Participation in education is not an end in itself. What matters for people and for our economies are the skills acquired through education. It is the competence and character qualities that are developed through schooling, rather than the qualifications and credentials gained, that make people successful and resilient in their professional and private lives. They are also key in determining individual well-being and the prosperity of societies. 

(OECD, 2016)

ROLE AND BENEFITS OF TERTIARY EDUCATION

In July 1945, Vannevar Bush wrote the following statement in his pioneering book *Science, the Endless Frontier*: “a nation which depends upon others for its new basic scientific knowledge will be slow in its industrial progress and weak in its competitive position in world trade.” While the book was written with the United States in mind—it was one of the triggers behind the creation of the National Science Foundation a few years later in 1950—, other nations heeded the call for developing scientific capacity, especially in South-East Asia. One of the first ones was South Korea, whose tertiary education enrolment rate was barely 2% when it regained its independence in 1945. It embarked on a long journey of investment aiming at building up its education system in support of the transforming economy, starting with primary education, then secondary and finally expanding the post-secondary sector so much that today it can boast the highest level of tertiary education completion among OECD nations (60%).

It is widely recognized that the ability of a society to generate, adapt and apply knowledge is critical for sustained economic growth and improved living standards. Rapid technological progress, the spread of global value chains, and the increasing importance of knowledge-based capital mean that knowledge has become the most important factor in economic development, not only technical knowledge but also knowledge about attributes, that is the informational characteristics that support analysis and decision-making (World Bank, 1999). Comparative advantages among nations come less and less from abundant natural resources or cheap labor and increasingly from technical innovations and the competitive use of knowledge—or from a combination of both (Porter, 1990; Ranis et al., 2011). As the Norwegian
Prime Minister Erna Solberg observed upon taking office in early 2015, “knowledge is the key to a future after the age of oil.”

The innovation strategy recently articulated by the OECD (2015) outlines five priorities, namely (i) the need to strengthen investment in innovation and foster business dynamism, (ii) the importance of investing in an efficient system of knowledge creation and diffusion, (iii) the opportunity of capturing the benefits of the digital economy, (iv) the need to foster talent and skills, and (v) the urgency to improve the governance and implementation of innovation policies. A strong tertiary education system is vital to support the second and fourth priorities.

More specifically, tertiary education supports knowledge-driven economic growth and poverty reduction strategies by (a) training a qualified and adaptable labor force, including high-level scientists, professionals, technicians, teachers in basic and secondary education, and future government, civil service, and business leaders, (b) generating new knowledge through basic and applied research, and (c) providing the platform for accessing existing stores of global knowledge and adapting this knowledge to local use. Tertiary education institutions are unique in their ability to integrate and create synergy among these three dimensions. Sustainable transformation and growth throughout the economy are not possible without the capacity-building contributions of an innovative tertiary education system, especially in low-income countries with weak institutional capacity and limited human capital (Salmi, 2012a).

This important role of tertiary education is borne out by widespread evidence showing that tertiary education graduates have better employment prospects and receive higher salaries than individuals with less education. In North America and Europe, for example, until the 2007-08 economic crisis, the unemployment problem was almost exclusively concentrated among the low skilled. According to OECD’s 2012 Education at a Glance, “… tertiary-educated individuals are employed at a higher rate than people with an upper secondary or post-secondary non-tertiary education. On average, 83% of 25-64 year-olds with a tertiary education were employed in 2010, compared to 74% of those with an upper secondary education” (OECD, 2012, p.122). Similarly, earnings data continue to show a significant premium for tertiary education over upper secondary education.

The success of East Asian economies illustrates the symbiotic relationship among tertiary education, innovation, and growth through the production of research and skills. A recent World Bank report analyzed the positive links between economic growth and tertiary education as measured by the tertiary gross enrollment ratio, science test scores, levels of R&D investment, and the number of scientists and engineers relative to a country’s population. Firm innovation surveys undertaken in Indonesia, the Philippines and Thailand showed that the most active innovators are those with higher levels of R&D expenditures, more highly qualified staff, and located in more R&D-intensive industries (World Bank, 2012).

As far as research is concerned, the same World Bank report on East Asia found that universities and other tertiary education institutions not only added to the
knowledge stock, but also helped raise the technological capacity of low income countries and supported countries with medium technology capacity in the transition from technology assimilation to innovation through consulting services, hosting incubation facilities, and customizing foreign technologies for local requirements (World Bank, 2012).

The country studies undertaken in the context of that report revealed that, in terms of skills formation, employers expect tertiary education institutions to equip graduates with the cognitive, technical, social, and behavioral skills making them capable of bringing advanced knowledge to bear on complex problems, use that knowledge to work toward their solution, perform relevant applied research, and develop ideas for more innovative ways of designing processes and products. These competencies include client orientation, communication, problem solving, and creativity skills (World Bank, 2012).

![Figure 7. Contribution of Universities in the Asian and Pacific Region. Source: APRU (2016)](image-url)
A recent study of the Association of Pacific Rim Universities attempts to measure the contribution of its 45 member institutions, which are distributed across 17 countries (APRU, 2016). APRU identifies six principal roles played by member universities (7).

As educators, the universities “train work-ready, flexible graduates including professionals to serve their communities, educate tomorrow’s leaders, offer pathways for social mobility and role models for a fairer, more cohesive society, and reach out to raise cultural, scientific and health literacy.” As knowledge creators, they “generate cutting-edge knowledge through research, gather, interpret and maintain data over long periods of time, necessary to understand complex issues, and provide work of local cultural and social importance. As societal problem-solvers, they “apply research to complex societal challenges such as disaster risk reduction, health, environmental sustainability, the digital economy, and ageing.” As innovators, APRU universities “commercialize intellectual property, collaborate with industry, and support the next generation of entrepreneurs.” As connectors, they put “stakeholders in relationships to the latest knowledge and to each other, and build intercultural understanding across the region. Finally, as agents of change, they “experiment with new ideas on campus, offer support for wider reform in society, and provide a critical conscience for society.”

Looking at the impact of human capital development policies at the national level is not the only way of exploring the interface between innovation and tertiary education. Recent research in Europe indicates that the regional dimension of economic development maybe as important as what happens at the national level, or sometimes even of greater magnitude. The most successful regions are those that manage to attract and retain people in employment, improve the adaptability of workers and enterprises, and increase investment in human capital through skills matching and upgrading (Ederer et al., 2011). Figure 8 illustrates how tertiary education institutions interact with the local economy.

A recent study of about 15,000 universities in 1,500 regions across 78 countries, which estimated fixed effect models at the sub-national level between 1950 and 2010, found evidence of the positive role of universities on economic growth at the local level.

… Increases in the number of universities are positively associated with future growth of GDP per capita… [The] estimates imply that doubling the number of universities per capita is associated with 4% higher future GDP per capita… We show that the relationship between growth and universities is not simply driven by the direct expenditures of the university, its staff and students. Part of the effect of universities on growth is mediated through an increased supply of human capital and greater innovation… The benefit of universities is not confined to the region where they are built but “spills over” to neighboring regions, having the strongest effects on those that are geographically closest. Using these results, we estimate that the economic benefits of university expansion are likely to
THE CONTRIBUTION OF TERTIARY EDUCATION

Figures 8. Interface between Tertiary Education and the Region. Source: Goddard and Chatterton (2003)

exceed their costs... We provide suggestive evidence that universities play a role
in promoting democracy, and that this operates over and above their effect as
human capital producers. (Valero and Reenen, 2016, pp. 1 and 32)

In that perspective, researchers have explored the growing importance of cities,
especially megacities, as drivers of economic growth (Ohmae, 1995; Florida, 2008).
Beyond population size, what characterizes dynamic megacities are the presence of
a significant productive capacity, a large market, relevant innovative activities, and
talented people with high educational qualifications. In planning for the development
of tertiary education, governments should not focus only on the national level but
rather work closely with regional authorities and city municipalities in configuring
the articulation between tertiary education institutions and other components of
urban development.

Two caveats should be mentioned with respect to the complexity of measuring
the economic contribution of tertiary education. First, the impact of universities, as
assessed through the quantity and quality of graduates, is likely to be reflected in
faster economic growth with a relatively substantial time lag of 20 to 30 years, as the
arrival of new graduates into the labor force represents no more than 5 to 10% of the
total stock. In research, by contrast, the return to investment is visible at a fairly early
stage, given that research results can be more rapidly translated into new firms with
new products or services and/or into new products and services in existing firms.
Second, as demonstrated by Aghion and Howitt (2006), the impact of tertiary education on growth is influenced by the state of technological advancement of the economy. Economies with a larger high technology sectors that are closer to the technology frontier will benefit more from tertiary education and research than countries in the converging state. Box 6 illustrates the importance of science in an advanced economy such as Australia.

**Box 6. The Importance of Science for the Australian Economy**

Advances in the physical, mathematical and biological sciences in the past 20 to 30 years underpin A$330 billion (US$233 billion) a year of Australia’s economic output. These advances also support nearly 1.2 million Australian jobs, or 10% of total employment. These findings are presented in a new report commissioned by the Office of the Chief Scientist and the Australian Academy of Science.

Without the last 30 years of advances in the biological sciences alone, the Australian economy would be 5% smaller than it is today. The burden of disease carried by its people would be 18% to 34% higher, and Australians would miss out on health improvements worth up to A$156 billion every year.

Australia’s outgoing Chief Scientist, Professor Ian Chubb AC, said the reports underscore the importance of science to all Australians. “Of course the benefits of science are difficult to measure. Of course those benefits can only be partially counted in dollar terms. But of course we have to investigate them, in economic as well as human terms, because we cannot afford to ever take them for granted.” We have, for the first time, a credible estimate of a phenomenon that defines our lives and underpins our prospects for growth.

Professor Andrew Holmes AM, President of the Australian Academy of Science, noted that the finding that science contributes so substantially to Australia’s economy is consistent with similar analysis conducted in Australia and overseas. “Our national situation is unique, but the message for all advanced economies is clear. Scientists, and the industries which harness their discoveries, are critical to prosperity. “We need Australian science to address our own challenges, just as we need it to have access to the new knowledge uncovered overseas.”

Universities Australia said that at a time when the country faces a growing burden of chronic, often preventable disease, the reports highlight the contribution of science to prevent illness—and not just treat it. The reports reveal that without the advanced biological sciences, the burden of cardiovascular disease in Australia would be between 35% and 40% higher, while the burden of cancer would be between 27% and 54% higher.
Spray-on skin, the Cochlear hearing device, and cervical cancer vaccines are some of Australia’s best-known inventions. Yet the reports highlight that remarkable advances in biological sciences are being used in all sectors, not just health. For instance, developments in microbiology have helped create ‘self-healing’ concrete while other advances are being used to build a more resilient Great Barrier Reef.

(Source: UWN, 2016b)

A recent review of 99 studies looking at various dimensions of the impact of tertiary education on development, commissioned by DfID, came to the following main conclusion regarding the effects on earnings and economic growth (Oketch et al., 2014, p. 23):

The studies show that tertiary education has a strong impact on the earnings of graduates. There is evidence that tertiary has a stronger impact on growth than previously assumed. However, there are some inconsistencies in the results, largely due to methodological differences between studies. The impact of TE on income equality is difficult to isolate and appears to vary significantly depending on context.

Tertiary education’s contribution is strong beyond the economic sphere. Nations with high level of educational attainment also enjoy important social benefits. Studies indicate that people with tertiary education are much less dependent on welfare programs. In the US, for instance, the government spends up to US$2,700 less per year on social programs for tertiary education graduates than for high school graduates (Baum, 2005).

A recent OECD publication provides useful data to support this assessment of the social benefits of tertiary education (OECD, 2012). Individuals with tertiary education also tend to be in better health, are less likely to smoke, are more actively engaged in civic life, and are less prone to engage in criminal activities. For example, for the 15 OECD countries for which sufficient data are available, “a 30-year-old male tertiary graduate can expect to live another 51 years, while a 30-year old man who has not completed upper secondary education can expect to live an additional 43 years” (OECD, 2012, p. 204). Adults with tertiary education are more likely to vote in democratic elections than those with lower levels of education, with a 14.8 percent gap for the 25-64 age-olds group and even higher (26.8) for young adults (25-34 year-olds). The benefits of tertiary education also extend across generations: children of parents with tertiary education are more exposed to reading, have higher cognitive skills, and are better able to concentrate during their studies. Box 7 illustrates the transformative power of tertiary education in developing countries, especially for minorities and women.
Sindy Patricia Ramos Pocón, 23, knows what it means to be poor and go without food. As a child growing up in Villa Nueva, Guatemala City, she used to help her grandmother sell meat or cheese and bananas from her car to survive. At one point she had to leave school and work a six-day week in a tree nursery, earning US$250 a month, to keep herself fed and pay for her younger sister’s education. Sindy’s mother died when she was 13 and when her sick father was unable to support her she had to enter a grant-aided boarding school.

“There is too much poverty in Guatemala – 50% of the population are poor, a lot of them are indigenous, and 20–30% are in extreme poverty. “They can’t buy food or other basics, it’s very difficult. It’s very hard for poor people to find work, especially for women. Many survive on US$2 a day and they have to try and support six or seven children on that,” she explains.

Now, as the first of four siblings to enter university, she is nearing the end of a four-year undergraduate program in agricultural sciences and natural resource management in Costa Rica, and is simultaneously heading up a groundbreaking project to enable poor women to establish their own independent businesses in that country. “I wanted to help people. I have always had that dream ever since I was a little girl; I wanted to make a difference,” she says.

Sindy has been supported in that journey by a scholarship from The MasterCard Foundation, which covers all her costs to study at EARTH University, Guácimo, Limón, in Costa Rica. Established in 1986, EARTH University is a private, international, non-profit institution with two bases in Costa Rica. It aims to enable young disadvantaged people from Latin America, the Caribbean, Africa and Asia to contribute to the sustainable development of their countries. The university boasts world-class technological and scientific facilities and has approximately 423 students from 42 countries, 60% of whom receive full scholarships, with the remaining receiving significant financial aid. Attitudes, values and an ethical entrepreneurial spirit are as important as technical and scientific knowledge in the curriculum.

Studying at EARTH University has given Sindy an understanding of the value of being able to work with other people. She put into practice her university research and team-working skills when she developed a project to enable unemployed women to establish their own businesses using banana stalk fibre – a waste material in plantations – to create arts and crafts for sale, to benefit local women from rural communities. The medium-term plan is to provide disadvantaged Costa Rican women, who are housewives, with an independent income so that they can help their families, but if Sindy wins the competition in December, she will use the US$10,000 to develop a brand and spread the idea to Guatemala.
The DfID-commissioned literature review mentioned earlier came to a similar conclusion: “a number of studies showed a positive impact of tertiary-level study on graduates’ capabilities. Impact was shown in areas of health, nutrition, political participation and women’s empowerment” (Oketch et al., p. 31).

In the 2001 World Development Report on Poverty Reduction, the World Bank (2001) emphasized the key role played by tertiary education institutions in imparting the norms, values, attitudes and ethics necessary to build the social capital that graduates must acquire to be able to contribute to the construction of healthy civil societies and socially cohesive cultures that underlie good governance and democratic political systems. The institutions, relationships, and norms that emerge from tertiary education are instrumental in influencing the quality of a society’s interactions, which in turn fortify economic, political, and social development. Universities and other tertiary institutions are the crossroads for social cooperation, fostering strong networks, stimulating voluntary activity, and promoting extracurricular learning and innovation. In post-conflict nations, especially, reconstituting social capital is essential for assisting societies in reinventing themselves with resilient institutions and a sound moral compass (World Bank, 2002).

A related, critical issue is the ability of society to deal with the new ethical challenges brought about by scientific advances, such as genetically modified crops, stem cell and embryo research, genome editing technologies, or additive manufacturing methods. In that respect, all countries need a strong tertiary education system that grounds its graduates in philosophy and ethics to equip for the proper consideration of issues linked to emerging technologies.

Finally, it is doubtful that any low-income country can achieve the United Nations Sustainable Development Goals (SDGs) without a strong tertiary education system. In addition to the essential contribution that tertiary education can make to the goals of sustainable economic growth (SDG 8) and poverty reduction (SDG 1), advances on all the other dimensions, from developing a vibrant agricultural sector and building up a resilient infrastructure to mitigating the devastating effects of climate change and preserving the environment, cannot happen without the participation of scientists and well-trained professionals and the application of leading edge

The goal is for the women in the project to turn their knowledge into their own small businesses and provide financial stability to their families through ecological and sustainable products and practices – to lift them out of the kind of poverty trap that Sindy experienced when she had to drop out of school to earn a meager income, foregoing achieving educational progress. “My project challenges inequality because women are able to take charge of the whole process themselves. It is giving independence to women who otherwise would not have the possibility to work,” she concludes. “And I know that’s what I want to do in the future. “I used to dream but now I can see changes,” she says.
(Source: Rigg, 2016)
research for finding appropriate solutions to the big challenges faced by mankind. With respect to the goal of diminished inequality (SDG 10), tertiary education plays a critical role in promoting social mobility through equal educational opportunities for all groups, especially the most vulnerable groups in society (low-income groups, minorities, people with special needs, etc.). Achieving the SDGs also requires strong institutions for policy design and implementation, and well-prepared citizens who care about inclusion and sustainability.

The contribution of tertiary education is crucial, in particular, for achieving real progress in basic and secondary education. A recent study found that more than a quarter of all primary school teachers in 31 countries had not achieved the minimum education standards themselves (The Economist, 2016). Tertiary education supports the rest of the education system through the training of effective teachers and school principals, the involvement of highly qualified specialists in curriculum development and educational research, and the design of appropriate tests to assess students learning outcomes. The symbiotic linkage between tertiary education and the lower levels of schooling has the potential of stimulating a virtuous circle of capacity building in as far as the quality of tertiary education affects the quality of primary and secondary school education and is, in turn, directly influenced by the quality of secondary school graduates. As summarized by the former President of the World Bank:

It is impossible to have a complete education system without an appropriate and strong higher education system. You have to have centers of excellence and learning and training if you are going to advance the issue of poverty and development in developing countries... the key ... is higher education, not just on the technological side, but to create people with enough wisdom to be able to use it. (James D. Wolfensohn, former President of the World Bank. (March 1, 2000))

A similar argument applies to the fundamental role of medical education and research for meeting the health sustainable development goal (SDG 3). Universities train the medical doctors, nurses, technicians, epidemiologists, public health specialists, and hospital managers who form the most important pillar of any health system. Universities and associated health institutes conduct the fundamental research and a significant share of the applied research that condition any significant progress in the fight against diseases and health hazards. Box 8 provides a powerful illustration of how universities can help resolve important health crises.

Box 8. University Research Helping Address Public Health Issues: Virginia Tech and the 2015 Flint Water Crisis

The young scientists, mostly in their 20s, had drawn an audience so large that it spilled from the auditorium on the Virginia Tech campus into two overflow rooms. They were explaining to students, members of the faculty and guests
how they were at first laughed off by government regulators about 550 miles northwest of here in Flint, Michigan, when they detected alarming amounts of lead coming from residents’ taps. Siddhartha Roy, a doctoral student from India, held up a bottle of yellow-tinted Flint water. The team’s role was “essentially validating what citizens had been saying for months.”

Flint’s public health problem stemmed from a failure to properly treat water from the Flint River, which resulted in pipe corrosion and elevated levels of lead. Lead exposure can result in health and developmental problems, particularly in children, and its toxic effects can be irreversible. The crisis is at best a tale of neglect and incompetence. At worst, critics say, it is criminal conduct that imperiled the public’s wellbeing. … But as government officials were ignoring and ridiculing residents’ concerns about the safety of their tap water, a small circle of people was setting off alarms. Among them was the team from Virginia Tech.

The team began looking into Flint’s water after its professor, Marc Edwards, spoke with LeeAnne Walters, a resident whose tap water contained alarming amounts of lead. Dr. Edwards had his students send testing kits to homes in Flint to find out if the problem was widespread.

Their persistence helped force officials to acknowledge the crisis and prompted warnings to residents not to drink or cook with tap water. Officials are now scrambling to find a more permanent solution to the problem than trucking in thousands of plastic jugs, and are turning to Virginia Tech for advice. The scientists “became the only people that citizens here trust, and it’s still that way,” said Melissa Mays, a Flint resident who has protested the water quality.

At Virginia Tech, the researchers are a source of pride. The team is a mixed group. Mostly environmental engineers, members range in experience from undergraduates to professors. Several of them were drawn to environmental engineering, Mr. Roy said, because “we have this childhood aspiration of hopefully helping people and serving society at some point.”

The students began their work last summer as Michigan officials insisted that Flint’s malodorous, discolored water was safe. The team mailed testing kits to Flint, and in August a group packed into Dr. Edwards’s family van and set off for a site visit. Once in Flint, the group visited several homes to collect water, shipping the samples back to Virginia so they could be tested quickly on campus. “It’s like a once-in-a-lifetime experience,” said Colin Richards, 25, a graduate student in environmental engineering, who went on that trip. The tests revealed alarming levels of lead. Besides calling residents to advise them of the troubling results, the team posted its documents and data online at flintwaterstudy.org, an act that has helped others investigate Flint’s problems. When the federal, state and local governments failed to acknowledge the scope of the problem, Dr. Edwards held a community meeting in September advising residents to stop drinking the water.

In October, government officials finally warned of the lead risk, but the Virginia Tech researchers became concerned about the possibility that the water
was causing Legionnaires’ disease. As it turned out, state officials had long been aware of a spike in Legionnaires’ cases after the switch in water sources, but the public was not told until last month.

Joyce Zhu, a doctoral student, went to collect samples at a Flint hospital, looking for signs of the bacteria that cause Legionnaires’. “When I turned on the tap, you see this corrosive, reddish, brownish tap water,” she said. “It’s that moment that made it so real.” Ms. Zhu said she had planned on a “typical” academic career, doing lab research with limited application off campus. But after analyzing lead-tainted water samples in the labs in Blacksburg and traveling to Flint, she said, she is considering how her career can benefit the public. “I grew up in Singapore, where clean water, you take it for granted so much,” Ms. Zhu said.

State officials in Michigan initially dismissed the Virginia Tech team’s findings. As they did with other whistle-blowers, they disparaged its work. In one email obtained by the researchers, a spokesman for the Michigan Department of Environmental Quality, Brad Wurfel, played down the lead risk, telling a reporter that the Virginia Tech team was known to “pull that rabbit out of that hat everywhere they go.”

Now the tables have turned, and the Virginia Tech team has been enlisted to help address the crisis. Governor Rick Snyder, whose administration has been widely blamed for a failure to protect Flint’s residents, has thanked Dr. Edwards and included him in a group now advising officials on permanent fixes for the Flint problem.

The Virginia Tech team is among a handful of outside researchers who have been credited with helping expose the lead problem and stop it from getting worse. Some in Flint have said they will not trust that the water is safe until the Virginia Tech researchers say so. Without Dr. Edwards and his team, residents suspect little would have been done to protect Flint from its toxic water.

(\textit{Source: Smith, 2016})

Developing countries need to build up their capacity to deal with serious health issues not only from a domestic policy viewpoint, but also in order to be able to contribute effectively to the resolution of global health crises through collaborative research. Indeed, research production has moved from being discipline-driven to problem-focused, with diverse teams of scientists from several disciplinary areas collaborating on the resolution of complex problems, which often correspond to shared challenges that affect mankind as a whole regardless of political boundaries. This evolution is best illustrated by the global health issues that have come up in recent years, from SARS to MERS to the latest Ebola epidemics in West Africa. In the case of SARS, for example, identifying the corona virus required data sharing and collaborative efforts on an unprecedented scale. This experience has radically changed how the international scientific community responds to emerging global health threats (Box 9).
Box 9. Global Epidemics and Open Science Collaboration: the SARS Epidemics

The SARS-Coronavirus (SARS-CoV) caused an infectious disease that was first identified in people in early 2003. Scientists believe that the virus emerged from Guangdong province in China, infecting people who handled or inhaled virus droplets from cat-like mammals called civets.

By 2004, SARS-CoV disease had disappeared in humans, and scientists are not sure whether it will return. Though its stay was short, SARS-CoV changed how scientists respond to emerging infectious diseases by focusing on the need for global openness and immediate cooperation.

Prior to SARS-CoV, emerging infectious diseases were thought to take weeks or months to spread globally. SARS-CoV showed how efficiently a virus could spread through international travel. By mid-2003, SARS-CoV had spread to 29 different countries, including the United States.

Since then, scientists and public health officials around the world have worked to rapidly coordinate studies and emphasize the need to share information with colleagues at the start of infectious disease outbreaks.

(Source: US National Institutes of Health, 2015; http://www.ncbi.nlm.nih.gov/pubmedhealth/PMHT0024856/)

To conclude this review of the contribution of tertiary education to economic and social development, Table 1 recapitulates the fundamental role that tertiary education institutions can play in supporting the achievement of the Sustainable Development Goals by fulfilling their main functions: skills development, knowledge generation and transfer, capacity building, and values formation.

In summary, although the mechanisms through which tertiary education contributes to social and economic development are not fully understood and precise measures of these contributions are not yet available, tertiary education contributes a wide range of private and social benefits, as indicated in the DfID literature review cited earlier, and summarized in Table 2 below.

When taken as a whole, the body of evidence … suggests that tertiary education plays an important role in both economic and non-economic development in lower-income contexts. For years, much of the international literature on tertiary education in lower income contexts emphasized the private benefits to individuals. However, recent studies have indicated that investment in tertiary education also yields significant social returns, both in terms of economic growth and in terms of non-economic benefits. The included studies show a consistent positive impact of tertiary education on societal institutions and on a range of capabilities that have public, as well as private, benefits. (Oketch et al., p. 48)
### Table 1. Contribution of Tertiary Education to the Sustainable Development Goals

| SDGs                          | Preparation of Skilled Professionals | Knowledge Generation, Adaptation & Diffusion | Institutional Development & Capacity Building | Values & Citizenship Skills |
|-------------------------------|--------------------------------------|---------------------------------------------|----------------------------------------------|-------------------------------|
| 1. Poverty Ended              | X                                    | X                                           | X                                            | X                            |
| 2. Sustainable Agriculture to End Hunger | X                                    | X                                           | X                                            | X                            |
| 3. Healthy Lives              | X                                    | X                                           | X                                            | X                            |
| 4. Inclusive & Equitable Quality Education | X                                    | X                                           | X                                            | X                            |
| 5. Achieve Gender Equality    | X                                    | X                                           | X                                            | X                            |
| 6. Water & Sanitation for All | X                                    | X                                           | X                                            | X                            |
| 7. Sustainable Energy         | X                                    | X                                           | X                                            | X                            |
| 8. Inclusive & Sustainable Economic Growth | X                                    | X                                           | X                                            | X                            |
| 9. Resilient Infrastructure   | X                                    | X                                           | X                                            | X                            |
| 10. Reduced Inequality        | X                                    | X                                           | X                                            | X                            |
| 11. Sustainable Cities        | X                                    | X                                           | X                                            | X                            |
| 12. Sustainable Consumption & Production | X                                    | X                                           | X                                            | X                            |
| 13. Managed Climate Change    | X                                    | X                                           | X                                            | X                            |
| 14. Sustainable Marine Resources | X                                    | X                                           | X                                            | X                            |
| 15. Sustainable Use of Terrestrial Systems | X                                    | X                                           | X                                            | X                            |
| 16. Peaceful & Inclusive Societies | X                                    | X                                           | X                                            | X                            |
| 17. Global Partnership for Sustainable Development | X                                    | X                                           | X                                            | X                            |

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Table 2. Potential Benefits from Tertiary Education

| Benefits | Private                                      | Public                                      |
|----------|----------------------------------------------|---------------------------------------------|
| Economic | Higher salaries                              | Greater productivity                       |
|          | Better employment prospects                  | National and regional development           |
|          | Higher savings                               | Increased potential for transformation from low-skill industrial to knowledge-based economy – |
|          | Improved working conditions                  | Attraction of dynamic firms                 |
|          | Professional mobility                         |                                             |
| Social   | Improved quality of life for self and children | Nation building and development of leadership |
|          | Better decision-making                       | Democratic participation; increased consensus; perception that society is based on fairness and opportunity for all citizens |
|          | Improved personal status                     | Social mobility                             |
|          | Increased educational opportunities           | Greater social cohesion and reduced crime rates |
|          | Healthier lifestyle and higher life expectancy | Improved health                             |
|          |                                              | Improved basic and secondary education      |

Source: Adapted from World Bank (2002, p. 86)

THE REALITY OF TERTIARY EDUCATION IN DEVELOPING COUNTRIES: LONG-STANDING AND NEW CHALLENGES

Sixteen years after the publication of the groundbreaking report sponsored by the World Bank and UNESCO—Peril and Promise—tertiary education systems have changed significantly. In particular, developing countries have seen tremendous enrollment growth, especially in the private sector. As a result, many if not most of the issues outlined in Peril and Promise continue to challenge tertiary education systems that are financially constrained.

Problems of quality and lack of resources are compounded by the new realities faced by higher education, as higher education institutions battle to cope with ever-increasing student numbers. Responding to this demand without further diluting quality is an especially daunting challenge. … Expansion, public and private, has been unbridled, unplanned, and often chaotic. The results—deterioration in average quality, continued interregional, inter-country, and intra-country inequities, and increased for-profit provision of higher
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education—could all have serious consequences. (Report of the Task Force on Higher Education and Society. (World Bank and UNESCO, 2000))

To assess the performance of tertiary education in developing countries against this background, this chapter adopts a benchmarking approach that makes a fundamental distinction between (i) the results of tertiary education systems (“system performance”) and (ii) the drivers of performance that account for these results (“system health”). This can be translated into the following two questions:

- How well does the tertiary education system actually produce expected outcomes at the current time (system performance)?
- How well do the tertiary education systems’ key inputs, processes and enabling factors reflect conditions that are known to bring about favorable outcomes?!

Table 3 summarizes the principal dimensions of system performance and health in tertiary education.

Table 3. Conceptual Framework for Benchmarking Tertiary Education in Developing Countries

| Focus of Benchmarking   | Main Dimensions of Analysis |
|-------------------------|-----------------------------|
| **System Performance**  | Educational Attainment      |
|                         | Equity (access, completion, outcomes) |
|                         | Learning Achievement        |
|                         | Labor Market Outcomes       |
|                         | Research Output             |
|                         | Technology Transfer Results |
| **System Health**       | Expansion Strategy          |
|                         | Curricular and Pedagogical Practices |
|                         | Quality Assurance           |
|                         | Relevance, skills mismatch and links to the economy |
|                         | Stewardship and Governance  |
|                         | Financing                   |

Elaborated by Jamil Salmi

Unequal Performance

Educational attainment. In the past two decades, the achievement of universal primary education and the ensuing secondary education expansion in many developing countries has contributed to accelerating demand for tertiary education.
Figure 9, which shows the evolution of tertiary education enrollment rates in various parts of the globe, illustrates these trends in a clear way.

Figure 9. Evolution of Enrolment Rates by Region (1980–2014).
Source: UIS

The data reveal important differences among regions, with South Asia and Sub-Saharan Africa lagging significantly behind the other regions. As a recent report on inequality in African tertiary education underlines, “despite the fast growth in enrollment, Africa is decades behind other regions in providing access to tertiary education (Darvas et al., 2016).

These differences are clearly reflected in the level of educational attainment of developing countries, calculated as the proportion of adults in the working age population who have completed a tertiary level degree.

Not only are there strong differences in tertiary education attainment and enrollment rates across regions and across countries within each region, but developing countries also face disparities in educational opportunities among income groups. Indeed, the expansion of tertiary education experienced over the last decades all over the world does not necessarily mean that tertiary education systems have become equally accessible to all social groups. Increased tertiary education rates can result from the participation of a greater proportion of students from families with a relatively high socio-economic status. To illustrate this situation, Table 4 summarizes equity data for various regions of the world, showing two key equity measures: the mean disparity ratio (enrollment rate of the top income quintile...
divided by the enrollment rate of the lowest quintile) and the range of disparity ratios from best to worst country in each region.

| Country Groupings                  | Mean Disparity Ratio | Range      | Average Enrollment Rate in 2014 |
|-----------------------------------|----------------------|------------|---------------------------------|
| East Asia                         | 16.0                 | 1–61       | 51.6                            |
| Eastern Europe and Central Asia   | 3.5                  | 1–9        | 50.5                            |
| Latin America and the Caribbean   | 27.0                 | 3–100      | 39.6                            |
| Middle East and North Africa      | 28.2                 | 7–89       | 23.9                            |
| South Asia                        | 21.1                 | 7–45       | 15.6                            |
| Sub-Saharan Africa                | 99.3                 | 4–200      | 12.8                            |

*Source: Salmi and Bassett (forthcoming)*

Eastern European and Central Asian countries stand out with the lowest degree of inequality overall. Their lower levels and smaller range of inequality reflect the positive legacy of decades of socialist policies that emphasized quality primary and secondary education for all. In the developing world, South Asia is the most homogenous region, owing to the fact that the region regroups a much smaller
number of countries, which are at relatively similar levels of tertiary education development. Sub-Saharan Africa shows the worst pattern of inequality in tertiary education, reflecting the strongly elitist nature of its universities. Figure 11 presents the disparity ratios for all SSA countries for which data are available.

Figure 11. Disparity Ratios in Sub-Saharan Africa.
Source: Household Surveys
While the above regional and country comparisons on the basis of household survey data provide a valuable illustration of the scope of socio-economic disparities at the tertiary level, they suffer from methodological problems due to the lack of consistency across household surveys. A complementary, statistically more rigorous way of measuring socio-economic disparities is to use regression analysis to assess the importance of family socioeconomic status in shaping access to tertiary education. Using large datasets providing information on the family background of individuals across two or three generations in 68 countries, it is possible to measure the extent of intergenerational mobility in tertiary education by examining the variation in the correlation between the probability of participating in tertiary education and parents’ educational attainment as a proxy of family socio-economic background (d'Hombres, 2010).

The 68 countries for which sufficient data are available consist of eight Latin American countries, 28 countries from Eastern Europe and Central Asia, nine countries from South-East Asia, and 23 OECD countries. African and Middle Eastern countries were not included because of the unavailability of recent micro data representative of the whole country. Appendix 1 presents the data sources and country sample sizes for each of the countries included in this exercise, as well as the methodology applied in this statistical analysis of the surveys.

**Table 5** below reports the average relationship between participation in tertiary education and father’s education for the four large regional groups analyzed in the study.

| Region | Relative probability to reach TE for | Relative probability to reach TE when father has TE | Composite Inequality of Opportunities Index |
|--------|------------------------------------|--------------------------------------------------|-------------------------------------------|
| OECD   | –0,167w                            | 0,285                                            | 0,452                                     |
| LAC    | –0,276                             | 0,228                                            | 0,504                                     |
| ECA    | –0,118                             | 0,246                                            | 0,378                                     |
| SEA    | –0,104                             | 0,214                                            | 0,318                                     |

*Source: d’Hombres (2010)*

The results confirm that an individual’s probability of accessing tertiary education depends significantly on the educational status of his/her father. In addition, the association between family origin and access to tertiary studies varies significantly across regions. LAC countries display the highest level of inequality while SAA countries, followed by ECA countries, show the lowest figures. In the LAC region, individuals whose father has reached tertiary studies are 22.8% more likely to participate in tertiary education than their peers whose father has only secondary
Similarly, individuals with the poorest family background are 27.6% less likely to reach tertiary studies than the reference group. In SEA, children coming from a family with a low social status have 10.4% less chances to enrol in tertiary studies as compared to the reference group, and the comparative advantage for coming from a high social status family takes the form of an additional 21.4% chance of enrolling in tertiary studies.

For the set of OECD countries, having a father with a high level of education results more than in any other region in an increase in the probability of participating in tertiary education (point estimate: 0.285). However, the disadvantage of having a father with a low educational status is much lower than in the LAC region (point estimates in absolute values: 0.167 for OECD countries versus 0.276 for LAC countries).

Socio-economic characteristics are not the only dimension of equity worth looking at. Gender balance in tertiary education is also an important aspect. Available statistics indicate that all countries have significantly increased female participation in tertiary education. In some countries, progress has been such that today there are significantly more women than men enrolled in tertiary education. This has been the trend in Eastern Europe and Central Asia, the Middle East and North Africa, as well as Latin America and the Caribbean. The two outlier regions are South Asia and Sub-Saharan Africa, where considerably fewer females are enrolled in tertiary education in comparison to other regions. Across Sub-Saharan Africa, there are only about 62 female students for every 100 male students. In South Asia, the proportion is 74%.

Box 10 illustrates the main barriers encountered by women in tertiary education in Afghanistan.

**Box 10. Challenges to Female Participation in Afghanistan**

Progress in education in Afghanistan since the fall of the Taliban, whilst significant, has been described as ‘fragile, limited in reach, depth and uncertainty of sustainability’. This is particularly true for Afghan women participating in tertiary education, within a culture that remains resistant to women’s education, and where women face many significant barriers to their participation. The UN’s Human Development Report for Afghanistan indicates that, in 2012, 5.8% of adult females have reached secondary or tertiary education, compared to 34% of males; female participation in the labor market is 15.7% compared to 80.3% for men.

The vital role of tertiary education in promoting a unified national identity, cross-cultural understanding, social cohesion and democracy in Afghanistan has been highlighted. However, the tertiary education participation rate in Afghanistan is one of the lowest in the world, with a gross enrolment ratio of around 5%. According to a recent World Bank study of tertiary education in
Afghanistan, women made up only 19% of students enrolled in public universities and tertiary education institutions in 2012. The report identified a number of factors contributing to women’s underrepresentation in tertiary education in Afghanistan, including the lower participation of girls in secondary education reducing the eligible pool of applicants; the lack of appropriate transport, sanitation and residential facilities for women students; and inadequate child care provision.

The testimonies of Afghan women enrolled in tertiary education from recent interviews provide useful insights into the challenges that they face in seeking to pursue their education.

- My aim is to get an education to be a different person from my mother. I don’t want to be locked at home like my mother. I want to be an active member of society and to help my people (Sabrina, Maidan Wardak Province).
- My main concern is the security situation in Afghanistan. If the security worsens, and the situation gets difficult for girls to get to school or university, they will be forced to abandon their education (Madina, Kunduz Province).
- We have faced cases where girls couldn’t continue their higher education due to financial problems. In case girls can’t pass the exam for government universities, they need to have enough budgets to attend private universities. This is very difficult for most Afghan families to afford expenses of private education (Heela, Parwan Province).
- Shortage of job opportunities is the biggest concern. When I see people have queued in lines to get a very basic job, I get concerned (Laila, Herat Province).
- Unfortunately, due to the corruption in the government … incompetent people with money and power rise to higher levels. For instance, scholarships intended for talented and distinguished students are often distributed among those who already have money, influence and power (Lailuma, Serat Province).
- Education is as important for me as water is for sustaining life. Education brings changes that brighten your world … Education causes positive changes to emerge in everyone’s life (Janan, Daikundi Province).

(Source: Burridge et al., 2016)

Quality and relevance. The third key dimension of performance is learning achievement, which refers to the quality and relevance of the education and training experience of tertiary level graduates. This is one of the most difficult areas to measure. Unlike what happens at lower levels of education, where evaluators use widely accepted metrics, such as TIMMS or PISA, to assess student learning outcomes in an international perspective, no such instrument exists for tertiary
Box 11. Understanding and Using Rankings to Their Best Advantage

Just as scarcity, prestige, and having access to “the best” increasingly mark the purchase of consumer goods, the users of tertiary education are also looking for indicators that enhance their capacity to identify and access the best universities. In this race for “high quality” education, countries are striving to develop “world-class universities” that will spearhead the development of a knowledge-based economy. Because of the power of rankings, institutions are playing a game of innovating and investing in light of ranking methodologies, perhaps at the expense of their real mission and strengths, financial resources, and institutional capacity.

Regardless of their controversial nature and methodological shortcomings, university rankings have become widespread and are unlikely to disappear. Because they define what “world-class” is to the broadest audience, they cannot be ignored by anyone interested in measuring the performance of tertiary education institutions. The following general recommendations may help understand what rankings actually mean:

- Be clear about what the ranking actually measures.
- Use a range of indicators and multiple measures, rather than a single, weighted ranking.
- Consumers should be aware of comparing similar programs or institutions.
- Institutions can use rankings for strategic planning and quality improvement purposes.
- Governments can use rankings to stimulate a culture of quality.
- Users of the rankings data can use the rankings as one of the instruments available to inform students, families, and employers and to fuel public debates.

(Source: Salmi and Saroyan, 2007; Salmi, 2013a)

education yet, despite promising developments in recent years, as discussed in Chapter 1.

In the absence of direct measures of learning outcomes, the global rankings can be used as a useful proxy to assess the quality of tertiary education in developing countries from an international viewpoint. In spite of their methodological limitations (Box 11), international rankings identify the top universities, which significantly contribute to knowledge generation through their cutting-edge research, offer high-quality teaching with innovative curricula and teaching methods, and produce graduates who excel in the global labor market. Table 6, which shows how many developing countries universities appear in the Times Higher Education 2015-2016 ranking, reveals in an unequivocal manner that universities in the developing world operate at lower levels of performance.
Out of 500 top ranked universities, only 23 come from the developing world. In addition, they are concentrated in 9 countries: China and Malaysia for South-East Asia, India, Brazil, Chile and Mexico in Latin America, Iran in the Middle East, and South Africa and Uganda in Africa. None are included in the top 100. The top ranked developing country university, University of Cape Town, is ranked 120th in the world.

While the rankings presented above provide a comparative assessment of individual universities, they do not give direct information on tertiary education systems considered as a whole. The publication since 2012 of a ranking specifically designed to focus on entire tertiary education systems—the U21 ranking—gives a useful comparative perspective for benchmarking the results of developing countries systems in relation to OECD nations. This ranking, prepared by a group of experts from the University of Melbourne in Australia is based on four groups of indicators that evaluate the level of funding for tertiary education, the production of the system in terms of research and training for the labor market, international connections of tertiary education institutions, and the regulatory framework. Table 7 presents the latest (2016) and the first (2012) systems rankings, showing the top 10 countries and all the developing world countries included in the 50 ranked nations (in 2012, only 48 countries were ranked).

Among the 50 countries assessed in this tertiary education system ranking, Malaysia has the best results among all developing countries, which is consistent with its status as a high-middle income economy. China is the one that has most progressed in the past five years. None of the world’s 77 low-income countries have tertiary education systems that make it into this ranking.
Table 7. U21 Ranking of National Tertiary Education Systems (2016)

| Countries | 2016 Rank | Countries | 2012 Rank |
|-----------|-----------|-----------|-----------|
| USA       | 1         | USA       | 1         |
| Switzerland | 2       | Sweden    | 2         |
| Denmark   | 3         | Canada    | 3         |
| United Kingdom | 4   | Finland   | 4         |
| Sweden    | 5         | Denmark   | 5         |
| Finland   | 6         | Switzerland | 6       |
| Netherlands | 7      | Norway    | 7         |
| Singapore | 8         | Australia | 8         |
| Canada    | 9         | Netherlands | 9       |
| Australia | 10        | United Kingdom | 10    |
| Malaysia  | 27        | Malaysia  | 36        |
| China     | 30        | Chile     | 37        |
| Chile     | 33        | Argentina | 38        |
| South Africa | 37 | China     | 39        |
| Brazil    | 38        | Brazil    | 40        |
| Argentina | 40        | Thailand  | 41        |
| Mexico    | 43        | Iran      | 42        |
| Thailand  | 44        | Mexico    | 43        |
| Turkey    | 44        | Turkey    | 45        |
| Iran      | 47        | South Africa | 46    |
| India     | 49        | Indonesia | 47        |
| Indonesia | 50        | India     | 48        |

Source: University of Melbourne. (2016 and 2012). U21 Ranking of National Higher Education Systems. Melbourne Institute and Universitas. http://www.universitas21.com/article/projects/details/152/u21-ranking-of-national-higher-education-systems

Box 12. The Quality Crisis in Developing Countries

Sub-Saharan Africa
The reasons for poor quality are known: large enrolment of students beyond the carrying capacity of the institutions; acute lack of funding in public institutions; severe shortage of qualified faculty; poor governance; internal, institutional inefficiency; inadequate linkages with the productive sector; and a proliferation
of private, for-profit providers. The consequences are equally known: inadequate and crumbling infrastructure; programs, departments and even institutions that fail to be nationally accredited; large unemployment of graduates; abysmally poor research output; and, ultimately, higher education institutions being unable to contribute to the development of Africa.

Malawi
The supply of qualified graduates is inadequate in terms of both quality and absolute numbers. Higher education institutions have struggled to insulate the quality of education delivered from pressures associated with increased enrolment. Available evidence suggests that the limited increase in enrolment is not aligned with the needs of the labor market, and that universities have weak linkages with the private sector with regard to program development and curriculum review. Quality assurance systems remain under-developed.

Egypt
The Egyptian higher system is not serving the country’s current needs well, and without far-reaching reform it will hold back Egypt’s economic and social progress. The dysfunctions include poor quality of educational inputs and processes, and deficiencies and imbalances in graduate output relative to labor market requirements.

… The reality of a narrow, content-heavy curriculum delivered to very large classes in poorly equipped facilities gives rise, as a necessary condition of teacher survival in the majority of institutions, to reliance on “the recitation method” of one-way communication, “telling” rather than “asking”. For students, the experience is a passive one of “listening” rather than participating in interactive and experiential modes of learning.

Latin America and the Caribbean
The results of LAC universities are not commensurate with the economic weight of the Region. Although the Caribbean, Central and South America account for 8.5% of the world’s population and produce 8.7% of global GDP, the region’s universities make up only 2.2% of the top 500 universities in the Shanghai Jiao Tong University ranking, less than 1.5% of the 400 universities in the THE rankings, and 2.6% of the 500 universities in the Leiden bibliometric ranking. The contrast between large countries like Brazil and Mexico, which have no university ranked among the top 100, and small countries such as Israel and the Netherlands, placing respectively three and two universities among the top 100 in the Shanghai ranking, is striking.

Quality in the universities of the Region is adversely affected by the insufficient academic preparation of incoming students, the low proportion of qualified full-time academics and the long duration of first degrees, resulting in high level
of dropouts. Mexico, for example, is the only OECD country where university graduates have more trouble finding a job than uneducated youths, partially because of the unsatisfactory quality and lack of relevance of many academic programs. A recent survey administered by the Manpower Group reveals that 54% of Mexican firms report difficulties in finding the right talent for open jobs, reflecting the inability of the universities to develop the right competencies.

**East Asia**

The quality (and relevance) of education and training appears to be much more of a binding constraint than the quantity of students in all employers’ surveys… The co-existence of significant demand for professionals, relatively high tertiary unemployment rates, and fairly long times to fill professional positions suggests skill mismatches between the labor market and the tertiary education system in some countries… Higher education graduates simply do not have the right skills.

**India**

It is a never-ending source of dismay to Indians themselves that they have only a single institute in the Shanghai Academic Ranking of World Universities (Indian Institute of Science), while China has 44. The reason for this is not hard to work out. Indian universities traditionally focused very heavily on arts and humanities; the institutions that did focus on science and engineering tended to be small and narrowly focused. Neither of those profiles wins you points in international rankings. But more broadly, infrastructure at most Indian universities is substandard, and professorial pay is more or less designed to keep bright scientific talent in the private sector.

(Sources: Barceló, 2015; Mohamedbhai, 2016; Mumbo, 2016; OECD/World Bank, 2010; Salmi, 2013d; World Bank, 2011; Usher, 2014a)

To illustrate how the quality and relevance issues that affect developing countries play out, Box 12 provides a sample of vignettes from various corners of the world.

One of the most serious problems affecting tertiary education systems in developing countries is the low academic level of incoming students. Not all nations participate in the PISA assessment program of the OECD, but the results of the few countries that have taken part clearly indicate that students in developing countries score way below the OECD average (Table 8). In Latin America, for instance, the best performing country, Chile, is 10% below the OECD average. The score of the worst performing system, the Dominican Republic, is about 60% of Singapore, the top performer in the 2015 round. In North Africa and the Middle East, Algeria, Jordan, Lebanon and Tunisia lag significantly behind. Indonesia, the only low-income East Asian country that participated, has an average score about 20% below the OECD average.
Table 8. PISA Scores in Developing Countries and Selected High-Income Economies (2015)

| Countries     | Science | Reading | Mathematics |
|---------------|---------|---------|-------------|
| 1. Singapore  | 556     | 535     | 564         |
| 2. Japan      | 538     | 516     | 532         |
| 3. Estonia    | 534     | 519     | 520         |
| 4. Chinese Taipei | 532   | 497     | 542         |
| 5. Finland    | 531     | 526     | 511         |
| 6. Macao-China| 529     | 509     | 544         |
| 7. Canada     | 528     | 527     | 516         |
| 8. Vietnam    | 525     | 487     | 495         |
| 9. Hong Kong China | 523 | 527     | 548         |
| 10. BSJG China| 518     | 494     | 531         |
| 11. S. Korea  | 516     | 517     | 524         |
| **OECD average** | **493** | **493** | **490**     |
| 31. Latvia    | 490     | 488     | 482         |
| 35. Hungary   | 477     | 470     | 477         |
| 37. Croatia   | 475     | 487     | 464         |
| 44. Chile     | 447     | 459     | 423         |
| 45. Bulgaria  | 446     | 432     | 441         |
| 47. Uruguay   | 435     | 437     | 418         |
| 48. Rumania   | 435     | 434     | 434         |
| 51. Albania   | 427     | 405     | 413         |
| 54. Thailand  | 421     | 409     | 415         |
| 55. Costa Rica| 420     | 427     | 400         |
| 56. Qatar     | 402     | 424     | 402         |
| 57. Colombia  | 416     | 425     | 390         |
| 58. Mexico    | 416     | 423     | 408         |
| 59. Montenegro| 411     | 427     | 418         |
| 60. Georgia   | 411     | 401     | 404         |
| 61. Jordan    | 409     | 408     | 380         |
| 62. Indonesia | 403     | 397     | 386         |
| 63. Brazil    | 401     | 407     | 377         |
| 64. Peru      | 397     | 398     | 397         |
| 65. Lebanon   | 386     | 347     | 396         |
| 66. Tunisia   | 386     | 361     | 367         |
THE CONTRIBUTION OF TERTIARY EDUCATION

The high level of graduate unemployment experienced by many developing countries is another major source of concern. Figure 12, based on ILO statistics, shows that quite a few countries have 40% levels of graduate unemployment, or even close to 50% in the case of Panama.

Paradoxically, unemployment for the graduates of many tertiary education programs is often associated with skills shortages in key sectors of the economy. This is notably the case in countries that export health personal.

The already inadequate health systems of Africa, especially sub-Saharan Africa, have been badly damaged by the migration of their health professionals. There are 57 countries with a critical shortage of healthcare workers, a deficit of 2.4 million doctors and nurses. Africa has 2.3 healthcare
workers per 1000 population, compared with the Americas, which have 24.8 healthcare workers per 1000 population. Only 1.3% of the world’s health workers care for people who experience 25% of the global disease burden. (Naicker et al., 2009)

Skill shortages also reflect the lack of relevance of existing programs in many parts of the world. In India, for example, large-scale studies of employability of engineers have found, four years in a row, worrisome gaps in the quality of training. In 2015, less than 20% of engineers trained in Indian institutions were assessed as employable for the software services sector, and less than 40% for non-functional roles such as business process outsourcing (Aspiring Minds, 2015). In East Asia, similarly, employers point to serious skills gaps, which is confirmed by prevailing patterns of wage skill premiums across low- and middle-income in the Region.

But higher education today does not sufficiently provide its graduates with the skills that firms need to increase their productivity. The quantity of higher education graduates is still too low for the labor market in countries like Cambodia, China, and Vietnam. More important than quantity, however, is quality. Across low- and middle-income East Asia, employers expect workers—particularly those with higher education—to possess the technical, behavioral, and thinking skills to increase their productivity and growth. They need science, technology, engineering, and math skills. They also need the problem-solving and creative skills to support a higher value-added manufacturing sector and the business, thinking, and behavioral skills for a higher-productivity service sector. (World Bank, 2011)

Finally, from the point of view of preparing graduates to be active citizens in democratic societies, few tertiary education institutions put sufficient emphasis on inculcating positive values as an integral part of their study programs. Even though very few studies on this aspect exist, anecdotal evidence on the academic background of professionals and politicians involved in reprehensible behaviors (corruption, fraud, harm to the environment, human rights violations, etc.) suggests that the ethical dimensions of the curriculum are generally neglected, even in top universities.

Research and technology transfer. Research output refers to the publications produced and the advanced training provided by universities in developing countries, measured by the number of scientific journal citations relative to a country’s population and the capacity of tertiary education systems to prepare PhD graduates. Figure 13 presents the number of scientific citations of the top five countries in each region of the world and among OECD countries, relative to their population size.

The research output of developing countries is lagging dramatically behind that of OECD economies, reflecting the low performance of their research
universities. China is the only research powerhouse among developing countries, with a production five times as high as that of India. Brazil, Iran and South Africa are the only other developing countries with a significant research output. As shown in the final section of this chapter, this situation reflects the absence of ambitious science and technology development strategies in most developing countries, limited funding for research, and the lack of critical mass in the research community.

The lagging research output of most developing countries universities is caused, to a great extent, by the lack of critical mass, as reflected in the low numbers of new PhD graduates in most developing countries (Figure 14).

The scanty presence of developing countries universities in the Shanghai ranking (Table 9), which essentially measures the research output and strength of universities,
Figure 14. PhD Graduates per Million Inhabitants (2011).
Source: World Bank data
confirms their limited contribution in this area. The developing world does not have any university in the top 100, and does not represent more than 10% of the total number of universities among the 500 that are ranked.

The Leiden ranking, which measures not only the number of publications but also their impact (most highly cited publications), provides another assessment of the research performance of developing countries universities (Table 10). The 2016 CWTS Leiden Ranking is based on the Web of Science bibliographic database produced by Thomson Reuters. Universities worldwide are ranked according to their publication output in the Web of Science database in the following five broad scientific fields: (i) biomedical and health sciences; (ii) life and earth sciences; (iii) mathematics and computer science; (iv) natural sciences and engineering; and (v) social sciences and humanities.  

Table 10. 2016 Leiden Ranking Results for Developing Countries Universities

| Country Groupings           | 1–100 | 101–200 | 201–300 | 301–400 | 401–500 |
|----------------------------|-------|---------|---------|---------|---------|
| East Asia and the Pacific  | 15    | 11      | 17      | 17      | 13      |
| Eastern Europe and Central Asia | 0    | 0       | 1       | 1       | 0       |
| Latin America and the Caribbean | 1    | 3       | 2       | 2       | 2       |
| Middle East and North Africa | 0    | 0       | 1       | 3       | 3       |
| South Asia                 | 0     | 0       | 1       | 2       | 3       |
| Sub-Saharan Africa         | 0     | 0       | 0       | 0       | 3       |
| Total                      | 16    | 14      | 22      | 25      | 24      |

Note: While the proportion of developing countries universities is higher than in the Shanghai ranking, this reflects essentially the progress of Chinese universities (67 ranked universities). Only a handful of universities from 12 other developing countries have a scientific output sufficient to be included: India (7), Brazil (6), Iran (6), Malaysia (4), South Africa (3), Thailand (2), Argentina (1), Chile (1), Mexico (1), Serbia (1), Slovenia (1), and Egypt (1).
Some of the critics of the Shanghai ranking rightly argue that it is biased in favor of the hard sciences and engineering and neglects the social sciences where developing countries universities are stronger. But the few existing social sciences rankings do not show better results for the developing world. For example, in the Tilburg University ranking of the top 100 economics schools in the world, the only developing countries institutions represented are three Chinese universities. Similarly, the ranking of the top 100 research business schools prepared by the University of Texas in Dallas does not include any university from the developing world. The same situation can be observed with the rankings of finance programs published by the University of Arizona: not one university from the developing world makes the cut.

The situation is especially critical in Sub-Saharan Africa, where the priority given to basic education by governments and donors has adversely affected the development of tertiary education systems.

Higher education in Africa faces severe constraints in terms of attaining critical mass of quality faculty. The average percentage of staff with PhD in public higher education institutions in Africa is estimated to be less than 20 percent (based on 10 countries in the region). Many departments do not have more than 1 or 2 senior professors, many close to the retirement age. This prevents departments and universities from being able to provide relevant higher education training (in part to develop faculty themselves), and establishing vibrant research environments. Moreover, low salaries of faculty, lack of research funding and equipment as well as limited autonomy provide disincentives for professors to stay in African universities. (World Bank, 2013)

While universities in East Asia are significantly more advanced and well resourced than their Sub-Saharan African counterparts, their contribution to innovation is still far from being adequate.

Higher education also fails to provide the type of research needed to boost technological upgrading in firms. Governments are urging universities to go beyond simply providing skills to support innovation through research and technology... Research enables universities to produce ideas for the business community, thereby contributing to knowledge and technological innovation through basic and applied research and technology transfer. But international rankings and research output indicate that low- and middle-income East Asian higher education systems are not providing research of adequate quality. Even mere university involvement in technology adaptation and upgrading is limited in lower- and middle-income East Asia, with the possible exception of China. In Malaysia, Mongolia, and Thailand, for instance, universities are mentioned as leading in acquiring
technological innovations (in a broad sense) by only 1–2 percent of firms. (World Bank, 2011)

Finally, measures of technology transfer capture the contribution of tertiary education institutions to the development of the regions and the economy that they serve. **Figure 15** shows the annual number of registered patents per one million inhabitants in the top 5 countries of each region of the world, as well as among the OECD economies. China and, to a lesser extent, Iran are the only two developing countries with a substantial output.

![Figure 15. Registered Patents by Origin for Developing Countries (per Million Inhabitants, 2014)](http://www.wipo.int/ipstats/en/wipi/figures.html)

*Source: World Intellectual Property Indicators. Available from http://www.wipo.int/ipstats/en/wipi/figures.html*

**The Determinants of Performance**

Conducting a comprehensive analysis of the various factors explaining the relatively poor performance of many tertiary education systems in developing countries could turn into an encyclopedic endeavor beyond the focus and scope of this report. Instead, this section proposes a series of summary tables indicating the main areas of progress in recent years and outlining the key challenges faced by tertiary education systems in developing countries (**Tables 11 to 15**). A more detailed discussion of generic issues and progress in addressing these issues in recent years can be found in other parts of the report (quality assurance in Chapter 1, governance in Chapter 3, and financing in Chapter 4).
CHAPTER 2

Table 11. Coverage, Access and Equity

| Principal aspects               | Strengths                                                                 | Areas for improvement                                                                 |
|---------------------------------|---------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| Expansion of coverage           | Rapid enrollment growth in all regions                                     | South Asia and SSA still lagging. In most countries, lower enrollment rates for vulnerable groups |
| Institutional configuration      | Degree of institutional diversification (non-university institutions, private sector) varies a lot. East Asia, Middle East and Latin America more diversified | Non-university public institutions poorly resourced and considered. Absence of pathways and bridges |
| Financial aid for low-income students | Scholarships and student loans available in many countries                | Insufficient public resources                                                             |
| Non financial equity promotion measures | Very few countries with a national equity plan                           | Insufficient policy attention to these aspects and lack of public and institutional resources |
| Retention                       | A few successful schemes in individual institutions                      | High level of dropouts in many countries                                                 |

Table 12. Quality and Relevance

| Principal aspects                                      | Strengths                                                                 | Areas for improvement                                                                 |
|--------------------------------------------------------|---------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| Academic preparation and qualification of incoming students | A few developing countries have significantly improved their secondary education, as measured by PISA and TIMMS scores | In most developing countries, insufficient preparation of high school graduates       |
| Licensing                                               | Growing number of countries with requirement for all new programs         | Insufficiently rigorous standards to avoid entry of fraudulent providers               |
| Quality assurance/accreditation                        | Significant progress in East Asia and Latin America, followed by Eastern Europe and the Middle East | Challenges to independence and professional level of accreditation agencies. SSA lagging behind. |
| Assessment of learning outcomes                        | Brazil, Colombia, Jordan, Mexico and Panama pioneers                       | Need to ensure better measure of actual competencies                                   |
| Evaluation of labor market outcomes of graduates        | Labor Market Observatories in Chile, Colombia and Mexico as pioneers      | Insufficient use of existing instruments by tertiary education institutions             |
THE CONTRIBUTION OF TERTIARY EDUCATION

Table 12. (Continued)

| Principal aspects                  | Strengths                                                                 | Areas for improvement                                      |
|-----------------------------------|---------------------------------------------------------------------------|-------------------------------------------------------------|
| Curriculum and structure of degrees | A few universities, especially private ones, have aligned their programs with the Bologna process | Insufficient linkages with the productive sectors           |
| Pedagogical practices             | A few innovative initiatives in some universities in many countries        | Still traditional teaching methods in the majority of tertiary education institutions |
| Postgraduate education            | Progress in East Asia, Brazil and South Africa                             | Insufficiently developed in most developing countries       |
| STEM programs                     | Pockets of excellence in a few countries, especially in leading public universities | Limited in many developing countries                       |

Table 13. Research and Innovation

| Principal aspects                  | Strengths                                                                 | Areas for improvement                                      |
|-----------------------------------|---------------------------------------------------------------------------|-------------------------------------------------------------|
| National science and technology vision and strategy | A few countries, especially in East Asia, have defined a long-term strategy | Lack of clear vision and comprehensive strategy in many if not most developing countries |
| Research production               | Rising proportion of academics with a PhD in many public universities                              |
|                                   | Centers of excellence in a few universities in most countries               | Low levels in South Asia, SSA and low-income countries East Asia and Latin America |
| Financing of research             | Recent increases in several East Asian countries and a few Latin American countries | Low level in South and Central Asia, North Africa and SSA |
| Doctoral education                | Overall progress in the past decade                                        | Slow development in most countries, especially low income |
| Focus of research activities      | Efforts of national research policy agencies to link research to the needs of the economy | Overtly theoretical and academic in many universities       |
## Table 14. Governance

| Principal aspects                  | Strengths                                                                 | Areas for improvement                                                                 |
|-----------------------------------|---------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Institutional autonomy            | Fairly high level of autonomy regarding academic organization and management | Financial and human resources management in public institutions usually constrained by civil service regulations and salary levels |
| Accountability                   | Financial audits                                                          | Few accountability mechanisms to reflect actual university performance               |
| Role and composition of university boards | Increasing participation of external members in several countries           | Limited power of university boards in many countries                                 |
| Selection of university presidents and leadership team members | Governance reforms of public universities in few countries Good practices in top private universities | In many public institutions, absence of objective process for selection of presidents and leadership teams on the basis of professional criteria Lack of transparency in many private institutions |
| Stability in the operation of tertiary education institutions | Stability in private institutions                                           | Frequent conflicts and strikes in public universities, especially in Latin America, South Asia and SSA |

## Table 15. Financing

| Principal aspects                  | Strengths                                                                 | Areas for improvement                                                                 |
|-----------------------------------|---------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| National budget contribution      | -                                                                         | Low level of public funding (with a few exceptions)                                   |
| Allocation mechanisms             | A few countries have introduced formula funding and/or performance based allocation mechanisms | Lack of performance criteria: no incentives to improve or be efficient                |
| Efficiency in resource utilization | Financial crisis has forced public institutions to rationalize their spending | Waste of resources linked to high level of dropouts, long duration of studies, low completion rates, and inefficient deployment of academics |
### Table 15. (Continued)

| Principal aspects          | Strengths                                                                 | Areas for improvement                                                                 |
|----------------------------|---------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| Distribution of public subsidies | More equitable distribution in the few countries with an effective, well-targeted scholarships and student loans program | Regressive distribution of public funding in most cases: wealthiest groups benefit in a disproportionate way in tuition-free public universities |
| Effectiveness of student loan programs | Very few countries with a well-functioning program                       | Most student loan schemes affected by problems of high administrative costs, low interest rates, and inefficient loan recovery |

### NOTES

1. This conceptual framework was developed by the author while working at the World Bank in the context of a wider policy research project on the measurement of the results of education systems. A summary presentation of the framework for tertiary education can be found in Salmi (2013e).
2. [http://www.universitas21.com/article/projects/details/152/u21-ranking-of-national-higher-education-systems](http://www.universitas21.com/article/projects/details/152/u21-ranking-of-national-higher-education-systems)
3. The CWTS Leiden Ranking measures the scientific performance of 843 major universities in 53 countries. Using a sophisticated set of bibliometric indicators, the ranking aims to provide highly accurate measurements of the scientific impact of universities and universities’ involvement in scientific collaboration. The 2016 CWTS Leiden Ranking is based on Web of Science indexed publications from the 2011–2014 period. Detailed information is available at: [http://www.leidenranking.com/#sthash.zFFiawq4.dpuf](http://www.leidenranking.com/#sthash.zFFiawq4.dpuf)
4. [https://econtop.uvt.nl/rankinglist.php](https://econtop.uvt.nl/rankinglist.php)
5. [http://jindal.utdallas.edu/the-utd-top-100-business-school-research-rankings/worldRankings#20082012](http://jindal.utdallas.edu/the-utd-top-100-business-school-research-rankings/worldRankings#20082012)
6. [http://apps.wpcarey.asu.edu/fin-rankings/rankings/results.cfm](http://apps.wpcarey.asu.edu/fin-rankings/rankings/results.cfm)