Some college and university admissions offices even ask students to create a portfolio that includes their experiences, along with samples of their writing or other non-academic accomplishments. In short, some Asian countries have more room to consider diversifying the entrance criteria to higher education. In addition, it is necessary to project clear expectations about entrance requirements to secondary schools, students, teachers, and parents. In all cases, requirements have to be made more transparent.

Table 3 A Typology of Higher Education Admission Systems

Type 1: Secondary Leaving Exams	
National exam score only	Austria, France,[a] Ireland, **Sri Lanka**
National exam score plus application dossier	United Kingdom
Regional/state exam score plus secondary school academic performance	Australia
Type 2: Entrance Exams	
National exam score only	**PRC, Indonesia, Mongolia, Viet Nam**
National exam score plus secondary school academic performance	Spain, Turkey
Institutionally administered exam score only	Argentina
Institutionally administered exam score plus secondary school academic performance	Bulgaria, **Philippines**
Type 3: Standardized Aptitude Tests	
Standardized aptitude test score or secondary school academic performance	Sweden
Standardized aptitude test scores, plus application dossier	**Republic of Korea**, United States
Type 4: Multiple Exams	
National entrance exam score, plus institutionally administered entrance exam score	France,[a] **Japan**, Russian Federation
National entrance exam score, institutionally administered entrance exam score, and/or secondary school academic performance	Brazil, **Lao PDR, Thailand**
National secondary leaving exam score plus institutionally administered entrance exam score	Finland, **Malaysia**, **Singapore**
National secondary leaving exam score plus standardized aptitude test score	Israel
Multiple exams administered by multiple entities	**India**
Type 5: No Exam	
Secondary school academic performance	Canada, Norway
Application dossier that does not require exam scores	Certain United States institutions

Lao PDR = Lao People's Democratic Republic, PRC = People's Republic of China.
Note: While some Asian countries are in the process of reforming admission requirements, their placement in this typology is representative of major patterns.
[a] Students who pass the nationally administered Baccalauréat examination have open access to most university programs (Type 1). However, the elite universities' (Grandes Ecoles) candidates must also pass institutionally administered entrance examinations (Type 4) (Helms 2008).
Source: Modified from the typology presented in Helms (2008).

Thus, the crux of the external efficiency problem facing many developing countries at the start of higher education is to address the inadequate and in some cases the decreasing readiness of secondary school graduates for higher education. This growing lack of readiness can be remedied by closer collaboration between secondary schools and HEIs. The more HEIs are able to understand the students who occupy their classrooms and laboratories, the better they will be able to develop measures to lessen the gap in expectations about readiness.

All stakeholders need to be involved. Secondary teachers are not always aware and informed about what is expected of their students after entering higher education. The gap between the expectations of school teachers and college professors can be significant. If few parents, teachers, counselors, and school administrators have knowledge of college and university and what is needed to successfully undertake studies in HEIs, they are less able to transmit accurate information to students. Furthermore, children of poor rural households, ethnic minorities, urban migrants, and other disadvantaged parents can easily become marginalized in their quest for access to higher education, as their parents usually lack the knowledge and experience to help their sons and daughters prepare for higher learning. Some secondary schools in Asian countries have never had a student enter university, and such schools have little contact with HEIs.

While national entrance examinations have to recalibrate themselves from the days of elite higher education, schools and universities have to forge closer contact with each other. Governments have a responsibility to make this possible within the context of the increasingly stratified and diverse system of colleges and universities in their nations. Moreover, the community's role can also be important: There is a need for joint efforts involving university, school, and community to provide academic support services to prospective university students. Methods should be developed to identify deficiencies much earlier at the secondary school stage. Information and orientation workshops can also be provided in senior secondary schools by university professors and other academic staff for students, parents, teachers, and school counselors of students. Better awareness is also needed of student readiness requirements for alternative opportunities, e.g., studies in TVET HEIs and community colleges. Secondary schools must be supported and encouraged to require more rigorous coursework from their students than merely meeting minimal requirements. For this, dual courses can be introduced (i.e., in the last year of senior secondary school, courses with similar levels of substance and rigor as in the first year of university should be offered). It will be important also to follow up students' progress in higher education, to be able to review and further improve, as necessary, the school–university alignment. None of the measures noted above can be effective without high-quality teaching in both secondary schools and universities. Teacher education programs need to strengthen the pedagogical skills of secondary school teachers and university faculty alike to help students practice critical thinking and problem solving.

Differentiating Institutions in Higher Education Systems

As economies diversify, so must institutions of higher education. Developing countries in Asia should increasingly reconfigure their HEIs, including research universities, undergraduate institutions, specialized colleges, vocational professional institutes, regional colleges, and national flagship universities. An efficient system of higher education is one in which postsecondary institutions have different but distinct missions, educate and train students for different careers and therefore pursue different instructional approaches, are funded and

managed differently, and function and are governed under different laws and relationships to government (OECD 1998). However, to be effective, the diversified higher education system as a whole must appropriately support the vision of the nation for economic development. An appropriate range of HEIs can provide flexibility and dynamism to serve different student needs and be responsive to the changing needs of the labor market. A rationalized alignment of an appropriate range of HEIs can help address both challenges: student readiness for higher learning and student readiness for the workplace.

Middle-income countries often have a diverse configuration of colleges and universities, and some regionally or globally ranked universities. A differentiated array of HEIs of various levels (including TVET institutions and community colleges) is necessary for middle-income countries to prepare human resources for the labor market and boost indigenous innovation and science and technology to avoid the so-called middle-income trap (ADB 2011a) and help drive their economies toward higher income levels. A key task concerns how well HEIs are configured with distinct missions and have the capacity to educate students from more diverse ability ranges and to prepare them for changes in the labor markets and workplaces.

Lower income countries will need to pursue strategic plans to strengthen their existing institutions, making selective universities able to attract international investment as they contribute to particular forms of production. Other colleges need to set basic standards and justify their financial planning on the sound basis of how well they serve their local communities. Community-based institutions can excel by promoting local entrepreneurship. The colleges in these countries can benefit from becoming bases for the application of technology to local problems, whether they be agricultural or have to do with resource extraction and processing, transportation, energy production, etc. These colleges can also promote languages and cultural knowledge that will help graduates gain access to further study at colleges outside their home country.

Alignment of Higher Education and the Workplace

On a per student basis, the cost of higher education far exceeds that of primary and secondary education (Glewwe and Kremer 2005, Sarvi 2008). It is important to pursue appropriate cost-sharing measures with stakeholders such as students, their parents, and the private sector to reduce the cost burden on governments in financing expanding higher education systems. While this is necessary, it is not sufficient for improving the cost efficiency of higher education; external efficiency matters a great deal. Preparing university graduates with knowledge and skills that align with Asia's labor markets and dynamic workplaces is a key factor.

Higher Education Graduates to Drive Diverse Economies Forward

As economies move upward, higher education also has to move upmarket. For Asia's *low-income developing economies,* which depend on agriculture and manufacturing industries and low-wage labor, an upgrade in productive capacity requires university graduates who can understand and adapt ideas and technologies from abroad to help diversify their economies. *Middle-income developing economies* have begun to shed some of their low-wage industrial labor in favor of more value-added production for the international consumer market. An increase in science and technology graduates will contribute to their making a transition to developed status. *Developed economies* face intense global competition and can sustain their competitive advantage with university graduates from within and across their borders. They increasingly rely on graduates who are bilingual or trilingual, culturally sophisticated, and effective cross-border collaborators.

Occupation Premiums for Graduates from Universities and Higher TVET Institutions

It is not surprising that occupation premiums—the salaried positions in the workforce awarded for receiving a higher education—are generally higher for workers with graduate degrees. However, the situation becomes more complex when comparing the difference between university and higher TVET graduates. University graduates in Indonesia and Thailand receive higher occupation premiums than higher TVET graduates. Premiums for service, sales, and production workers are slightly higher in the Philippines. In Mongolia, workers with higher (postsecondary) TVET qualifications receive higher salaried positions in the labor market than do graduates of colleges and universities, including those in agricultural and professional occupations (Di Gropello and Sakellariou 2010). Thus, in some cases, higher TVET graduates

have lower unemployment rates than university graduates due to the relevance of their skills in the workplace.

In Thailand, about a fifth of individuals with higher vocational qualifications are in professional occupations, and about a third are employed in production/other manual labor. Only 5% of university degree holders are employed in production jobs and manual labor. For Indonesia, almost half of those with higher TVET qualifications are employed in professional occupations, and about a third of university degree holders are employed in professional occupations. Almost a third of university degree holders are in clerical jobs, and less than a fifth of higher TVET holders are in clerical jobs (Sakellariou 2010).

The highest proportions of university graduates are employed in technical and professional occupations. For example, in Mongolia, Thailand, and Viet Nam, the figure is about 70% or higher, and it is 60% for Philippine graduates. Again, in Indonesia and Philippines, where there is an oversupply of low-quality university places, and a tilt in study areas toward social sciences rather than natural sciences and technology, a large proportion of university graduates also work in clerical jobs (Sakellariou 2010).

In transition economies like Cambodia and Viet Nam, occupation premiums are increasing over time along with the emphasis on skills for the expanding labor markets. It is still possible for the labor market to absorb university graduates, even though making university education more relevant to the workplace becomes an increasing challenge. In these transition economies, labor markets also continue to provide a good payoff in the growing services-related fields (Sakellariou 2010). In Indonesia, Philippines, and Thailand market forces have long guided the reward structure for skilled occupations: Those with relevant skills continue to reap benefits, and earnings increase with greater occupational skills.

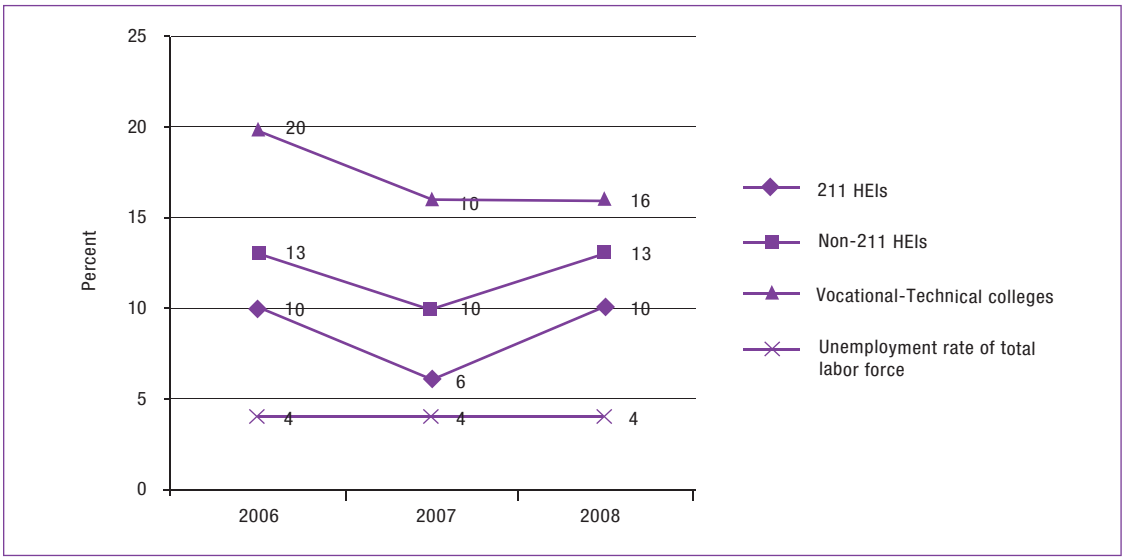
Graduates often lack information about jobs until they graduate, and they may not understand what they are equipped to do after graduation, as well as their work effectiveness. For example, Thailand's colleges and universities graduate about 250,000 students per year. Yet 80% of Thai firms experience difficulties in filling job vacancies due to graduates who lack basic and technical skills (World Bank 2011). Thailand also has an oversupply of social science graduates and a shortage of graduates who have specialized in science, technology, and health science—the fields that are essential for building Thailand's knowledge economy.

Since the PRC's rapid expansion of enrollments in higher education, its unemployment rate for higher education graduates has risen. The so-called 211 universities—those in the top tier—had a graduate unemployment rate of 10% in 2008, as compared with a 13% rate for other colleges and universities (Figure 3). The rate is slightly higher (16%) for graduates from vocational-technical colleges. These figures stand in contrast to the official overall national unemployment rate of 4% (Mycos Institute 2009, NBSC 2009).

Higher education premiums rose in the PRC after 1988 but began to level off in 2001 (Becker 2010). Moreover, the national employment report in 2009 noted a general deficiency in applied analytical ability and managerial skill among college and university graduates (Mycos Institute 2009).

The main challenge for the PRC does not concern employment opportunities for graduates of its top-tier universities, which are increasingly approaching international standards. Rather,

Figure 3 Unemployment Rates by Type of Higher Education in the PRC, 2006–2008



HEI = higher education institution.
Note: The unemployment rate applied in HEIs and vocational and technical colleges refers to the rate 6 months after graduation.
Sources: Mycos Institute 2009, NBSC 2009.

it is to raise the instructional quality of the country's hundreds of second- and third-tier HEIs, including the growing number of private colleges (Postiglione 2011). Graduates' employability is the obvious test of whether the vast bulk of colleges are aligned with the workplace. Most central government funding goes to top institutions, which are supposed to act as models for the rest. Yet, less stellar institutions need to focus as much on fostering partnerships with industry as on emulating the academic elite. Fostering quality will be the key to turning the PRC's diverse higher education system into a driving force of economic development.

The Changing Workplace

Interesting times could be in store in countries like the PRC, Indonesia, and Thailand, where the percentage of higher education graduates in the workforce is now about one-fifth—double what it was 15–20 years ago. In the dynamic Asian region, demands of the workplace change quickly and can result in changes in unemployment rates, rates of return, and workplace opportunities.

The major qualitative changes in the workplace will be linked with the expanding need for innovation, ability to exploit niche industries, and capacity to operate in an increasingly multilingual and cultural global milieu (Cheng 2007). Developed countries have learned hard lessons about the futility of relying upon human resources planning forecasts and overspecialization in higher education. While economies still require some very specific types of human resources, dynamic economies also require high-level talent that is innovative, risk taking, adaptable, and responsive to changing environments. The modern workplace is flatter and less hierarchical than before and requires different skills sets than in the past. The implications are significant for higher education. Colleges and universities will have to radically change the way that instruction is delivered as well as expand offerings in continuing education for workers who need to readjust

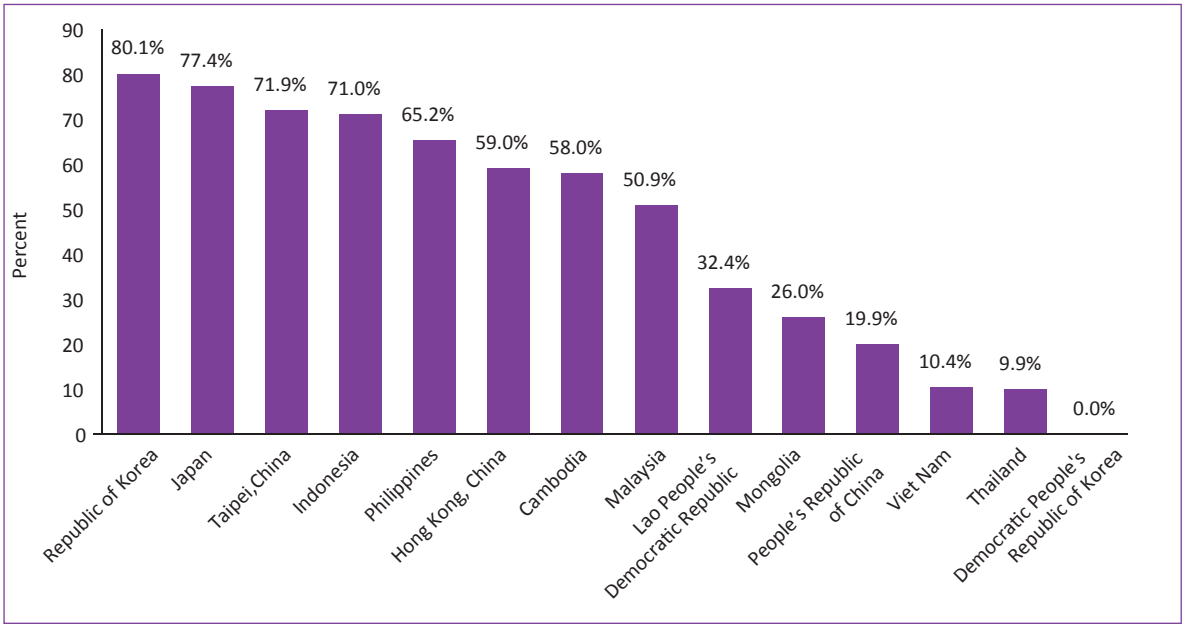
to rapidly changing labor markets. Employers will expect their employees to be more attuned to an increasingly competitive external environment, which will require good skills for teamwork, problem-solving ability, communication, and other so-called noncognitive or "soft" skills.

Universities should appoint representatives of local business and industry to their career advisory boards, which already contain academics from different departments of the university. Forums on globalization, the knowledge economy, and graduate employment can create ideas for forging a closer alignment between universities and the workplace. This calls for modification of aspects of the traditional elite university models to find ways for higher learning both to maintain the essence of universities and also to exploit their advantage in providing students with a broad understanding and an entrepreneurial orientation that will improve their capacity to enter the labor market. The external efficiency of Asian higher education will increasingly come to depend upon the extent to which graduates can enter a workplace that is regional in scope, one in which knowledge and skills are not only relevant for domestic labor markets but transferable across borders and beyond the region. The recruitment and utilization of talent that drives economic change will be sourced not only by universities in their own countries but also by regional centers of higher learning.

The Need for Public–Private Partnerships

The interface between public and private higher education is complex but provides opportunities for significant synergies. Private colleges have an incentive to respond to competitive labor markets, since their survival often depends upon it. Aside from an increasing number of private colleges, there is also growth in private sources of funding of public universities (Figure 4).

Figure 4 Private Percentage of Total Higher Education Enrollment in East Asian Economies



Source: Adapted from Levy 2010.

Public universities often have the advantage of being proactive with experimental initiatives. For example, a government initiative in the PRC has created space for selected public universities to experiment with the establishment of loosely coupled academic centers for software production. These centers can draw their staff from both inside and outside the university and focus more on external stakeholders in newly emerging software production industries. Such centers are given more autonomy by their universities than other academic units but are required to generate more of their own funding. They may select their own students and charge higher tuition fees, but their success will be determined by providing students with internships and eventually jobs with external stakeholders in the software industry (Yang 2012).

Regional Cooperation Matters

Colleges and universities are beginning to work more closely with external stakeholders, both public and private, to improve the alignment of their graduates with the workplace. The state has a role to play in using policy levers to facilitate collaboration and partnerships. Moreover, as labor markets become borderless, a regional perspective for the alignment will be increasingly necessary. Asia needs qualified graduates with expertise in science and technology who are creative and innovative thinkers and are well equipped to respond with entrepreneurial skills to a variety of workplace situations, including periods of future economic growth and even periods of economic recession.

While local context has to be considered in bridging the gap between the secondary school curriculum and entrance requirements to higher learning, growing economic integration across Asia means that it will be increasingly beneficial to capitalize on the experiences of neighboring countries and beyond. Increasing numbers of students in the region are pursuing their higher education studies in other than their home country. This trend is likely to grow and become an invaluable asset that enriches the diversity of higher learning across the entire Asian region. It will be important to pursue measures that will increase the consensus about criteria for admission to higher learning across borders and, more broadly, regionally.

Overseas study is already aligning itself with this regional labor market. In the future, the top four countries attracting foreign students are likely to be in Asia. The PRC will approach three million foreign students by 2025 (Bohm et al. 2004). At present, students from the Republic of Korea are the most highly represented group of foreign students in the PRC (China.org.cn 2006). Despite its plan to internationalize, Japan, which has been conservative with respect to admitting students from other parts of Asia, will continue to increase that number, partly due to its own population demography and its surplus of university places.

The Republic of Korea has the highest access rate in higher education but may eventually find itself in a similar situation as Japan, with larger numbers of foreign students, many from Southeast and South Asia. The two most developed economies in Asia—Hong Kong, China and Singapore—have a high level of labor mobility among the specialized professions. Each has increased its efforts to internationalize, and the trend of universities from US, Canada, Europe, and Australia opening branch campuses in Asia is increasing. This is likely to spur the talent needed for the regional labor market. Asian students can increasingly take advantage of the opportunities to access good quality higher education in the region (Daisuke and Fukunari 2008).

The McKinsey Institute points out that only 25% of Indian and 10% of the PRC engineering graduates have the skills required to work at their nominal skill level in an international company. Thus, while the larger Asian region might have a supply of scientists and engineers, raising all such graduates to international standards is still a work in progress. Southeast Asian countries would do well to keep this in mind and consider that their smaller student populations are an advantage, in comparison with the PRC and India, if QA as well as upgrading and certification after graduation are handled in a more expedient and efficient manner than in the past (Farrell et al. 2005).

Responding to Stakeholders

In the dynamic context of Asian development, university leaders are taking a multiplicity of concerns into consideration, among which is the extent to which graduates receive an education that is relevant to the needs of the workplace (Salmi 2009). University leaders are beset with a difficult balancing act: they are accountable for the manner in which public resources are utilized and sustained so that the financial capacity of their institutions can grow and maintain high standards. At the very least their institutions need to establish labor-market monitoring, such that detailed information can be provided about the employment characteristics of graduates from their various programs. In Chile, for example, the annual survey of employers is an important source of data for its annual ranking of university programs.

Proposals for External Efficiency Accountability

It is important to help HEIs become more accountable for their external efficiency. That accountability should focus on both the self-institutionalized monitoring processes and the results HEIs achieve. Accountability measures are more effective if they are formulated in the first instance by individual HEIs. In this sense, it is essential that each HEI more fully come to terms with the relevance and alignment of its programs to the workplace. If the process is driven by government, institutions have an almost natural tendency to resist or strategize around what will inevitably be perceived as an outside imposition. Universities are more likely to take the initiative to improve their viability, especially as the proportion of government subvention decreases, when they place their relationship with stakeholders in high regard. University leaders will have a more positive incentive to systematically report to stakeholders when it is made voluntary within a perceived relationship of mutual benefit and trust. Such an agreed-upon relationship with stakeholders will generate a greater sense of common mission and shared responsibility. Autonomy from government and accountability for external efficiency are not mutually exclusive. The benefit to HEIs comes as these two evolve toward a favorable balance.

Unrealistic Expectations

Varying levels of employment of university graduates are an unavoidable reality in many market economies. White collar work is not as available in fields where it was a norm in the past. The average graduate in the US will have seven jobs in the first 2 years after graduation, many in areas unrelated to their fields of study. This includes jobs unbefitting a university graduate, but jobs that nonetheless can teach valuable life skills. Students should be provided with information for

making realistic expectations about their opportunities in the workplace. Research can provide increased understanding of the outcomes of higher education and its linkage to the workplace. However, most developing countries do not collect systematic data on labor market outcomes and the workplace effectiveness of HEI graduates. Accurate information about skill shortages and labor market outcomes is invaluable for planning curricula and course offerings (Thorn and Soo 2006).

The focus on jobs, labor markets, and cost structures should not make universities lose sight of their larger role of creating global citizens who can also make authentic contributions to the development of their own countries and the larger regional economy in a plethora of ways that include contributing to the labor market, civil society, and community development (Daniel and Uvalic-Trumbic 2008).

The Community College and Higher TVET Sector

Some countries in Asia have adopted the community college model to help them address the rising costs of higher education, the diversity of abilities of secondary school graduates, the increasing demands of the population for more education, the needs of a dynamic labor market for midlevel expertise across a range of technical fields, and the specific talents required to build local communities (Elsner 2009; Raby and Valeau 2009, 2011). For example, Viet Nam has a thriving TVET sector, including an established network of community colleges that provide TVET within a flexible structure of instructional service. These institutions tend to be resilient, especially during periodic economic ups and downs, and can respond more quickly to labor market needs. The establishment of a system of community colleges also helps expand opportunities to bring educational progress and jobs to poor and other disadvantaged communities (Lam and Vi 2009). This ensures social balance by providing training that helps talented students from disadvantaged groups and remote areas find opportunities to access higher education.

Hong Kong, China and Thailand have imported and adopted the community college model, while the PRC and Singapore have retained their systems of postsecondary TVET. When Hong Kong, China tried to address the growing demand of the labor market and individual households for more higher education, it found itself handicapped by the Asian economic crisis. Unable to fund more higher education, the government took a bold initiative in 2000 to introduce community colleges with associate degree programs. Most of Hong Kong, China's community colleges nested themselves within the adult and continuing education divisions of public universities. These self-financed units offering 2-year associate degree programs helped lift the postsecondary participation rate in higher education to 53% by December 2004, and then to 66% by August 2005—overshooting the 2010 target—largely due to the popularity of the self-funded community college (Lam and Vi 2009).

While maintaining its TVET colleges, the PRC has also expanded its community college sector. The country's labor market needs are guided by a human resource blueprint pointing out that by 2020, young people will average 12.8 years of education. Shortly after the global recession began, only 68% of 6.11 million university graduates had found jobs, leaving nearly 2 million still unemployed in July 2009. Measures have been instituted to expand opportunities and find

work for graduates. The high level of unemployment among graduates of regular HEIs has led to a renewed focus on postsecondary TVET colleges, especially as more households drop the traditional emphasis on academic higher education. This is occurring as TVET and community colleges align themselves more closely with the needs of the labor market (Postiglione 2009).

During the dramatic transformation and rapid expansion of higher education in the last decade, 2- to 3-year higher vocational colleges played an indispensable role in providing higher education opportunities for roughly half of all college students who otherwise would not have been able to access higher education in the PRC. However, this achievement was made possible by high tuition and fees that generated more than half of total revenue for 3-year higher vocational colleges. The level of tuition and fees charged to students can be as high as if not higher than that charged to students attending the most prestigious 4-year universities (Postiglione 2009).

The central government in the PRC launched the Model Higher Vocational Colleges Construction Project and financial aid policy initiatives to help make higher vocational colleges more affordable (Song and Postiglione 2011). Yet ensuring equity remains a challenging issue. The recently promulgated Outline of the National Medium- and Long-Term Program for Education Reform and Development has the potential for improving this situation. However, further research is needed to address the specific financial implications of the new policies regarding the development of the system of higher vocational and technical colleges in the PRC. According to the Outline, a comprehensive TVET system will be established by 2020 to meet the requirements for transition in methods of development and adjustment in economic structure, to embody the idea of lifelong education, and to include coordinated content at both the secondary and advanced levels. Local governments are being told to establish and improve QA in TVET and to employ enterprises for quality assessment. Moreover, the government is pushing ahead with program articulation—specifically a system wherein TVET graduates will be allowed to directly seek higher education, which will broaden the channels for continuing education.

Public–private partnerships are contributing to higher TVET programs responsive to the market. Corporations have not only invested in workplace training but also in academic units that are responsive to job placement. In Asia, the Infosys Global Education Center in Delhi is one example. There, coursework and testing are conducted on-line. Industry can work with chambers of commerce to improve the skills match (Son et al. 2011). Meanwhile, the PRC is trying to capitalize on Sino–foreign partnerships in higher education to improve the quality of education and to study different experiences. While some overseas partners are driven primarily by commercial motives, monitoring by partner programs can help alleviate the problem.

The Crux of Employability

If not considered in more detail, employability can become a major drag on development in Asian countries in the coming years. A rapid expansion of higher education has the potential to complicate employability rather than address it efficiently. There is no consensus about who has the major responsibility for employability. Many businesses continue to prefer training their employees to be effective within their own sphere. However, rapid urbanization and mobility have made many businesses less willing to provide training, since company loyalty cannot be taken for granted in a rapidly changing society. Moreover, the numbers of jobs in particular sectors

rise and fall rapidly as industries and technologies change. Universities are not accustomed to taking responsibility for employability. That stance is rapidly changing, and universities must get ahead of the curve. They must elevate employability to an issue for students to consider in their first year of study. This does not mean that employability should be the first priority of higher education; it is crucial that employability not assault the main purpose of higher education—to empower and prepare citizens for a greater role in development and innovation. Yet it remains important as households pay more, as governments expend more, and as businesses expect more. Higher education is increasingly expected to address the issue of employability.

If the economy cannot provide full employment for university graduates, one might call it a market failure. Yet all three parties—businesses, universities, and individuals—have a share of the responsibility. One government role is to improve coordination among these three groups of stakeholders. The model is for broad-based growth (export, business investment, research and development innovation, small businesses, etc.) to create new industries. HEIs can help foster growth and employment. For example, the information and communications technology (ICT) industry in Asia has great potential for growth, but governments have to provide the framework for entrepreneurs to create new industries and employment opportunities for university graduates. The growing ICT industry in Asia will eventually also need cyber security, an industry currently in its infancy. In short, universities not only have to be on the cutting edge of identifying new industries, but have to adjust their governance in such a way as to permit sectors of the major academic units to form more new autonomous units that can partner with new industries, generate funding, have autonomy in decision making about financing and programming, and forge closer ties with external stakeholders. This can significantly improve the alignment between university programs and the workplace opportunities of graduates.

HEIs should conduct tracer studies to provide information about the opportunities in the workplace for their graduates. Also, incentives could be provided to attract students to study programs that align more closely with the labor market demand. Regularly updated and published employment statistics by subject area and by HEI can help prospective students make better decisions about which HEIs to choose and what subject majors in which to enroll. Students would benefit from practical and easy-to-use on-line information that helps develop realistic expectations about the opportunities in the workplace. Loosely coupled academic centers can be established at HEIs. They should draw staff from inside and outside the HEI and align closely with stakeholders in emerging industries such as software production, energy, and environmental protection. And universities should appoint representatives of local business and industry to their career advisory boards.

An Efficient Role for Research in Asian Colleges and Universities

Research universities play a key role in training scientists. They drive the production of new knowledge to support national innovation (World Bank 2002). A study of patents has shown that universities and research institutes drive scientific advances in biotechnology more than do industrial firms (Cookson 2007). Thus, a priority of many governments is to ensure that their universities operate at the cutting edge of scientific research and development (R&D). Research universities have become key institutions for Asia's 21st century.

Research universities in Asia can anchor economic globalization into its rapidly urbanizing regions. Urban Asia is where most of the region's population will live and where most of its GDP will be generated. It will be the role of higher education in urban Asia to become the driver of innovation and technological development (ADB 2011b). As the number of Asian colleges and universities expands, so will their role in producing new knowledge for scientific and technological innovation.

Asia now accounts for about one-third of the world's spending on R&D. It has surpassed Europe and is soon expected to surpass the US. In R&D expenditures as a percentage of GDP, Japan and Republic of Korea rank particularly high, with both spending 3.3% of GDP (NSF 2012). The PRC's R&D expenditure rose from 0.6% of GDP in 1996 to around 2% in 2010 (a level more common among developed countries), and it is expected to reach 2.5% in 2020 (Whalley and Zhou 2007).

Measures of Research Output

The PRC also leads all countries except the US in scientific publications. In 2008, its universities published 163,000 papers in journals that had an abstract in English and had been peer reviewed. The PRC's share of the world's publications rose from 4% to 10% from 1999 to 2008, with a very strong showing in engineering subjects, including nanotechnology. Yet the high number of scientific publications does not mask the lower frequency of the world's scientists who cite the PRC's scientific publications, which places it sixth in the rankings (The Royal Society 2011).

Science and technology innovation can lead the way to addressing major challenges in developing countries in the region in the coming decades. When compared with OECD countries, the BRIIC[2] nations (including the PRC, India, and Indonesia) are making sizable investments in

[2] BRIIC = Brazil, People's Republic of China, India, Indonesia, and Russia. These five countries accounted for more than one-half of non-OECD global GDP in 2008 (Abler 2010).

research and environmental technologies. Students benefit from the transmission of research, and research is also one measure commonly used in making decisions about tenure and promotion of academic staff. Top researchers are recruited by and gravitate to the leading universities, where research funding from both government and private sources is greatest. These researchers have more opportunities to network internationally and collaborate with other top researchers domestically and around the world.

Second- and third-tier universities have a more challenging set of factors affecting their research output. Many of their academic staff have not earned research doctorates, their research facilities are more modest by comparison, and governments invest much less in their research budgets. Yet the communities they serve could greatly benefit from research that addresses problems in agriculture, urban development, energy use, transport infrastructure, product development, etc. However, second- and third-tier universities are less efficient in producing relevant research and knowledge transfer to local communities, since a major motivation for their research activities is journal publication leading to promotion. While top international journals are peer reviewed and may publish only 5%–10% of the articles submitted to them, locally published and university-based academic journals are more likely to accept and publish most of what is submitted to them. In some developing countries in the Asian region, fees are charged for publication of academic articles, many of which are discussions rather than cutting-edge research. In short, as HEIs expand, the conditions for the production of research become highly inefficient. Rather than measure the impact of research solely on the basis of academic journal ranking, academics can also be recognized and rewarded according to the measurable impact their research has on local development. Local leaders and industrialists, as stakeholders, can become more involved in local universities.

As consumer markets grow and the level of research talent in Asian developing countries rises, opportunities increase for innovative research in STI. STI research at second- and third-tier universities could be doing more to increase local industrial competitiveness, raise productivity, and contribute to national growth as well as to the quality of life of the communities they serve. the PRC, India, and Republic of Korea already have a higher proportion of high-tech patents in industries than the global average. Other Asian countries could also increase their standing in this respect (OECD 2008).

Some incentive programs for improving research productivity are already under way. Malaysia has developed a framework of rewards that link salaries to research productivity. For example, an increase in the number of citations of articles published in scientific journals will be translated into more salary or funding (M. Sirat, pers. comm. February 2012).

Public–Private Partnerships for Research

Many Asian countries have already begun to expand public–private partnerships in higher education. In terms of governance, including more external stakeholders in university councils is a step forward. However, better policy support at specific stages of the innovation and value chain process could improve efficiency. These might include grants, tax credits, and/or other incentives. For these to work well, a legal framework is a basic condition for capitalizing on public–private partnerships. For example, an emerging technology could improve food

production and product marketing while using alternative energy sources. Research investment for an emerging technology can make science and technology innovation more relevant to local conditions. Private enterprises could benefit from the assistance that university-based software engineers could provide. The PRC has already established technology zones that benefit from tax reductions for R&D in innovative technologies, e.g., in software engineering and nanotechnology (Yang 2012).

However, obstacles still exist. These include university bureaucracy, which hinders its academic staff from engaging in such partnerships. Both private firms and universities would have more confidence in collaboration if they had better legal guarantees and protection in cases concerning copyright, patents, and product liability. In short, policy support can be a key method of removing obstacles to partnership in research, raising efficiency, and increasing investment for promising ventures and technology clusters.

It is up to government to provide coordination and coherence. The greatest challenge for government policies is to provide the right mix and balance of measures. This can be achieved by bringing stakeholders together in various forums to discuss with experts in different fields how to craft policies that create the conditions for university research to be effective and efficient for promoting innovative production and improved quality of life.

Strategies to Promote R&D

National education ministries can pursue strategies that (a) identify specific fields in HEIs that can potentially have positive impacts on local development, (b) encourage HEIs to establish new experimental academic units, (c) free HEIs from extensive bureaucracy, (d) provide HEIs with decision-making autonomy, (e) require HEIs to be self-supporting, and (f) permit HEIs to establish councils that include both internal and external stakeholders but retain their status as an academic unit of the university. Staff for these units can be recruited from other academic departments, as well as from elsewhere, including other universities and industries. The units can recruit their own students and charge fees capped at a level above the standard university fee.

The reputations and sustainability of these units would be based on the relevance of their research to their stakeholder industries, as well as their ability to place students after graduation. This in no way suggests that universities should become vocationally oriented, with research driven solely by industry. However, as the external environment of universities changes, they need to adjust and become more proactive in diversifying their operations. This is especially true of second- and third-tier HEIs, which receive less and less support from government.

With changes in the international economy, the perspective of knowledge-based production has changed. Asian countries will be moving to create more knowledge-intensive products and service industries. Innovation and technological change are needed to support local development and improve their competitive edge. The research enterprise has to move from linear to nonlinear, from unitary disciplines to multidisciplinary, and from individuals to collaborative networks. This constitutes a paradigm shift in knowledge production. There is an important role of government here—to establish policies based on financial competition that would steer the establishment of private foundations for funding research in STI.

Academic research has to respond to changing global and regional conditions, but government policies have to set a framework for their response (Dill and van Vught 2010). Academic research in developing Asia is at present only marginally at the core of economic development and national innovation. Conditions can be improved to facilitate collaboration with industry and the private sector in general. This will vary from country to country. For example, in Thailand, a structure of incentives is needed to steer toward more effective research collaboration between universities and private industry. For Viet Nam, it is more important to remove bureaucratic obstacles and provide more autonomy to academic units for entrepreneurial ventures.

Asia can increase and improve university research-based scientific output in two ways. At present, Asian scientists receive most of their research funding from their own institutions, government funding agencies, and other government entities (Table 4). A much smaller proportion of funding for scientific research comes from industry, private nonprofit foundations, and other nongovernment sources. At the same time, most patents in Asian economies are owned by industry, not by the research universities (Table 5). While this pattern is not unusual, universities in only two Asian countries—the PRC and Singapore—exceed the world average share of patents owned by universities.

Table 4 Shares (%) of Research Funding Received by Academics in Selected Asian Economies, Academic Year 2008

Economy	Own Institution	Public Research Funding Agencies	Government Entitles	Business Firms or Industry	Private Not-for-Profit Foundations
PRC	43.55	10.63	25.47	13.10	
Hong Kong, China	44.59	20.36	16.45	2.07	2.91
Japan	50.77	22.11	15.10	8.04	2.98
Republic of Korea	32.16	30.95	24.25	7.61	2.82
Malaysia	51.71	16.91	17.93	3.61	3.49

PRC = People's Republic of China.
Note:
The results presented in the table are from the 2008 Changing Academic Profession Survey, an international comparative study examining the nature and extent of the changes experienced by the academic profession.
Source: Changing Academic Profession Survey 2008.

The problems that confront second- and third-tier universities in Asia deserve more attention. Because their research funding levels are certainly less than those of first-tier research universities, their research efficiency has to be as high or higher to be able to attract sufficient funding. For most Asian developing countries to move their universities into a highly innovative role in STI research, there must be a multilayered shift from basic research and non-industry-specific applied research to a predominantly applied research mode. This will not be easy in the sense that there are currently clear boundaries between the roles of different organizations that do research. It can become more possible to change this as coordination increases across boundaries in the production of research.

Table 5 Share of Patents Owned by Industry, Universities, and Government (%)

Economy	Industry		Universities		Government	
	1995–1997	2003–2005	1995–1997	2003–2005	1995–1997	2003–2005
PRC	18.8	58.2	5.8	4.8	0.3	0.2
India		63.9		0.7		13.7
Japan	93.2	90.5	0.1	2.6	0.4	2.2
Republic of Korea	62.0	65.9	0.6	2.3	7.0	1.5
Singapore		63.0		10.2		14.0
Taipei,China		61.0		0.5		0.8
World	78.5	79.5	3.9	4.0	1.8	1.8

PRC = People's Republic of China.
Notes:
1. Patent counts are based on the priority date and the applicant's country of residence, and use fractional counts on Patent Cooperation Treaty filings at the international phase (international phase—a procedure consisting of four main steps: the filing of an international application and its processing by the receiving office; the establishment of an international search report and a written opinion by the international searching authority; the international publication of the international application and related documents, as well as their communication to the designated and elected offices; and an option of international preliminary examination, which concludes with the establishment of the international preliminary report on patentability (WIPO 2011).
2. Patent applications are attributed to institutional sectors using an algorithm developed by Eurostat. Only countries/economies with more than 300 patents over the period are included in the table.
3. This dataset is based on OECD Patent Database, June 2008 and EPO Worldwide Statistical Patent Database, October 2007.

Source: OECD (2008).

As boundaries blur, there is likely to arise a more entrepreneurial culture to drive regional growth. Nevertheless, there is a risk in that the universities may lose their core competencies and identity by concentrating too much energy on applied research for industry. It may be difficult to recruit good researchers if most of their work would be as low-paid temporal researchers or consultants (Vang et al. 2009).

Making university STI research more aligned with the economy and society requires that it also be structurally integrated and financially sustainable. It has to be integrated with programs that build human capital as well as those that reduce poverty. It has to be financially sustainable and aligned with building needed technical capacity though partnerships across countries at different stages of development. To improve the efficiency of scientific research, developing countries need to make a firm commitment to university-based R&D for STI, but also to protection of intellectual property, and a system that rewards innovation based on competition.

Cross-Border Partnerships for Research Efficiency

There are potential gains from improving science and technology research through cross-border regional partnerships. Some of these have already been cited by the Southeast Asian Ministers of Education Organization (SEAMEO). However, the emphasis in the past was not specifically on innovation. For example, SEAMEO supported the development of a program to promote networking among Association of Southeast Asian Nations (ASEAN) scientists and

technologists. The second Informal ASEAN Ministerial Meeting on Science and Technology, held in 2003, focused on science and technology for regional integration and competitiveness (UNESCO 2003). The ministers cited the importance of involvement by the private sector and supported an integrated approach, with efforts to strengthen links between Asia and Europe. This includes joint research programs and postgraduate programs.

Ultimately, partnerships for STI research, whether with universities or industry and the private sector, would work better across countries within the Asian region if incentives and frameworks were established to support them. At present, there is a lack of coordination, consultation, and linkage among various partnership programs. Each partnership emphasizes a different aspect of capacity development in STI research. Individual efforts do not necessarily add up to a coherent regional capacity development strategy. Most research-based partnerships aim to improve graduate student training and build research capacity in a university or a specific academic unit. Initiatives by single universities do not easily influence the strategies and scientific operations at the national or regional level (Watkins and Mandell 2010).

It is reasonable for Asian developing countries to expect that progress in science and technology will ultimately contribute to their economic development. However, there is much to gain if the countries at the subregional level, such as those in Southeast Asia, can collaboratively formulate a strategic vision of how their university systems can sustain the economic dynamism of the region over the long term. There is a role for cross-border and regional cooperation in fostering knowledge exchange for building research capacity in science and technology. However, overlap and inefficient investment have to be avoided. Planning at the national level has to be improved so as to create frameworks for both government and private investment in cross-border university research.

Advanced countries like Japan generate thousands of copublished journal papers with institutions in the PRC, Republic of Korea, and Western developed countries (Table 6). However, the figures for collaboration among researchers in developing Asia pale in comparison. Frameworks are needed to help forge more research partnerships and joint journal publications between first- and second-tier university researchers across Asia.

HEIs in Asian societies are often cited for not producing enough talent for innovative scientific discoveries. This is often attributed to traditional methodologies of teaching and learning. Yet, in terms of the total number of articles published in the prestigious *Science Citation Index*, Asia has shown remarkable growth. While US research output has remained flat over the last 20 years (0.6% annual growth rate; the US share of all articles fell from 38% to 29% between 1988 and 2005), and Japan has experienced only modest growth in its share of scientific publications since 1995 (circa 1.6%), several Asian economies have experienced notable growth in scientific productivity and have increased their shares of world output. In particular, the Republic of Korea's research productivity increased 15.7% between 1995 and 2005; the PRC's increased by 16.5%; Singapore's increased by 12.2%; and between 1993 and 2009, Hong Kong, China academics doubled their research output, and the number of refereed publications tripled.

Table 6 Research Collaboration between Japan and Asian and Other Institutions

Institution	Economy	Number of coauthored papers
Chinese Academy of Science	PRC	2,923
Harvard University	US	2,018
Max Planck Society	Germany	1,669
Seoul National University	Republic of Korea	1,383
University of Michigan	US	1,361
Russian Academy of Science	Russian Federation	1,331
University of Toronto	Canada	1,140
University College London	UK	1,046
Centre National de la Recherche Scientifique	France	986
Beijing University	PRC	805
Instituto Nazionale de Fisica Nucleare	Italy	752
University of Melbourne	Australia	586

PRC = People's Republic of China, UK = United Kingdom, US = United States.
Note: The table shows a sample of international institutes with which Japanese researchers published frequently between 2005 and 2009.
Source: Adams et al. (2010: 9).

A major driver of research productivity in Japan, Republic of Korea, and Malaysia is cross-border collaboration. In fact, it is inevitable that global cooperation in higher education research will be on the rise. Global universities are reshaping the world with potential long-term implications for eastern Asia (Wildavsky 2010). As barriers of geography and finance have dropped, universities are responding to globalization in ways that involve students, teachers, instruction, research, and a freer flow of ideas. Asia is fast becoming a center of attraction for global universities. Top-ranked American and European universities such as Yale University, New York University, Johns Hopkins University, University of Chicago, Nottingham University, and University of Michigan have established overseas centers and campuses in the PRC, Malaysia, Singapore, and other countries. Globalization will continue to produce new and broader trends in cross-border higher education, trends that may be resisted but probably not reversed. Therefore, it is timely to consider the patterns and emerging trends and create useful knowledge for long-term strategic planning of higher education in Asia's developing countries. They need to consider how to more systematically improve the quality of research in their universities through regional initiatives. For example, Southeast Asian countries can take advantage of the explosion of scientific output in that subregion to raise their own level of scientific productivity.

Cross-regional partnerships in higher education can play a key role in strengthening national capacity in science and technology. The common model or emerging prototype is a cluster of academic institutions and industries that can effectively transfer whatever knowledge is being produced. Cross-border collaboration in research and publication has improved the research productivity of those HEIs that have been participating actively in joint and multicountry research. Heightened productivity is indicated by an increase during the last 10 years in the number

of internationally indexed publications (some coauthored with foreign partners) produced by researchers based in HEIs with international linkages.

International research partnerships need to collaborate on research issues of importance to all the partners. Scientific research in lower income countries should initially focus on applied research. After a country achieves greater socioeconomic development, more basic research can be undertaken, and more of a balance between applied research and basic research can then be developed. There is a need to emphasize socially relevant research and national evaluation systems.

To establish and sustain the capacity of a research university, cross-border collaboration with other universities can play a role in improving external efficiency. As Singapore has demonstrated, transnational collaborations can improve the external efficiency of an HEI, especially if it can draw talent and experience from abroad. Bringing local students and academic staff into direct competition with those from abroad can also be useful and effective within a supportive campus environment. The New Singapore University of Technology and Design, headed by the past dean of engineering of the Massachusetts Institute of Technology, is but one example of an institutional collaboration that will make applied research a hallmark of its operation.

Asian countries are opening their markets and beginning to consider regional trade in educational services. In the PRC, overseas universities can establish joint campuses with a PRC university as host. India has recently introduced measures that permit independent campuses, but there are detailed rules designed to prevent abuse. Southeast Asian nations such as Singapore have moved deliberately to cross-border partnerships, with Malaysia and Philippines close behind. Viet Nam has impressive plans that are still in the early stages of implementation.

University partnerships are encouraged if there is a belief that they raise quality, attract educational resources, address a burgeoning demand, promote internationalization, and bring innovation to a higher education system. The blossoming of trade in educational services has led to new strategic thinking about how to capitalize on partnerships while avoiding the problems such partnerships bring. Thus, as regional collaboration in higher education grows in the coming years, the external efficiency of the growing number of partnerships will add a new dimension to the competitiveness rankings (Table 7).

In the final analysis, the external efficiency and contribution of higher education to the competitiveness of individual developing countries in the region will be dependent not only upon what universities spend for R&D, but also upon the quality of scientific research institutions, university–industry research collaboration, and the availability of scientists and engineers. Urbanizing Asia needs innovation and entrepreneurial skill, which higher education can provide. Slowing access to higher education is a trap that can handicap Asia's development. External efficiency requires that quality education be widely and equally accessible. Unequal access to higher education by different groups sustained over time can lead to efficiency losses and economic imbalance (Bourguignon et al. 2007).

Table 7 Selected Competitiveness Rankings in Asia, 2011–2012

Economy	Overall Rank	Basic Requirement	Efficiency Enhancers	Innovation and Sophistication Factors
Cambodia	97	108	98	91
PRC	26	30	26	31
Hong Kong, China	11	2	4	25
India	56	91	37	40
Indonesia	46	53	56	41
Japan	9	28	11	3
Korea, Republic of	24	19	22	18
Malaysia	21	25	20	22
Mongolia	96	101	105	112
Philippines	75	100	70	74
Singapore	2	1	1	11
Sri Lanka	52	65	69	34
Thailand	39	46	43	51
Viet Nam	65	76	66	75

Note: The Global Competitiveness Report (GCR) is an annual report published by the World Economic Forum since 1979. The 2011–2012 report covers 142 developed and emerging countries. The Global Competitiveness Index measures the set of institutions, policies, and factors that set the sustainable current and medium-term levels of economic prosperity. Measurement: **Basic requirement** (institution, infrastructure, macroeconomic stability, health, and primary education); **Efficiency enhancers** (higher education and training, quality of the educational system, local availability of research and training services, technological readiness, availability of latest technologies, firm-level technology absorption, foreign direct investment, and technology transfer); **Innovation and sophistication factors** (business sophistication, local supplier quantity, local supplier quality innovation, capacity for innovation, quality of scientific research institutions, company spending on R&D, university–industry research collaboration, availability of scientists and engineers).
Source: Schwab (2011).

Recommendations

Most countries across Asia have experienced rapid enrollment growth in higher education. This rapid expansion can improve prospects for economic development and quality of life for the populations of these countries. However, there are indications, especially among second- and third-tier HEIs, that external efficiency could be weakening. External efficiency concerns the alignment and relevance of the higher education that students receive to their subsequent work or study options, as well as to the value of research output as higher education expands. Two aspects of external efficiency are of particular relevance to higher education leaders: the extent that the knowledge and skills of secondary school graduates who seek further education are aligned with the entrance requirements of HEIs, and the extent to which the knowledge and skills of higher education graduates are aligned with the demands of the workplace. A third aspect of external efficiency concerns the value of university research for national and regional development. As research costs rise, policy frameworks are needed to foster partnerships, attract and make efficient use of research funds, and solve practical problems in creating new products and services.

In the following, operational recommendations are made for supporting developing countries in the region to tackle the above challenges.

Recommendation 1: Improve the readiness of secondary school graduates for higher learning

Rationale. More entrants to college and university mean that more and better preparation is needed. In some countries, it means making the school curriculum align more closely with entrance examinations to universities. In other countries, it concerns readiness in specific subjects like science and mathematics. In all countries, it refers to improving the readiness of students, including those from underrepresented communities. School heads, local education departments, admissions office personnel, and academics from colleges and universities can strengthen measures to improve student readiness.

Recommended action. Assist governments, secondary schools, and higher education institutions in determining deficiencies in prior preparation of entering university students.

Recommended support through project operations. Projects can provide technical assistance for the *design and implementation of academic support services* at the secondary school level, including skill and information workshops by university academic staff and dual-enrollment (secondary and postsecondary) courses. In addition, projects can sponsor participation of government and university leaders in related in-country, subregional, and regional *knowledge-sharing* events.

Recommendation 2: Better align university curricula and instruction with labor market needs

Rationale. Families in all countries are making greater investments in higher education and have rising expectations about students' employment opportunities after graduation. Some countries are beginning to experience rising unemployment, while others face the same risk as their economies change and grow. This alignment can be improved without assaulting the central role of higher education. Overlap in institutional missions and duplication in instructional programs can be minimized. Letting market forces determine the range of subjects studied in higher education can go only so far in improving external efficiency. Some countries are in desperate need of graduates in science and technology fields, even as most private colleges prefer to offer business, social science, and education courses to keep their costs down. Countries can improve their external efficiency by increasing the amount of emphasis on soft skills in higher learning, including cross-disciplinary perspectives, critical thinking, and collaborative problem solving—skills demanded by the changing workplace.

Recommended action. Assist universities in pursuing proactively experimental initiatives aimed at improving responsiveness to labor market needs.

Recommended support through project operations. Projects can assist universities in *experimenting with units or centers* that (a) draw staff from inside and outside the university; and (b) are more directly focused on newly emerging industries such as software production, energy, and environmental protection and green economies. Universities would give such centers more autonomy than other academic units but would permit them to solicit additional funding on their own. While, as special centers, they could select their own students and charge a higher tuition fee, their success would be determined to a greater extent by providing students with internships in specific industries that align with the knowledge and skills offered by their academic courses. Projects can provide technical assistance in the design of these approaches and sponsor participation of government and university leaders in related in-country, subregional, and regional knowledge-sharing events.

Recommendation 3: Improve public–private and cross-border research partnerships

Rationale. Recent research has shown that a major driver of research productivity is cross-border collaboration. As collaboration and partnerships grow, there is a need for coordination and consultation among various partnership programs. Each public–private partnership with commerce or industry, or across borders, emphasizes a different aspect of capacity development in research. Individual efforts need to add up to a coherent regional capacity development strategy that raises the quality of research output.

Recommended action. Assist countries to improve their policy frameworks in ways that allow and encourage high-quality research partnerships between the universities and private sector commerce and industry.

Recommended support through project operations. Projects can provide technical assistance for *improving legal frameworks* and for *design of research approaches* that facilitate

collaboration and can help second- and third-tier HEIs take a leading role in applying research to practical problems that confront the local communities they serve. Projects can provide support to help utilize advances in ICT that can increase the efficiency of research productivity by *linking remote universities* to their national counterparts and to other universities across national borders. In addition, projects can support cross-border collaboration aimed at facilitating *regional centers of research excellence* that effectively enhance regional capacity and productivity.

References

Abler, D. 2010. Demand Growth in Developing Countries. *OECD Food, Agriculture and Fisheries Working Paper no. 29.* Available: http://dx.doi.org/10.1787/5km91p2xcsd4-en

ACER (Australian Council for Educational Research) and LH Martin Institute. 2008. *The Changing Academic Profession.* Available: http://www.lhmartininstitute.edu.au/research-and-publications/research/20-the-changing-academic-profession

Adams, J., C. King, N. Miyairi, and D. Pendlebury. 2010. Global Research Report Japan. Thomson Reuters. Available: http://researchanalytics.thomsonreuters.com/m/mpdfs/globalresearchreport-aptme.pdf

ADB (Asian Development Bank). (2011a). *Asia 2050: Realizing the Asian Century*. Manila: ADB.

____. 2011b. Higher Education Across Asia: An Overview of Issues and Strategies. Manila: ADB.

____. 2011c. Proposed Loan Mongolia: Higher Education Reform Project. Manila: ADB.

Agarwal, P. 2006. *Higher Education in India: The Need for Change*. New Delhi: Indian Council for Research on International Economic Relations.

Becker, G. S. 2010. *Causes of the Worlwide Boom in Higher Education, Especially of Women*. Available: http://www.fbe.hku.hk/prof_ Becker_lecture/

Becker, Gary S., W.H.J. Hubbard, H.J. William, and K.M. Murphy. 2010. Explaining the Worldwide Boom in Higher Education of Women. *MFI Working Paper No. 2010-09*. Available: http://ssrn.com/abstract=1681606 or http://dx.doi.org/10.2139/ssrn.1681606

Bohm, A., M. Follari, A. Hewett, S. Jones, N. Kemp, D. Meares, D. Pearce, and K. Van Canter. 2004. *Forecasting International Student Mobility: A UK Perspective*. London: British Council.

Bologna Process. [2006]. Available: http://www.wg.aegee.org/ewg/bologna.htm

Bourguignon, F., H.G. Ferreira, and M. Walton. 2007. Equity, Efficiency and Inequality Traps: A Research Agenda. *The Journal of Economic Inequality.* 5: 235-256. Netherlands: Springer.

Bovornsiri, V. 2006. Thailand. In M. N. N. Lee and S. Healy (Eds.). *Higher Education in South-East Asia*. pp. 187–218. Bangkok: the UNESCO Asia and Pacific Regional Bureau for Education.

Bray, M., and C. Lykins, 2012. Shadow Education: Private Supplementary Tutoring and Its Implications for Policy Makers in Asia. *Comparative Education Research Center Monograph Series, Number 9.* Manila: Asian Development Bank.

Buchori, M., A. Altbach, and Malik. 2004. The Evolution of Higher Education in Indonesia. In P.G.T. Umakoshi (ed.). *Asian Universities: Historical Perspectives and Contemporary Challenges.* Baltimore: The Johns Hopkins University Press.

Changing Academic Profession Survey. 2008. [International Survey].

Chamnan, P., and D. Ford. 2004. Cambodian Higher Education : Mixed Visions. In P.G. Altbach and T. Umakoshi (eds.). *Asian Universities : Historical Perspectives and Contemporary Challenges*. Baltimore: Johns Hopkins University Press.

Cheng, K.M. 2007. The Postindustrial Workplace and Challenges to Education. In M.M.S. Orosco (ed.). *Learning in the Global Era*. Berkeley: Ross Institute.

Chet, C. 2006. Cambodia. In M.N.N. Lee and S. Healy (eds.). *Higher Education in South-East Asia.* Bangkok: The UNESCO Asia and Pacific Regional Bureau for Education. pp.13–34.

China.org.cn. 2006. Available: http://www.china.org.cn/english/LivinginChina/189809.htm

Chosunilbo. 2010. *College Entrance Exam to Be Held Twice a Year from 2014*. http://english.chosun.com/site/data/html_dir/2010/08/20/2010082000947.html

Cookson, C. 2007. Universities Drive Biotech Advancement. *The Financial Times*. 6 May.

Coomaraswamy, U. 2010. Access and Equity in Higher Education: The Role of Information and Communication Technologies. Paper presented at the Workshop on ICT in Higher Education: Access and Equity, 16–17 August 2010, Manila.

Dai, N. D. 2006. Viet Nam. In M.N.N. Lee and S. Healy (eds.). *Higher Education in South-East Asia*. Bangkok: the UNESCO Asia and Pacific Regional Bureau for Education. pp.219–250.

Daisuke, H., and K. Fukunari. 2008. *East Asia's Economic Integration: Progress and Benefit*. New York: Palgrave Macmillan/IDE-JETRO.

Daniel, J., A. Kanwar, and S. Uvali-Trumbi. 2008. The Right to Education: A Model for Making Higher Education Equally Accessible to All on the Basis of Merit. *Asian Journal of Distance Education.* 6(2): 5–11.

Di Gropello, E., and C. Sakellariou. 2010. *Industry and Skill Wage Premiums in East Asia. World Bank WPS5379.* Washington, D.C.: World Bank.

Dill, D. and F. van Vught. (eds.). 2010. *National Innovation and the Academic Research Enterprise: Public Policy in Global Perspective*. Baltimore: Johns Hopkins University Press.

Educational Statistics Yearbook of [the People's Republic of] China [PRC] 2008. 2009. [PRC]: People's Education Press.

Elsner, P.A. 2009. *A Global Survey of Community Colleges, Technical Colleges, and Further Education In Different Regions of the World*. Washington D.C.: American Association of Community Colleges Press.

EPO (European Patent Office). 2007. EPO Wordwide Patent Statistical Database. Available: http://www.epo.org

EUA (European University Association). 2011. Consolidating the European Higher Education. Available: http://www.eua.be/eua-work-and-policy-area/building-the-european-higher-education-area.aspx

Farrell D., M. Laboissiére, J. Rosenfeld, S. Stürze, and F. Umezawa. 2005. *The Emerging Global Labor Market: The Supply of Offshore Talent in Services*. Part II. San Francisco: McKinsey Global Institute.

Glewwe, P., and M. Kremer. 2005. Schools, Teachers and Education Outcomes in Developing Countries. *CID Working Paper No. 122.* Massachusetts: Harvard University.

Gonzalez, A. 2006. The Philippines: Past, Present, and Future Dimensions of Higher Education. In P. Altbach. *Asian Universities: Historical Perspectives and Contemporary Challenges*. Baltimore: Johns Hopkins University Press.

Government of Mongolia. 2006. *Master Plan to Develop Education of Mongolia in 2006–2015*. Ulaanbaatar: Government of Mongolia.

Hayden, M., and L.Q. Thiep. 2010. Vietnam's Higher Education System. In G. Harmon, M. Hayden, and P.T. Ngai (eds.). *Reforming Higher Education in Vietnam: Challenges and Priorities*. New York: Springer Press.

Helms, R.M. 2008. University Admission Worldwide. Education *Working Paper Series*. No. 15. Washington D.C.: The World Bank.

Hong Kong Education Bureau. 2001. Learning to Learn. Available: http://www.edb.gov.hk/index.aspx?langno=1&nodeID=2877. Accessed on 10 January 2012.

Hu, Angang. 2011. [People's Republic of] China in 2020: A New Type of Superpower. *New York: Harper Collins*.

Ichikawa, S. 1991. Distinctive Features of Japanese Education. *NIER Occasional Paper*. Tokyo: National Institute for Educational Policy Research.

ILO (International Labour Organization). 2012. LABORSTA Internet: Labour Force Survey. Available: http://laborsta.ilo.org/sti/sti_E.html

Jakarta Post. 2010. Education Minister Defends National Exam. 29 April. Available: http://www.thejakartapost.com/news/ 2010/04/29/education-minister-defends-national-exam.html

Kaul, S. 2006. Higher Education in India: Seizing the Opportunity. *ICIER Working Paper.* No. 179. New Delhi: Indian Council on International Economic Relations.

KICE (Korean Institute for Curriculum and Evaluation). [2010]. Available: http://www.kice.re.kr/en/index.do

Lam, D.B., and N.H. Vi. 2009. The Development of the Community College Model in Vietnam at the Time of the Country's Reorganization and International Integration. In R. L. Raby and E. J. Valeau (eds.). *Community College Models: Globalisation and Higher Education Reform.* pp. 91–110. New York: Springer.

LaRocque, N. 2007. The Role of Education in Supporting the Development of Science, Technology and Innovation in Developing Member Countries: An Issues Paper. Manila: ADB.

Lee, M. 2004a. Malaysian Universities: Toward Equality, Accessibility and Quality. In P. Altbach. *Asian Universities: Historical Perspectives and Contemporary Challenges*. Baltimore: Johns Hopkins University Press.

____. 2004b. Restructuring Higher Education in Malaysia. Available: http://www.cshe.nagoya-u.ac.jp/seminar/kokusai/lee.pdf. Accessed 11 November 2010.

Levy, D. 2010. East Asian Private Higher Education: Reality and Policy. Draft for Discussion. New York: University at Albany-SUNY.

Lin, J., and B. Pleskovic. 2008. Higher Education and Development. Washington D.C.: World Bank.

MOE, PRC (Ministry of Education, People's Republic of China). 2010. State Medium and Long Term Program on Education Reform and Development. Available: http://www.gov.cn/jrzg / 2010-07/ 29/content_1667143.htm. Accessed 12 November 2010.

Mycos Institute. 2009. *The Chinese College Graduates' Employment Annual Report. 2009*. Beijing: Social Science Academic Press.

National Report of Republic of Korea. 2008. The Development of Education. The Ministry of Education, Science and Technology in Korea.

NBSC (National Bureau of Statistics of [the People's Republic of] China). 2009. [the People's Republic of] China Statistical Yearbook. Beijing: [the People's Republic of] China Statistics Press.

NCUEE (National Center for University Entrance Examinations). 2012. Available: http://www.dnc.ac.jp/

NEC (National Education Commission). 2009. *National Policy Framework on Higher Education and Technical and Vocational Education*. Sri Lanka: NEC.

Nizam, I. 2006. Indonesia: The Need for Higher Education Reform. In M. N. N. Lee and S. Healy (eds.). *Higher Education in South-East Asia*. Bangkok: UNESCO Asia and Pacific Regional Bureau for Education.

NSF (National Science Foundation). 2012. Science and Engineering Indicators 2012: Chapter 4 R&D: National Trends and International Comparisons. Available: http://www.nsf.gov/statistics/seind12/c4/c4h.htm

OECD (Organisation for Economic Co-operation and Development). 1998. *Redefining Tertiary Education*. Paris: OECD.

____.2008. Compendium of Patent Statistics. Available: http://www.oecd.org/dataoecd/5/19/37569377.pdf

____.2011a. Program for International Student Assessment. Available: http://www.pisa.oecd.org/pages/0,2987,en_32252351_32235731_1_1_1_1_1,00.html. Accessed 1 November 2011.

____.2011b. *Strong Performers and Successful Reformers in Education: Lessons from PISA for the United States*. Paris: OECD. Available: http://dx.doi.org/ 10.1787.9789264096660-en

Paññāsāstra University of Cambodia. 2010. Admission Requirements for Undergraduate Program. Available: http://www.puc.edu.kh/admissionss/undergraduate.html. Accessed 16 November 2010.

Phou, K.X.S. 2006. Lao PDR. In *Higher Education in South-East Asia* . Bangkok: UNESCO Asia and Pacific Regional Bureau for Education. pp. 69-99.

Postiglione, G. 2009. Community Colleges in [the People's Republic of] China's Two Systems. In R. L. Raby and E. Valeau (eds.). *Community College Models: Globalization and Higher Education Reform*. Amsterdam: Springer.

____. 2011. Higher Education: University Challenge. [People's Republic of] *China Economic Quarterly*. 15(2): 22–25.

Raby, R.L., and E. Valeau. 2009. *Community College Models: Globalization and Higher Education Reform. Amsterdam: Springer.*

____. 2011. *Increasing Effectiveness of the Community College Financial Model: A Global Perspective for the Global Economy*. Hampshire: Palgrave Macmillian.

The Royal Society. 2011. Knowledge, Networks and Nations: Global Scientific Collaboration in the 21st Century. Available: http://royalsociety.org/uploadedFiles/Royal_Society_Content/Influencing_Policy/reports/2011-03-28-Knowledge-networks-nations.pdf

Sakellariou, C. 2010. *Labor Market Outcomes of Higher Education in East Asia*. Available: http://siteresources.worldbank.org/INTEASTASIAPACIFIC/Resources/EastAsia-LaborMarketOutcomesofHE.pdf

Salmi, J. 2009. The Growing Accountability Agenda: Progress or Mixed Blessing? *Higher Education Management and Policy.* 21(1): 109–129.

Sarvi, J. 2008. Higher Education in Asia and the Pacific Region: Issues of Financing and Partnerships, Particularly from the Perspective of Access, Equity, Quality, and Diversity of Higher Education. Paper presented at the Asia-Pacific Subregional Preparatory Conference for the 2009 World Conference on Higher Education, Macau, China, 24–26 September.

Schwab, K. (ed.) 2011. *The Global Competitiveness Report 2011–2012*. Geneva: World Economic Forum.

Science Citation Index. Available: http://thomsonreuters.com/products_services/science/science-products/a-z/science_citation_index/Accessed 2011.

SEAB (Singapore Education and Assessment Board). 2011. Available: http://www.seab.gov.sg/oLevel/generalInfo.html. 30 December 2011.

Setiawati, I. 2010. Blame Game Begins as Students Flop*. The Jakarta Post*. 29 April. Available: http://www.thejakartapost.com/news/2010/04/29/blame-game-begins-students-flop.html

Singapore Education Statistics Digest. Available: http://www.moe.gov. sg/education/education-statistics-digest/

Singapore Ministry of Education. 2012. Programme for Rebuilding and Improving Existing Schools. Available: http://www.moe.gov.sg/initiatives/prime/. Accessed 10 Jan 2012.

Sirat, M. 2006. Malaysia. In *Higher Education in South-East Asia.* pp. 101–36. Bangkok: UNESCO Asia and Pacific Regional Bureau for Education.

Son, H.H., J. Asanova, and S. Jagannathan. 2011. *Human Capital, Skills Development, and Structural Transformation in Asia*. Manilla: Asian Development Bank.

Song, Y.Q., and G. A. Postiglione. 2011. The Expensive Dream: Financing Higher Vocational Colleges in [People's Republic of] China. In R. L. Raby (ed*.). Increasing Effectiveness of the Community College Financial Model: A Global Perspective for the Global Economy*. New York: Palgrave Macmillian Publishers.

Susanti, D. 2011. Privatisation and Marketisation of Higher Education in Indonesia: The Challenge for Equal Access and Academic Values. Higher Education. 61: 209–218.

Taipei,China Economic and Cultural Office in Ho Chi Minh City. 2010. The College Entrance Test in Vietnam Have Five Categories and Can Be Divided into Two Stages. Available: http://192.192.169.230/edu_message/data_image/AH/2010/0030C.PDF. Accessed 16 November 2010

Thorn, K., and M. Soo. 2006. *Latin American Universities and the Third Mission: Trends, Challenges, and Policy Options.* Washington D.C.: World Bank.

Triaswati, N. and F. Roeslan. 2003. *Senior Secondary Education and Access to Higher Education, Higher Education Sector Study*. Japan: JBIC-DGHE.

UIS (United Nations Education, Scientific, and Cultural Organisation Institute for Statistics). 2011. http://stats.uis.unesco.org/unesco/ TableViewer/tableView. aspx? ReportId =167

UNESCO (United Nations Educational, Scientific and Cultural Organization). 2003. Ministerial Round Table on Science, Technology and Innovation for Sustainable Development: The Role of UNESCO, Review of Science and Technology Meetings at Ministerial level, 1996–2006.

University Grants Commission, India. 2003. Available: http://www.ugc.ac.in/

University of Delhi. 2011. Admission. Available: http://www.du.ac.in/ index.php?id=38. Accessed 31 Dec 2011.

University of the Philippines. 2011. Admissions & the UPCAT. http://www.up.edu.ph/content.php?r=4&c=4. Accessed 31 Dec 2011.

Vang, J., C. Chaminade, and L. Coenen, 2009. Learning from the Bangalore Experience: The Role of Universities in an Emerging Regional Innovation System in Asia. In G. Parayil and A.P. D.S. Costa (eds.). *The New Asian Innovation Dynamics: [People's Republic of] China and India Perspective* pp. 193–215. New York: Palgrave Macmillan.

Wang, J., M. Tello, L. De la Vina, and J. Slate. 2009. Gaps Between Secondary Schools and Higher Education as Perceived by South Texas Secondary English Teachers. *International Journal of Educational Leadership Preparation.* 4, (1). Available: http://cnx.org/content/m198706/latest/

Watkins, A. and J. Mandell. 2010. Global Forum Action Plan: Science, Technology and Innovation; Capacity Building Partnerships for Sustainable Development.1 September 2010. Washington D.C: World Bank. Available: http://siteresources.worldbank.org/INTSTIGLOFOR/ Resources/STI_GlobalForum_ActionPlan.pdf. Accessed 31 Dec.

Wechsler, A. 2009. Chinese, Japanese, Korean, and Indian Patent Information: Asia's Rising Role in Technology Disclosure Through the Patent System. *Tsinghua [People's Republic of] China Law Review.* 1:2.

Whalley, J., and W. Zhou. 2007. Technology Upgrading and [the People's Republic of] China's Growth Strategy to 2020. *Centre for International Governance Innovation Working Paper No. 21*. Available: http://www.cigionline.org/publications/2007/3/technology-upgrading-and-chinas-growth-strategy-2020.

Wildavsky, B. 2010. *The Great Brain Race: How Global Universities are Reshaping the World*, Princeton: Princeton University Press.

WIPO (World Intellectual Property Organization). 2011. WIPO: Encouraging Creativity and Innovation. Available: http://www.wipo.int/pct/en/texts/ glossary.html

World Bank. 2002. *Constructing Knowledge Societies: New Challenges for Tertiary Education*. Washington D.C.: World Bank.

____. 2009. *Development Indicators*. Washington D.C.: World Bank.

____. 2010. *Tertiary Education in Mongolia: Meeting the Challenges of a Global Economy*: *Policy Note*. Washington D.C.: World Bank.

____. 2011. *Thailand Social Monitor: Towards a Competitive Higher Education System in a Global Economy*. Washington D.C.: World Bank.

World Education News and Review. 2004. Avaiable: http://www.wes.org/ewenr/04nov/practical.htm. Accessed 31 Dec. 2011.

Xaysomphou, K. 2008. The Current Situation of Higher Education in Lao PDR. Available: http://www.unescobkk.org/fileadmin/user_upload/apeid/workshops/macao08/papers/1-p-2-5.pdf

Yang, D. 2012. *Decentralization, Marketization and Organization in Higher Education: A Case Study of an Academic University in [the People's Republic of] China*. Doctoral Dissertation: University of Hong Kong.

Yilmaz, Y. 2010. Higher Education Institutions in Thailand and Malaysia—Can They Deliver? Available: http://siteresources.worldbank.org/INTEASTASIAPACIFIC/Resources/Thailand-Malaysia-HEInstitutions.pdf. Accessed 30 Dec 2011.

Zeng, J. 2010. Nanjing Explore New Way of Eduation: Professors Work as Tutors of Middle Schools Student. (Nanjing tansuo zhongxuesheng peiyang xinlu: daxue jiaoshou zuo gaozhongshegn daoshi). *Guangmin News Press*. Available: http://jijiao.jyb.cn /ts/201009 / t20100915_388877.html. Accessed 12 November 2010.

Higher Education in Dynamic Asia: Study Reports

The reports from the Asian Development Bank's regional study on Higher Education in Dynamic Asia provide an analysis of the issues facing higher education across Asia; suggest priorities among these issues; and offer detailed recommendations for the role that governments, higher education leaders, and other stakeholders and partners such as ADB could play in strengthening higher education systems and institutions in the region. Other titles include the following:

Higher Education Across Asia: An Overview of Issues and Strategies (2011)
This publication summarizes findings and recommendations of a major regional study on Higher Education in Dynamic Asia, financed by ADB. It provides an overview of the critical issues challenging higher education across Asia. It summarizes suggested priorities and solutions among those key issues and offers recommendations to help countries and higher education institutions implement the solutions.

Improving Instructional Quality: Focus on Faculty Development (2011)
This publication provides an analysis of key factors that can help strengthen the internal efficiency of higher education institutions in Asia. It focuses on differentiating institutional missions, improving the quality of teaching, creating a more positive institutional culture, and strengthening university-based research.

Counting the Cost: Financing Asian Higher Education for Inclusive Growth (2012)
The publication focuses on critical issues of financing higher education in Asia, including alternative funding sources; privatization of public higher education institutions, and financial consequences of the rise of private higher education; student loans; and lower cost strategies for delivering instruction. It provides evidence that a key priority to strengthen higher education finance is via effective implementation of quality assurance.

Access Without Equity? Finding a Better Balance in Higher Education in Asia (2012)
Although expanded access is the major accomplishment of higher education systems in Asia, equitable provision of higher education is a challenge. The publication focuses on improving access to higher education for students from marginalized groups, and on mainstreaming access and equity in national and institutional policies and strategies. In addition, it analyzes the expansion of higher education access and equity via the growth of private higher education and effective technology-based instruction.

Private Higher Education Across Asia: Expanding Access, Searching for Quality (2012)
The publication focuses on the growth of private higher education in Asia. It provides a comprehensive analysis of the various types of private higher education institutions and their functions, and pursues timely perspectives, including implications for policy, quality assurance, and accreditation.

Regional Cooperation and Cross-Border Collaboration in Higher Education in Asia: Ensuring that Everyone Wins (2012)
An increasing number of countries across Asia are participating in regional cooperation and cross-border collaborations as a strategy for strengthening their higher education systems. Often collaboration works to the advantage of each partner, but not always. The publication analyzes the popularity of these collaborations and the range of purposes and activities. As the collaboration mechanisms have expanded, so too have the complexities. Shifting economic circumstances converge to raise new issues for higher education leaders seeking to reap the benefits of regional cooperation and cross-border partnerships.

Improving Transitions: From School to University to Workplace (2012)
The publication explores the critical issues of alignment and relevance among schools, universities, and the labor market in Asia. It argues that incoming university students must be prepared, and thus school curricula need to align with university entrance examinations. Meanwhile, university curricula ought to correspond with market demands to increase the employability of graduates with the right skill sets for the workplace.

Administration and Governance of Higher Education in Asia: Patterns and Implications (2012)
The publication discusses the types and functions of various administration and governance systems of higher education in Asia. It particularly focuses on issues of institutional autonomy, and implications for financing, quality assurance, and personnel management.

Improving Transitions
From School to University to Workplace

The increasing number of higher education institutions (HEIs) in developing Asia can lead to improved prospects for development. However, the rapid expansion can undermine external efficiency—the alignment of higher education with the external environment. This publication focuses on tackling three key challenges in strengthening external efficiency: (i) improving students' readiness for higher learning; (ii) fostering in graduates knowledge and skills that meet the needs of labor markets; and (iii) pursuing fresh strategies for productive partnerships not only for top-tier HEIs but also for 2nd and 3rd tier HIEs, to bring the necessary diversity in the higher education scene and benefit local communities.

About the Asian Development Bank

ADB's vision is an Asia and Pacific region free of poverty. Its mission is to help its developing member countries reduce poverty and improve the quality of life of their people. Despite the region's many successes, it remains home to two-thirds of the world's poor: 1.8 billion people who live on less than $2 a day, with 903 million struggling on less than $1.25 a day. ADB is committed to reducing poverty through inclusive economic growth, environmentally sustainable growth, and regional integration.

Based in Manila, ADB is owned by 67 members, including 48 from the region. Its main instruments for helping its developing member countries are policy dialogue, loans, equity investments, guarantees, grants, and technical assistance.

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