The Changing Global Environment

All things change. Yet nothing is extinguished . . . there is nothing in the whole world which is permanent. Everything flows onwards and all things are brought into being with a changing nature. The ages themselves glide by in constant movement, for still waters will never reach the sea.

Ovid

The last decade of the 20th century saw significant changes in the global environment that, in one way or another, bear heavily on the role, functions, shape, and mode of operation of tertiary education systems all over the world, including those in developing and transition countries. As Table 1.1 shows, some of these trends offer opportunities while others constitute potential threats. Among the most influential changes are the increasing importance of knowledge as a driver of growth in the context of the global economy, the information and communication revolution, the emergence of a worldwide labor market, and global sociopolitical transformations. This chapter examines each in turn.

Knowledge as a Key Factor in Development

The ability of a society to produce, select, adapt, commercialize, and use knowledge is critical for sustained economic growth and improved living standards. Knowledge has become the most important factor in economic development. A recent study by the OECD on the determinants of growth concluded that “underlying long-term growth rates in OECD economies depend on maintaining and expanding the knowledge base” (OECD 1998b: 4). *World Development Report 1998/1999* concurred, stating that “today’s most technologically advanced economies are truly knowledge-based . . . creating millions of knowledge-related jobs in an array of disciplines that have emerged overnight” (World Bank 1999c: 16). The real growth of value added in knowledge-based industries has consistently outpaced overall growth rates in many OECD member countries.
over the past two decades. Growth of value added for the 1986–94 period was 3.0 percent for knowledge industries versus 2.3 percent for the business sector as a whole. Between 1985 and 1997, the share of knowledge-based industries in total value added rose from 51 to 59 percent in Germany, from 45 to 51 percent in the United Kingdom, and from 34 to 42 percent in Finland (OECD 2001).

The process of globalization is accelerating this trend because knowledge is increasingly at the core of a country’s competitive advantage (Porter 1990). 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 the two, as is illustrated by the success story of Bangalore, the capital of the Indian software industry. The proportion of goods in international trade with a medium-high or high level of technology content rose from 33 percent in 1976 to 54 percent in 1996 (World Bank 1999c: 28).

Today, economic growth is as much a process of knowledge accumulation as of capital accumulation. In OECD countries, investment in the intangibles that make up the knowledge base—research and development (R&D), education, and computer software—is equaling or even

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| Growing role of knowledge     | - Possibility of leapfrogging in selected areas of economic growth  
                               | - Resolution of social problems (food security, health, water supply, energy, environment)  
                               | - Increasing knowledge gap among nations                                      |
| ICT revolution                | - Easier access to knowledge and information       | - Growing digital divide among and within nations                             |
| Global labor market           | - Easier access to expertise, skills, and knowledge embedded in professionals | - Growing brain drain and loss of advanced human capital                      |
| Political and social change   | - Positive environment for reform                  | - Growing brain drain and political instability                               |
| - Spread of democracy         |                                                    | - Loss of human resources                                                     |
| - Violence, corruption, and crime |                                                  |                                |
| - HIV/AIDS                    |                                                    |                                |

Note: ICT = information and communication technologies.
exceeding investment in physical equipment. Firms devote at least one-third of their investment to knowledge-based intangibles such as training, R&D, patents, licensing, design, and marketing. In this context, economies of scope, derived from the ability to design and offer different products and services while using the same technology, are becoming a powerful factor in expansion. In high-technology industries such as electronics and telecommunications, economies of scope can be more of a driving force than traditional economies of scale (Banker, Chang, and Majumdar 1998).

A new type of enterprise—the producer services company, which provides specialized knowledge, information, and data in support of existing manufacturing firms—has begun to prosper. Experts see such companies as the principal source of created comparative advantage and significant value added in highly industrialized economies (Gibbons 1998). In the knowledge economy, advances in microelectronics, multimedia, and telecommunications give rise to important productivity gains in many sectors and are also key components of a multitude of new products in a wide range of industrial and service activities. At the same time, the rapid acceleration in the rhythm of creation and dissemination of knowledge means that the life span of technologies and products becomes progressively shorter and that obsolescence sets in more quickly.

Developing and transition economies are affected by these transformations but are not yet reaping all of the potential benefits. Indeed, the capacity to generate and harness knowledge in the pursuit of sustainable development and improved living standards is not shared equally among nations. There are striking disparities between rich and poor countries in science and technology (S&T) investment and capacity. It was estimated in 1996 that OECD member countries accounted for 85 percent of total investment in R&D; China, India, Brazil, and the newly industrialized countries of East Asia for 11 percent; and the rest of the world for only 4 percent. Among the reasons for the divergence in agricultural productivity between industrial and developing countries are that advanced economies spend up to five times more on agriculture-related R&D than do their counterparts in developing countries and that they possess the critical combination of infrastructure, expertise, and organizational and incentive structures that allows these investments to be productive. Members of the exclusive group of advanced economies enjoy the fruits of a virtuous circle in which the concrete benefits of research help produce the wealth and public support needed to continue the investigation of the frontiers of science (Romer 1990).

By contrast, the large majority of countries in the developing world have neither articulated a development strategy linking the application of knowledge to economic growth nor built up their national S&T capac-
ity. A key indicator is the ratio of foreign patent applications to local patent applications, which measures, in a given country, the level of innovative activity by national researchers. In low-income countries the ratio of patents filed by nonresidents to those filed by residents is 690 to 1, while in high-income countries the ratio is, on average, only 3.3 to 1 (World Bank 2000d: table 5.12).

Figure 1.1, which compares the economic evolution of Ghana and the Republic of Korea between 1958 and 1990, illustrates the significant difference a knowledge-based development strategy made for two countries with similar gross domestic product (GDP) per capita in 1958. The figure, based on the standard Solow method of accounting for economic growth, represents a stylized attempt to estimate the relative contribution of two types of factors: tangible factors such as the accumulation of physical capital and additional years of schooling in the labor force, and other factors linked to the use of knowledge, such as the quality of education, the strength of institutions, the ease of communicating and disseminating technical information, and management and organizational skills (Solow 2001). In this model, technical progress raises the potential output from a given set of inputs. Empirical measures are then applied to assess the extent to which growth is attributable to increased inputs (more labor and capital) or to the use of inputs in a more productive way. The latter measure, commonly referred to as total factor productivity (TFP), is generally considered to be closely linked to the way in which knowledge is used in production. Because TFP is a measure of output per unit of input, raising it leads to higher standards of living. Tertiary education is one of the most influential of the set of complex factors that determine TFP for a given economy. Other factors, too, have to be taken into account; among these are divergent economic policies and political climates—both of which have strongly influenced industrial growth paths, labor markets, and conditions for retaining and utilizing skills in the two countries (Box 1.1).

In the Solow model, the difference in economic growth between Ghana and Korea is a telling example of a more general pattern. Easterly and Levine (2000) have reviewed and analyzed findings from several studies of cross-country growth, similar to the comparison here between Ghana and Korea. They arrive at the conclusion that TFP—which measures factors other than physical and human capital—explains the bulk of the differences in economic growth. They accordingly recommend that policymakers shift their focus from capital accumulation as such to policies that promote TFP growth.

Developing and transition countries must achieve greater economic productivity if they want to be able to compete effectively in the global economy. World Development Report 1998/1999 observes that “the need for developing countries to increase their capacity to use knowledge
cannot be overstated” (World Bank 1999c: 16). Lagging countries will miss out on opportunities to improve their economies through, for example, more efficient agricultural production and distribution systems—which would increase yields and lower the proportion of food wasted due to poor distribution—or by making exports more competitive through better metrology, standards, and quality testing.

One of the greatest and most urgent challenges facing the poorest countries may be to produce an adequate supply of affordable, nutritious food for their growing populations without causing further environmental degradation. The utilization of modern biotechnology techniques such as genetically modified crops and modern genomics can play a critical role in increasing yields, enhancing nutritional value (protein, calories, micronutrients, and vitamin supplements), improving plant characteristics (e.g., resistance to drought, pests, salinity, and herbicides), and decreasing postharvest loss. But the development of genetically modified crops poses serious issues of possible environmental and human health risks that require careful risk management and biosafety procedures. To make informed decisions on how to address these challenges, countries need to call on highly qualified specialists—who will not be available unless investments in advanced human capital are made.

Countries without a minimum scientific and technological capacity will also lag in realizing social and human benefits such as rising life
Box 1.1 Tertiary Education Strategies in Ghana and the Republic of Korea Contrasted

Divergent evolutionary paths in tertiary education policies and practices may have contributed to the growing difference in total factor productivity (TFP) between Ghana and the Republic of Korea. The following is a very general description of tertiary education policies in the two countries.

The development of tertiary education in Korea took place in four distinct phases: (1) in the 1950s, the expansion of public institutions, with cost sharing equivalent to 30 percent of expenditures; (2) in the 1960s, encouragement of private institutions, with limited public funding for capital costs and scholarships; (3) in the 1970s and 1980s, the expansion of engineering and technical education to meet manpower requirements; and (4) in the 1990s, a focus on quality, R&D capacity, accountability, deregulation, and performance-based funding.

In Ghana enrollment in public tertiary education has grown slowly over the years. In the late 1980s the government formulated a reform program that included measures to improve the financial sustainability of the system, increase quality and relevance, and promote expansion of enrollments, but many of the proposed reforms were reversed by subsequent administrations.

The enrollment of students in science and technology disciplines has remained relatively constant in both countries and is approximately equivalent, at about 50 percent of the student population. But in other important respects, the outcomes of the two strategies are strikingly different:

- The enrollment ratio in tertiary education for the eligible age cohort in Korea skyrocketed from 5 to 80 percent between 1960 and 2000. In the same period, Ghana’s enrollment ratio stagnated at less than 2 percent.

- Private tertiary institutions have proliferated in Korea, enrolling 85 percent of the total student population in 2000. In Ghana private institutions have emerged only recently and account for no more than 6 percent of total enrollment.


- The Korean government has actively promoted university-industry partnerships since the late 1980s. Linkages between tertiary education and industry have been relatively uncommon in Ghana.

Source: World Bank data.
expectancy, lower infant mortality, and improved health, nutrition, and sanitation. Such countries will be increasingly vulnerable to emerging threats.

For example, poverty exacerbates the problems of dealing with the HIV/AIDS epidemic, in that the resulting lack of capacity hampers the emergence of more effective coping strategies. Low-income countries with high infection rates can afford neither to develop their own solutions nor to buy existing remedies from the industrial world. Gains in life expectancy that were achieved over the past 40 years are in some cases being reversed. Only a few countries, including Brazil, Senegal, and Uganda, have shown initial success in fighting the AIDS epidemic. Their positive results have been founded on (a) effective outreach health programs targeting poor people; (b) firm political decisions to suspend intellectual property rights in the context of the health emergency and to encourage production of generic drugs; and (c) in the case of Brazil, the existence of a local pharmaceutical industry with the technical and human capital capacity to manufacture the needed drugs.

Low-income countries, which are, on average, disproportionately vulnerable to the effects of climate change and natural disasters, stand to benefit most from better use of emerging technological know-how in areas such as meteorology and remote sensing. New knowledge and technology make possible greatly improved forecasting and early-warning techniques that can dramatically reduce the effects of land and environmental degradation and of natural disasters. The catastrophic floods in Mozambique in December 2000 furnish a negative example: six months beforehand, British meteorologists had issued warnings about the danger, but there was no in-country capacity to analyze the scientific data, draw concrete conclusions, and recommend preventive measures that could have saved thousands of lives.

The Information and Communication Revolution

One specific dimension of scientific and technological progress that is already having a strong effect on the tertiary education sector is the information and communication revolution. The advent of printing in the 15th century brought about the first radical transformation in modern times in the way knowledge is kept and shared. Today, technological innovations in informatics and telecommunications are once more revolutionizing capacity to store, transmit, access, and use information. Rapid progress in electronics, telecommunications, and satellite technologies, permitting high-capacity data transmission at very low cost, has brought about the quasi neutralization of physical distance as a barrier to communication and as a factor in economic competitiveness. In
1985 the cost of sending 45 million bits of information per second over one kilometer of optical fiber was close to 100 dollars; in 1997 it was possible to send 45,000 million bits per second at a cost of just 0.05 cents (Bond 1997). Alternative energy sources such as solar energy and crank technology eliminate some of the electric power constraints in remote locations. Generally speaking, the convergence of increased computing power and reduced communication costs means that there are few logistical barriers to information exchange and communication among people, institutions, and countries, at least for those with access to the Internet and in places where telecommunication policies encourage affordable access.

The accelerated pace of technological development has made access to knowledge a crucial requirement for participation in the global economy. The impact of new information and communication technologies (ICT) has significantly changed the speed of production, use, and distribution of knowledge, as evidenced by the increased publication of scientific papers and the number of patent applications. A country’s capacity to take advantage of the knowledge economy therefore depends on how quickly it can adjust its capacity to generate and share knowledge. A recent study by the International Labour Office (ILO) found that the new technologies can have a positive impact on countries, whatever their level of economic development. Brazil, China, Costa Rica, India, Malaysia, and Romania have successfully created—with the help of relatively effective education systems—information technology (IT) niches that allow them to compete in the global market (ILO 2001).

Although this transformation offers many potential benefits to developing and transition countries, increasing reliance on digital information and advanced communication technologies carries, at the same time, the real danger of a growing digital gap among and within nations. Disparities in per capita income and standards of living could translate into the marginalization of entire societies or segments of society. The digital divide has several dimensions. On a global scale, it divides industrial and developing countries according to their ability to use, adapt, produce, and diffuse knowledge. In Korea the number of households connected to the Internet in 2000 doubled, raising the total to 3 million homes, whereas in Japan only 450,000 homes are connected. The technological gap between high-income and low-income countries is reflected in the number of personal computers per 1,000 inhabitants—less than 1 in Burkina Faso, compared with 27 in South Africa, 38 in Chile, 172 in Singapore, and 348 in Switzerland. Sub-Saharan African countries together have 1 Internet user per 5,000 population; in Europe and North America the proportion is 1 user for every 6 inhabitants (International Communications Union data). Figure 1.2 illustrates this global inequality.
Among developing countries, the digital divide sets apart the technologically more advanced countries from the less advanced ones. Whereas a few African countries with small populations still lack even one Internet host, in Singapore 98 percent of households use the Internet. Within a given region, some countries have a stronger information and communication infrastructure than others. In Sub-Saharan Africa the number of Internet hosts per 1,000 population ranges from 0.01 in Burkina Faso to 3.82 in South Africa (International Telecommunications Union data).

Within countries, technological change often means that groups which were already disadvantaged or excluded—low-income families, rural populations, women, minorities, and the elderly—fall farther behind. In the United Kingdom, for example, only 4 percent of households in the poorest income quintile are connected to the Internet, compared with 43 percent in the top quintile, and the gap is increasing every year. In the United States the proportion of Afro-American families that are connected is half that for white families (OECD 2001: 149). The 2001 ILO report reveals a “digital gender gap” in many parts of the world, including OECD countries. Although some economies have near parity in Internet use (examples are Taiwan, China, with 45 percent female users, and Korea, with 43 percent), the situation is more often far from balanced. In Latin America 38 percent of Internet users are women, but in the European Union (EU), Japan, and the Middle East, the shares are 25, 18, and 4 percent, respectively (ILO 2001: 16). In Senegal 12 percent of Internet users are women, but only a tiny 0.1 percent of the population is on the Internet. In South Africa, where 3 percent of the population is on the Internet, 19 percent of the users are women (International Telecommunications Union data).

Appropriate, well-functioning information and communications technologies are of vital importance to tertiary education because they have the potential to (a) streamline and reduce administrative tasks and, in general, make possible greater efficiency and effectiveness in the management of tertiary education systems and institutions; (b) expand access and improve the quality of instruction and learning on all levels; and (c) vastly broaden access to information and data—cross-campus, or across the globe. The appearance and the rapid evolution of ICT have created at least two major challenges for education: to achieve the appropriate integration of ICT into overall education systems and institutions, and to ensure that the new technologies become agents of expanded access and equity and increase educational opportunities for all, not just for the wealthy or the technologically privileged. Indeed, early policy research in the United States, one of the first widespread adopters of new ICT, found strong evidence that uneven access to the technologies was worsening existing equity gaps in education. Explicit attention
needs to be given to equity considerations so that the new technologies, which “shatter geographical barriers [may do so without] erecting new ones and worsening the digital divide” (Gladieux and Swail 1999: 17).

Figure 1.2 Distribution of Internet Hosts and of World Population, by Region, 1999

Distribution of Internet hosts

- United States and Canada (65.3%)
- Europe (22.4%)
- Australia, Japan, and New Zealand (6.4%)
- Developing countries (5.9%)

Distribution of world population

- Developing countries (80.4%)
- Europe (12.1%)
- Australia, Japan, and New Zealand (2.5%)
- United States and Canada (5.1%)

Source: Data from the International Telecommunications Union and the United Nations Population Fund.
The Global Labor Market

Globalization, declining communication and transportation costs, and the opening of political borders combine to facilitate increased movements of skilled people. This dynamic is de facto leading to a global market for advanced human capital in which individuals with tertiary education are the most likely to participate (Carrington and Detragiache 1999). In this 21st century marketplace, the richer countries strive to attract and retain the world’s best-trained minds in many ways. Among the more powerful “pull” factors are effective policies that stimulate R&D activities and increase direct investment, offer attractive postgraduate training and research opportunities, and recruit younger graduates and professionals (Glanz 2001). OECD countries are increasing their investments in R&D not only in the S&T sector but also in other knowledge-based sectors, thus creating job opportunities for well-trained people. For example, in early 2001 the Australian government announced a 100 percent increase in the funding of the Australian Research Council and a tax write-off equivalent to 175 percent of the value of R&D spending by firms.4

Roughly 25 percent of the science and engineering students in U.S. graduate schools come from other countries. This amounts to somewhere between 50,000 and 100,000 students from abroad who are introduced into the U.S. market for advanced human capital. Most of these students received their basic education and first degrees in their home countries—meaning that the cost of their initial training was probably assumed by the countries of origin rather than by the country of employment (NSF 2000: app. table 4-22). Advanced countries are opening recruitment offices in countries where, because of lack of opportunity and political instability, graduates are available. Australia, Canada, EU members, and others all compete for their share of well-trained people in the global marketplace. France and Germany have freed up the issuance of visas to attract foreign professionals in technology-related areas, and in October 2000 the United States introduced an amendment to its immigration laws that made available 600,000 new visas for scientists and engineers.5

The global labor market for advanced human capital is an expanding reality that brings the circulation of skills and the related problem of “brain drain” to the forefront of national concern, particularly in developing countries (see Table 1.2). Whether it results from push or pull factors, brain drain can have a debilitating effect on national governing structures, management capacities, productive sectors, and tertiary institutions. It is estimated, for example, that at least 40 percent of the graduates of the highly regarded Indian Institutes of Technology seek employment abroad. The countries of Sub-Saharan Africa have an aver-
age tertiary enrollment rate of only 4 percent, compared with 81 percent in the United States, yet it is estimated that about 30,000 Africans holding Ph.D.s live outside Africa and that 130,000 Africans are currently studying overseas. One of Venezuela’s most prestigious private universities, Metropolitan University, lost 50 percent of its graduates in academic year 2000 to multinational corporations abroad. In Bulgaria the Union of Scientists estimates that 65 percent of all university graduates (close to 300,000 persons) left the country during the past decade. Universities in developing and transition countries are struggling to recruit professors with advanced degrees, and the lack of adequately trained staff is leading to declining quality of instruction.

The rising international mobility of skilled human resources can have positive as well as negative effects on countries at all levels of development. Developing countries, however, tend to suffer largely adverse consequences, as they may lose the very technical and professional specialists who would be capable of contributing to poverty-alleviating improvements in the living conditions of the local population. Despite its potentially far-reaching consequences, brain drain has rarely been an explicit public policy concern. The reasons for this benign neglect include respect for universally accepted human rights such as freedom of movement and choice of employment (embodied in the Universal Declaration of Human Rights, Articles 13 and 23), as well as the complex and shifting interplay of “pull” and “push” factors motivating individuals to enter or leave a country. Nevertheless, it is clear that whatever its causes, the interna-

<table>
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<tr>
<th>Country or region of origin</th>
<th>Number of emigrants living in United States</th>
<th>Number of emigrants with tertiary education in United States</th>
<th>Emigrants with tertiary education as share of total emigrants (percent)</th>
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<tbody>
<tr>
<td>Mexico</td>
<td>2,700,000</td>
<td>351,000</td>
<td>13</td>
</tr>
<tr>
<td>Philippines</td>
<td>730,000</td>
<td></td>
<td>50</td>
</tr>
<tr>
<td>China</td>
<td>400,000</td>
<td>200,000</td>
<td>50</td>
</tr>
<tr>
<td>India</td>
<td>300,000+</td>
<td>225,000+</td>
<td>75</td>
</tr>
<tr>
<td>Korea, Rep.</td>
<td>300,000+</td>
<td>159,000+</td>
<td>53</td>
</tr>
<tr>
<td>Sub-Saharan Africa</td>
<td>128,000</td>
<td>95,000</td>
<td>75</td>
</tr>
<tr>
<td>Jamaica</td>
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<td>42</td>
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<tr>
<td>Trinidad and Tobago</td>
<td>46</td>
<td></td>
<td>46</td>
</tr>
<tr>
<td>South America</td>
<td>About 50</td>
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<td>50</td>
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Note: Includes only immigrants to OECD countries; actual totals are probably higher. Source: Carrington and Detragiache (1999).
tional mobility of skilled and scarce human resources will continue to present long-term risks for tertiary education investments in many nations.

**Political and Social Change**

Rapid changes are occurring worldwide, not only in economics, science, and technology but also in political and social dynamics. The dissolution of the former Soviet Union, the African political renaissance, the consolidation of civilian rule in Latin America, and other events have altered the global political landscape of the planet. The outcomes include a transition to democracy in many parts of the world, a greater concern with issues of political development in areas such as governance and accountability, increased awareness of human rights, and the rise of civil society organizations as legitimate stakeholder voices in increasingly pluralistic environments. The proportion of the world’s countries practicing some form of democratic governance rose from 40 percent in 1988 to 61 percent in 1998 (World Bank 2000e: 43). Tertiary education institutions themselves have been profoundly influenced by the changes around them, which are heightening their importance as pillars of social cohesion, forums of public discourse, and contributors to open debate.

**Persistence of Conflict**

Notwithstanding these encouraging steps forward, the political situation in many countries remains insecure. Threats from regional and ethnic conflict, increased poverty, growing economic inequality, rising levels of crime and corruption, and the expanding AIDS epidemic combine to put severe pressures on political and social institutions of all kinds, including tertiary education institutions, thereby limiting their effectiveness. Internal and ethnic strife, once suppressed by Cold War pressures or post-colonial influences, have proliferated over the past 10 years. These conflicts, which have been felt most acutely in Africa, Eastern Europe, and the countries of the former Soviet Union, have resulted in an estimated 5 million deaths and the displacement of 50 million refugees (World Bank 2000e: 36). Although some analysts claim that the number of major armed conflicts is on the decline throughout the world, a recent study conducted by a group monitoring the political stability of national governments declared 33 countries to be at high risk of instability and 47 more, including China, India, and Russia, to be at moderate risk (Smith 2001). In 1996 a third of the countries of Sub-Saharan Africa experienced armed conflict, causing enormous human suffering, material devastation, human resource depletion, and damage to the social and cultural
fabric of the nations concerned (World Bank 2001a). And since the terrorist attacks in the United States on September 11, 2001, the overall level of instability may be higher than was once believed.

**Income Inequality**

Throughout the world, income inequality both within and across nations has grown as people have benefited differentially from the rise of the global economy. In 1973 the income difference between the richest and poorest countries was 44 to 1, but by 1992 the gap had widened markedly, to a ratio of 72 to 1 (World Bank 2001e: 6). Throughout this period, the gulf between the economic well-being of industrial nations and that of the developing world grew as the share of world exports contributed by the least-developed countries declined from 0.6 percent in 1980 to 0.4 percent in 1998 (UNDP 2000: 82). Today, with 1.2 billion people living on less than one dollar a day, it is estimated that the benefits of globalization have remained out of reach for nearly half of the developing world’s inhabitants (World Bank 1997: 12).

Within nations, too, income inequality is on the rise. For example, in Brazil, Guatemala, and Jamaica the income of the richest 20 percent is more than 25 times that of the poorest 20 percent (UNDP 2000: 34). In less than 10 years, inequality in Eastern Europe and the former Soviet Union, as measured by the Gini coefficient, increased from an average 25–28 (showing greater equality than the OECD average) to 35–38 (greater inequality than the OECD average). In some countries, such as Bulgaria, Russia, and Ukraine, the increase in inequality has been even more dramatic, outpacing the yearly speed of Gini increase in the United Kingdom and the United States in the 1980s by three to four times (Milanovic 1998). In many countries social disparities and poverty have translated into a steep increase in crime and lawlessness. Equitable access to tertiary education opportunities is important for easing inequalities and related social problems.

**The HIV/AIDS Crisis**

The spread of the AIDS virus is contributing to economic and political instability. According to estimates by the Joint United Nations Programme on HIV/AIDS (UNAIDS) for 2001, 40 million people worldwide are living with HIV/AIDS. In 2000 alone, there were an estimated 5 million newly infected individuals and 3 million deaths.

Africa is commonly described as a continent in peril. Of the nearly 34 million people infected with HIV worldwide at the end of 1999, 23 million resided in Sub-Saharan Africa. Since the beginning of the AIDS epidemic in the early 1980s, more than 17 million Africans have died, 3.7
million of them children. It is estimated that 8.8 percent of African adults are infected with the HIV/AIDS virus, and the incredibly high rate of premature adult death is expected to result in 40 million children becoming orphaned within the next decade.

In the seven Sub-Saharan African countries with the highest infection rates—Botswana, Lesotho, Namibia, South Africa, Swaziland, Zambia, and Zimbabwe—between 20 and 36 percent of the adult population lives with HIV. The rise of HIV over the last decade has caused life expectancy to slip by more than 10 years in some of these countries. The epidemic has serious implications for economic and human development. For example, by 2010, South Africa is expected to be 20 percent poorer than it would have been had the AIDS virus never existed.

The threat of an AIDS epidemic is also very real in all Asian and Eastern European nations, where the world’s fastest rising infection rates, combined with the high cost of antiretroviral drugs and inadequate access to health care services, have placed effective AIDS treatment out of reach for most citizens. Recently, the Chinese government acknowledged that by 2010 the incidence of AIDS in China will reach levels similar to those for Sub-Saharan African countries.

These trends combine to exert severe pressures on political and social institutions of all kinds. It is estimated that some countries of Africa are losing one-quarter of their health care personnel to HIV/AIDS. One-third of the nurses in Natal Province, South Africa, have died from AIDS in the past three years (ACU 2001). Meanwhile, professors, teachers, administrators, and students are dying or are leaving their academic institutions because of illness or to care for someone who is sick with AIDS. In Zambia the loss of teaching staff in primary and secondary schools is staggering, equaling about half the number of teachers trained each year. Tertiary education institutions are also losing large numbers of their teaching staff members, administrative personnel, and students.

These statistics do not begin to measure the losses experienced in other sectors of the economy and in the government, all of which depend on skilled professionals, technically trained adults, and strategic thinkers and planners. In order to maintain education, health, judicial, and other essential public service sectors, replenishment of these losses is imperative. This need is even more important in the poorest countries, where the numbers of highly educated persons were already often barely sufficient to provide the capacity necessary for democratic governance and a functioning civil service, let alone for enhancing development.

Outside the modern sector, agricultural productivity in many countries is declining as a result of HIV/AIDS. Thailand has seen output from rural households drop by 50 percent, and UNAIDS estimates that the most afflicted countries will lose more than 20 percent of their GDP by 2020 if current trends continue.
As noted above, tertiary education institutions face major disruptions because of HIV/AIDS. Yet this is precisely the time when tertiary education is essential as a means of making up for the losses, providing the human capital required to keep governments functioning and economies moving forward, and producing teachers and health care workers. A strong, flexible tertiary education sector can help build the capacity needed to temper the negative effects of HIV/AIDS and other threats to public health.

Conclusion

The last decade of the 20th century was characterized by momentous changes and significant new trends in the global environment. The resulting challenges present both opportunities and threats that are likely to affect not only the shape and mode of operation but also the very mission and purpose of tertiary education systems. In the next chapter, we describe the current situation of tertiary education in developing countries and examine how educational institutions are adapting, or may find it possible to adapt, to the new tasks and realities.

Notes

1. World Development Report 1998/99 described two broad categories of knowledge into which specific forms of knowledge fall: technical knowledge (know-how), and knowledge about attributes (information and awareness that permit analysis and decisionmaking).
2. OECD (2000): 220, table 2. Knowledge-based industries include high- and medium-high-technology industries; communication services; finance, insurance, and other business services; and community, social, and personal services.
4. The prime minister declared that “in an extremely competitive world of highly mobile capital and labor, it is all the more important that Australia has the right incentives and opportunities to translate Australian ideas into income and jobs at home for Australians” (reported in Maslen 2001).