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(eds.)

# Higher Education, Research and Innovation: Changing Dynamics



with support from the  
UNESCO Forum on  
Higher Education, Research  
and Knowledge



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Ulrich Teichler  
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(Editors)

# **Higher Education, Research and Innovation: Changing Dynamics**

Report on the UNESCO Forum on  
Higher Education, Research and Knowledge  
2001-2009

International Centre for Higher Education Research Kassel  
(INCHER-Kassel)

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# Contents

	<b>Pages</b>
<b>Foreword</b>	
V. Lynn Meek, Ulrich Teichler, Mary-Louise Kearney	v
<b>Acknowledgements</b>	vii
<b>Part I. Forum Scientific Advisory Committees, 2001-2009</b>	<b>1</b>
<b>Interim Global Scientific Advisory Board, 2008-2009</b>	
Global Scientific Committee	
African Scientific Committee	
Arab States Scientific Committee	
Asia/Pacific Scientific Committee	
Europe/North America Scientific Committee	
Latin America/Caribbean Scientific Committee	
<b>Part II. Issues Addressed</b>	<b>5</b>
<b>Chapter 1. Higher Education, Research and Innovation: Charting the Course of the Changing Dynamics of the Knowledge Society</b>	
Mary-Louise Kearney	7
<b>Chapter 2. Compelling Rationale for a UNESCO Forum on Knowledge Systems</b>	
Berit Olsson and Thandika Mkandawire	25
<b>Chapter 3. Policy Dynamics in Higher Education and Research: Concepts and Observations</b>	
V. Lynn Meek and Dianne Davies	41
<b>Chapter 4. Changing Challenges of Academic Work: Concepts and Observations</b>	
Ulrich Teichler and Yasemin Yağcı	83
<b>Chapter 5. Comparative Study on National Research Systems: Findings and Lessons</b>	
Johann Mouton and Roland Waast	147

<b>Chapter 6. Measuring R&amp;D in Developing Countries: International Comparability and Policy Relevance</b>	
Simon Ellis, Ernesto Fernández Polcuch and Rohan Pathirage	171
<b>Chapter 7. On the Way from the Forum: A Future Research Agenda</b>	
Mala Singh	187
<b>About the Authors and Editors</b>	205
<b>Part III. Annexes I-V</b>	209
Annex I. Publications List of the UNESCO Forum, 2001-2009	211
Annex II. UNESCO Forum Activities, 2001-2009	221
Annex III. Special Events Involving the UNESCO Forum, 2001-2009	223
Annex IV. Core and Associated Partners, 2001-2009	227
Annex V. Collection of Forum Slides and Graphics	237

# Foreword

We are pleased to present the publication entitled *Systems of Higher Education, Research and Innovation: Changing Dynamics*. This is the first edition of the Research Report emanating from the outcomes of the UNESCO Forum on Higher Education, Research and Knowledge, between 2001 and 2009.

First and foremost, it is appropriate to situate this Research Report 2001-2009 in relation to the aims of the UNESCO Forum and, thus, to contextualize the specific issues related to higher education and research worldwide.

The UNESCO Forum focuses on the role and status of national research systems and international trends in this domain in relation to the challenges posed by the Knowledge Society of the twenty-first century. Located at UNESCO and supported by the Swedish International Development Agency (Sida), the UNESCO Forum provides a platform for researchers, policy-makers and relevant stakeholders to engage critically with the key elements underpinning research systems: (i) *policy trends*; (ii) *infrastructure*; (iii) *human capacity*; and (iv) *investment*. This project has assured follow-up action for two major UNESCO conferences, the 1998 World Conference on Higher Education, “*Higher Education in the twenty-first century*” and the 1999 World Conference on Science, “*Science for the twenty-first century*”, and links closely to the intergovernmental programme for the *Management of Social Transformation* (MOST), located in the Sector of Social and Human Sciences (SHS), UNESCO.

The UNESCO Forum believes that it is central to reaffirm the importance of research at the current moment given the rapid developments since 2000 in knowledge production and management, and their ramifications for social change and progress. *Research on research* has become, therefore, even more crucial and is now well-recognized as a major field of enquiry for international organizations, charged with advising their Member States about the questions involved.

This year 2009 marks the 10<sup>th</sup> Anniversary of the World Conferences on Higher Education and Science, to be held in Paris and Budapest respectively, as well as the convening of the 2<sup>nd</sup> World Social Sciences Forum in Bergen, Norway. This first Research Report of the UNESCO Forum on Higher Education, Research and Knowledge links to these occasions and, very importantly, aims to continue a vigorous and provocative debate on research systems.

The contents of this Research Report and its articulation of emerging trends and challenges are intended to provide fresh insights both for policy-makers and the higher education community alike, as they address the main challenges facing research systems in a globalized world.

The Annexes to this Research Report document the publications produced by the Forum between 2001 and 2009, as well as its programme of activities and wide participation in the international policy dialogue on higher education, research and innovation (HERI) systems during this period. Last, but not least, a collection of Forum slides and graphics and a list of the numerous partner organizations which cooperate with the Forum in support of its mandate are provided.

From our editorial standpoint, we see four special concerns for the future of the UNESCO Forum:

- *Continuing* to animate the global meta-debate on the complex issues related to knowledge systems.
- *Ensuring* an effective conduit to national and institutional policy-makers charged with these issues.
- *Continuing* both the efficient compilation and monitoring of the body of data generated by the Forum itself and also encouraging similar initiatives focused on the collection of HERI-related data in middle-income countries and low-income countries.
- *Sensitizing* the UNESCO Forum's programme to the current global climate of 2009 and beyond.

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## PART II

### ISSUES ADRESSED

# Chapter 1

## Higher Education, Research and Innovation: Charting the Course of the Changing Dynamics of the Knowledge Society

Mary-Louise Kearney

The UNESCO Forum provides a platform for researchers, policy-makers and experts to engage critically with research issues and research findings. The objective is to widen understanding of systems, structures, policies, trends and developments in higher education, research and innovation.

UNESCO Forum Mandate

### 1. Research Report

#### 1.1. Research on Research: Meta-Perspective on HERI Systems

This present Research Report provides a synthesis of the main findings of the UNESCO Forum on Higher Education, Research and Knowledge, from its establishment in 2001 to the conclusion of its activities under Phase 1 in 2009. This arena for debate was launched to follow-up the outcomes of the two major UNESCO world conferences, the 1998 World Conference on Higher Education, *“Higher Education in the twenty-first century”* and the 1999 World Conference on Science, *“Science for the twenty-first century”*. Having tracked the numerous and rapid changes of the intervening decade, it is, therefore, entirely fitting that the UNESCO Forum should take stock of the new dynamics in 2009, when UNESCO will reprise these major conferences so as to chart progress and identify emerging trends.

Over the past decade, new dynamics have emerged in each of the key domains of higher education, research and innovation (HERI), which are the integrated base for the Forum’s activities. In higher education, these include: (i) demand; (ii) diversification of provision; (iii) changing lifelong learning needs; and (iv) growing Communication and Information Technology (CIT) usage and enhanced networking and social engagement, both with the economic sector and with the community at large. In scientific research, the tension between basic and applied research is the core issue, thus linking to the “think global, act local” challenge. This necessitates more flexibly organized research systems, and pragmatic approaches which promote “Big Science” while also nurturing science which serves society in the widest sense. In the innovation field, the dynamic comprises both “research for innovation” and “research on innovation”. Partnerships amongst governments, the economic sector and research universities are growing exponentially, so that new knowledge becomes linked to development goals. But innovation often occurs outside academic environments, as a result of inventive thinking and creative experimentation. Indeed, research system experts must understand the critical factors involved in order to advance this process.

Consequently a new meta-dynamic has also emerged, resulting from the interaction of these systems. In recent years, an analysis of research management has morphed into the observation and study of knowledge systems. In practice, this term denotes the synergy generated by the convergence of higher education, scientific research and innovation systems, which have now become strategically interlinked in terms of their objectives and modalities.

Throughout the current decade, the world has witnessed the advance of the Knowledge Society and its principal engine, the Knowledge Economy. This era has offered great hope, and certainly ground-breaking developments have occurred, often due to the pervasive forces of new communication and information technologies. As a result, all countries, whatever their level of development, have been obliged to review and reorganize their capacities for accessing and benefiting from the high-level knowledge which shapes social change. For those with weak or non-existent capacity in this area, the risk of marginalization has accelerated sharply. Since 2007, the current global economic and financial crisis has wreaked havoc on many well-established institutions, thus altering the landscape of wealth and stability within a very short time-span. Yet despite this harsh reality, the global and irrevocably interconnected nature of society in the twenty-first century remains fundamentally unchanged. Protectionism may well re-emerge, but technology has rendered our interdependence irreversible. As a result, the search for more effective local, national and regional solutions must operate in tandem with ongoing global transformations, including those with unknown and possibly negative outcomes.

Against this background, the Forum's mandate for "research on research" has continued to gain importance. It is now widely held that understanding the Knowledge Society results from the meta-analysis of the crucial knowledge systems, namely higher education, research and innovation (HERI), which fuel its progress. This involves analysis of the current methodologies used to assess these systems, and the eventual design of alternatives better suited to different social contexts.

UNESCO is the United Nations Agency mandated to promote higher education and science. In keeping with this role the present Report takes a global view of the subject, which naturally covers the wide diversity of social contexts, from OECD Member countries to emerging economies, to middle-income countries (MICs) and low-income countries (LICs). This perspective was made possible through the wide experience of the Report's contributing authors.

## 1.2. Addressing the Issues

*Berit Olsson* opens the Report with a strong plea for "research on research", central to understanding and enhancing the higher education and research systems that serve the Knowledge Society. Knowledge must be socially inclusive, and oriented towards the social development priorities of both the state and the family of nations. Models for these systems will necessarily be diverse, so as to speak to varied social contexts. Thus the building of research communities, and the reinforcement of their capacities, is the priority; ownership of this process is an essential national commitment if systems of higher education, research and innovation are to flourish.

*Lynn Meek* and *Dianne Davies* then track the complex evolution of HERI systems over the past decade, where rapid changes in governance and funding patterns, diversified missions and the activation of social stakeholders have all forged major changes in the knowledge landscape. Though originating in OECD Member countries, these have quickly manifested themselves across all regions.

*Ulrich Teichler* and *Yasemin Yağcı* focus on the impact of these transformations on academia: the status of the academics and researchers; the future of research careers; trends shaping the perennial internationalization of knowledge; and the consequences of generating and applying new theories in a world whose cultural diversity now influences every sphere of activity.

*Johann Mouton* and *Roland Waast* describe the practical challenges of building a knowledge base in middle-income (MICs) and low-income countries (LICs). They seek to explain both emerging success stories, where radical renovation of, and investment in, HERI systems has borne fruit, and those instances where progress remains impeded by weak systems and scant resources.

*Simon Ellis*, *Ernesto Fernández-Polcuch* and *Roban Pathirage* address the tensions between the international comparability of knowledge systems and their impact on policy relevance. Instruments such as the OECD Frascati Manual (2002) operate as respected references due to the breadth of their bibliometric analysis and data, however such data may not be readily available in other social contexts; a strategy of adaptation is advocated, in order to assemble reliable indicators which can then lead to appropriate, evidence-based policies.

*Mala Singh* suggests crucial elements for an ongoing agenda so that “research on research” may continue to advance at all levels of enquiry. The operation of knowledge systems is complex, and must remain both context-specific and globally interconnected. Issues such as the politics of knowledge, the relationship between science and ethics, and safeguarding the transfer of the benefits of research to deserving recipients are universal concerns. These thoughtful proposals constitute a rich postscript for the Forum’s possible future deliberations.

This Research Report makes the point that an effective response to the changing dynamics of HERI systems involves several key factors:

- Acknowledging the knowledge dividend.
- Reinforcing the role of HERI systems in knowledge-based societies.
- Reaffirming the right to research.
- Learning from experiences, the positive ones as well as those indicating a need for change.

These factors are valid for all development contexts. Strength in these areas permits industrialized countries to monitor their performance, to maintain sustained growth, or to make necessary adjustments when faced with turbulent conditions. Middle- and low-income countries urgently need to build their own relevant knowledge bases. The challenge is greatest for the poorest states which are striving to achieve the Millennium Development Goals (MDGs) with support from the “*Delivering as One*” also known as “One UN” strategy (Report of the UN Higher-Level Panel, 2006) which aims to achieve more concerted action between UN agencies and to optimize the impact of donor assistance. In this regard, HERI systems remain essential for sound long-term solutions.

## **2. Importance of Knowledge Today**

### **2.1. Knowledge Dividend**

Today, systems of knowledge production cover a vast range of entities *inter alia* universities, public laboratories, research centres and think-tanks run by policy and civil society groups, industry and the private sector, and the military complex. Indeed, this Report has shown that, over the



past decade, these systems have undergone profound transformation to emerge as the main motors of development in a globalized world. This process has brought with it major changes in the landscape of higher education, notably in the university sector.

Consequently, countries across all regions worldwide are facing increased demand to strengthen their capacities for research and knowledge production. This demand is rising across vastly different political, socio-economic and cultural contexts, each with their own capacity to respond; it has also given new importance to national knowledge-oriented institutions, and often necessitates urgent efforts to renew systems and structures of higher education in order that countries take their place in knowledge-based societies which are both competitive and volatile. In turn, reinforcing research and higher education multiplies pressures on the funding, content and structures of knowledge systems. These challenges have become particularly overwhelming for middle- and low-income countries, thus increasing the risk of their further marginalization.

## 2.2. Promoting Knowledge Systems for Social Development

Knowledge generated by research is the basis of sustainable social development. In this regard, three dimensions merit attention:

- Placing knowledge, including high-level scientific knowledge, at the service of development.
- Converting knowledge, in all its forms, into value via applications and impact assessment.
- Sharing good practice, to ensure widespread benefits.

Despite global uniformity in many areas of society, there exists no single answer as to what constitute the most appropriate systems, structures or policies for higher education, research and innovation. Because these crucial processes take place in varying historical, social, economic, political and cultural contexts, their outcomes cannot be uniform. It is conceivable that research and higher education could be structured in much more effective ways, which means that experimentation in this direction should be encouraged and its findings widely debated and shared at regional and global levels.

The Knowledge Society varies widely in form and *modus operandi*, and this cultural diversity must be celebrated as an indicator of dynamism. For this reason, understanding local and indigenous knowledge through research is of the greatest importance. Excellence has many manifestations, and the search to define and conserve them can never be neglected because they witness the fundamental parity of cultures and their knowledge systems.

Nevertheless and from the perspective of social development, the ongoing serious inequalities in this area remain unresolved and have even assumed new urgency. The “Knowledge Divide” [concept used to describe the gap in living conditions between those who can find, manage and process information or knowledge, and those who are impaired in this respect and will become increasingly isolated and marginalized] and thus the “Research Gap”, constitutes an issue to be remedied without delay.

Recognizing and promoting excellence, so as to discover and access new frontiers of knowledge, is an imperative which should be possible for all countries whatever their level of economic development. Yet these frontiers are often in the fields of science, technology and engineering, health care, agriculture and economics where highly-educated and skilled human capital (HC), along with large-scale investment, is essential to appropriate context of enquiry.

Social development embraces an array of complex aspects, including political governance, economic growth, employment trends and income distribution, education levels, access to health care, rural and urban population patterns, energy and use of natural resources; it also includes factors affecting quality of life, such as private consumption, life expectancy and access to communication technology. These and other indicators are traditionally used by leading global organizations (*inter alia* the World Bank, the OECD, WHO and FAO) to measure progress of social and human development in specific contexts. However, poverty remains a reality in many parts of the world and even exists inside high-income countries (HICs). While the fight against poverty has led to significant improvements in certain contexts (East Asian economies being one example), the problem remains dire in too many countries: sustained growth and productivity are currently proving very elusive. Until this battle is won, progress will remain the privilege of a minority; and winning will largely depend on equitable and affordable access to, and use of, relevant knowledge.

### 2.3. Higher Education, Research and Innovation: The Key Axis

The research function of academia remains a prime source of knowledge and innovation at national, regional and international levels. Yet, over the past decade, most industrialized states have been obliged to address the double challenge of providing wider access to postsecondary education and training and ensuring adequate investment in high-level research. This is proving to be a delicate balancing act, which hinges on visionary policies and a more diversified funding base. Governments pursue reforms to build world-class systems of higher education, which assure quality in both research and teaching. In contrast, the term “World-Class University” tends to denote research-oriented institutions, although this should also recognize those who achieve excellence through innovative approaches to learning.

For universities wishing to enhance their research reputations, the challenges continue to grow. Today, some twenty-two of the world’s elite twenty-five research universities (known as “Super RUs”) are located in one country, the United States of America (USA). While American higher education deserves full credit for the breadth and resourcing of this sector, this monopoly cannot be expected to meet global needs in terms of research. For this reason support for research universities, notably those with science, technology and innovation strengths, has become an important priority in OECD Member countries.

The rise in status and influence of various ranking systems (aiming to evaluate excellence in academic research) has influenced this situation. In this regard the Shanghai Jiao Tong Rankings (Institute of Higher Education, University of Shanghai Jiao Tong) are very controversial, since they originate from a strong S&T bias where output can be fairly easily measured (e.g. numbers of top scientists, published articles, citations etc.). The Higher Education Evaluation and Accreditation Council of Taiwan (HEEACT) use a similar approach. In contrast, the *Times Higher Education - QS World University Rankings* (2008) adopt a wider range of criteria including peer appraisal, graduate employability, teaching quality, and the presence of international faculty and students, some of which are much harder to assess. These systems are also frequently challenged for their weakness in measuring research in the arts, humanities and social sciences, and regarding the whole issue of interdisciplinary research, which underpins the Mode 2 Knowledge concept designed to resolve complex global development problems (Hazelkorn, 2009; Nowotny, Scott and Gibbons, 2002).

These issues are now at the forefront for a growing number of middle- and low-income countries, which face similar dilemmas in their policy-making procedures. Social justice would

require that middle- and low-income countries not be allowed to fall behind in the knowledge stakes. Investment in research is increasing in emerging economies, such as Brazil, China, Singapore and South Africa. Postgraduate education and training has assumed new importance as an underpinning to this policy approach, and a dual agenda must be adopted: resources should be made available at this level, even where countries currently struggle with the provision of basic and secondary education (as in Nigeria and Pakistan, for example).

Overall, the situation of research universities in low-income countries remains bleak and they are in need of rapid, effective solutions. For example, in the LAC region 80 per cent of Ph.D. graduates are concentrated in just four countries (Argentina, Brazil, Chile and Mexico); average government expenditure on research in the Arab States is around 1.5 per cent, compared with 2.5 per cent in OECD Member countries – or, more starkly, 0.9 per cent in Egypt compared to 18 per cent in Japan (Ramirez, 2008: 7; El Kaffass, 2007: 7). Even the poorest nations require research capacity, or access to research findings, to progress; and so it could be argued that support for the principle of a research university in these contexts is more urgent than ever before. Reaching this goal, and maintaining the quality and relevance of these essential institutions, requires national commitment and must remain a major objective for international cooperation in the years ahead.

## 2.4. Major Challenges for Research

Current issues facing the research function and its environment include equity; quality; relevance; ownership; and international networking. An ever-growing number of nations of varying size have now given priority to developing their knowledge base through higher education, research and innovation, and to commit the necessary resources to this goal. Success stories are becoming more common in all regions, and they are characterized by specific indicators:

- Innovative policies in higher education and research and in Science, Technology and Innovation (STI).
- A will to improve and profile the necessary infrastructure, including universities.
- Efforts to train and retain and attract highly-skilled human capital (HC).
- Increased levels of investment in research and higher education.

One clear example of this movement is the significant rise in the number of Singapore's Research Scientists and Engineers (RSEs), from 4,329 in 1990 to 11,596 in 2004 (Mouton, 2007: 89). Another is the establishment of formal bodies, such as the Royal Moroccan Academy of Science and Kuwait's Private Universities Council (PUC), to assure an infrastructure for monitoring research and knowledge systems and to help organize national expertise in this field.

The mandate of the UNESCO Forum is to chart these important processes and help promote their replication and adaptation worldwide, in order to render the global knowledge society a more level playing field.

## 3. Knowledge Society: A Global Overview

### 3.1. Defining the Knowledge Society

The 1990s witnessed a process of swift and irrevocable change leading to what is now understood to be the Third Industrial Revolution, based on the advent of new technologies which have

facilitated the ongoing march of globalization. Today, the Knowledge Society and the Knowledge Economy place cognitive resources at the centre of human activity and social dynamics. This has critical implications for a country's knowledge base.

*What is a Knowledge Society?* UNESCO's World Report, *Towards Knowledge Societies*, defines this entity as "... a society that is nurtured by its diversity and its capacities" (UNESCO, 2005: 17). Access to education and training for all is clearly a right for all citizens, and an obligation for governments. Furthermore each society already has its own knowledge assets, which should be recognized and protected so as to link and mesh with the new variants promoted by the Knowledge Economy. Several guiding precepts are important:

- Knowledge-based societies must foster the sharing of knowledge.
- Information and Communication Technologies (ICTs) create new opportunities for reaching this objective.
- Knowledge-based societies are much wider and richer than the narrower "information societies".
- Knowledge-based societies can offer a fresh and relevant approach for the development of countries of the South.

Managing knowledge-based societies is a complex process, involving a range of strategies and mechanisms which should operate effectively for optimal results. Elements range from traditional upstream aspects such as governance, policies and investment, to downstream management of knowledge institutions and workers with due respect for interaction and adaptation and for specific cultural and ethical values.

### 3.2. Role of HERI in Knowledge-Based Societies

Use of the plural "knowledge-based societies" suggests that countries should strive to foster their own individual version of the global Knowledge Society, whose cornerstone is higher education and advanced research. This principle of ownership is crucial in order to ensure that knowledge production *via* research and higher education are directly relevant to national development agendas. Governance, "brain drain", resource levels, and the widening "Digital Divide" (between those benefiting from digital technology and those not) are common challenges for both areas, but strategies should be tailored to specific contexts.

In higher education, the advent of massification has radically changed the traditional patterns of knowledge production, diffusion and application over the past two decades. In the wake of burgeoning enrolments from the 1970s to 1990s, demand has continued to rise and the world's student population could reach an estimated 150 million by 2025. While this demand has been obvious in OECD Member countries (e.g. from 2.2 per cent in the 1960s to 59 per cent in 2002 in the USA), it is certainly not confined to them. Strong population growth in Africa, Asia and Latin America, coupled with increased enrolment in primary and secondary education, has boosted demand at the tertiary level.

This demand is varied in objective and scope, covering traditional academic and research-based teaching and learning as well as specialized and more practically-oriented training. As a result, institutional diversification has become essential in order to achieve a range of provision: all forms find their legitimate place in the development of a nation's cohort of skilled human resources. Also, this diverse landscape has led to the emergence of a new tertiary educational paradigm with specific characteristics, namely the promotion of "learning by doing" and of individual

creativity; the widening of access, through both face-to-face and open learning; and engagement with regional and local priorities. This new paradigm has also generated its own research agenda.

Regarding the particular role and contribution of research universities, these are characterized by top graduates, cutting-edge research, and vigorous technology transfer. Their critical dimensions are a concentration of talent, abundance of resources and favourable governance, which combine to assure excellence in graduate education and research output (Bienenstock, 2006).

In contrast, when countries lose their base for academic excellence – through outdated policies, neglected institutions, the exodus of their best graduates or woefully inadequate investment in research – their competitiveness in the global knowledge society will dwindle and eventually disappear. As the Forum's Special Initiative project has documented, 50 per cent of Colombia's science Ph.Ds. are abroad and an estimated 47 per cent of Ghanaian doctors' work in other countries. The dangers of this trend are evident and must be countered for at all costs.

### 3.3. Research and Innovation Systems

Systems of innovation may have varied scope (international, regional, national or local) and may have different organizational and institutional components:

- *Organizations* are formal structures that are consciously created with an explicit purpose, and are thus the principal players involved.
- *Institutions* can be defined as frameworks of norms, rules, legislation and routines which constitute the rules of the game

A total of ten critical activities occurring in these systems have been identified through debates Forum debates:

- (1) *Provision* of R&D investment to create new knowledge, primarily in engineering, medicine and the natural sciences.
- (2) *Capacity-building* to create a highly skilled group in the labour force to be used in R&D.
- (3) *Establishment* of new product markets.
- (4) *Quality assurance* mechanisms.
- (5) *Encouraging* creative organizations which promote entrepreneurship and enhance the infrastructure to boost innovation.
- (6) *Networking* through markets and mechanisms with interactive learning amongst the institutions involved.
- (7) *Creating* enabling institutions which facilitate innovation [such as Intellectual Property (IP) Rights and tax laws, R&D investment, sound environmental and safety regulations].
- (8) *Incubation* activities to foster innovative projects.
- (9) *Financing* of innovative processes to facilitate the commercialization of knowledge.
- (10) *Consultancy services* for technology transfer (including the legal and commercial aspects of innovative activities) (Edqvist, 2006).

In such a climate, innovation can be generated from the synergies amongst opportunities, capacities, resources and incentives. Countries with robust innovation systems privilege research in a variety of contexts including universities and the private sector. In recent years, the changing external environment has seen OECD Member countries' governments place unprecedented emphasis on research as a key motor for national development. This has led to new challenges for research management, and to universities expanding their research links with industry, commerce and government, and the community at large.

However, innovation in developing countries poses very different challenges, in terms of understanding the process and of building systems. These issues were analyzed in two expert workshops organized by the Forum in 2009: "*Research in Diverse Social Contexts: Tensions, Dynamics and Challenges*" and "*Innovation for Development Converting Knowledge to Value*" [co-hosted by the OECD with support from International Development Research Centre (IDRC) Canada and the Swedish International Development Agency (Sida)]. Special factors identified include democracy and governance, investment in education and training at all levels and the state of the economy.

In Africa, gross domestic expenditure on R&D (GERD) as a percentage of the gross national product (GNP) continued to remain under 0.5 per cent between 1992 and 2000 [UNESCO Institute of Statistics (UIS) S&T database, June 2005]. Inadequate investment is also evidenced by a weakened university system and an often fledgling private sector with little government support. The decline of universities in Africa due to lack of investment has led to widespread calls for emergency assistance, including pledges from the Group of Eight (G8) at their annual summits in Gleneagles, UK in 2006 and Heiligen, Germany in 2007. The latter was preceded by a special pre-event on education, research and innovation as the base for sustainable development, hosted by Italy in Trieste, where Forum Experts provided a major contribution to the debate.

As for the private sector, it has considerable potential as witnessed by the success of micro-credit schemes in Asia launched by Grameen Bank and similar bodies, and by the presence of small- and medium-sized enterprises (SMEs) which survive frequently harrowing economic conditions to constitute a major part of business activity in developing countries. For instance, Benin's thriving textile industry is controlled by small entrepreneurs who are mainly women. Nevertheless, much stronger business infrastructure is needed to realize the innovative potential of these contexts.

Overall, it is not surprising that research on innovation has gained importance: it has become essential to understand why and how certain enabling environments encourage innovation and help optimize its various benefits. Among other things, research can identify how knowledge translates into innovative action and how diversity can drive positive change.

### 3.4. Globalization in Practice: the Widening Knowledge Gap

Even before the onslaught of the global economic crisis, whose worst effects remain to be felt, there was heated debate on the long-term effects of the globalized economy in terms of equitable social benefits. Indeed, astonishing growth has taken place over the last few years as export-led economic policies brought sudden wealth to certain countries, thus reducing poverty levels. Significant opportunities were afforded to some of the poorest countries in Africa, Asia and Latin America; examples include the rapid rise of China since 2000, the ongoing creditable performance of the East Asian Tigers (Hong Kong, Singapore, South Korea and Taiwan), and the sharp upturn in commodity prices in agriculture and raw materials which rose 75 per cent in 2008 according to the International Monetary Fund (IMF). These gains have often been cancelled, in

contrast, by the rapid downward spiral of the global economy, which has provoked chaos in the labour, banking and industrial sectors. This has shown the unpredictability of social transformation processes, including the need to anticipate rescue strategies when severe reversals occur. It is inevitable that HERI systems will experience some negative impact from this situation, and they must weather the storm.

Access to knowledge is another domain where serious discrepancies persist, with damaging consequences for production and dissemination. Two areas affected are CIT access and research productivity. Regarding the former, the extent of the “Digital Divide” is captured by comparing the distribution of Internet hosts with that of the world population; they are almost diametrically opposed, with 5.9 per cent of the web hosting done in developing countries although these have 80.4 per cent of the world’s populations.

Indicators for research productivity (patents, scientific papers, numbers of active scientists, etc.) are also notoriously weak in middle- and low-income countries. The issue of health-related research, for example, helps to highlight attendant problems such as the questionable use of scarce resources, low patent production and limited publications in top scientific journals by researchers in the developing world. At the Forum’s 2006 Global Colloquium, one citation from the WHO Commission on Health Research for Development contrasted the GERD/GNP expenditure of 2 to 3 per cent in OECD economies with levels below 0.5 per cent in developing Asian countries such as Indonesia and Thailand. Until this situation improves, access to knowledge will remain inequitable and sustainable development a distant goal.

## The Case for African Higher Education, Research and Innovation

### ***Can African HERI systems attain the required excellence in multiple areas?***

“... there is the strongly held view that higher education should respond in and through all three core function areas of teaching, research and community engagement, through the development of new curricula and qualifications to address new education and training needs, through developing appropriate research themes to address new knowledge needs, and through forging new partnerships and joint ventures with industry, small- and medium-sized enterprises (SMEs), government departments, community organizations and other stakeholders” (Singh and Manuh, 2007: 12).

### ***1. Social development challenges for sub-Saharan Africa***

The Millennium Development Goals (MDGs) for 2015 include the following:

- Goal N°1: Eradicate extreme poverty and hunger.
- Goal N°2: Achieve universal primary education.
- Goal N°3: Promote gender equality and empower women.
- Goal N°4: Reduce child mortality.
- Goal N°5: Improve maternal health.
- Goal N°6: Combat HIV/AIDS, malaria and other diseases.
- Goal N°7: Ensure environmental sustainability.
- Goal N°8: Develop a global partnership for development.

The international debate on African development must be reshaped. Aid will remain essential, but should be for the poorest populations and for emergency assistance. However, the

greatest potential for sustainability lies in economic innovation, which can revitalize national economies and their private sector. African business is marked by high costs for capital, labour, taxes, transportation and communications, and by excessive government regulation. All these factors deter entrepreneurship, and impede productivity. The human capital base needed for this productivity, educated leaders and decision-makers, sound scientific research communities and skilled workers, is the long-term key to sustained progress.

Present problems date from the policies adopted in the last decades of the twentieth century, when this sector suffered severe reductions in donor investment in favour of the more rapid returns perceived from basic and primary education. This crisis in higher education and research was charted in a UNESCO Forum paper, entitled *“From Manpower Planning to the Knowledge Era: World Bank Policies on Higher Education in Africa”* (Samoff and Carrol, 2003). Two decades of reduced allocations to higher education resulted in the dramatic decline of African universities, and though demand for higher education grew in the region, the chances of a young person born in sub-Saharan Africa acceding to higher education were roughly eighteen to twenty times lower than those of their peers born in industrialized countries.

### Slide 1: The Research and Development Centre of the University of Agriculture, Abeokuta, Nigeria



Source: Oyewole, 2006, Accra, Ghana, colloquium, slide 2.

## 2. African HERI Systems: The Forgotten Sector

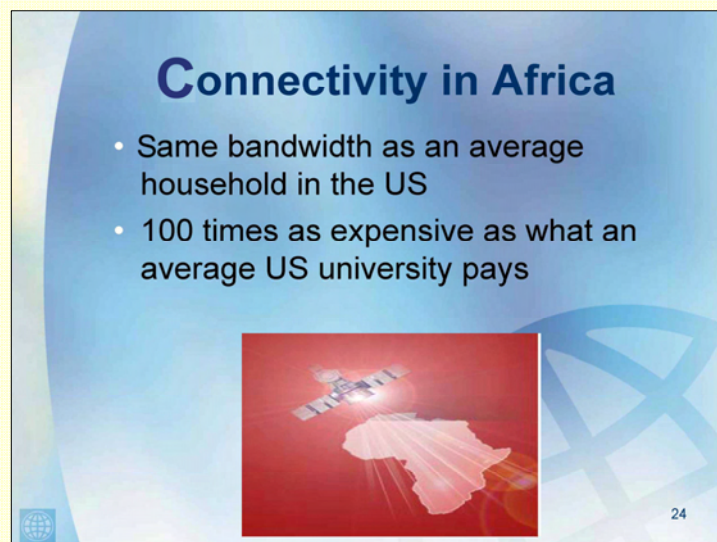
In the late 1990s the Knowledge Society and the CIT revolution induced changes in World Bank policy analysis, and the orientation of its advice altered sharply: tertiary education provided the necessary, diversified provision; CITs were seen as a fresh opportunity to access knowledge more easily, so that even the world's poorest nations could access “borderless” education. Africa was thus advised to prepare itself for the increasing role of market forces in tertiary education *via* a larger role for private higher education institutions, and also for the associated risk of increased “brain drain” that would result from favourable global employment opportunities.



The World Bank advocated enhanced governance and management skills; more adaptable regulatory frameworks and flexible curricula; and a strong emphasis on tertiary educational training, exploring the potential of distance learning and networked university systems. For low-income countries, the proposed approach was for targeted investment in advanced training and research in areas of comparative advantage (Salmi, 2003: 13).

In 2009 the challenges of governance, “brain drain”, scant resources and the “Digital Divide” all remain. And African CIT faces problems of cost and reliability: the average university bandwidth (which is about the same as an American household connection) is some 100 times more expensive than the same service in an American university. Yet opportunities exist, and according to IBM South Africa the Region is the world’s fastest growing mobile telephone market. This and similar technologies can broaden educational access for excluded publics if the right policies are put in place.

### Slide 2: Connectivity in Africa



Source: Salmi, Dublin, 2008, slide 24.

### 3. The Future: A Three-Fold Challenge

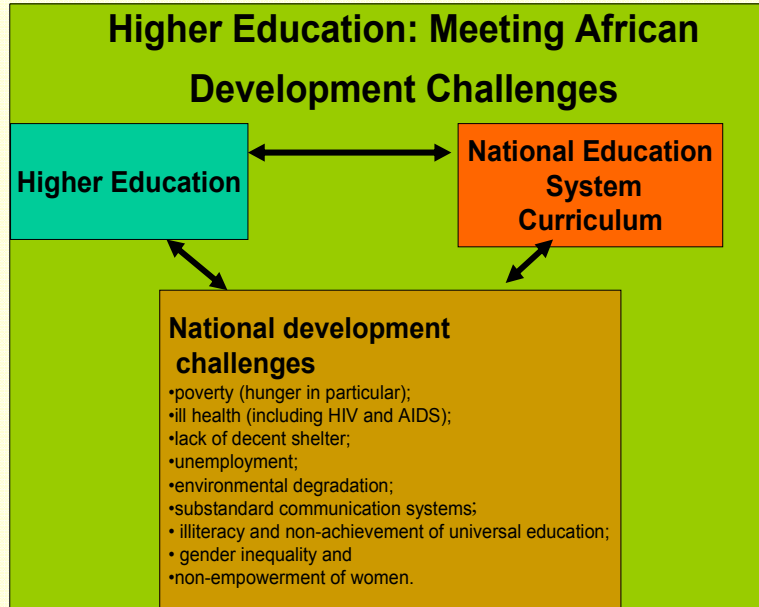
- (i) *Address* the multiple demands of tertiary education with diversified provision.
- (ii) *Ensure* that research deals with the Education for All (EFA) agenda, where issues such as poverty reduction, literacy, teacher training, technical and vocational education and training (TVET), non-formal learning and preventive health care *via* education need in-depth analysis.
- (iii) *Regain* an adequate level of high-level research, notably in STI fields, through re-energised academic investigation. African science which can help resolve development issues will depend on sound national research systems, the retention of top researchers, enhanced data collection and scientific publishing, and research-based policy-making.

Recent projects to address these needs include:

- World Bank’s Science, Technology and Innovation Global Forum.
- New Partnership for African Development (NEPAD).
- UNESCO Academics Across Borders (AAB) Initiative.
- UNESCO’s Teacher Initiative for sub-Saharan Africa (TISSA).

Despite the “height of the bar”, support for African knowledge capacity in its entirety should be accelerated.

### Slide 3: Higher Education: Meeting African Development Challenges



Source: Jhamba, Accra, Ghana, 2006, slide 4.

## 4. Reaffirming the Right to Research

### 4.1. Research Imperative

Progressive nations achieve and sustain their levels of development through the benefits that accrue from their investment in knowledge. Specifically, figures for OECD Member countries show that investment to be a tripartite process comprising R&D, higher education, and communication and information technology (CIT); the actual balance amongst these three elements varies. The USA supports all three components on a fairly equal basis, while Greece and Portugal post a low investment in the CIT area (OECD, 2003).

Is this sort of investment justified in middle- and low-income countries, given the often overwhelming extent of their development problems? Although their capacities in the area of indigenous knowledge are well-recognized, their scientific and related knowledge systems are often extremely weak. Various factors can explain reluctance to support research in low-income countries, including that other areas require more urgent attention; that policy attention is directed towards the provision of basic education and health care; and that the results and long-term impact of research are poorly understood or ignored. In addition, there are the frequent suggestions for problem-solving *via* simple transfer and adaptation of strategies which have worked in other contexts, and which can be applied through “catch-up” or “leap-frog” approaches. This can be summarized as the “We can solve it for them” mantra, but though there are undeniably some success stories, the real underlying issues are not tackled.

- *So, should poor countries limit their ambitions for accessing and using knowledge?*
- *Is it possible to identify, select and adapt new knowledge to local needs without a sound basis for its management via research capacity?*

Of course, the answers are negative. The right of each and every nation to build its own solid research community should be reaffirmed and their important benefits reiterated such as:

- Contacts with international research.
- Provision of local analysis and advice.
- Identification of relevant research agendas.
- Critical thinking in higher education.
- Evidence-based criticism and debate for policy-making.
- Capacity to train future generations of researchers.
- Stimulation of national innovation systems.

Systemic strength can be defined as knowledge that is generated and disseminated from a solid, central productive hub. In industrialized countries this would be national research capacity, with its diverse components. In developing countries such capacity is often located in the principal universities (or even in a single institution), which must then assume a wide range of heavy and complex tasks. These include, *inter alia*, fostering a national commitment to research; promoting a culture of enquiry; assuring the acquisition of research skills; developing the capacity to utilize external research and knowledge; participating in the national budget allocated for research; and forging linkages with the international research community. These constitute the meta-level of activity necessary to “build” and “sustain” the knowledge system.

## 4.2. From Research to Socially Relevant Application

In middle- and low-income countries, certain forces tend to weaken the chances of building a basis for research:

- Dilution and redirection of possible resourcing for research.
- Challenges posed by the rapid expansion of higher education to meet increasing demand.
- Fragmentation of research-oriented action.

This has various manifestations, including privileging the seemingly immediate returns on investment; a focus on application-driven project funding or on problem-oriented research cooperation to the exclusion of basic, “blue skies” research; and support for vertical programmes, thereby ignoring the integrally linked nature of the overall sustainable development process, whatever the social context in which it takes place.

The familiar catch words of relevance and utility need to be treated with caution. Relevance is vital, but truly useful knowledge can be discovered in various ways. Often long-term and in-depth investigations are essential for ground-breaking knowledge to be generated – and often, great inventions are a sudden spin-off of a much more thorough and ongoing research exercise. Examples of the latter are the Internet, which derives from the advanced physics research of its inventor, Tim Berners-Lee, while he worked at CERN in Geneva, and similar CIT-based phenomena such as the Google Search instrument which has revolutionized access to knowledge (its inventors are academics, Sergey Brin and Larry Page, who met at Stanford University, USA). Thus, useful knowledge can be the outcome of lengthy and even seemingly esoteric research. Applications then follow as a crucial complementary process.

Moreover, research has an intrinsic monitoring and regulatory function, which can help prevent catastrophic situations involving loss of human life and destruction of communities through its anticipatory dimension. Examples here include research on climate change in the Pacific, which has helped build an early warning system to prepare for natural disasters, and research in economics and business such as that by Nouriel Roubini of New York University, who reported to the International Monetary Fund (IMF) in 2006 on the approaching crisis in the housing and financial markets. The foresight function of research renders essential service to social development, as Forum debates have often emphasized.

### 4.3. Benefits of Research Cooperation

This critical area should be given priority attention at all levels. Global research cooperation facilitates interaction and the sharing of benefits, and this includes work undertaken at regional and national levels. These perspectives gained from specific situations permit wide and varied analysis, thus supporting conclusions that are based on a broad base of evidence.

But participation in global research requires sound foundations. This is a *sine qua non*, and cannot be substituted for research support for isolated or vertical programmes which, though seemingly vital, cannot be resolved without a much wider repository of knowledge. Regional, national and even local research strategies form the cornerstone for this repository because they can guide the organization of research and available resources as well as assuring the interface with external research partners – including the donor community. Benefits from this interaction include support for a clearly-defined research base, a logical choice of projects and coherent reporting. In this way research capacity gradually but surely builds into a solid national or regional asset, with an institutional base and with credibility for international partners.

The benefits of research cooperation have led to the emergence of universities whose missions focus on promoting regional, and even local, excellence. Examples include the Universidade Federal do Rio Grande do Sul in Brazil, which has received government funding for sector-specific research often related to energy and advanced technologies; John Moores University, in Liverpool, UK, which is aiming to be a knowledge hub for the North-East of the country; and Waikato University in Hamilton, New Zealand, whose Law School specializes in Maori culture and institutions.

Given these trends, the plight of the poorest countries becomes even more critical as they risk losing all connection to the research process around them. These states must plan for, and receive support for, at least one research-based university which has the capacity for research training; other institutions of higher learning may deal with the needs for professional training. Three countries currently in dialogue with UNESCO for this purpose are Guinea Bissau, Haiti and Madagascar.

## 5. Conclusion: Equitable and Dynamic Knowledge Systems

Since 2001, the UNESCO Forum has pursued its mandate to help understand, build and maintain knowledge systems in both global and local settings. Central to these systems is research, a key function of academic higher education and a cornerstone of scientific innovation at national, regional and international levels.

Systemic analysis is a threefold process:

- (1) *Understanding* the specific socio-political, economic and cultural dimensions of the research context: this is the essential framework for formulating advice. The examples cited have shown that contexts vary greatly and that the forces shaping research have changed radically over the past decade.
- (2) *Documenting* research systems, whether national or greater in scope, *via* the collection of reliable data: this is a necessary base for action of improvement. Statistics and trends related to policies, infrastructure, human capacity (HC) and investment must be the basis of evidence-based policy-making, certainly that intended to advance a country's global competitiveness and connectedness and to address local challenges effectively. For developing countries the research dimension of the MDGs should be more clearly articulated, since only this can underpin long-term sustained solutions. This type of research is increasingly prevalent and can inform policy-making in useful ways.
- (3) *Nurturing* research universities is perhaps the single strongest component of knowledge-based systems, due to their crucial social, economic and cultural impact. Though well-recognized in most countries, inadequate policies and investment over a lengthy period has diminished this potential in the poorest states. Consequently, forward-looking strategies and a range of partnerships are now urgent in order to bridge the gap.

The UNESCO Forum has dedicated its efforts to ensuring that all Member States may have equitable access to these systems. Any future phase of the Forum must build on the valuable lessons learnt to date, however the danger of the current climate cannot be underestimated; it must be addressed in the important debates of 2009, including the World Conferences on "Higher Education and Science" and the "World Social Sciences Forum". The first decade of the twenty-first century is drawing to a close in the midst of a major social and economic crisis.

The outcomes of this crisis are, as yet, unknown in their scale and severity, but they are already seriously affecting countries worldwide, whatever their level of development. In fact, this state of affairs creates the latest dynamic for higher education, research and innovation systems: *Will gains in this area be further consolidated, or will the crisis cause a certain stagnation, or even regression, regarding the progress achieved to date?* The latter scenario, which we cannot exclude, would be significantly detrimental to the advance of the Knowledge Society and would endanger our "mega-dynamic" of interactive knowledge systems. Every effort must be made in order that these systems continue to address their dual challenge: safeguarding the benefits which accrue from the knowledge dividend, and identifying viable and equitable solutions to the complex problems at hand.

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# Chapter 2

## Compelling Rationale for a UNESCO Forum on Knowledge Systems

Berit Olsson and Thandika Mkandawire

### Summary

The UNESCO Forum on Higher Education, Research and Knowledge was established by UNESCO following two important events. Two UNESCO World Conferences, on Higher Education in 1998 and on Science in 1999, reaffirmed the crucial role of higher learning and analysis in sustainable development. They also challenged the trend-setting policies of some funding agencies which downplayed the role of universities in low-income countries, marking a turning point in the international discourse.

Today, no one questions the need for high-quality Higher Education, Research and Innovation (HERI); indeed the knowledge nexus is regarded as a key driver of sustainable social and economic development. There remain, however, great disparities in capacity and opportunity between countries and across income levels. All countries, including low-income countries, need to invest in a vital research community, but a major challenge for low-income countries remains the identification of affordable strategies to support appropriate systems for HERI structures – the key building blocks of a knowledge system. For their part, middle- and high-income countries must enhance the efficiency of their knowledge systems in relation to sustainable development needs, the mobilization of new generations of researchers, and the elaboration of innovative interactions between research, society and industry.

While information on high-income countries is gathered and compiled by the OECD, there is currently little or no information to guide the design and development of HERI systems in low-income countries (LICs) and middle-income countries (MICs). UNESCO, the UN special agency for education, science and culture, is expected to provide an overview of such experiences for the benefit of all Member States.

The Forum provides a UNESCO arena, so to speak, to gather researchers who study systems of advanced knowledge, innovation, and research; it also allows for linkages between these researchers and their policy-maker and practitioner counterparts across the field. Nurtured over the years by regional and international groups of scholars and scientists, the Forum has defined and given voice to a broad range of issues and challenges. Among its major achievements in this regard is the renewed attention given to systems for advanced knowledge within UNESCO and its Member States. The Forum has brought to the fore evidence-based scrutiny of some pertinent issues concerning the role of research in quality higher education, and the role of universities in research. In its early period, the Forum mainly featured research on higher education systems; more recently, special effort has been made to highlight issues relating to research and innovation systems.

One eminent conclusion to be drawn from the Forum's workshops, seminars and colloquia is the need for all countries to foster a vital community of researchers. Indigenous research is essential, including as a guarantee of quality and integrity in the analyses that underpin national development policies and strategies. Such capacity is crucial in low-income countries, many of which continue to depend on external support and ideas for their development efforts. A local research community may play a number of roles in knowledge-based development, including facilitating access to and selection of global findings and technologies, and identifying possible niches for competitive contributions to global knowledge production. Regional and international collaboration may enrich research and higher education, but it is not a substitute for failing national capacity. To the contrary, it is only when such capacity is in place, among all partners, that such exchanges truly become mutually beneficial.

In the future, the Forum will continue to serve as an arena for researchers to present original work and studies on systems. The development of descriptive templates for such systems, of higher education, of research and of innovation – including those in early stages of growth – will make it possible to invite those who study them to share and compare data. The Forum therefore aims to constitute a repository of information on low- and middle-income countries which, together with the information available on OECD Member countries, can serve as a genuine knowledge bank on “global knowledge systems”. Such information could also be used for regular monitoring and reporting on the status of system development trends across the planet.

The Forum may thus serve as a meeting place for researchers; as a knowledge bank for UNESCO, in its advisory and normative role; and as a resource for Member States in their planning and assessment of systems for advanced knowledge.

## **1. Knowledge and Development: Shifting Paradigms**

No one today would argue the need for access to knowledge, and capacity for analysis, in all societies; and the funding of HERI is widely accepted as a productive investment in developed countries. Many middle-income countries see such investments as pivotal, and search ardently for mechanisms to enhance the impact and competitiveness of their systems. It is also being recognized that low-income countries will need strategic investments in HERI in order to escape a vicious cycle of ignorance and underdevelopment<sup>1</sup>, however this is a relative latecomer to the development cooperation agenda, and remains comparatively neglected in support terms. Increasingly, governments of low-income countries are addressing the need to strengthen HERI in their development strategies<sup>2</sup>, but so far the response from external funding agencies has been limited.

The need for investment in national research, including in low-income countries, is hardly a new insight. A high-level Task Force on Health Research (see Commission on Health Research for Development, 1990), which set out to identify the knowledge gaps responsible for persistent ill-health in many parts of the world, concluded in 1994 that the major caveat in most areas was not a lack of global knowledge, but rather a lack of capacity for so-called Essential National Health Research (ENHR). In the absence of a basis for research in low-income countries, global research findings and advances could not be identified, evaluated and translated into locally suitable applications.

In spite of this understanding, axiomatic as it is in the global research community, in development circles there has been a long-standing habit of downplaying the role of intellectuals. One



may recall the situation in the 1970s, when “degree disease” was an object of ridicule. African countries for instance had agreed, upon establishing the OAU in Addis Ababa in 1963<sup>3</sup>, on a strategy to boost education as a foundation for postcolonial societies: they would hire foreign academics to help run some centrally located African universities, while also sending away young Africans for academic training. The idea was that, upon their return, these newly minted academics would replace the foreign staff and build universities that could produce qualified graduates and teachers for the other levels of the education system. The disappointing results of such early strategies, coupled with successive economic crises, spurred the development of alternate approaches based on a belief in “barefoot doctors” and other professions requiring only short-term practical training. Many of the students involved stayed abroad, looking for more lucrative employment.

The second wave of university bashing was more of an externally influenced phenomenon. By the mid-1980s most countries had established national universities, and were struggling to secure the capacities and resources for the latter’s mission. With economies in decline, the social investments of developing country governments came under scrutiny, most importantly from the Bretton Woods institutions [which comprise the World Bank Group and the International Monetary Fund (IMF)].

A study commissioned by the World Bank suggested that the return on investments in higher education was far below that of investments in primary education (Psacharopoulos and Patrinos, 2002), and governments were asked to cut back investments in higher education as a condition for education sector loans. Many aid agencies took a similar stance. The strong focus on primary education left higher education institutions on their own, to find ways of surviving and adjusting with little or no strategic guidance. Support for higher education more or less vanished from development cooperation, with only a few exceptions, including Swedish assistance.

## **2. UNESCO and Its Partners: Reacting Against Neglect**

Against this background, the UNESCO World Conference on Higher Education marked a crucial turning point: it attracted some 4,000 participants, was seen as an enormous success, and served as a “wake-up call” of sorts. The Conference reassessed the strategic importance of higher education and research to development, and it reconfirmed UNESCO’s leading role as a source of normative guidance and advocacy in the field. Few had acknowledged the various protests<sup>4</sup> against the above policies, but the UNESCO statement simply could not be ignored; a similar message came from the UNESCO World Conference on Science the following year. UNESCO clearly saw the value of higher education as a public good in contrast to the World Bank’s advocacy of (privately funded) higher education as a private gain (see Olsson, 1995).

UNESCO decided that there was a need for informed debate on advanced knowledge systems, on the basis of evidence and not merely ideology. Therefore, it took the initiative to create a special Forum to promote the study of knowledge systems. The Swedish International Development Cooperation Agency (Sida) stood ready to support this initiative given its resonance with the needs identified by its own Department for Research Cooperation, SAREC.

### 3. Sweden's Decision to Support the UNESCO Forum

SAREC<sup>5</sup> has worked for many years to support research for development. In addition to supporting research on and for development, it has striven to support research in and by low-income countries. Recognizing that knowledge of the conditions in, and the phenomena affecting, low-income countries has been comparatively neglected in international research efforts, SAREC funds a number of international, regional and national research efforts to address this deficiency.

Funding of research *on* and *for* development has been relatively easy; various initiatives have emerged to address neglected research areas, including research programmes linked to the UN Special Agencies and to some regional research organizations. Global challenges such as the development of effective vaccines against malaria and HIV, the breeding of drought-resistant crops, and mechanisms to make use of renewable energy resources and influence climate change also attract other international funding. The ambition of supporting research *in* and *by* low-income countries, however, has been more challenging. Regrettably, very little international development research funding has addressed this need in a systematic way; most research allocations focus on projects designed to address specific problems, and few grants are directed at the systematic build-up of research structures and institutions in low-income countries.

The Swedish experience has been a long and winding path of learning, partly through mistakes but also through elements of success. Such successes include the practice of “sandwich-based” research training, where doctoral candidates remained active in their (university) institutions while being connected to supervisors abroad. Instead of four or five years of study abroad, the home-based research training brought research activities to the faculty, as well as some equipment, library and ICT facilities which supported continued research after the candidate's graduation. Focusing on research activities in the home country of the doctoral students, rather than on scholarships, also gave SAREC valuable insights into local research conditions.

In the early 1990s the impact of economic crises, and ebbing external support, on higher education institutions became apparent. SAREC revised its policy (see Olsson, 1992, and Sida 2004), shifting its support from individual research and research training programmes to comprehensive support for research development in national universities. This approach has been successful to date, particularly in those cases where university strategies exist and can be used as a framework for the external input. Recent evaluations have in fact identified the SAREC experience as an approach to be considered by other funding agencies (Eduards, 2006). Two limiting factors, however, currently weaken such efforts and need to be addressed. One is the relative absence of other external support efforts prepared to offer funding in line with institutional strategies. The other is the relative absence of overall strategies for the organization and funding of HERI at country level. Education strategies tend to cover higher education superficially, leaving the concrete steps to the market or to *ad hoc* decision-making. And strategies for research, to the extent they exist, tend to deal with research topics rather than its organization or funding; as in the case of innovation strategies, these are often blue-printed from literature that describes the systems of high-income countries.

Conditions for HERI, naturally, must be seen in the overall context of situational and socio-economic conditions, and need to be shaped locally. The gathering and compilation of experiences from other countries may guide decision-makers, but the available information on models has been limited to OECD Member countries – whose models may be unattainable for resource-poor societies. The debates of high-income countries often concern the refinement of an established system, whereas the immediate challenge in low-income countries may be to build the very

basis for HERI. As it is often from the more affluent countries that external funding is planned and possible experts are recruited, it may therefore be difficult to identify and select appropriate pathways, and to formulate realistic HERI development strategies. Thus there is a need to assemble and supply information on HERI systems from different parts of the World, a task clearly linked to UNESCO's mandate.

## **4. Why Should Low-Income Countries Invest in Research?**

### **4.1. All Countries Need to Use Research Findings**

The need for investments dedicated to building a proper basis for HERI, until recently, has not been widely recognized by governments in low-income countries or by external funding agencies. Some argue that relevant research may be better done internationally, and that low-income countries should rely on research findings produced elsewhere rather than invest in local research.

Naturally, all countries need to draw upon international research findings, and Sweden for instance produces only a fraction of the scientific findings it actually uses. But Sweden can do this because of its vital domestic research community, which links into the world of science and makes it possible for the country to harness global discoveries for social and economic development. Low-income countries on the other hand, with a weak national research community, have fewer opportunities to identify, adapt and make use of new knowledge. Sadly, and in many countries, children still die from diseases that could easily be prevented through the use of internationally available knowledge.

Obviously, the understanding of various problems and their underlying factors is an important task for research. Increasing agricultural production for example is more likely to result from new knowledge than from finding better land; negotiating terms for the exploitation of natural resources, including mineral resources attractive to foreign investors, requires scientific data collection and analysis; and local problem formulation is needed in order to choose strategies for growth, for education and for international relations, not to mention for signing international treaties and conventions and for weighing their implications. If this is not sufficiently convincing, most will yet agree that qualified analytical capacity must at least be in place for countries to design their own development strategies (sometimes referred to as Poverty Reduction Strategies or PRS), to be used as “ownership”-based frameworks for development cooperation.

### **4.2. The Usefulness of a National Research Community**

The usefulness of a local research community goes far beyond direct research work, and a research community can facilitate access to informed advice. Decision-makers rarely turn to original research publications to find out about new resistance to life-saving antibiotics: they turn for advice to local scientists, who know the literature and can consult international colleagues if need be. What Prime Minister would accept the testing of an AIDS vaccine on his or her national police force, as is the case today in Tanzania<sup>6</sup>, without local, qualified scientists to turn to and trust?

Another important role for a domestic research community is the formulation of relevant questions for research, combining local observations with available literature in order to address relevant issues. This process also feeds articulated, situated perspectives back to the global scene.

Researchers contribute to informed debates and to critical reflection, not least in higher education. Indeed, national research universities constitute centres of excellence and act as hubs for national research development. The research-based university has the capacity for research training, and can “reproduce its own capacity” while also supplying qualified analytical competence to other institutions. Women participate in research training to a higher degree when doctoral studies can be pursued at home. Furthermore, the local research community stimulates and takes part in innovations which contribute to societal change and economic growth. In short, there are many uses for national research capacity in addition to research output *per se*.

## 5. Efficient Use of Scarce Resources

### 5.1. Inefficient Use of Available Resources

Unfortunately, investments in building a proper foundation for research, including skills in research management and in the basic natural and social sciences, remain problematic in many low-income countries. This is not merely due to lacking resources, but also to the use of available ones: patterns of funding for higher education and/or research may be inefficient.

The last decades have featured an enormous expansion of higher education, and many low-income countries have been pressed to establish new higher education institutions without corresponding increases in funding or in academic and management capacity. In addition to the new public institutions, a number of so-called “new providers” has also entered on the scene: these may be private colleges, branches of foreign universities, or distance learning facilities. These new providers often rely on the staff and resources of existing, overloaded public universities, whose academics might teach on the side in order to augment their income; potential research time shrinks accordingly. Library resources and other facilities are used by all and become severely strained. Quality does not ensue, and national universities no longer constitute a genuine alternative for those who can afford to study abroad or are offered scholarships to do so. Thus resources are exported, contributing to the income of institutions abroad instead of being invested at home. In some parts of the World, where accreditation mechanisms can ensure quality, the apparition of new institutions and providers of higher education may have been a positive development. In many low-income countries, this mushrooming has entailed a severe dilution of already weak capacity for academic teaching and research.

Here the need for policies and strategies, and for the design of regulatory mechanisms, is obvious. Governments need to find ways of concentrating sufficient resources into sustaining at least one research-based university capable of graduating Ph.Ds. Without such a strategy, the system remains completely dependent on (costly) external institutions for research and research training, and this for many years to come.

As for research funding, many universities do not have defined budget lines for research, nor do they have access to grant-funding research councils or similar public funding bodies<sup>7</sup>. Unlike many high-income countries, which for efficiency purposes pool their research resources into one ministry, many low- and middle-income countries continue to view research as tied to various line ministries. Thus research may be funded as commissioned studies, or studies undertaken by specialized institutes also responsible for services (such as reference laboratories). The push for immediate return on investment leads to fragmented and *ad hoc* research funding, and both national governments and external donors appear to act on a short-term basis. In many

cases research is funded merely from sector interest, by line ministries, or as part of aid to different sectors – rarely as a “research sector” or “cross-sector” to be built up as a common resource. In this regard, the increasing recognition of the need for actual research communities is a welcome change. The statement of African Ministers of Science in their meeting in Addis Ababa in 2007, committing to an allocation of at least one percent of BNI to research, is indeed important (Decision on the Report of the Extraordinary Conference of Ministers of Science and Technology – DOC. EX.CL/315 (X), the 8th African Union Summit of Heads of State, Addis Ababa, 2007).

## 5.2. Strategies for Developing HERI

Such recognition of the need to invest in HERI is a good start, but it is not the same as knowing how to make it work. Today, an increasing number of low-income countries are recognizing HERI’s important role, and some have taken initiatives towards strategies for research development. Few however have a tradition of planning for research, and many countries tend to neglect the need for a research basis to support a range of sectors. Policies and strategies for research in low-income countries, where Sida supports long-term collaboration, are either lacking or in an early stage of development.

Such strategies must be based on prevailing conditions and existing institutions, and preferably be developed by in-country researchers and policy-makers. Once produced, HERI strategies and plans will facilitate the involvement of partner countries and donors regarding the optimal expenditure of efforts and resources. A strategy may thus identify key institutions for focused investments, in order to avoid spreading resources for research too thinly. The role of universities, as opposed to research institutes, needs to be clarified. In higher education, resources for research may be concentrated so that at least one university will develop capacity for in-country research training in critical fields.

Funding strategies will be decisive in order to balance core funds made available to institutions for research and those to be allocated on a competitive basis. Funding strategies will also determine the balance of grants open to proposals from researchers versus those targeted to defined priority areas. As mentioned earlier, strategies must consider the issue of funding research within sectors as opposed to funding a cross-cutting, “research sector”. A further concern is the establishment of peer review systems, within countries or in regional collaboration to diminish interest bias.

Strategies for using research are also important, and the balance between building research capacity and using research capacity may be delicate in countries with many needs and few resources. Strategies may help to optimize scarcity, so that the basis for “reproducing capacity” in national universities is not unintentionally eroded.

## 5.3. Strategies for Innovation

Increasing attention has been given to the notion of strategies for innovation, which are intimately linked to research strategies but also involve actors in government and the private sector. So far, few agencies have supported research on a comprehensive basis as part of bilateral development cooperation; however the increasing concern for enhanced capacity impact in research funding is likely to lead to an enhanced interest in the development of HERI strategies as a basis for defining and aligning support modalities.

Supporting agencies may assist with direct advice, financial support, or initiatives to collect and disseminate experiences and ideas on research systems. Sida currently supports studies on higher education systems, including in the African Association of Universities (AAU) and the Council for the Development of Social Science Research in Africa (CODESRIA) and Latin American Council of Social Sciences (CLACSO) councils, and the elaboration of research strategies in collaborating countries. Based on initiatives to promote the notion of innovation, pilot innovative clusters have been funded in selected East African countries, and this has led to discussions on the creation of regional funds for innovation. Sida also supports African Union/NEPAD initiatives to foster HERI strategies.

An important role of UNESCO is to provide the arena for sharing such experiments and experiences. To this end we have the UNESCO Forum on Knowledge, Higher Education and Research, which convenes researchers and aims to establish a reference base on such HERI systems.

## **6. Agency Perspectives**

Aid agencies increasingly recognize the need to fund research and analyses to inform their policy formulation and evaluation activities. The Paris Declaration on Aid Effectiveness (OECD, 2005), which implies that agencies have agreed to place their funding in the hands of partner governments, for the latter to use in line with their own strategies, has fuelled interest in and a need for careful analyses. Ironically, in spite of the strong ‘ownership’ rhetoric, there has been much less understanding of the need to support the same partner countries’ investment in a vital research community, able to underpin policy formulation and follow up on support activities.

### **6.1. The Paris Agenda**

Against the background of fragmented aid, a number of countries and supporting agencies have agreed on new principles of development cooperation. The Paris Declaration on Aid Effectiveness underlines the responsibility of both parties, namely governments of low-income countries as well as supporting agencies: governments are responsible for presenting coherent strategies, as a common framework for domestic as well as external investments. External support should be aligned with these frameworks, and supporting agencies for their part should accept common reporting and audits (harmonisation). Such practices would reduce administration and transaction costs on both sides, and the Paris Agenda also recommends that funds be used to reach agreed, targeted results.

In support of sectors such as health and education, the Paris principles have been put into practice through a programme-based approach (PBA), sometimes referred to as “basket funding”. The PBA has been defined as “... a way of engaging in development cooperation based on the principle of coordinated support for a locally owned programme of development, such as a national poverty reduction strategy, a sector programme, a thematic programme, or a programme of a specific organisation” (OECD, 2008). This approach, so far, has not been adopted in support for research.

## 6.2. What About Research Funding?

Few areas have been funded in a more fragmented way than research. Project support is still the most common, and in many cases grants go to researchers in the funding country with researchers from low-income countries as invited collaborators. Yet, there has been little talk of applying the Paris principles. Some have questioned whether such principles are suited to research funding at all.

In research funding aimed at enhancing research capacity in low-income countries, there may be limitations to PBA. In severe cases, countries may have neither policies, nor strategies, nor budget lines, nor transparent decision-making and follow-up processes. Is it then relevant to apply PBA principles?

We would argue that it is. In situations where both research systems and capacity are weak, and where research activities are poorly coordinated, the promotion of ownership, alignment, and harmonisation is just as important – if not more so – than when dealing with well-defined structures and plans. When conditions for complete harmonisation and alignment are not met, the opportunities for partial alignment and harmonisation should nevertheless be explored. Countries and organizations should be supported in their efforts to take control of their own development and planning processes.

Sida's experiences in supporting research capacity in low-income countries have recently been positively evaluated (Eduards, 2006). The ambition has been to support research capacity and training, focussing on one national university as the hub for research development in each low-income partner country. In the early 1990s, Sida switched from mere project funding towards comprehensive support for the build-up of an institutional basis for research; this approach has many features in common with the Paris principles. Two major dilemmas however have hampered application: the weak and unstructured commitment to research in partner governments, and the weak commitment to research capacity in the donor community.

## 6.3. Are Donors Not Committed to Research Capacity?

Many research funding aid agencies subscribe to the idea of capacity-building; the problem is that, in most cases, this is a secondary ambition and not a primary objective. Sida recently commissioned studies (Åkerblom, 2007; Ewart, 2007) which clearly demonstrate that most research funding addresses issues of importance on and for development. Few programmes have been designed primarily to enhance research capacity in and by low-income countries.

In funding research for development, we may distinguish between two central objectives: contributing to research capacity in low-income partner countries, and contributing to new knowledge of high importance to development. Most research funding is designed primarily to address important research issues; research capacity is often stated as a desirable secondary ambition. Many agencies hope to reach both objectives, however few programmes are designed primarily to strengthen research capacity in a partner country.

Aid agencies may support research as part of their contributions to a specific sector, which often means that studies may be commissioned. They may also offer participation in research programmes or projects, usually funded to include an external project leader. There are also cases without explicit capacity objectives but where co-operation is required for getting local perspectives or data into the analysis. Such initiatives offer opportunities for participating researchers, but they hardly contribute to the stable funding of a national basis for research.

Many research fundraisers hope that their project and programme funding, in addition to addressing priority topics, will contribute to enhancing local research capacity for research, and the “capacity nexus” may be an important alternative avenue for constructive support. Where this is a primary objective, the research conditions in the specific country must be addressed. Supporting agencies must see this as a long-term commitment, where the various components will support effective structures and systems.

Agencies often voice an ambition to support centres of excellence on a regional basis, but a regional institute housing high-level researchers could be a poor solution if it drains the national-level research communities. On the other hand the forging of nationally-based researchers into “networks of excellence” may be more constructive, as demonstrated by CODESRIA and CLACSO, the African and Latin American social science networks. Let us recall however that the success of such regional research cooperation depends on the quality and conditions of research in the countries concerned.

Cooperation offers from international research organizations tend to be well-defined as to orientation, content and design. This may suit in situations of established capacity to take on board new perspectives and contacts, but it will not automatically lead to capacity-building where the institutional basis is weak. Those offering cooperation from abroad seldom recognize the fragile basis for research in low-income countries, and the lack of basic research skills and methods across disciplines such as statistics, mathematics, epidemiology, the social sciences, biology, chemistry and physics. Those advising on research policy issues often assume the existence of such basic conditions, and argue for multi-disciplinarity in situations where the disciplinary basis remains to be built. The basis for research in low-income countries will not be built or sustained merely through vertical programmes that focus on particular issues or problems. In fact taken together, such “vertical” efforts risk fragmenting already scarce capacity and resources.

The UNESCO Forum will promote an improved understanding of the conditions for HERI across different situations, and point to constructive approaches for research cooperation, which unequivocally contribute to enhanced capacity for HERI.

## **7. The Forum: Rationale and Activities**

### **7.1. Convening Research on HERI Systems**

The UNESCO Forum on Knowledge, Research and Higher Education has established itself as a useful venue. It gathers researchers who study systems for research and higher education, and facilitates the sharing and compilation of available research findings; and it provides indispensable links to new knowledge, needed by UNESCO in its normative and advisory role and by Member States in their policy-making. The Forum facilitates access to front-line knowledge on systems, with particular emphasis on low- and middle-income countries.

UNESCO, in its advisory role, has long been able to tap into the information on national knowledge systems provided by the OECD; however this information has been limited to the systematic analysis of OECD Member countries. No similar overviews have been gathered concerning the situation in low- and middle-income countries, and the latter expect UNESCO to serve as a “knowledge bank” and clearing house in this regard. However, during the last decades, UNESCO has shifted its focus away from the analysis and support of knowledge systems, redirecting effort and resources to primary education. The two science sectors, for their part, have



focussed their attention on specific research issues rather than on policies and systems for research. More recently however, following the external review of the two science sectors, steps have been taken to revamp the advisory functions in relation to advanced knowledge systems. These advisory functions, which correspond to UNESCO's core competencies, will greatly benefit from the deliberations of the Forum and its links to ongoing system-oriented research.

## 7.2. Initial Focus on Higher Education

In recalling the Forum's inception, we may touch upon some of the themes it has brought forward. The initiative started as more of an exploratory exercise, inviting reports on the state of higher education and research from various UNESCO regions. The first gathering identified problems and trends in higher education and research management: the commodification of higher education, and trade and GATS issues were high on the agenda, as was the debate over research management at various levels (from system-wide policies, to the institutional level, to the management of individual research programmes and projects). The role of the Forum was never an advisory and supportive one, which is that of the UNESCO sectors; it is rather to convene and gather research on HERI systems and issues.

It was decided to establish a cycle of meetings, starting with workshops for researchers to share findings and studies on select issues, and proceeding to colloquia where they could share these findings with practitioners and decision-makers. An elaborate structure was established, with an inter-sectoral steering group within UNESCO to include representatives from the Social and Human Sciences (SHS) and Natural Sciences (SC) Sectors, and with a secretariat based in the Division of Higher Education. A network of relevant NGOs and institutes were invited as observers<sup>8</sup>. Scientific Advisory Groups were formed in each of the UNESCO regions, whose chairpersons also sat on the Global Scientific Committee.

The first workshop in 2004 elaborated on epistemological issues around the nature of knowledge and knowledge systems (UNESCO, 2004). As regional scientific groups were formed, these groups set out to define priorities for further attention in Forum meetings. An important debate concerned higher education, and the need to resist a simplistic focus on primary education. The 2006 colloquium focussed on the role of universities in research, and was entitled 'Universities as Centres of Research and Knowledge Creation: An Endangered Species?' as an indication of overall concern. Clearly, the focus had shifted from particular issues to an overall framework, particularly for institutions dealing with the "handling of knowledge". Participants felt that universities needed to be rescued from the fate of dismantlement due to scarce resources, and massification into large-scale, lower-quality tertiary education. A solution should be sought in the formulation and implementation of clear national policies, and instead of allowing various old and new providers to establish themselves uncritically, regulatory mechanisms were sought to minimise academic drift and make it possible to concentrate resources into at least one genuine research university in each country<sup>9</sup>.

Participants emphasized that the university sector must be dealt with in education as well as research policy terms. Research is needed to inspire critical thinking in higher education, which reflects back on society at large. Yet, higher education is not always dealt with through educational policies, as university research, and research training, is also part of the national research system. Few low-income countries however have produced research policy frameworks, partly because the need has not become obvious to decision-makers and partly because little is known about how to formulate and orient such policies. To the extent that research policies exist, they

often address issues for research and research priorities. The framework for *how research functions* is less often addressed.

### 7.3. Understanding Research and Innovation Systems

This is why the Forum decided to look more closely into systems for research. A special workshop in 2006 identified the need for a template, able to capture elements of research systems in low- and middle-income countries alike. Simply applying the OECD Frascati Manual was not possible, as data are scarce and the issues covered may be less relevant in less-developed research systems. The template needed to be simple enough to present the overall situation, but sensitive enough to capture changes in incipient and fragmented systems.

The Forum thus decided to commission a special review of the literature on national research systems, with the objective of learning more about research systems in middle- and low-income countries, and, based on these findings, producing a framework for further country studies. Johann Mouton and Roland Waast accepted this challenge and brought in a large team of researchers.

Their ambition was not only to develop a template, or “heuristic mapping tool”, that could be used by researchers in the future to undertake such studies first-hand; it was also to deliver (in many instances for the first time) integrated reviews of the research systems in fifty-two developing countries. The main findings (including four regional reports and a synthesis report) were presented at a workshop in Paris in January 2008. The study confirmed the challenges involved in undertaking such a review under conditions of poor data quality and limited endogenous research capacity; it also demonstrated the potential utility of a new research mapping tool which integrates traditional research and higher education indicators (mostly quantitative) with more qualitative, even narrative, descriptors. Despite some shortcomings (as far as certain country reports were concerned), the study also yielded helpful information in identifying regional differences and trends.

Further work is now under way to correct certain statistical data, improve on a small number of country reports and refine the proposed template. One challenge, identified at the recent advisory committee meeting, is to identify parameters which are sensitive to changes in very early, incipient and fragmented research systems so that also advances in such situations can be detected and monitored. Once guidelines have been produced regarding the use of the template, those who undertake studies will contribute feedback and further refinement can ensue. This will enable UNESCO to gather information from further studies undertaken amongst these countries. Regional observatories or reference centres may undertake the collection, storage and utilization of data (using the template) on research systems. UNESCO may thus be able to gather information with reference to countries and regions that have hitherto been nearly invisible on the international map of research systems. Such repositories will facilitate comparative analysis both for researchers and policy-makers.

The overall purpose of the special initiative is to help countries, and UNESCO in its advisory role, find and draw upon reference data and experiences as they articulate strategies for higher education and research; it is for countries to have ownership of HERI systems which are key assets for their development.

## 8. Some Common Issues

The initial impulse for the Forum was the need to understand HERI systems, and potential for system development, in low-income countries; this is not to say though that middle- and high-income countries cannot benefit from the type of research that the Forum generates. While levels of income and affluence may differ, many of the challenges facing HERI are similar in nature.

As mentioned earlier, the need of low-income countries for higher education and research should no longer be questioned. The question is how to realise our ambitions in these fields. Several issues need to be addressed, such as:

- How to balance investments across various levels of the education system.
- How to balance investments in increased access versus those in improved quality.
- How to differentiate higher education institutions: professional development centres, academic research universities, colleges, etc.
- The role of research in universities as opposed to research institutes.
- The optimisation of scarce resources.
- How to invest in basic conditions for research, as opposed to high-profile projects.
- How to balance commissioned research with more open, academic research.
- How to ensure the utilization of research findings and to stimulate innovation.

The balancing of “access” and quality in higher education is a near-universal challenge. In Sweden, one of the countries able to provide solid funding for HERI, the debate on diversification and how to balance quality and coverage has been fierce for decades. Some wish for a further concentration of research resources to only five universities, while others maintain that research funds should be extended, from the current sixteen, to all thirty-eight institutions for higher learning in the country. The rationales are not only driven by concern for high quality, research-based education, and research recruitment, but also by concern for quality in professional learning, where close relations with social services and industry are highly valued.

While Swedish higher education remains a public service, and is seen as a public good for society-at-large, other countries debate higher education funding as a means of adjusting to market needs and interests. Competition and market-driven supply of education then become engines, seen by many as drivers of quality; others see marketing as a waste of resources, and prefer that all resources be invested in quality enhancement. Private funding is sometimes argued as a necessary complement to limited public funds; Nordic countries, including Sweden, maintain that private funding would undermine the public revenue system and that costs for common goods such as education, research and health care, are to be shared via taxes. The actual outcome and impact of such different strategies is less well understood, and an important area for research.

Other oft-debated issues, also calling for policies and regulation, include quality-based accreditation; student funding systems, including loans and repayment structures; academic freedom; and salaries and promotion systems. One intensely debated issue in which experiential analysis is needed is the relation of higher education to nation-building and citizenship. The multitude of cross-border educational offerings ignores such ambitions and emphasizes the creation of individual, marketable skills. The notion of the “World-Class University”, originally intended to describe a level of quality, tends to disassociate education from its cultural and political context. The Bologna Process, which aims to create a European Higher Education Area by 2010, and similar efforts at comparability seek to facilitate academic mobility and cross-border education; in other settings this mobility is decried as “brain drain”, with its attendant negative connotations.

Taken together, these debates and views illustrate the need for research to underpin evidence-based information-sharing and analyses – for which the Forum is well-suited.

## 9. Looking Forward

The current Forum on Higher Education, Research and Knowledge has further potential as an arena for researchers to presenting original studies and research on HERI systems. UNESCO with its legitimacy and convening power is an important hub for such discussions and debates, both within the UN family of special agencies, and in relation to Member States. The development of a descriptive template will make it possible for its users to share and compare data. In the aggregate, such information can constitute a basis for assessing trends over time, as well as for making comparative assessments based on individual country studies. Another possible activity for the Forum would be to build a virtual reference library of available studies, to include comparative studies and assessments. Such information may be useful not only for UNESCO staff members in their advisory and normative role, but also for researchers in UNESCO Member States.

UNESCO, within the UN family, has the mandate for generic issues related to knowledge systems. In the current thrust towards “Delivering as One” also known as the “One UN” strategy, there is an obvious need to align the efforts of enhancing national research systems, linked to various specialized agencies, into a coordinated and comprehensive strategy. Several existing initiatives touch upon the need to understand HERI systems in greater depth. Within the World Health Organization (WHO), a policy on “research for health” is being developed for presentation at the World Health Assembly in May 2009. Linked to the Food and Agriculture Organization (FAO), the Consultative Group on International Agricultural Research (CGIAR) consortia address the need for stronger National Agricultural Research Systems (NARS). The UN’s Research Institute for Social Development (UNRISD) calls for stronger systems for research on social development in low-income countries. More specialized research groups harbour similar ambitions, all to do with the inclusion of low-income countries in global research efforts.

In our view and for the sake of optimal impact in its work, UNESCO should shift the balance, from research along specific issues and programmes to strengthening its core capacity for informed, evidence-based advice on HERI systems. In its advice to Member States and external funding agencies (“donors”), UNESCO should stress the need for investing in a basis for research, including research universities, as a prerequisite for targeted funds for “excellence” or specific research areas. The recent decision to create an inter-sectoral platform is a step in this direction, provided that it is adequately funded from the Regular Programme. However, further down the road, a formal merger of the current Division of Higher Education, the Social and Human Sciences (SHS) and the Natural Sciences (SC) Sectors would create a more powerful thrust towards UNESCO’s role for advocacy and advice on advanced knowledge systems. If UNESCO is to shoulder the challenge of its mandate, of providing advice on the organization and funding of research, from a “One UN” perspective the Organization will have to rethink the current fragmentation.

From the outset, the Forum has succeeded in generating active interest, participation and support on an inter-sectoral basis, and this has greatly contributed to its success. Nevertheless, inter-sectoral activities themselves tend to suffer from sector-driven borders, funding practicalities and competition. If UNESCO is to be credible in its ambitions of driving HERI policy throughout the UN system and of becoming a Clearing House for other initiatives (such as the

new International Council for Science engagement to strengthen research in Africa, the Global University Network for Innovation, and indeed the OECD's own broad engagement in these fields), it will have to put substantive commitment behind the cohesion of its internal efforts.

Above all, effective engagement by UNESCO in advising Member States on HERI systems will require the continuation of the Forum, as a repository of information and analysis and as a link to the system-oriented global research community. Given the Forum's proven potential, UNESCO's clear commitment to this important initiative in its planning and budgetary strategies is a critical factor. In this regard UNESCO's EFA Global Monitoring Report, with its autonomous status, presents a useful model for recording data and analyzing emerging trends. Moreover, the Forum has the potential to attract broader and continued external funding. Development cooperation agencies are likely to pay increased attention to knowledge systems, and for future reference they will certainly need the type of insights generated by the Forum.

The Forum has proven potential to attract researchers active in analyzing systems for HERI. It thus offers a vital link between UNESCO, its Member States, and the research community, which is crucial for understanding, shaping and assessing the advanced knowledge systems essential for sustainable development in all countries.

## Notes

- 1 As Jeffrey Sachs and many others have pointed out, local research is essential to the achievement and monitoring of the Millennium Development Goals, our chief indicators of sustainable development (see <http://www.unmillenniumproject.org>).
- 2 The World Bank and other funders in development cooperation increasingly tailor their support to the development strategies, sometimes referred to as Poverty Reduction Strategies (PRS), of national governments. See also the work of the Task Force on Higher Education and Society, including its report, *Higher Education and Developing Countries: Peril and Promise* (2000) (<http://www.tfhe.net/report/readreport.htm>).
- 3 Resolutions adopted by the conference of heads of state and of government of independent African countries, 22-25 May 1963 ([http://www.africa-union.org/Official\\_documents/Assemblee%20fr/ASS63.pdf](http://www.africa-union.org/Official_documents/Assemblee%20fr/ASS63.pdf)).
- 4 See for instance the Harare Statement from the Sixth IAU Round Table (Harare, Zimbabwe, 1987), in response to the World Bank's *Financing Education in Developing Countries: An Exploration of Policy Options* (1986). See also the Buenos Aires Statement from the Tenth IAU Round Table (1994), in response to the World Bank's *Higher Education: The Lessons of Experience* (1994).
- 5 SAREC was created in 1975 as the independent Swedish Agency for Research Cooperation with Developing Countries. In 1995 it became the Department for Research Cooperation within Sida.
- 6 Testing based on a potential vaccine developed within the TANSWED Programme (Kagera AIDS Research Project (KARP)/TANSWED Programme supported by SIDA (SAREC) 1987) in the course of which qualified research capacity was developed at the Muhimbili Medical Centre (MMC), now Muhimbili University of Health and Allied Sciences (MUHAS).
- 7 This was noted in a major seminar in Tanzania in May 2007, and led to the Government's request to UNESCO for assistance in the definition of an appropriate research development strategy (see UNESCO, 2007).
- 8 These included the International Association of Universities (IAU), the International Council for Scientific Unions (ICSU) and UNESCO International Institute for Educational Planning (UNESCO-IIEP).
- 9 The term used here may need some clarification. Traditionally a university is an academic institution engaged in teaching, research and services. It has the capacity to perform and disseminate research; to produce teaching based on research; and to train and graduate Ph.Ds. As other institutions of higher learning today also call themselves universities, the term "research university" has been chosen here to describe such an institution. The term is thus not reserved to top-class universities, nowadays often referred to as "World-Class Universities" and which rank among the top 100 or so. It is not likely that low-income countries will appear in this league in the near future, but they do need to have at least one university able to graduate students at Ph.D. level.

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# Chapter 3

## Policy Dynamics in Higher Education and Research: Concepts and Observations

V. Lynn Meek and Dianne Davies

### 1. Governance and Management: Environment and Context

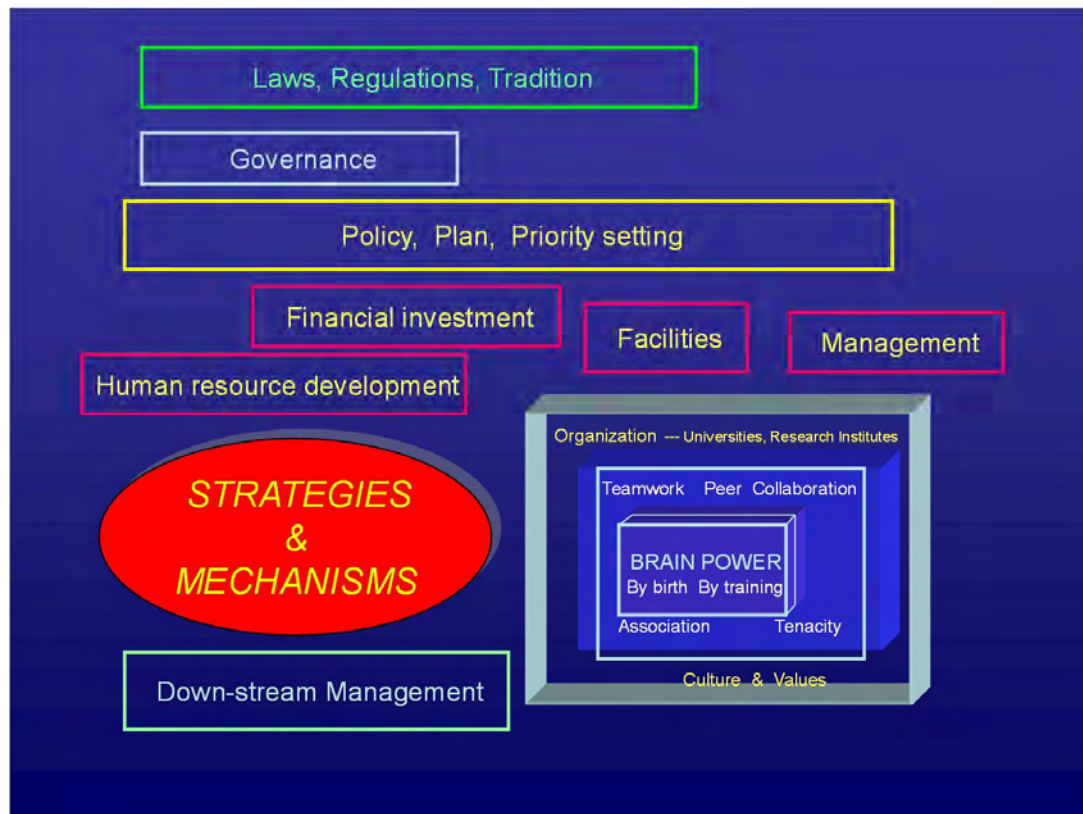
#### 1.1. Trends in Sector Steering

How governance and management in higher education are defined depends on the level of analysis: national, local, institutional, sub-unit or discipline level. Clark (1983: 205-206) directs attention to three primary authority levels: the under-structure (basic academic or disciplinary units), the middle or enterprise structure (individual organizations in their entirety), and the superstructure (the vast array of government and other system regulatory mechanisms that relate organizations to one another). The dynamics within each level, and the interaction between levels, differ according to context. The context, according to Clark, depends on where higher education institutions are located within a triangular field of governance/coordination constituted by academic oligarchy, state authority and the market. We find these three “ideal types” of coordination in developing and developed countries alike.

Explanations with respect to the ability of higher education institutions to exercise initiative in the context of system-wide authority structures have often been organized on a continuum. At one end of the continuum is the “bottom-up” type of system, where government policy follows, rather than leads, a change process initiated at the departmental, faculty or institutional level; at the other end of the continuum is the “top-down” type of system where institutions merely respond to government-inspired policy initiatives which are enforced by the power of the state. “Bottom-up” systems are characterized by high institutional autonomy; “top-down” systems are characterized by the opposite. An attempt to visualize the complex interplay between governance and management strategies at various organizational and administrative levels is provided in Figure 1.

National systems differ substantially in the ways in which they have organized the governance of higher education. Moreover, the literature on higher education also throws up a number of different conceptual models of governance: collegial; bureaucratic; political; organized anarchy; and professional. The more recent literature adds to this list the entrepreneurial university; the service university; the enterprise university; and the corporate/managerial university, to name but a few.

Figure 1. Governance and Management of Higher Education and Research



Source: Suwanwela, 2005, Seoul slide 4.

A central question in research on higher education governance is whether the university is an exceptional institution that has retained its core authority structure over the centuries, or is it to be understood in the same way as any other modern corporation? Some empirical research on the governance of higher education points to the resilience of higher education institutions and asks whether the changes we are now witnessing are a categorical break with the past or are merely the codification of existing practices. Clark (1998), in his analysis of the entrepreneurial university, while recognizing the importance of strengthening the central steering core, nonetheless returns to what he terms the “stimulated academic heartland” as the fundamental ingredient of success. Others, such as Askling and Henkel (2000: 113), see the move of the university to the corporate enterprise as undermining the claim of exceptionality, where the challenges facing them are “... broadly similar to those of a range of public service agencies in the late twentieth century”.

## 1.2. New Public Management (NPM)

Since the early 1960s, governance and management of higher education have come under attack from many directions. The governance reform movements of the 1960s and 1970s mainly involved issues of democratization and the inclusion of staff and students in decision-making. From the 1980s onward, the governance debate has shifted more toward issues of efficiency and accountability. This has been accentuated in particular by the introduction of NPM into higher education. Leisyte (2006: 1) argues that:



“New Public Management ... deliberately alters the structure and policy-development process of public-sector organizations with the intention of making them more efficient and effective (Clarke and Newman, 1997; Pollitt and Bouckaert, 2000). In higher education systems the management models of the 1980s and 1990s entailed a much more direct ideological and political attack on the institutional and professional autonomy of universities which continues to have ramifications (Meek, 2002: 172–173). But the process of structural change was not just a simple centralization of power in higher education institutions; Henkel (2000) argues that there were parallel moves to decentralize, at least in the context of the UK higher education landscape. In other words, ‘centralized decentralization’, which is a management strategy based on the assumption that creative peripheries need strong central values and strategies, has become more important” (Henkel, 2000: 27).

NPM approaches to higher education governance and management more resemble those of the corporate sector than the traditional norms of academic collegiality. Governments have introduced NPM in the hope of maximizing output while reducing unit cost, and in the process shifting the accountability for achieving these ends to the institutions themselves. Johnstone and Maruccci (2007: 12) note that, in NPM, budget authority in a number of key areas is shifted from government ministries to the higher education institutions, for example, to:

- Establish wage and salary policies (formerly reserved to the ministry or parliament and to the government’s financial, personnel, and civil service bureaucracies).
- Reallocate expenditures from one category to another in response to institutionally determined priorities (formerly generally forbidden).
- Carry forward unspent funds from one fiscal period to the next, thus encouraging savings and institutional investment and discouraging spending for no reason other than avoidance of loss or the appearance of an excessive budget.
- Enter into contracts with outside agencies and businesses expeditiously and competitively (formerly too frequently politicized and prolonged).
- Receive and own assets and sometimes even borrow and incur debt (not allowed in ordinary government agencies).

The NPM approach tends to stress the centrality of the role of executive in the decision-making process to the exclusion of the professional scientists, which in turn may threaten the innovative nature of the so-called professional bureaucracy of which the university is a prime example.

### 1.3. Globalization, Marketization and New Steering Directions

Changes to higher education governance have involved in many jurisdictions the stepping back of the state from direct control of higher education – the movement from a state control model of higher education governance to a state supervisory model. This has entailed greater freedom for higher education institutions, but a freedom nonetheless moderated by strict calls to accountability and, in many instances, harsh market competition. Many governments have moved towards the market steering of higher education institutions in the hope that this will enhance efficiency and accountability, while simultaneously reducing the financial burden of higher education on the public weal. Also, behind much of this change in overall governance structures is the need for individual nation-states to be competitive in the global knowledge economy. According to Ordorika (2006: 1):

“Globalization has substantially modified the nature of contemporary Nation-States as the principal organizers of capital accumulation and as bearers and creators of national identities

(Castells, 1996; Evans, Rueschemeyer and Skocpol, 1985). The Nation-States' progressive withdrawal from higher education, expressed notably in the reduction of public resources (Altbach and Johnstone, 1993; Johnstone, 1998), has implied an increasing competition for individual and/or institutional resources from the State and vis-à-vis the market (Marginson, 1997; Marginson and Considine, 2000; Pusser, 2005). Consequently, traditional autonomy of academic institutions (universities and other postsecondary organizations) and its professionals from both Nation-States and markets, has been notably reduced" (Rhoades, 1998; Slaughter and Leslie, 1997).

And, with respect to accountability, Ordorika (p. 2) continues to argue that:

"Due to globalization and internationalization processes as well as changes in the nature of Nation-States, initiatives for accountability have been promoted in almost every area of societal life. The public sphere has been put into question and the weight of market relations in every type of social interaction has increased. Globalization has been a product and has in turn promoted a growing economization of society and an erosion of all that is considered 'public' (Wolin, 1981); changes in the nature and capacity of Nation-States (Evans et al., 1985); and continuous expansion of markets, particularly within the realm of education and the production of knowledge (Marginson, 1997; Marginson and Considine, 2000; Slaughter and Leslie, 1997); all of these contribute to explain the 'reduction of trust' from societies towards universities, institutions that rely heavily on public resources".

Finally, Ordorika (p. 10) concludes that:

"The emergence of a higher education market poses a significant challenge for national research universities: the need to participate in the global realm of colleges and universities on the basis of their own nature and distinctive character, without diluting these in the face of hegemonic models and dominant international guidelines. For this purpose it is increasingly important to understand the loaded nature of concepts and notions of research performance and productivity that are so deeply linked to market oriented institutions of higher education. We need to be aware of the homogenizing effects of productivity driven policies, their impact on the narrowing of university goals and the detrimental consequences on the social responsibilities of the university. In the face of this hegemonic understanding of what constitutes a successful university in contemporary society, the challenge for peripheral universities is the preservation of diversity of traditions and responsibilities through a broad commitment to society".

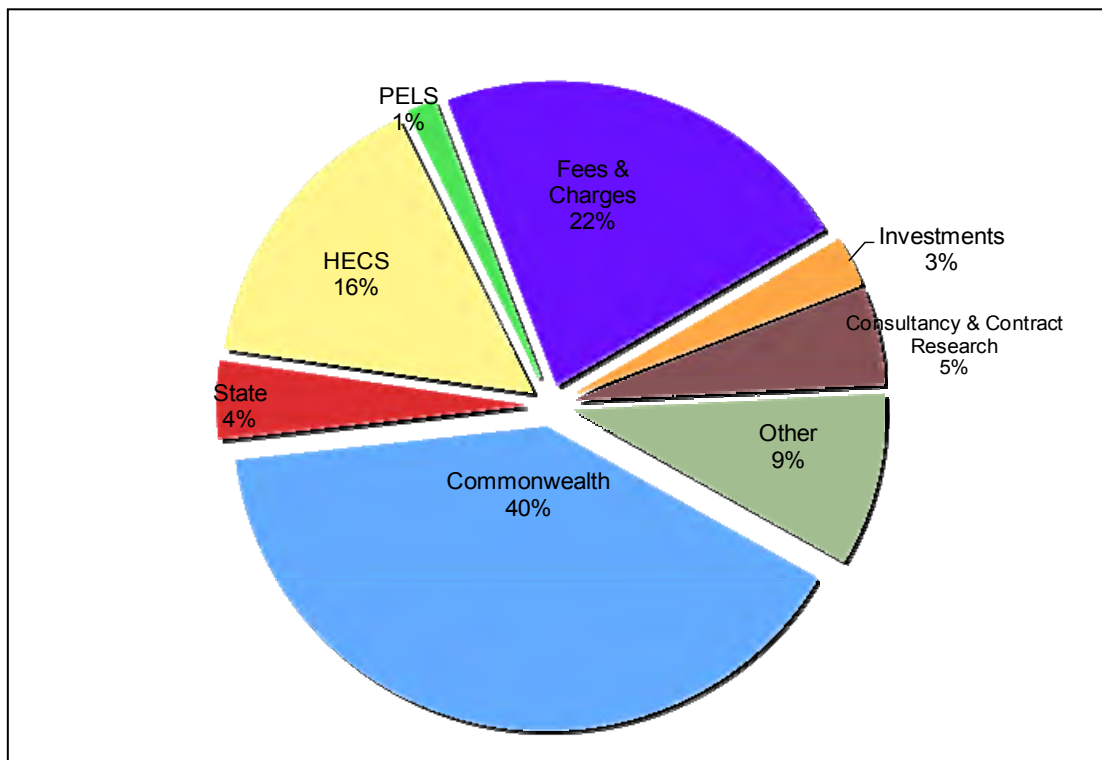
Suwanwela (2006: 7) is somewhat more optimistic about the benefits which the knowledge economy and society may afford developing countries, arguing that:

"In the present era of the knowledge-driven economy and the knowledge-based society, knowledge policy – including policy regarding science and technology as well as knowledge management and tacit knowledge – is crucial. Developing countries must find appropriate positions and strategies to cope with change and to take advantage of this. Research on the research system itself, which must include knowledge production, innovation and knowledge utilization, offers this type of opportunity".

Meek (2003) describes the situation in Australia as a primary example of where NPM and market competition have replaced many traditional forms of academic governance. Within this changed policy context, many responsibilities have been devolved to individual universities. But, at the same time, institutions are held more directly accountable for the effective and efficient use of the funding and other freedoms they enjoy. Moreover, institutions are now placed in a much more highly competitive environment, and considerable pressure has been placed on universities to strengthen management, to become more entrepreneurial and corporate-like, moving to a situation where government funds less than 50 per cent of the operating budgets of public universities (see Figure 2). The large universities, with more than 40,000 students and annual budgets

that run to billions of dollars, rival in size and complexity many private corporations. Institutions must respond quickly and decisively in order to take advantage of market opportunities. There can be little doubt that the sheer size and complexity of Australian higher education demand strong and expert administration at the institutional level. Nonetheless, changes in the governance and management of Australian higher education directly concern the re-norming of the academic profession and possibly fundamental transformation of the idea of knowledge and of the university itself (Meek, 2003).

Figure 2. Funding of Australian Public Universities (HECS = Higher Education Contribution Scheme; PELS = Postgraduate Education Loan Scheme)



Source: Meek, 2007, China slide 19.

Kogan and Bleiklie (2007: 1) also see dramatic changes in academic norms and values as the governance of higher education has shifted from one based on a republic of scholars to one based on the stakeholder organization:

“How organizational and decision making structures within universities are organized may vary according to two broad sets of ideas about university governance that we may call the university as a *republic of scholars* and as a *stakeholder organization*. In the former case institutional autonomy and academic freedom are seen as two sides of the same coin – which means that leadership and decision-making are based on collegial decisions made by independent scholars. In the latter case institutional autonomy is considered as a basis for strategic decision-making by leaders who see it as their primary task to satisfy the interests of major stakeholders and where the voice of academics within the institutions is but one among several stakeholders. Academic freedom is therefore circumscribed by the interests of other stakeholders, and decision-making is taking place within more hierarchical structures designed to provide leaders authority to make and enforce strategic decisions within the organization”.

### The Crisis of “Publicness” in Higher Education

(Ordorika, 2006: 2-3)

This crisis of “publicness” and eroded societal trust in the realm of education has been expressed in permanent challenges to the efficiency, productivity, lack of equity, and low quality of large education systems (Díaz Barriga, 1998). Critiques about the state of education and demands for accountability have put assessment, evaluation and certification policies at the core of public educational guidelines all over the world. Diversification and dissemination of academic and institutional assessment and evaluation are both a consequence of international dynamics generated by international organizations – such as OECD or the World Bank, among others – as much as a response to the adoption of the discourse and practice of evaluation and accountability by nation-states and educational administrators at the local level (Bensimon and Ordorika, 2005; Coraggio and Torres, 1997; Díaz Barriga, 1998; Ordorika, 2004).

Colleges and universities all over the world have been subject to profound transformations during the last two decades of the twentieth century. Higher education institutions, and the nature of academic work that is performed within them, have suffered changes that have no precedent in the history of postsecondary instruction (Slaughter and Leslie, 1997). Until the 1970s, higher education expanded continuously in student enrolments, number of faculty and availability of financial resources. Since the 1980s, however, public resources for higher education have been reduced significantly in almost every country (Altbach and Johnstone, 1993; Johnstone, 1998; World Bank, 1994, 2000).

The fiscal crisis of universities has been accompanied, both as a cause and as a consequence, by a redefinition of meanings, goals, and practices of higher education. Ideas of universities as broad cultural societal projects or as institutions that focused on the production of public goods have moved into a marginal or solely discursive realm (Marginson, 1997; Readings, 1996). These notions have been substituted by a renewed emphasis on the links between higher education and markets (Marginson, 1997; Marginson and Considine, 2000; Slaughter and Leslie, 1997), by a scheme of “entrepreneurial universities” (Clark, 1998), by notions of excellence (Readings, 1996), by the centrality of managerial concepts and goals – such as “productivity” or “efficiency” – and by the increasing privatization of educational supply and financing (Slaughter and Leslie, 1997).

#### 1.4. Governance and Management of Knowledge Systems

Governance of higher education is, in the end, primarily about the governance and management of knowledge and the formation of coherent knowledge systems. The knowledge system is, according to Choucri (2007: 10):

“... basically the ‘architecture’ for the framework within which to ‘locate’ the knowledge-items. In well-developed areas of knowledge, usually the ontology serves that function. In domains where the foundations of knowledge are evolving and where part of the challenge is to develop the very fundamentals as well as the derivatives, then the first task is to address head on the need for a knowledge system. In practice, the framework provides the basic guidelines for organizing and managing knowledge.

More specifically, we define a knowledge system as: *An organized structure and formal process for generating and representing content, components, classes, or types of knowledge.* Defined by its architecture, the knowledge system is (a) generic in form, but (b) specific in its domain content, (c) reinforced by a set of logical relationships that connect knowledge-items, (d) enhanced by a set of iterative processes that enable evolution, revision, adaptation, and change, (e) subject to pre-defined criteria of relevance, reliability, and quality”.

The value of a knowledge system is based on four factors. First, "... a knowledge system provides a consistent venue for organizing knowledge and a coherent framework for addressing the challenges posed by the proverbial 'devil' of complexity and the associated 'details'" (Choucri, 2007: 11). Whether organized around virtual or physical parameters, the basic principle is that knowledge must be accessible.

Second, there are "gains-from-organization", Google being a primary example. The third, added value of knowledge systems, is utilization – allowing "... people in different parts of the world to converge around common understandings of the issues at hand and collaborate for purposes of sharing knowledge, developing new knowledge, or even applying knowledge to their own needs" (Choucri, 2007: 11). Finally, added value provided by well-organized knowledge systems is the re-use and reconfiguration of existing knowledge.

Increasingly, the governance and management of higher education are about the governance and management of knowledge systems and knowledge workers. In developing and developed countries alike, the utility of higher education governance and management models will be judged in terms of how well they allow the higher education institutions to contribute to further the knowledge society and knowledge economy.

## 2. Funding and Resource Conditions

### 2.1. Doing More for Less

Change in the governance and management of higher education institutions has been coupled with just as dramatic change in the way in which they are funded. A general worldwide phenomenon has been the movement away from near total public funding of higher education to a more heavy reliance on private funding and the principle of user pays. This in turn has questioned the public good nature of higher education.

Nearly everywhere, over the last two to three decades, higher education institutions and systems have experience growing austerity. This has been due to, in part, dramatic rising costs on the one hand fuelled by the massification of higher education, and the inability or unwillingness of governments to meet those costs, on the other. Johnstone and Marcucci (2007: 1) note that:

"These diverging trajectories of costs and available revenues, in turn, are a function of three principal forces: (1) rapidly increasing unit, or per-student, costs; (2) increasing tertiary level participation, or *massification*, greatly exacerbated in many countries by the combined forces of university-age population growth and the increasing higher educational participation rates of these increasing cohorts; and (3) a dependence on what in most countries is increasingly inadequate governmental revenue. These forces vary by country, but the result in most countries – and especially low- and middle-income countries – has been increasing austerity in both universities and other institutions of higher education as well as in national systems of higher education".

### **Financing the Research Mission** (Johnstone and Marcucci, 2007: 2-3)

Within this caldron of higher educational finance, in which most of the problem lies in the combination of high and rising costs, exacerbated in most countries by high and increasing enrolments, the public and governments alike tend to think of universities and colleges mainly as places for *instruction*. The important *research* missions of those institutions that are properly labelled universities may thus drop to an even lower priority or become otherwise distorted by the rising student-faculty ratios and the need to spend more time teaching or searching for entrepreneurial revenue or both – in any event, to the likely detriment of the quality of both teaching and research. Research may fall to only a few universities in a country, or fall mainly to the universities and research institutes in the advanced industrialized countries – especially in the United States (Herbst, 2007: 167-185) – or may fall mainly to business and private investment (Vincent-Lancrin, 2006). Such scenarios carry serious implications for the role of research at non-elite universities (indeed to the very missions of such institutions), to the already heightened economic and cultural – and now the academic and scientific – hegemony of the wealthy nations, and to the balance between research that is *applied* and is more commercially supportable and research that is more *basic* and *curiosity-driven*. Thus, research – which is increasingly important not simply for the knowledge economy but for the preservation of cultures and for solutions to social and political problems, and which is dependent on universities for the training of scholars as well (in most countries) as a venue for much of the research that is basic – is also at risk from these trends in financing. In short, solutions to the financial threats to universities and other institutions of higher education in their *instructional* missions must also address the financial threats to their *research* missions – especially that research that is basic or risky, or otherwise not likely to be given sufficient attention if left solely to the commercial market.

Tadjudin (2008) notes that market competition and competitive funding of higher education are aspects of higher education systems worldwide. Competitive funding can take the form of funding for projects, units, programmes or institutions. Drawing on the Indonesian case, Tadjudin (2008: 81-82) outlines the following principles of competitive funding arrangements:

- Competition: the number of grants offered should be smaller than the number of units taking part in the competition ideally not exceeding 20 per cent of the participants.
- Specific purpose: the purpose of the grants scheme should be described in the guidelines for submission and in the performance indicators.
- Autonomy and decentralization: the grantee should be responsible and accountable for carrying out the project.
- Consistency in applying policies: competitive funding should be consistently applied if it is used.
- Tiered competition: there should be a reasonable chance of being awarded a grant which can be achieved by having healthy competition between institutions of a similar level.
- Objective selection process: the selection should be carried out by peer review and information about reviewers should be kept secret until the period of site visits.
- Evaluation and monitoring: after the announcement of the winners a periodic evaluation and monitoring process should be established.
- Incentive and disincentive: incentive is provided by a grantee being able to take part in more prestigious granting schemes and placement in a higher tier whilst punishment in

the form of terminating a grant should be considered if the project does not perform well.

Tadjudin (2008: 87-88) believes that the success of competitive funding is based on a number of factors:

- There should be supportive policies at the level of the Directorate General of Higher Education (DGHE) and at the national level.
- The lack of understanding at a national level of the concept of competitive funding should be combated, particularly in the case of parliamentary leaders.
- Higher education institutions should look beyond competitive funding as just an opportunity to get funding from the DGHE and look at how it can improve their systems.
- In evaluating the results of this scheme some external review mechanisms like accreditation and university ranking should also be taken into consideration.

The cost of research is rising constantly, with many countries attempting to devote between 1 and 3 per cent of GDP. But for small economies, even this level of investment is not enough for some forms of research, particularly in the physical sciences and some of the health-related fields. Sörlin (2007: 1) notes that:

“The net results of these ever-increasing knowledge interests have contributed to an ever-increasing research budget in virtually all states around the world, albeit with certain plateaus and stagnant periods. Currently, it is newly industrialized countries in Asia, along with old industrial giants such as India, which are demonstrating the most rapid growth. Still, in most OECD countries as well, research funding is gradually increasing its share of GDP, although GDP itself continues to grow. The same is true, although to a lesser extent, of publicly funded R&D, which in many ENA countries is now approaching 1 per cent of GDP and in a few cases is exceeding that figure, which one generation ago seemed unattainable. In absolute terms this means that research funding has multiplied in the last two decades and since WWII the net growth is so huge that it would be hard to calculate with any reasonable precision”.

Research is not only expensive, generally, but often carries many hidden financial burdens for individual higher education institutions. One of the big debates in many countries is the extent to which research should be fully funded, covering not only direct costs, but also contributing to overheads and infrastructure. Often, higher education institutions are asked to provide matching funding when bidding for research grants. According to Sörlin 2007: 1-2):

“Looked at from the institutional level, this enormous growth may seem less encouraging. It is often felt that, although budgets are constantly growing, they tend to be much harder to get and they come with more demands on performance. Also, a closer look at the gross R&D figures reveals that it is privately funded, and privately performed, R&D that grows at the fastest rate. The funds that go to universities and research institutes, and that these receive directly as block grants, have for a long time stagnated in most countries ... So the fact of the matter is that those institutions that carry out the higher education work and do the research have to do more and more work for less funding ‘per unit’, regardless of whether the unit is a student trained for three years or a scientific paper researched, written and published. In other words, productivity is going up in the research and higher education sectors”.

While maintaining adequate public funding of higher education is a worldwide problem, it is most pronounced in developing countries. And here, the problem is not merely one of creating and maintaining an adequate higher education system, but allowing countries to participate fully in the global knowledge economy. Clearly, the amount of money devoted to General Expenditure on Research and Development (GERD) is much higher in developed than in developing countries (see Table 1). The immediate tangible effects of such funding differentiations are felt

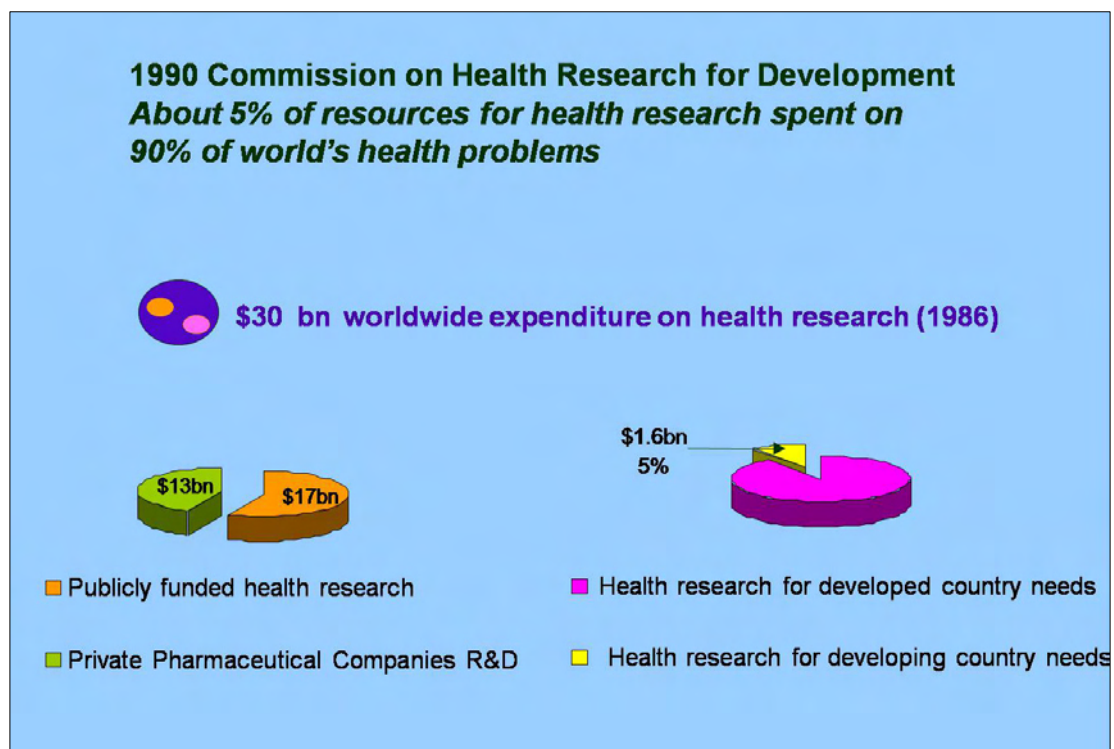
immediately in areas like health. As can be seen in Figure 3, in 1986, only about 5 per cent of resources for health research were spent on the health problems of developing countries, which constituted 90 per cent of the world's health problems. The current situation has only marginally improved.

Table 1. Comparative Support for R&D (2002)

<i>Country</i>	<i>GERD \$billion</i>	<i>GERD % of GDP</i>	<i>GERD per inhabitant \$</i>	<i>Researchers per million inhabitants</i>
World	829.9	1.7	134.4	894.0
Developed Countries	645.8	2.3	540.4	3272.7
Developing Countries	183.6	1.0	42.8	374.3
Less-developed Countries	0.5	0.1	0.7	4.5
Arab States Africa	1.2	0.2	6.5	159.4
Arab States Asia	0.6	0.1	6.2	93.5
All Arab States	1.9	0.2	6.4	136.0
Brazil	13.1	1.0	75.0	314.9
China	72.0	1.2	56.2	633.0
India	20.8	0.7	19.8	112.1
Israel	6.1	4.9	922.4	1395.2

Source: UNESCO, 2005: 4, cited in Zahlan, 2007: 5.

Figure 3. Global Forum for Health Research: Helping Correct the 10/90 Gap



Source: Burke, 2008, Paris slide 2.



## 2.2. Neo-liberal Ideology

Much of the recent debate over funding of higher education and research has been driven by a neo-liberal ideology. The policies of the World Bank, the International Monetary Fund (IMF), and the World Trade Organization (WTO) have been based on open market principles and free market competition. This has been particularly apparent and contested with respect to the introduction of the General Agreement on Trade in Services (GATS) and its impact on the provision of cross-border higher education. Bultana (2007: 1) argues that "... one of the main instruments of globalization and the emergence of the neo-liberal global economy is the creation of the World Trade Organization (WTO) and the launching of the General Agreement on Tariffs and Trade (GATT)". According to Knight (2007: 1):

"While demand is growing, the capacity of the public sector to satisfy this need is being challenged. As a result, new types of providers such as international companies, for-profit institutions, corporate universities, IT and media companies are emerging. This scenario is changed further with providers – public and private, new and traditional – delivering education across national borders to meet the demand in other countries. Alternative types of cross-border programme delivery such as branch campuses, franchise and twinning arrangements are being developed. As a result, a rather complex picture of higher education provision is emerging".

Knight (p. 1) notes that "... the fact that the General Agreement on Trade in Services ... clearly identifies education as a service sector to be liberalized and regulated by trade rules is new territory for the education sector". However, Knight (p. 5) quite correctly recognizes that GATS is only one small element of the large mosaic of change in higher education:

"There is much discussion and debate over four rather controversial trends or 'izations' of higher education. They include: commercialization (buying and selling including commodification), privatization (private ownership and/or funding), marketization (allowing the market to determine supply and demand) and liberalization (removal of trade barriers and promotion of education as a tradable service). Some would even add a fifth – globalization – and point to it as an underpinning cause for the other 'izations'. Some scholars and policy-makers would disagree and label education as an actor not a reactor to globalization and thus fully involved and responsible for these major shifts. Nevertheless, these trends or 'izations' are closely related to each other and are linked to the relationships between cross-border education, GATS and higher education policy and practice".

## 2.3. Competition and Globalization

Clearly, higher education operates in a globally competitive market and governments everywhere are concerned to maximize their higher education institutions' contribution to the knowledge economy. This has given rise to the notion of the so-called "World-Class" research university which has gained prominence in recent years. Global university rankings and the emphasis on creating world-class universities are part and parcel of globalization, as Ordorika (2006: 5) notes:

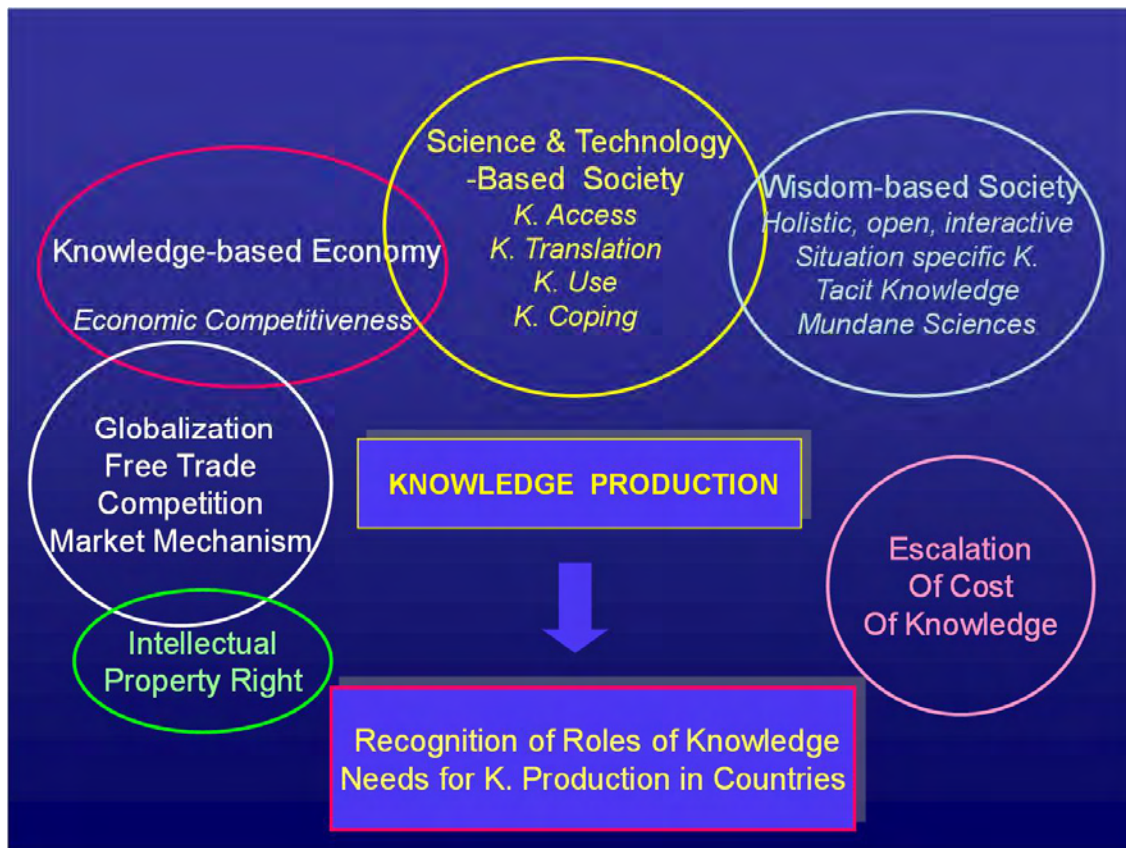
"Globalization has added a new element to competition and stratification in higher education. Research universities have always competed with each other for social and academic prestige, and also have long engaged in cross-border activity at their margin. Now for the first time we can identify a single system of world-wide higher education: a network of web-sites joined by instant messaging and data transfer, in which global connections run through the centre of institutions and governments and are integral to day-to-day practices. At the same time global people mobility in higher education has substantially increased. In turn global communications and mobility have created conditions for the emergence of a global market in higher educa-

tion, i.e. competition among elite universities is now worldwide and is moving closer to capitalist economic forms.

The global higher education market is structured in two tiers: a super-league of global research universities, which are driven more by prestige and power than by economic revenues as such; and a larger group of institutions of lesser status involved in the commercial export of higher education, where the mode of development is that of an expansionary capitalism. This global market is mediated by comparative 'league tables' of research performance or university status (e.g. the annual comparisons issued by Shanghai Jiao Tong University, and the UK *Times Higher Education Supplement*)”.

A stylization of various possible social dynamics surrounding the creation of global knowledge economies is provided in Figure 4.

Figure 4. Knowledge Production



Source: Suwanwela, 2005, Seoul slide 2.

## 2.4. The Role of the Private Sector

Section 4 below will address the theme of diversification of higher education in more detail. Here, however, it is important to note how funding and overall resource issues impact on diversity, or at least on the generation of new types of institutions. This is particularly apparent with the relatively new phenomenon of the rise of the private, for-profit higher education sector in many countries. These initiatives include the creation of physical campuses, the creation of cross-border initiatives by established public universities, and virtual universities. According to Guri-Rosenblit, Sebkova and Teichler (2007: 7–8), the positive aspects of such initiatives include:

- The widening of learning opportunities at various higher education levels by providing more choice for citizens in any given national jurisdictions.
- Challenging traditional education systems by introducing more competition and innovative programmes and delivery methods.
- Helping make higher education more competitive.
- Assisting in diversifying the budgeting of higher education.
- Benefiting through links with prestigious institutions, mainly in developing countries.

There are also negative aspects to the development of for-profit higher education: some providers may be unregulated, not subject to external quality control and offer degrees of dubious standard. “Programmes offered by private institutions tend to concentrate in the areas of liberal arts, business administration, and computer sciences and technology ... to avoid investing in high-cost programmes in order to insure a higher profit margin” (Al-Atiqi and El-Azma, 2007: 34). Prestigious institutions that establish cross-border programmes or campuses may not enforce the same quality assurance rigour overseas as they do at home. But, overall, the development of private higher education is playing an important role in helping to meet rising participation expectations in many countries.

## 2.5. Commodification and Marketization

Bertelsen (2002: 1) observes that “... the commodification of higher education to serve the market is revolutionising our entire practice from institutional image through to management, jobs and curriculum”. She goes on to state that:

“Once they have conceded that knowledge is a commodity to be traded, universities become subject ... to the full and ruthless protocols of the market. Time-honoured principles of truth and intellectual rigour are rapidly superseded by cost-effectiveness and utility, and market rules are systematically applied. First, research is only done if it creates new products, and courses which don't feed job skills are a waste of time. So managers dutifully prioritise 'core business' and eliminate 'peripheral' activities, and funding becomes an investment decision based on short-term production goals”.

It appears that the modern university has shifted its orientation from social knowledge to market knowledge and that the “... development of a market oriented university supersedes academic decision-making” (Buchbinder, 1993: 335). According to Newson (1993: 298), “These new forms of decision-making fundamentally undermine a conception of the university as an autonomous, self-directing, peer-review and professional-authority based institution, and thus changes the politics of how academic work is accomplished”.

Clearly, the commodification of knowledge has led to new types of relationships within the academy based on what Slaughter and Leslie (1997) refer to as academic capitalism, and the academic capitalist professor has become a powerful position within many universities. According to Henkel (2002: 60), “academic scientists and the institutions in which they work have become more or less willing actors in a range of markets and so in the commodification of scientific knowledge”. She goes on to state that “... capacity for profit-making sits alongside intellectual reputation as high value currency in an increasingly competitive academic labour market”. But this does not mean that the university is being transformed out of all recognition. Marmolejo and Puukka's (2006: 5) summary of the current situation is worth quoting:

“Higher education institutions are seen historically as key actors in the production, preservation, and dissemination of knowledge. Since the foundation of the Bologna University, almost a millennium ago, the idea of a university as a place in which learned individuals transmit information and knowledge to learners has been evolving. In today’s world it is understood that higher education institutions in societies all over the world are the main factor for the social and economic mobility of individuals and, in the long run, for societies. Moreover, in a context characterized by complexity and accelerated change, higher education faces important opportunities and challenges, many of which are new and unexpected”.

### **3. Higher Education, Research and Society: Civil Society Stakeholders and Other Links**

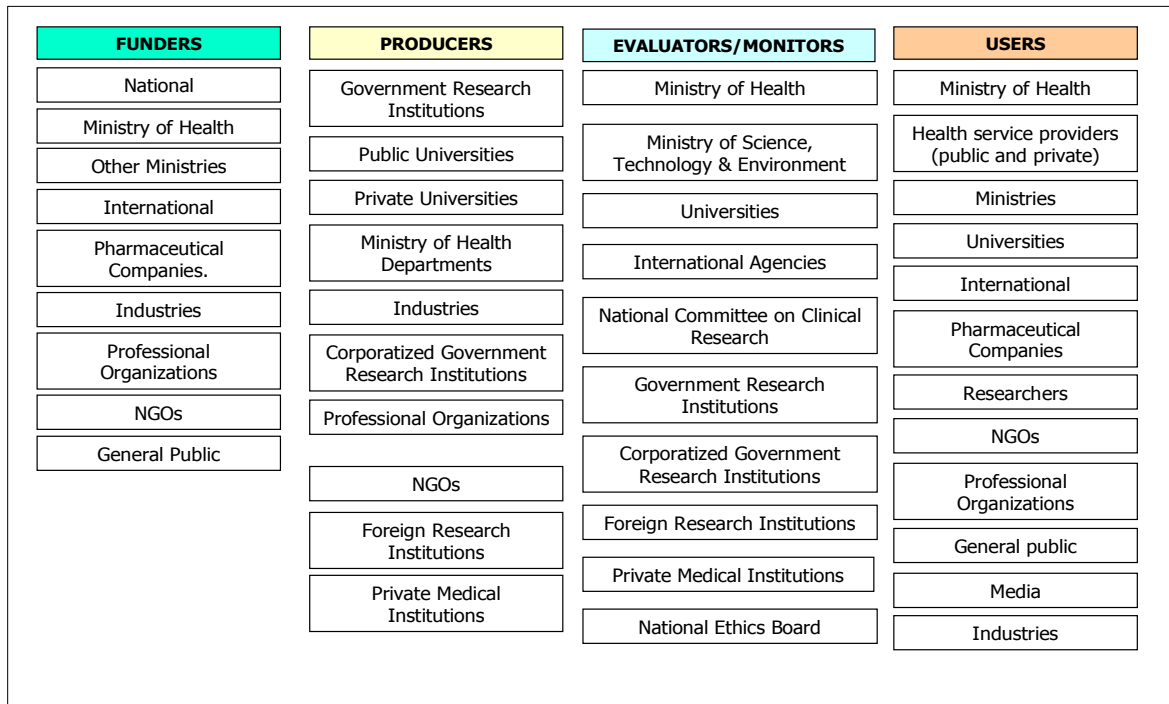
#### **3.1. The Stakeholder Concept**

The term “stakeholder” originates from the business/management literature, and is defined by Freeman (1984) as “... any group or individual who can affect or is affected by the achievement of the firm’s objectives”. The appeal of the concept is that it emphasizes that an organization’s long-term success is not solely dependent on the financial interests of its immediate shareholders, but that it must take account of a broad range of social, political and cultural agents in order to achieve long-term success. For the university to be an effective institution in an increasingly complex environment, this means that it is not just a matter of generating sufficient income to “remain in business”, but that it is just as essential that it proves “... its relevance to society and the various entities in society that the university regards as important” (Jongbloed and Goedegebuure, 2001: 9).

There are at least three different stakeholder theory types: normative, instrumental and descriptive (Donaldson and Preston, 1995). The *normative* approach concerns how managers should deal with the organization’s stakeholders. The *instrumental* approach sees stakeholders as a means towards an end. The *descriptive* aspect of stakeholder theory deals with specific organizational characteristics and managerial behaviours regarding stakeholders.

There are many kinds of stakeholders, and the interests of some may be in competition with those of others, and, depending on where one is located within an institution’s environment, some may be considered more of a stakeholder than others. However conceptualized, the interaction between stakeholders and institutions has a direct impact on knowledge production. One example of this for the field of health is provided in Figure 5.

Figure 5. Challenge (and Opportunity): Wide Range of Stakeholders in Knowledge Production and Health



Source: Sadana, 2008, Paris slide 11.

### 3.2. Think Global, Act Local: The Knowledge Economy and the Third Mission

While the globalization of higher education has been emphasized over the last couple of decades, a more recent and just as important phenomenon has been the notion of regional, social and economic commitment. In a number of important ways, global competition has led higher education institutions to discover or re-discover the importance for their survival of local support and engagement. Marmolejo and Puukka (2006: 1) comment that:

“Higher education institutions can and do make a significant contribution to regional, economic, social and cultural development. In a globalized economy, the relevance of the various activities conducted in those institutions is growing in importance and is subject to increasing scrutiny. Too often, however, failures of communication between regional stakeholders and higher education institutions reduce the effectiveness of their teaching, research and public service efforts and limit the understanding at the local level of their impact. These communication failures are often ... due to weak or unclear policy signals, and conflicting agendas”.

And they conclude (p. 2) that:

“Preliminary findings suggest that, if countries want to be globally competitive, regional innovation systems need to be strengthened. In order to achieve this, cooperation between higher education institutions, public authorities and the business sector becomes vital. Currently, many regions are characterized by an abundance of activity involving higher education in regional development in some way, but there is limited evidence of coherent action. It is also evident that there are often no proper incentives, indicators nor monitoring of the outcomes of this type of activity. Finally, a cultural change within HEIs is necessary since regional engagement, academic excellence, and research are often not seen as complementary activities”.

**Think Global, Act Local**  
(Marmolejo and Puukka, 2006: 6)

The increased diversity of higher education institutions is reflected in the expansion of their roles and responsibilities. No longer is it merely expected that HEIs provide quality teaching and conduct sound and relevant research, but more and more they are expected to play a key role as agents of regional development. This engagement is to take place in an environment characterized by scarce and limited resources, increased scrutiny, and calls for transparency and accountability from a number of internal and external stakeholders.

This complex environment confronts institutional decision-makers with recurrent dilemmas. A typical example is when institutions confront conflicting options in search of common ground between the institutional research agenda, the needs of surrounding industry, the priorities of external funding agencies, and the personal agendas of researchers (Ylijoki, 2003). Decision-makers face the need to ensure that their institutions become nationally and internationally competitive, while struggling to address the needs of the region in which they are located. In this context, institutions are compelled to orient themselves, and allocate internal resources, in such a way that often fields closer to market needs are favoured, while others such as the humanities and arts have difficulties surviving (Slaughter and Rhoades, 2004). Similar challenges are faced by universities in dealing with the clamour of employers demanding the development of more flexible academic programmes. This pushes institutions to again favour fields and content closer to market needs. Finally, institutions confront pressures to be more active as agents for economic development, sometimes competing with entities created for that purpose by regional and national governments as well as by the business sector.

In Table 2 Laredo (2007) provides a very useful summary of the various dimensions of higher education institutions' third mission.

**Table 2. The "Radar" of Third Mission Elements Proposed by the PRIME–OEU Project**

<i>Issues</i>	<i>Focus, main indicators and descriptors</i>
1. Human resources	<p><i>Focus:</i> Transfer of embodied knowledge in Ph.D. students and graduates.</p> <p><i>Comment:</i> This axis screens the transfer of "competences trained through research" to industry and "mission oriented" public services.</p> <p><i>Indicators:</i> The number and share of Ph.D. diploma going to industry and public services (distinguishing between R&amp;D and non R&amp;D positions).</p>
2. Intellectual property	<p><i>Focus:</i> Codified knowledge produced by the university and its management (patents, copyright).</p> <p><i>Indicators</i> concern not only patents owned by the university, but university "inventors" (whatever the grantee is). Patent numbers should be complemented by licences granted and fees received.</p>

Table 2. (cont'd)

3. Spin offs	<p><i>Focus:</i> Knowledge transfer through entrepreneurship.</p> <p><i>Indicators:</i> Simple counts are not enough, a typology of relationship between spin-off firms and labs has to be considered (staff that left, staff still involved, research contracts, licences granted ...).</p> <p><i>Descriptors</i> are needed to characterise university involvement and support: dedicated teams, incubator, funds provided (in whatever form, including shareholding).</p>
4. Contracts with industry	<p><i>Focus:</i> Knowledge co-production and circulation to industry. This is taken as the main marker of the attractiveness of universities for existing economic actors.</p> <p><i>Indicators:</i> Number of contracts amount as a share of total resources, type of partners (global, large firms, SME) are the key aspects. Level of concentration (sectoral and/or on a few partners), types of contract (research, consultancy, services) and duration are important complementary aspects. Delineating in large labs the degree of concentration (thematic or on given teams) is also often of strategic interest.</p> <p><i>Comment:</i> This is often complemented by a “soft” dimension where account is taken of membership to professional associations (and role played in given professional networks), professional publications, activities in continuous training, consultancy activities (often not paid to the lab) and internships (master students accepted in “stages”).</p>
5. Contracts with public bodies	<p><i>Focus:</i> The “public service” dimension of research activities.</p> <p><i>Indicators:</i> Similar aspects as for contract with industry apply, especially differentiating between co-research and services.</p> <p><i>Comment:</i> It is important to complement contracts by non-market relations which are often critical when labs focus on social and cultural dimensions (this has often important implications for identity building but also for economic activities such as tourism). This is also very present in health research (with clinical trials for new therapeutic protocols ...).</p>
6. Participation in policy-making	<p><i>Focus:</i> Involvement in the shaping and/or implementation of policies (at different levels). This is often captured under the wording of “expertise”, including policy studies, participation in the formulation of long-term programmes or to “formalised” debates on S&amp;T&amp;I policy, involvement in standard setting committees, in committees and work on safety rules ...</p> <p><i>Descriptors:</i> The usual mode is to consider a description in the annual report in order to build an indicator of presence and “relative importance” (number of different activities and entities, number of persons involved).</p>
7. Involvement in social and cultural life	<p><i>Focus:</i> Involvement of the university in “societal” (mostly “city”) life.</p> <p><i>Comments:</i></p> <ul style="list-style-type: none"> <li>— A number of universities have lasting “facilities” that participate in the social and cultural life of the city (museums, orchestra, sport facilities, facilities like libraries open to schools or citizens ...). Some involve themselves opening “social services” (like law shops).</li> <li>— Besides these “structural” investments, a number of labs involve themselves in given social and cultural events (expos, concerts, urban development projects ...).</li> </ul> <p><i>Descriptors:</i> There is little accumulated knowledge on how to account for such activities. Two approaches are being experimented: accounting for relative importance in all university investments and/or activities, positioning these within their own environment (as can be done for museums).</p>

Table 2. (cont'd)

8. Public understanding of science	<p><i>Focus:</i> Interaction with society.</p> <p><i>Comment:</i> The choice has been to focus here only on “dissemination” and interaction with the “general public”. All growing aspects upon involvement in public debates are considered to be part of dimension 6 (participation in policy-making).</p> <p><i>Descriptors:</i> Follow sets of activities deployed (open days, involvement in scientific fairs and the like, involvement in general press and science journals for the public, involvement in the different media, construction of “dissemination” and “interactive” websites, involvement in activities directed towards children and secondary schools ...). Differentiate between individual initiatives and proactive policies of labs and of the university (as a whole or through its departments).</p>
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Source: Laredo, 2007: 8-9.

### 3.3. Research and the Knowledge Economy

The increasing recognition of the importance of research and the training of a highly skilled workforce in positioning nations in a global knowledge-based economy at once elevate the importance of higher education institutions and threaten many of their traditional values. The process is part and parcel of the advent of the post-industrial society and the commodification of knowledge – commodification taken here to mean “... the phenomenon in which non-material activities are being traded for money” (Lubbers, 2001). Neave (2002: 3) writes that:

“Knowledge has always been power as well as a public good. Access to it and its role in innovation determine both the place of Nations in the world order and of individuals in society. But, commodification displaces the creation and passing on of knowledge from the social sphere to the sphere of production.

Displacing and reinterpreting knowledge under these conditions raise fundamental questions for the university above all, in the area of academic freedom and in the ‘ownership’ of knowledge. They also pose questions about the ethical obligation to make knowledge freely available to those who seek it”.

In the mid-1980s, Lyotard (1984: 3, cited in Roberts, 1998: 1) hypothesized that “...the status of knowledge is altered as societies enter what is known as the post-industrial age and cultures enter what is known as the post-modern age”. According to Roberts (1998: 1), knowledge “... is becoming ‘exteriorised’ from knowers. The old notion that knowledge and pedagogy are inextricably linked has been replaced by a new view of knowledge as a *commodity*”. Or as Oliveira (2000: 25) puts it, “... there is an essential difference between ‘science as a search for truth’ and ‘science as a search for a response to economic and political interests’”. Lyotard (1984: 4-5, cited in Roberts, 1998: 1-2) maintains that:

“Knowledge is and will be produced in order to be sold, it is and will be consumed in order to be valorised in a new production: in both cases, the goal is exchange. If knowledge ceases to be an end in itself, it loses its ‘use-value’ ...

Knowledge in the form of an informational commodity indispensable to productive power is already, and will continue to be, a major – perhaps *the* major – stake in the worldwide competition for power”.

According to the OECD (1996: 3), “... knowledge is now recognized as the driver of productivity and economic growth, leading to a new focus on the role of information, technology and learning in economic performance. The term *knowledge-based economy* stems from this fuller recognition of the place of knowledge and technology in modern ... economies”. Several writers



have extended the concept, arguing that science and research are transforming the whole of the social structure, creating a knowledge-based society of global proportions. Concepts depicting this transformation are formulated by Gibbons and his colleagues (1994) in terms of Mode-1 and Mode-2 science, and later Mode-2 society (Nowotny, Scott and Gibbons, 2001). Etzkowitz and his colleagues provide the less ambitious conceptualization of the “Triple Helix”, representing the complex interplay between universities, government and industry in the innovation framework (Etzkowitz and Leydesdorff, 2001).

Of course, neither knowledge nor its utilization is equally distributed within or between nations. The knowledge divide is particularly stark between the richer and poorer countries of the world, as depicted in Figure 6. However, as is argued in more detail elsewhere in this report, the divide is starting to be bridged, at least partially, as the developing nations begin to create their own competitive research systems.

Figure 6. Knowledge Divide, Research Divide



Source: Suwanwela, 2006, Paris slide 8.

There is clearly a reciprocal relationship between the massive and unprecedented expansion of higher education during the second half of the twentieth century and global economic restructuring based on the advent of the post-industrial or “knowledge” society. In the post-industrial society, knowledge supersedes agriculture and manufacturing as the main means for wealth production, and becomes the primary resource of society. It is not that agriculture and manufacturing disappear, but rather that technology has made both agriculture and manufacturing so efficient that they demand the attention of only a minority of the workforce (Perkin, 1991).

As the knowledge society continues to develop, market relations based on knowledge production increasingly permeate all aspects and institutions of society, and the university is faced with a growing number of competitors in both research and training. Also, the commodification of knowledge is impacting heavily on the internal social structure of the scientific community.

What is remarkable is the continuing importance and centrality of the university as knowledge is increasingly brought within market and political exchanges.

#### **4. Institutions: Structural Differentiation and Patterns**

There are many different types of diversity in higher education (programmatic, systemic, procedural, etc.). This theme will concentrate mainly on systemic diversity which can be defined as the “existence of distinct forms of post-secondary education, of institutions and groups of institutions within a state or nation that have different and distinctive missions, educate and train for different lives and careers, have different styles of instruction, are organized and funded differently and operate under different laws and relationships to government” (Trow, 1995). One also needs to distinguish between vertical (or hierarchical) diversity based on the status of institutional types and horizontal diversity based on institutions’ teaching and, to a lesser extent, research functions.

Diversity, it is claimed, affects nearly every aspect of higher education: access and equity, teaching methods and student learning, research priorities, quality, management, social relevance, finance, etc. Stadtman (1980: 98-99), for example, states that diversity:

- Increases the range of choices available to learners.
- Makes higher education available to virtually everyone.
- Matches education to the needs and abilities of individual students.
- Enables institutions to select their own mission and confine their activities.
- Responds to the pressures of a society (complex and diversified in itself).
- Becomes a precondition of college and university freedom and autonomy.

However, views about both the character and extent of diversity vary substantially. Guri-Rosenblit, Sebkova and Teichler (2007: 2) ask the following questions:

- What range of heterogeneity or homogeneity is preferable?
- To what extent should diversity be arranged inter-institutionally or intra-institutionally?
- How clearly should differences be demarcated or softened and blurred?
- To what extent is diversity best served by formal elements of diversification (i.e. different types and levels), or by informal elements (i.e. differences in the reputation or profile between individual institutions or their sub-units)?
- Does diversity prevail predominantly according to the vertical dimensions, i.e. ranking according to quality, reputation etc., or does horizontal differentiation, e.g. according to curricular thrusts and institutional profiles, play a role as well?

With the continual expansion of higher education following the Second World War, the issue of diversity has been a recurrent theme in debates on the steering and management of higher education institutions and systems. But the debate has resolved neither how diversity is to be achieved, whether or not it is an inevitable result of expansion, nor even if it is a worthwhile goal. Responses to the issue by different national systems vary widely. Much of the writing on higher education in the USA assumes that diversity is an inherent good, best achieved through market competition rather than by centralized planning. Many European countries until quite recently have not only developed centralized systems of higher education but have also in the name of equity and quality enforced a high degree of homogeneity amongst institutions, particularly universities. Other countries have attempted to manage diversity through structural means, such as

the binary systems in Australia, Germany and the United Kingdom which differentiate between “theoretically based” universities and “vocationally oriented” polytechnics. While the binary arrangement has been discarded by Australia and the UK, it appears to remain entrenched in Germany and is being introduced and/or reinforced in such countries as Finland, the Netherlands and Norway. In addition, according to Guri-Rosenblit, Sebkova and Teichler (2007: 2), “... trends of globalization, supra-national policies, bottom-up initiatives of founding private for-profit higher education institutions, continuous cuts of higher education budgets by governments, the emergence of the digital technologies and the growth of transnational higher education in the last decade have added additional layers to the debates on diversity and massification in higher education”.

### **Arguments Advocating Diversity**

(Guri-Rosenblit, Sebkova and Teichler, 2007: 1)

Two arguments were most powerful as far as advocacy for increasing diversity is concerned. First, most experts agreed that it is impossible to teach all of the large numbers of students in research universities which are extremely expensive to sponsor. Therefore, it seemed obvious that other types of higher education institutions geared mainly for teaching and professional training are appropriate for absorbing the growing numbers of students (Clark, 1983; Trow, 1974, 2000). Second, a growth of diversity of backgrounds, talents and motives of job expectations among the rising number of students should be accommodated by heterogeneous higher education providers.

#### **4.1. Structural Differentiation or Integration**

One thing that is known about diversity is that it cannot be understood in isolation from the way in which governments manage and structure higher education systems. The great debate over the last thirty years is whether higher education systems around the world are evolving towards integrated, unitary systems or formally differentiated systems. So far the empirical evidence does not support the ascendancy of one trend over the other. Nonetheless, it is important to understand the basis of the two arguments for they impact directly on how we think about both the character and the efficacy of higher education.

Bleiklie (2007: 1) argues that “... higher education systems in much of the Western world have become steadily more integrated”. But he also comments that this is a very complex and far from inevitable, or one-directional process. He notes that, from the literature, there are two opposing views on the development of diversity of higher education systems: convergence and divergence. The convergence school argues that, for example, with the increased emphasis on similar compliance schemes in the areas of quality assurance and accountability, increased student mobility, the blurring of basic and applied research, and cross-border initiatives such as the Bologna Process, all higher education institutions are assuming similar characteristics, norms and values. The counterargument has it that institutions in competition with one another will “naturally” seek a niche market and differentiate themselves from their competitors. Governments also take a direct interest in diversity because, with growth in function, complexity and size, they find it extremely difficult to fund all institutions on the same basis.

Research and different knowledge regimes are also potentially powerful differentiators of higher education systems. No country can afford to fund all of its universities as world-class research universities. But in integrated, unitary systems, there is a tendency for non-research universities to emulate research-intensive institutions. However, due to the lack of resources, this emulation results in second-rate imitations. Moreover, those institutions that emulate research universities without sufficient resources to adequately do so, cannot provide their students, particularly their research students, with appropriate tuition. Emulation of research universities also diverts institutions away from engaging in extensive programmatic diversity which appears imperative for mass higher education. The important question is how to foster diversity by preventing institutions from converging on some preconceived gold standard of what is proper higher education. But how this is to be accomplished is not at all clear.

According to Bleiklie (2007: 5), there are basic political-economic concerns driving the development of higher education everywhere: “The first concern is that the level of education in the population affects the competitiveness of a nation”. Nations will attempt to structure their higher education systems in order to produce the highest educated population at the lowest possible cost. The level of education in the population is directly related to a nation’s ability to compete in the global knowledge economy. “The second concern is that higher education systems need to be flexible”. Specialization both within and between institutions is necessary to match graduates with the needs of the labour market. Nations’ response to these concerns is influenced by a number of factors:

- Firstly, institutions within today’s integrated higher education systems constitute a complex set, in which different categories of institutions have had vastly different relationships with public authorities and demonstrate considerable variation with respect to their degree of autonomy.
- Secondly, institutions may try to adapt to the integration process by means of different strategies.
- Thirdly, national systems vary considerably with regard to the degree that they are placed into a hierarchy, both across categories of institutions, and within categories.
- Fourthly, knowledge has gained importance in society amongst other reasons, because of the emergence of mass education and the steadily more extensive use of research in private business and public administration (Bleiklie, 2007: 6-7).

In a similar vein, Guri-Rosenblit, Sebkova and Teichler (2007: 3-4) argue that:

“The extent of diversity and homogeneity of higher education systems in each national context depends on various variables. Each national higher education system has external and internal boundaries that portray its horizontal and vertical structure at various levels. The external boundaries define basically which kind of institutions are included in or excluded from the higher education system ... The internal boundaries reflect the horizontal and vertical structures of any given higher education system in relation to a variety of variables: overall structure (unified, binary or segmented into several sectors), the interrelations between the public and private sectors, access policies, study programmes, budgeting patterns, research and teaching policies, academic traditions and cultures, evaluation and accreditation, etc.”.

## 4.2. Rankings and the Pursuit of Prestige

One form if not aberration of vertical differentiation in higher education on a global scale is the current university ranking craze. The obsession with university rankings and league tables is

driven by several complex factors and is coupled with the notion of world-class universities. Basically, as the global competition of the knowledge economy heats up, nations are concerned that they create the best research universities possible in order to maximize their competitive advantage. World rankings are one means for nations to judge how well they are doing in the competitive global knowledge stakes. “Preoccupations about university rankings reflect the general recognition that economic growth and global competitiveness are increasingly driven by knowledge, and that universities can play a key role in that context” (Salmi, 2008: 1).

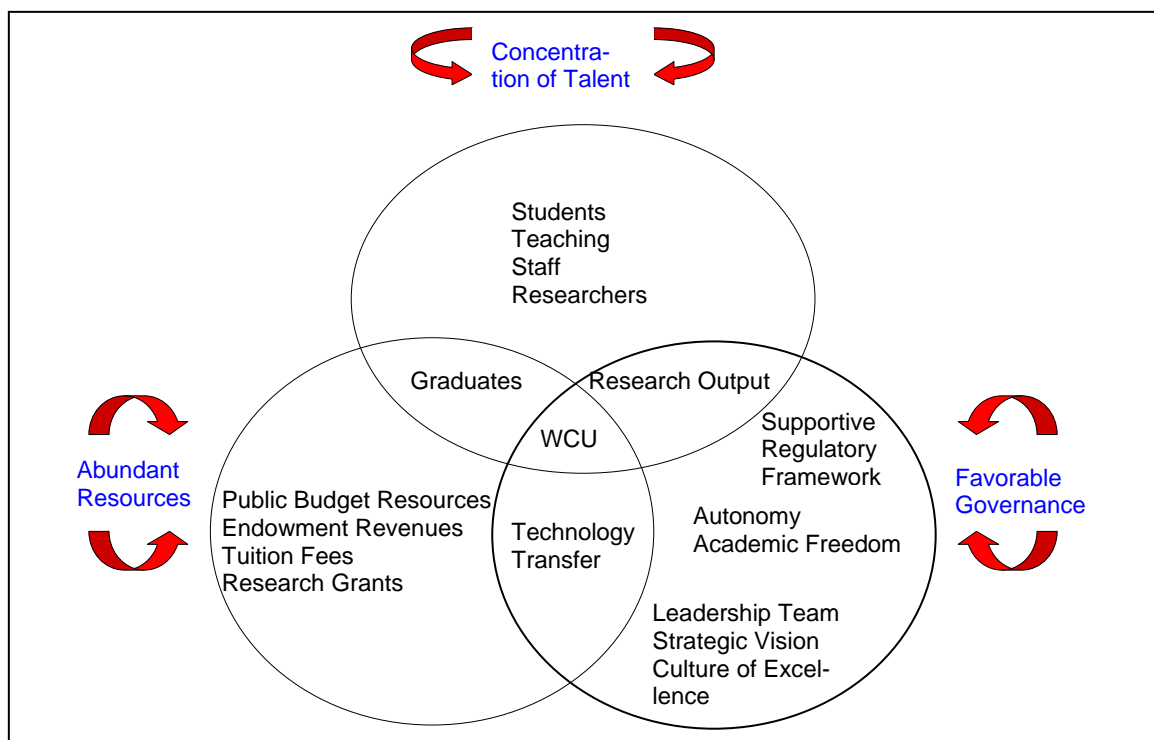
Putting the more bizarre aspects of university rankings to one side, it is important to note that the creation of world-class, research-intensive universities is the preoccupation of nearly all OECD Member countries, and many if not most developing nations are realizing that they require at least one, though not necessarily world-class in all aspects, research-intensive university. Thus, it is worthwhile to explore what is actually meant by a world-class university.

In general, world-class universities are distinguished by a few basic features, the most important appearing to be: excellence in research, highly qualified faculty, high levels of government and private sources of funding, and highly talented students. According to Salmi (2008: 5), achieving the level of excellence required to be categorized as world-class can be attributed to three complementary sets of factors:

- A high concentration of talent (faculty and students).
- Abundant resources to offer a rich learning environment and conduct advanced research;
- Favourable governance features that encourage strategic vision, innovation and flexibility, and enable institutions to make decisions and manage resources without being encumbered by bureaucracy.

The way in which these three factors interact with one another is depicted in Figure 7.

Figure 7. Characteristics of a World-Class University: Alignment of Key Factors



Source: Salmi, 2008, Dublin slide 11.

While recognizing the importance of both research and research-intensive universities to the development of knowledge economies in developing and developed countries alike, it needs to be recognized that no nation can afford to fund all of its universities at a level commensurate with world-class research universities. Moreover, many nations may be better positioned in a competitive global market by creating “world-class systems” of higher education, rather than devoting the majority of their resources to creating a few so-called “World-Class” universities. Even in the USA, “... of about 5,000 tertiary education institutions no more than thirty universities are among the best in the world” (Salmi, 2008: 13).

There is evidence to suggest that world-class systems of higher education are differentiated systems. These are systems that address the increasing needs of society and the diversity of student backgrounds that result from massification. Higher education institutions require a variety of missions and need to cater to a range of stakeholders. The core business of higher education will remain teaching and scholarship, and, in an increasingly complex and volatile global environment, the relevance of their activities to local communities will become all the more important.

## **5. The Role of Universities in Higher Education and Research Systems**

### **5.1. Universities, Research and Innovation**

“The proper role of the university in a national innovation system”, according to Xue (2006: 2), “or, more broadly, in a knowledge economy has become increasingly controversial ...” While there may be agreement on the role of the university in disseminating knowledge through teaching and related activities, there are “... disagreements regarding its role in generating knowledge, and even less agreement on its linkage to the industry and the commercial market”. Nonetheless, the advanced industrialized countries are all concerned to maintain and enhance strong research and innovation systems. But, as Johnstone and Marcucci (2007: 29) note:

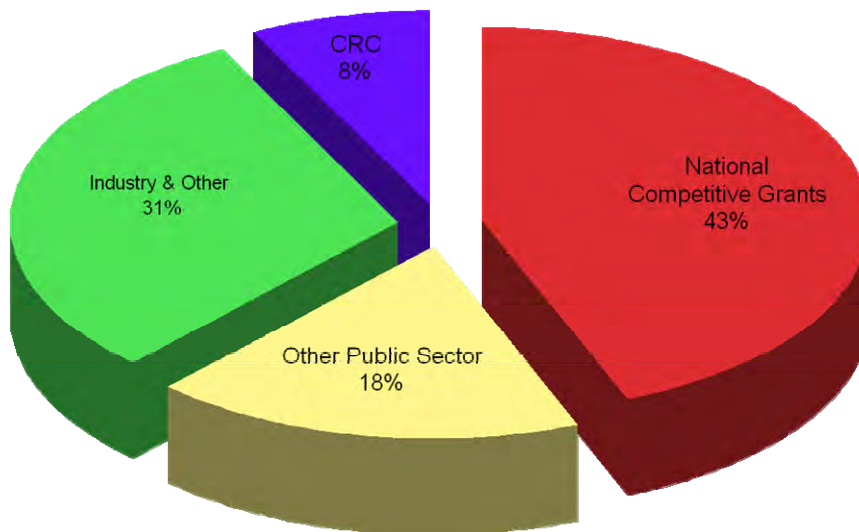
“Research capacity is important as well for low- and middle-income countries: for the sake of their economies, for the requirements of effective management and sound policy-making in their governments as well as in the entities of their civil societies, and for the preservation of their national histories, cultures, and identities”.

### Research and Innovation (Ho, 2007: 3)

The creation of new knowledge or technology is also known as discovery or invention. Research is the scholarly work needed to arrive at finding new things or new knowledge. This is the process of creating value for knowledge. Critical success factors for research are quality, pertinence to societal or business needs or economic growth, and sustainability. We determine quality by its degree of excellence, superior to existing knowledge or products. Pertinence is defined by its degree of relevance to meet a business need, economic development or a societal challenge; its nature can be in the form of knowledge, technology or a solution. Quality and pertinence are among the attributes that define the value of the research outcome. Sustainability is determined by the research's ability to survive and grow. Without this, there is no future for research or activity of research. Sustainability can be achieved if the research's results or innovations can be used effectively or profitably. In order to arrive at these critical success factors, the university research community should align their interests with the strategic objectives of industries and government in order to tackle societal and business challenges and get funding and resources from them. These resources can also help universities improve their infrastructure. By working closely with industries, the governance and processes can be more realistic and efficient. Research and innovation can therefore be useful to the government, sponsoring industries or society at large. These groups will contribute to the research pertinence and, eventually, the sustainability of the research.

According to Johnstone and Marcucci (2007: 29), R&D does not depend on universities: "Most R&D in OECD countries, which constitutes some 80 per cent of the world's research and development and which has been growing significantly in the last two decades, is carried out by business and industry". Nonetheless, the authors note that the proportion of R&D that is conducted in universities and university-affiliated research centres has grown substantially in recent years. The growth of higher education-based R&D has been funded by both governments and the private sector, although in those countries lacking a strong private sector, much of the funding of higher education-based R&D falls to government. This is clearly an aspect of research funding in Australia, as can be seen in Figure 8.

Figure 8. Australian Research Income by Source – 2003



Source: Meek, 2007, China slide 18.

In most systems of innovation, according to Edquist (2006: 1-2), the following activities appear to be important:

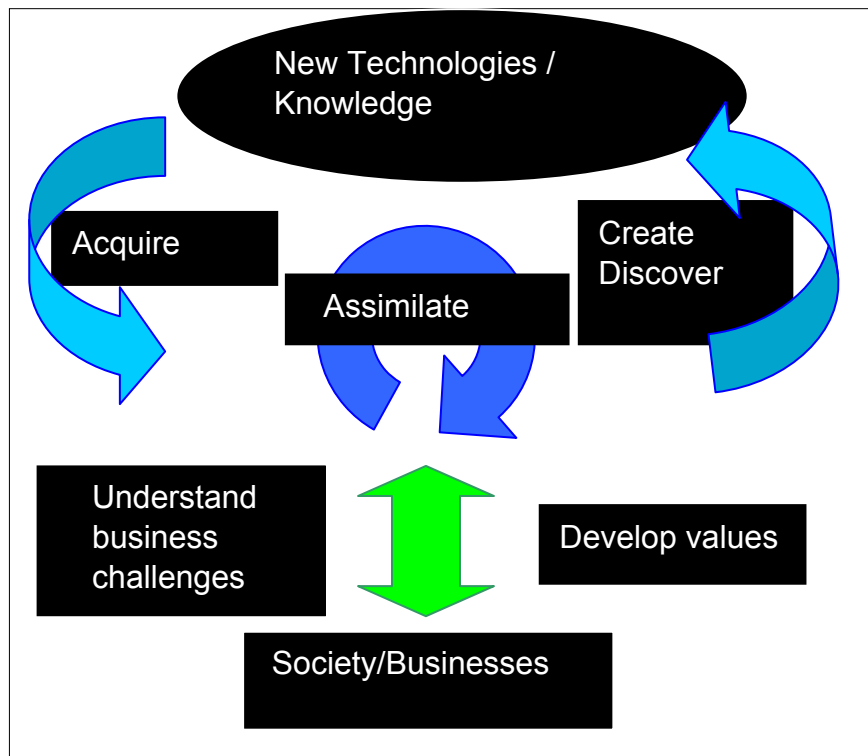
1. Provision of research and development (R&D) creating new knowledge, primarily in engineering, medicine and the natural sciences.
2. Competence building (provision of education and training, creation of human capital, production and reproduction of skills, individual learning) in the labour force to be used in innovation and R&D activities.
3. Formation of new product markets.
4. Articulation of quality requirements emanating from the demand side with regard to new products.
5. Creating and changing organizations needed for the development of new fields of innovation, for example, enhancing entrepreneurship to create new firms and intrapreneurship to diversify existing firms, creating new research organizations, policy agencies, etc.
6. Networking through markets and other mechanisms, including interactive learning between different organizations (potentially) involved in the innovation processes. This implies integrating new knowledge elements developed in different spheres of the SI and coming from outside with elements already available in the innovating firms.
7. Provision (creation, change, abolition) of institutions – for example, IPR laws, tax laws, environment and safety regulations, R&D investment routines, etc. – that influence innovating organizations and innovation processes by providing incentives or obstacles to innovation.
8. Incubating activities, for example, providing access to facilities, administrative support, etc. for new innovating efforts.



9. Financing of innovation processes and other activities that can facilitate commercialization of knowledge and its adoption.
10. Provision of consultancy services of relevance for innovation processes, for example, technology transfer, commercial information and legal advice.

One possible way of depicting the interrelationships between the various elements of research and innovation systems is illustrated by the knowledge cycle in Figure 9. According to Ho (2007: 2), the knowledge cycle “... consists of knowledge acquisition, assimilation and development”. Ho (p. 2) explains that “... knowledge development may lead to creating or discovering new knowledge/technology or creating new value by applying knowledge/technology to societal or business challenges. The knowledge development stage is where value is created, in other words, innovation”.

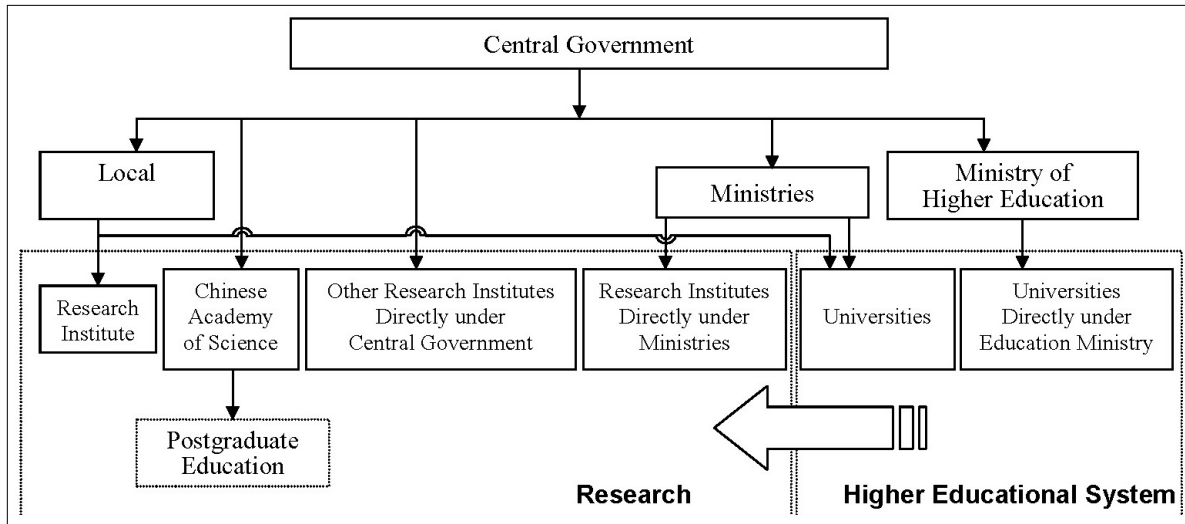
Figure 9. The Knowledge Cycle



Source: Ho, 2007: 2.

The shape of one particular nation's national innovation system and universities is depicted in Figure 10.

Figure 10. China's National Innovation System and Universities



Source: Xue, 2006: 6.

## 5.2. Commercialization and Knowledge Transfer

As mentioned in Section 2, in a global knowledge economy, knowledge becomes a commodity to be bought and sold. The importance of knowledge and having a highly skilled labour force to utilize that knowledge are the backbone of the economy of many if not most nations.

Suwanwela (2008) has recognized that massification in a knowledge-based society leads to or forces innovation both within and without higher education. Distance education, recognition of prior learning, new courses, new types of institutions, new disciplines and technologies are but a few examples. As part of this process, Suwanwela (2008) argues that knowledge is becoming generally more accessible to the public and that knowledge transfer and the growing ties between universities and industry and commerce are increasingly becoming more important.

One needs to be cautious about the degree of the impact of commercialization and knowledge transfer on higher education institutions, particularly with respect to return on investment. A recent Australian study (Australian Centre for Innovation, Howard Partners and Carisgold, 2003: 4, cited in Harman, 2007: 13) suggests that "... even at its best, research commercialization is likely to generate no more than 3 to 5 per cent of university revenue ... Salary costs are high and considerable funds are needed to meet expenses in taking out patents and in consulting fees". Very few if any universities anywhere are in a position to entirely support themselves through the commercialization of their research products. In the USA, "... annual licensing revenue has grown from \$160 million in 1991 to \$862 million in 1999, but still only accounts for about 2.7 percent of university research and development expenditure" (Poyago-Theotoky, Beath and Siegel, 2002: 12). Also, "... it is easy to overstate the value of industry funding for university research" (Scott et al., 2002: 22). In the USA, industry funding for research has remained stable at around 6 per cent for the last twenty years, and is today about the same proportion that it was in 1960. Interestingly, "60 per cent of USA industry funding for university research is for basic research" (ibid.). The argument that university/industry commercial partnerships are turning the attention of research

universities away from the more fundamental, knowledge for knowledge sake questions can be challenged.

Suwanwela (2008) argues that the commercialization of research tends to favour not only a few elite institutions, but also disciplines that are more directly capable of turning their knowledge products into commodities (e.g. biomedicine, certain areas of engineering, etc.). This has left many academics in the social sciences feeling marginalized. However, the importance of “social knowledge” and interdisciplinary teams that involve social scientists as well as scientists and technologists in the innovation process is being recognized. It is becoming accepted that “... there is a growing need for firms to have knowledge about the social and regulatory pressures that will partly determine whether innovations succeed or fail” (Scott et al., 2002: 13).

However, several commentators have argued that a major drawback to greater commercialization of university research is the threat it poses to “open science” and academic freedom. The fear is that commercial-in-confidence joint ventures limit the free exchange and dissemination of ideas between both academics and students. Academics may be hindered in the open publication of research results, and research students may find themselves caught between dual loyalties to the university and the firm. “Universities thrive on the idea of publishing the research results, while firms may want to keep much of the information as a trade secret” (Chakrabarti, 2003: 20). It appears that strategic alliances between universities and industry in the area of biotechnology are particularly prone to such problems (Suwanwela, 2008).

There is some empirical evidence to suggest that academics involved in commercial ventures are more secretive, but other studies have shown that they are also more productive and publish more (Harman, 2005). While some studies have noted concern for the academic freedom of graduate students working on projects involving university-industry partnerships (Geuna, 2001), other studies found no evidence that academic freedom was under threat (Behrens and Gray, 2001). There has been a growing trend for joint publications between university researchers and those based in industry and government, which appears to have actually increased the significance of the university researchers’ contribution. In Canada, for example, “... over a period of eighteen years, the industry and federal government sectors have doubled their collaborations with universities, while provincial governments have increased such collaborations by more than 50 per cent, thereby increasing their links with institutions of higher education” (Godin, Doré and Larivière, 2002: 67).

“The emergence of public-private research partnerships reflects a fundamental change in the way in which knowledge is generated and applied as well as changes in approaches to the management of industrial research and development” (Howard Partners, 2003: ii). “Simply put”, according to Poyago-Theotoky, Beath and Siegel (2002: 16), “... university-industry partnerships appear to accelerate technological diffusion”. Thus, “it is not surprising to observe the formulation of policies that stimulate the formation of university-industry partnerships” in many if not most countries. But it must be admitted that “... we still know very little about the global impact of the rise of university-industry partnerships” (ibid., p. 25). Governments everywhere “... have sought to bring about institutional ‘framework conditions’ that are favourable to industry-university relationships and that encourage the development of channels through which these relations can develop” (Scott et al., 2002: 12). But how best this can be done remains unknown.

Nonetheless, a few generalizations about university-industry partnerships are possible. First, it seems that the quality of the relationships and the free flow of information, particularly tacit knowledge, are as important if not more so as the actual commercialization of a research product. Second, interactive partnerships are becoming more the norm rather than simple contractual

arrangements designed to develop a specific product – Suwanwela (2008) provides several examples of this. Third, university and other forms of publicly funded research provide the core support for knowledge transfer and innovation. Fourth, while in many jurisdictions, universities and industry are coming closer together, the distinctive qualities of each must nonetheless be preserved as well. Fifth, university-industry partnerships are beginning to be regarded as an important policy instrument for regional development and are seen in an overall context of community engagement that extends from the local to the global, rather than a simple university department/industrial firm arrangement (see Section 3 above for a further elaboration of this theme). Finally, and related to the last point, a more multidisciplinary approach to university-industry relationships is starting to emerge where it is being recognized that social and cultural factors and the involvement of social scientists are as important in bringing about successful innovation as the more scientific and technological oriented aspect of such ventures.

There is no one best model for enhancing university-industry relationships or for the commercialization and application of publicly-funded research. The types of successful linkages, transfer channels and partnerships appear to depend greatly on the context in which they occur. The national context is important, but so are the regional and the global. Suwanwela (2008: 31) makes the very important point that:

“The escalation of the cost of technology-intensive commodities such as drugs, energy, tools and services has created a widening divide between knowledge-producing/exporting and knowledge-importing countries. Intellectual property right leads to monopoly and power of pricing. Profit maximization leads to price setting based upon the level of need for the product and the ability to pay by those in need to use it. If the technology is needed, the knowledge-importing countries have to buy at a high price with their limited resources”.

Academics often form networks and alliances nationally and internationally to promote their disciplines and research agendas with little or no regard for immediate financial return. Universities form consortiums not only to further their financial interests, but to assist one another to further key areas of development, such as in the area of medicine. Through competition, higher education institutions enhance resources and prestige. Through collaboration they can build on strengths and compensate for weaknesses in building successful research and teaching partnerships.

## **6. The Relationship between Research and Teaching**

### **6.1. The Teaching/Research Nexus**

Analysis of the teaching/research nexus is not only a complex technical task, but also one fraught with many political overtones and vested interest. There is little doubt that higher education plays an essential role in the knowledge economy, and there is evidence to suggest (see Section 4) that every nation needs at least one university with a degree of research intensity. However, whether every university or higher education institution needs to pursue a research as well as a teaching mandate is quite another question.

Nguyen (2008), drawing on Trowler and Wareham (2007), summarizes the strengths and weaknesses of the teaching/research nexus.

The seven dimensions of the teaching/research nexus identified by Trowler and Wareham (2007) are summarized in Table 3.

Table 3. Dimensions of the Teaching/Research Nexus

<i>Meaning of "nexus"</i>	<i>Practices</i>	<i>Suggested benefits</i>	<i>Possible dysfunctions</i>
1. Learners do research.	<p>Research-based learning approach.</p> <p>Research community practices replicated – peer review, publication on web or paper.</p>	<p>Range of skills developed.</p> <p>Range of concepts developed.</p> <p>Epistemological awareness developed.</p>	<p>Learning too slow to cover curriculum.</p> <p>Patchy coverage of curriculum.</p> <p>Low-quality research with poor ethical control and saturation of respondents with requests for interviews etc.</p> <p>Resistance from learners.</p> <p>Modularised curriculum and timetable constraints mean impractical to do this.</p>
2. Teachers do research.	<p>Teaching cutting edge material.</p> <p>Teaching about their research.</p>	<p>Develops passion for the subject, communicated to learners.</p> <p>Professionalizes academic staff.</p> <p>Teaching-informed research agenda saves time and effort.</p> <p>Skills developed in research re-used in teaching.</p> <p>Develops thinking abilities of teachers.</p> <p>Engagement with pedagogic research and its outputs improves teaching.</p> <p>The effect on individual academics' identities of having a significant research role alongside and/or linked with their teaching activities.</p>	<p>Teachers spend most of their time and energy on research to the exclusion of students.</p> <p>Teaching assistants employed to replace teachers engaged on research resulting in student exposure to lower levels of expertise.</p> <p>Students feeling abandoned.</p>
3. Teachers and learners research together.	<p>Students as research assistants.</p> <p>Co-operative planning and implementation of research projects.</p>	<p>All of the above benefits, plus more task-oriented and co-operative relationship between teachers and learners.</p>	<p>Learning too slow to cover curriculum.</p> <p>Patchy coverage of curriculum.</p> <p>Students effectively unpaid research assistants.</p>

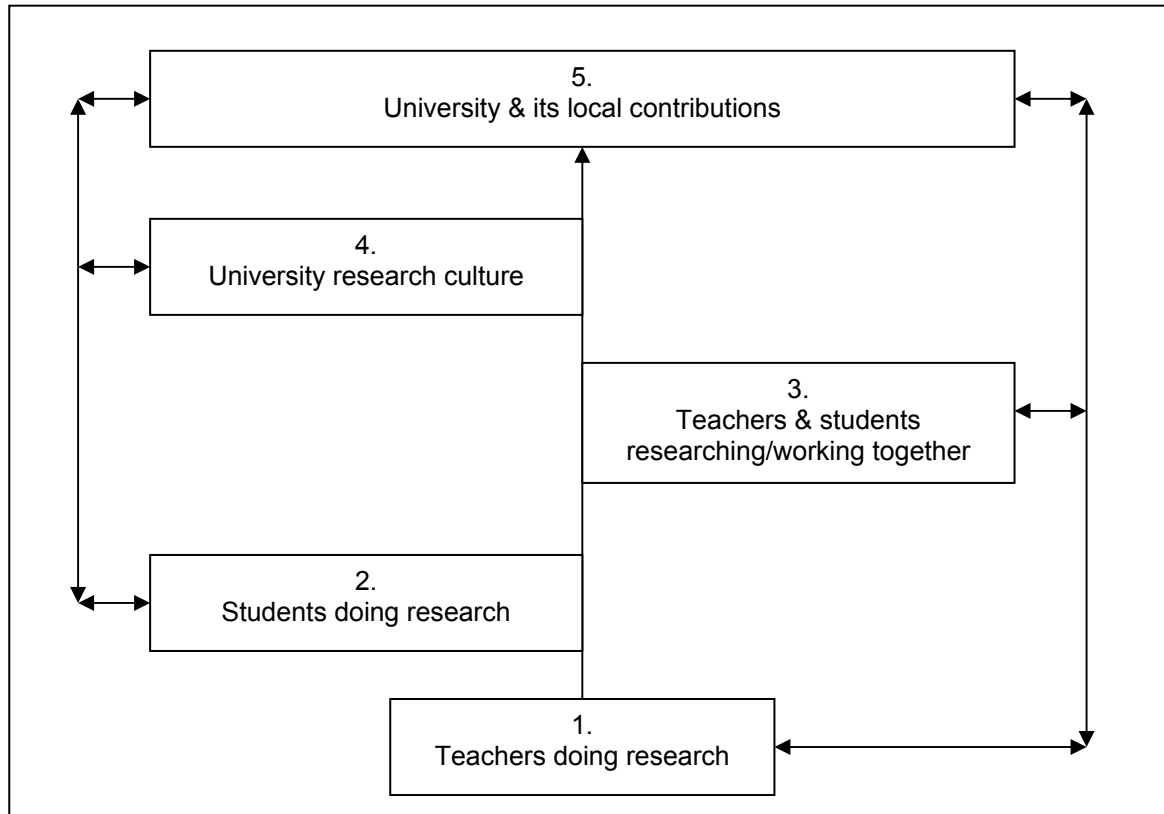
Table 3. (cont'd)

<p>4. Research embedded in the curriculum (Research influences the <i>what</i> and the <i>how</i> of curriculum design).</p>	<p>Research-based learning approach used.</p> <p>Cutting edge research and knowledge incorporated in curriculum design.</p> <p>Students' research skills fore-grounded.</p> <p>Students' cognitive skills of enquiry fore-grounded.</p> <p>Pedagogic theory and inquiry-based practice inform curriculum.</p>	<p>Action research feeds into quality review and enhancement.</p> <p>Students gain benefits as in 2 and 3 above.</p>	<p>Patchy coverage of curriculum.</p> <p>Transmission of essential knowledge poorly effected.</p>
<p>5. Research culture influences teaching and learning.</p>	<p>Teachers and students discuss research together.</p> <p>Research culture permeates practices in teaching and learning.</p>	<p>Research culture provides motivational context for teaching and learning.</p>	<p>Research prioritised over teaching, leaving non-researchers among the staff as well as students feeling abandoned.</p>
<p>6. The nexus, the university and its environment.</p>	<p>Both teaching and research are linked into the commercial environment and local communities, addressing needs and solving problems.</p> <p>Knowledge transfer takes place.</p>	<p>Research-teaching links offer opportunities for knowledge transfer.</p> <p>The nexus can indicate improved institutional structures and strategies.</p> <p>The nexus can indicate improved national policies on enhancing teaching and research.</p> <p>Claims about a teaching/research nexus having instrumental value in terms of marketing of programmes &amp; courses and institutional reputation.</p>	<p>The needs and priorities of employers and others take precedence in the academy. Pure research and critical approaches to society and become marginalised.</p>
<p>7. Teaching and learning influences research</p>	<p>Research projects refined and developed as a result of discussion with students (particularly in areas of preparation for professional practice)</p> <p>Pedagogical research conducted in the context of teaching students.</p>	<p>Mutual benefit to both teaching and research in a feedback loop.</p> <p>Skills developed in teaching re-used in research.</p>	<p>Substantive disciplinary research becomes sidelined.</p> <p>Low quality pedagogical research begins to predominate because of lack of training in methods and relevant social scientific disciplines.</p>

Source: Trowler and Wareham, 2007: 3-5.

Nguyen (2008: 158) condenses Trowler and Wareham's (2007) seven dimensions of the teaching/research nexus into five items, the interrelationships of which are depicted in Figure 11. The five items or variables in Nguyen's continuum are: (1) teachers doing research; (2) students doing research; (3) teachers and students researching/working together; (4) university research culture; and (5) university and its local contributions.

Figure 11. The Continuum of the Teaching/Learning and Research Nexus



Source: Nguyen, 2008, China slide 8.

At the undergraduate level, it is easier to identify the negative aspects of a heavy emphasis on the teaching/research nexus than the positives ones. The main dysfunctions are: devaluing teaching and diverting staff time from teaching; forcing staff who have little interest and/or skill in research to become research active; and diluting scarce financial resources. Of course, at the postgraduate level, research training must be supported by a strong research culture. However, not every institution or every field in particular institutions necessarily needs to be engaged in postgraduate research training activities. The relationship between research and mission diversity was mentioned in Section 4 and is discussed in more detail below.

### **The Research University**

(Bienenstock, 2006: 8)

... the establishment and maintenance of a first rate research university is a major undertaking. It requires visionary leadership that is committed to the educational and research goals. It requires leadership, as well, that is capable of managing a complex organization in which the faculty provide much of the intellectual leadership and in which consequently power is spread diffusely through the institution. Despite the goals of some who establish it, a new university is unlikely to yield major scholarly or economic advances in its early years. The leadership must have the political capability to withstand outside impatience and guide the institution's evolution towards great intellectual strength.

## 6.2. Mission Diversity and the Teaching/Research Nexus

The question of the relationship between the teaching/research nexus and institutional mission diversity is highly complex. Meek (2006: 226-230) has explored this question in some detail in *Higher Education, Research, and Knowledge in the Asia-Pacific Region*, summarized below. Meek begins by referring to Nowotny, Scott and Gibbons (2001: 84-85) who maintain that the scientific and social roles of the university, rather than being mutually exclusive, are actually mutually sustaining:

“The development of higher education and research policies in many countries has been based on the belief that it is necessary to insulate the scientific functions of the university from its social functions, often equating the former with ‘elite’ and the latter with ‘mass’ education. The intention often has been to create a clearer separation between research, in which the elite university still plays an important but no longer exclusive role, and the higher education ... of mass student populations where such a separation either does not exist, or to reinforce it, where it does exist, by encouraging the emergence of more differentiated systems”.

Nowotny, Scott and Gibbons (2001: 87-88) argue that “... high-profile attempts to maintain, or promote, differentiation between research-led and access-oriented institutions have not always been successful because of the political difficulties such attempts create”. It is difficult to segregate research-led universities from access-oriented higher education institutions in open, democratic societies, which may “... help explain the tendency to seize on quasi-market, or actual market, solutions”. As a consequence, “... not only has the number of ‘researchers’ within higher education systems increased as a result of the expansion of these systems since 1960; research is now undertaken in a wider range of non-university settings which extend far beyond free-standing research institutes or dedicated R&D departments into government, business, community and the media” (ibid., p. 88).

Clearly, “... the old division of labour between fundamental and applied or problem-oriented research has almost disappeared, and with it, the functional distinctions between universities, public labs and industrial and other private research” (Rip, 2002: 46). Also, according to Rip (2002: 47), “... the contrast between fundamental (and scientifically excellent) research ... and relevant research ... is not a principled contrast. It has more to do with the institutional division of labour, than with the nature of scientific research”.

Moreover, there can be little dispute that many societies have become more knowledgeable and that with the advent of the World Wide Web and other forms of modern telecommunications, access to knowledge has become more widespread and nearly instantaneous. At the same time, society has successfully challenged the elite position, autonomy and exclusivity of many



professions, including academic researchers. The knowledge society is simultaneously more dependent upon science and less trustful of it and its proponents – “... enhanced understanding [of science] tends to diminish rather than increase public confidence” (Henkel, 2002: 60).

Nonetheless, differentiation both within and between institutions remains an important policy question and the empirical evidence strongly suggests that research remains the primary differentiator. As noted in Section 4, one of the most important areas for higher education is how best to differentiate higher education systems to serve the multiplicity of needs and demands of mass higher education and the “knowledge-based economy”. The important research question is how to foster diversity by preventing institutions from converging on a single preconceived “gold standard” of what is proper higher education.

Much of the argument plays on the meanings of “research” and “knowledge”. In adopting a fairly traditional definition of research (publications, grants, patents, etc.), questions of differentiation of function both within and between institutions remain important concerns. Arguments based on the fundamental importance of the nexus between teaching and research in higher education are often self-serving, particularly when we take into account the fact that in all higher education systems something like 80 per cent of the research output is produced by 20 per cent of the staff. Since research attracts prestige, everyone wants a share, despite the legitimacy of their claim.

From a research management point of view, it does not appear that research is a democratic, widely dispersed activity, and, as stated above, one might question the nexus between teaching and research – at least in terms of research that generates external funding. A case probably can be made that all university staff should be engaged in scholarship at a high level, which means staying informed about the latest research in their areas of expertise. However, with respect to research itself, concentration and selectivity appear to be the order of the day.

This issue is not so much the separation of teaching and research. The evidence suggests that this occurs regardless. What is important is the policy context that structures the way in which the boundaries between teaching and research are created and maintained. It is probably true that “... economic growth is affected not only by the quantum of funding but by the way funds are allocated (for example, in terms of the institutions, fields and industries to which they are directed, and the mechanisms used to finance research) and by knowledge dissemination and research commercialisation practices that are adopted ...” (Department of Education, Science and Training, 2003: 115). On the other hand, a narrow priority-driven and overly utilitarian approach to public support for research may in the long-term be counterproductive. Henkel (2002: 64) cites investigations that suggest that “... since outcomes of inquiry are often wholly unpredictable, imposing limits in terms of future relevance or applicability is likely to reduce, rather than enhance, the social or economic benefits it may generate”.

The research university is unlikely to disappear, though it is being transformed as it interacts with an increasingly complex and turbulent environment. According to Rip (2002: 49),

“... the key challenge is to diversify and recombine its components, both cognitively and institutionally, into what I call a post-modern university. Such a university will include overlaps and alliances with Centres (of excellence and relevance), public laboratories of various kinds (themselves on the move!) and various private organizations managing and performing research. The boundaries between the university and the outside world are porous, and such ‘porosity’ is sought explicitly”.

While the boundaries between the university and the outside world may be becoming more porous, this does not necessarily mean the comprehensive dissolution of the normative structures

that maintain scientific communities specifically and academic organizations generally. According to Henkel (2002: 60), the extent of category collapse implied by some observers is questionable, although "... it is not necessary to subscribe wholesale to a post-modern perspective to perceive a variety of ways in which the boundaries between academic and other worlds are being blurred and to conclude that this is a growing trend". The university, even under mass conditions of higher education, "must remain relatively stable in order to continue to fulfil two primary functions: the production of the next generation of researchers and generator of cultural norms" (Nowotny, Scott and Gibbons, 2001: 93). The question of diversification versus homogenization of higher education institutions and systems is one of the most important areas for further research for all nations.

### 6.3. Building Research Culture

Higher education institutions must provide a supportive environment if research is to flourish. In some developing countries, higher education institutions were originally established mainly to engage in teaching and it will take a good deal of effort and an appropriate policy environment to nourish a research culture. For example, Salazar-Clemeña (2006: 190), writing about the Philippines, notes that that country has a number of general policies which emphasize the development of a research culture and environment. These include the recognition that research:

- Is the ultimate expression of an individual's innovative and creative powers. Higher education institutions shall ensure that the academic environment nurtures and supports Filipino research talents.
- Thrives in an environment characterized by the free flow of information, honest and analytical exchange of ideas, and supportive administrative structures. Higher education policies shall enhance the individual's capacity to conduct independent and productive research.
- Is one of the main functions of higher education institutions. Universities, in particular, are expected to lead in the conduct of technology-directed and innovative/creative researchers who are locally responsive and globally competitive.

Yutronic (UNESCO, 2007: 58) argues that successful development of research capacity in universities should involve:

- Research and development with relevant impact, that is, the creation of local pertinent knowledge integrated with global knowledge advancement and transfer to produce relevant impact.
- The renovation of professions in order to solve development problems and take advantage of new opportunities.
- The creation of new development frameworks for societies and countries based on their own particularities (for further elaboration, see Yutronic, 2007: 4-8).

Yutronic also maintains that, in order to create successful research universities, the following areas need attention:

- Critical capabilities ("critical mass") must be achieved particularly in terms of the creation of research webs and communities.
- Assessment procedures need to be defined in order to guarantee high quality staffing.
- There should be clear criteria for the institutional organization of research universities.
- Research universities should also strive for involvement in R&D initiatives.

- A process of continuous R&D operation and production with relevant impact should be started (for further elaboration, see Yutronic, 2007: 11-16).

Meek's (UNESCO, 2007: 70) recommendations for better management of the Australian research enterprise include:

- Universities should identify strengths and make hard decisions about allocating resources based on these.
- Care should be taken that the social sciences as well as basic research in the sciences are not neglected.
- In shifting the financial pressure to students, the government should recognize that student fees will not support increased research efforts.
- Increasing the number of private providers in the market is unlikely to increase research levels.
- Increases in funding coming from business and industry are needed but should not diminish the investment from other sectors, particularly government (for further elaboration, see Meek, 2008).

#### 6.4. What Counts as Research and Indigenous Knowledge?

##### **Women and Indigenous Knowledge**

(Carr, 2008: 1)

Over the centuries, a vast base of indigenous technical knowledge has been built up which has been handed on from generation to generation. Much of this knowledge, such as that which enables forest resources to be processed into foods which protect against droughts and into medicines which heal common illnesses, resides with women. Study after study shows that women have a much greater indigenous technical knowledge than men but that this is totally overlooked because it is not "formal" and thus not considered as being scientific. When commercial interests have become interested in plants which form the basis of traditional food and health systems, natural resources have been exploited to make profits for Northern food and pharmaceutical companies while women, who are the owners of the resources and the knowledge of their properties, receive no benefits from their commercialization or lose control of them altogether. This process has been precipitated by increased globalization and WTO regulations relating to intellectual property rights.

Much of the writing on the relationship between higher education and the global knowledge economy concentrates on Western systems of innovation. However, non-Western traditions of knowing and cognitive engagement with the environment have existed for centuries. A challenge in many countries is to effectively blend Western constructions of knowledge with indigenous ones. Chanana (2007, 2008), for example, analyses "Situating the Indian Academic Profession in Guru Tradition". In comparing the Guru tradition in India with that of the modern university professor, she notes that the indigenous academic tradition in India both existed since ancient times and held advanced learning in higher esteem. The contemporary Indian professor is a British transplant and introduced a significant degree of distance between teacher and student. Of course, the Western academic tradition is itself going through a transition, the trajectory of which

needs to be understood, at least in part, in terms of the indigenous circumstances into which it was initially introduced. "Because the faculty role is essential to the functioning of the higher education system, it is transformed along with the transformation in the functions of the system. However, if only the Western framework of values and practices is considered, then important points that impact the academic profession are likely to be missed" (Kalekin-Fishman, 2007: 568, cited in Chanana, 2008: 134).

Thaman (2006) argues for the inclusion of Pacific "indigenous knowledge systems" in the discourse on knowledge production and dissemination in higher education, particularly in higher education institutions in Oceania. Like indigenous peoples everywhere, the inhabitants of the islands of the Pacific Ocean have for centuries used local knowledge of themselves and their environment to live, work, trade and communicate with one another. Western influence commencing about 300 years ago constitutes a small fraction of the thousands of years of history of these peoples. Thaman (2006: 176) uses the term "indigenous knowledge systems" to refer to "... specific systems of values, knowledge, understandings, and practices developed and accumulated over millennia, by a group of people in a particular region, which may be unique to that group or region".

"Indigenous knowledge systems" and "Western knowledge systems" are different but have equally valid ways of knowing and interpreting the world. Western knowledge claims universality, while "indigenous knowledge" is peculiar to the culture that owns it. In recent years there has been a concerted effort by some educators to incorporate indigenous knowledge into the formal education systems in Oceania, both to improve results and to preserve the cultural heritage of the Pacific people. Western scientific interest in indigenous knowledge is increasing. For some time, Western scholars have been interested in local agriculture and farming technologies. Presently, this interest has extended into the areas of environmental protection ("traditional ecological knowledge"), housing and health ("ethno-medicine"). But indigenous knowledge is more than making modern development more efficient and productive. It is, as Thaman (2006: 178) argues, part and parcel of the "... very identities and futures of Pacific Island people themselves". Nonetheless, "... there remains a need to develop new methods (participatory, interdisciplinary research) to elicit and generate local knowledge, as well as innovative teaching methods that involve alternative forms of knowledge transfer, and to produce teaching materials that are adapted to local situations" (Thaman, 2006: 181).

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## Chapter 4

# Changing Challenges of Academic Work: Concepts and Observations

Ulrich Teichler and Yasemin Yağcı

### 1. Mobility of Students, Graduates and Scholars

#### 1.1. Physical Mobility – the Most Visible International Activity

Physical mobility – of students, graduates, scholars and possibly administrators – is by no means a new phenomenon in the sphere of higher education and research. Rather, looking and cooperating across boundaries was more widespread in this sector than in most other sectors of society, and it has always been its most visible international activity. But most experts agree that mobility has accelerated in recent years, as a consequence of increased opportunities, declining national controls and global economic and societal interconnectedness. As regards student mobility, for example, it was argued in a contribution to the UNESCO Forum that “... the opportunities and the problems linked to student mobility have certainly changed substantially under conditions of expansion of higher education, the changing economic and social order as well as the doorsteps towards what is called a ‘knowledge society’ ” (Rivža and Teichler, 2007: 459).

Mobility in higher education and research tends to be discussed notably in four respects: (a) the role physical mobility plays for knowledge transfer, (b) the contributions of mobility to quality of teaching, learning and research as well as the risks as far as quality is concerned, (c) the impact of mobility on the knowledge, values and subsequent life course of the mobile persons, and (d) the ambivalent setting of costs and benefits of mobility for the mobile persons, the higher education and research institutions, and the nations experiencing an influx or out-flux of persons.

#### 1.2. Quantities and Patterns of Student Mobility

Education statistics collected by UNESCO (see Chart 1 and 2) show that the worldwide number of students studying abroad, i.e. in a country different from that of their citizenship, has increased substantially in absolute terms from less than 200,000 in the early 1950s to more than 2 million in most recent statistics. However the overall student population has increased at a regular pace and the rate of foreign students has remained more or less constant at about 2 per cent.

Chart 1. International Mobile Students by Region of Study, 1975 to 2004

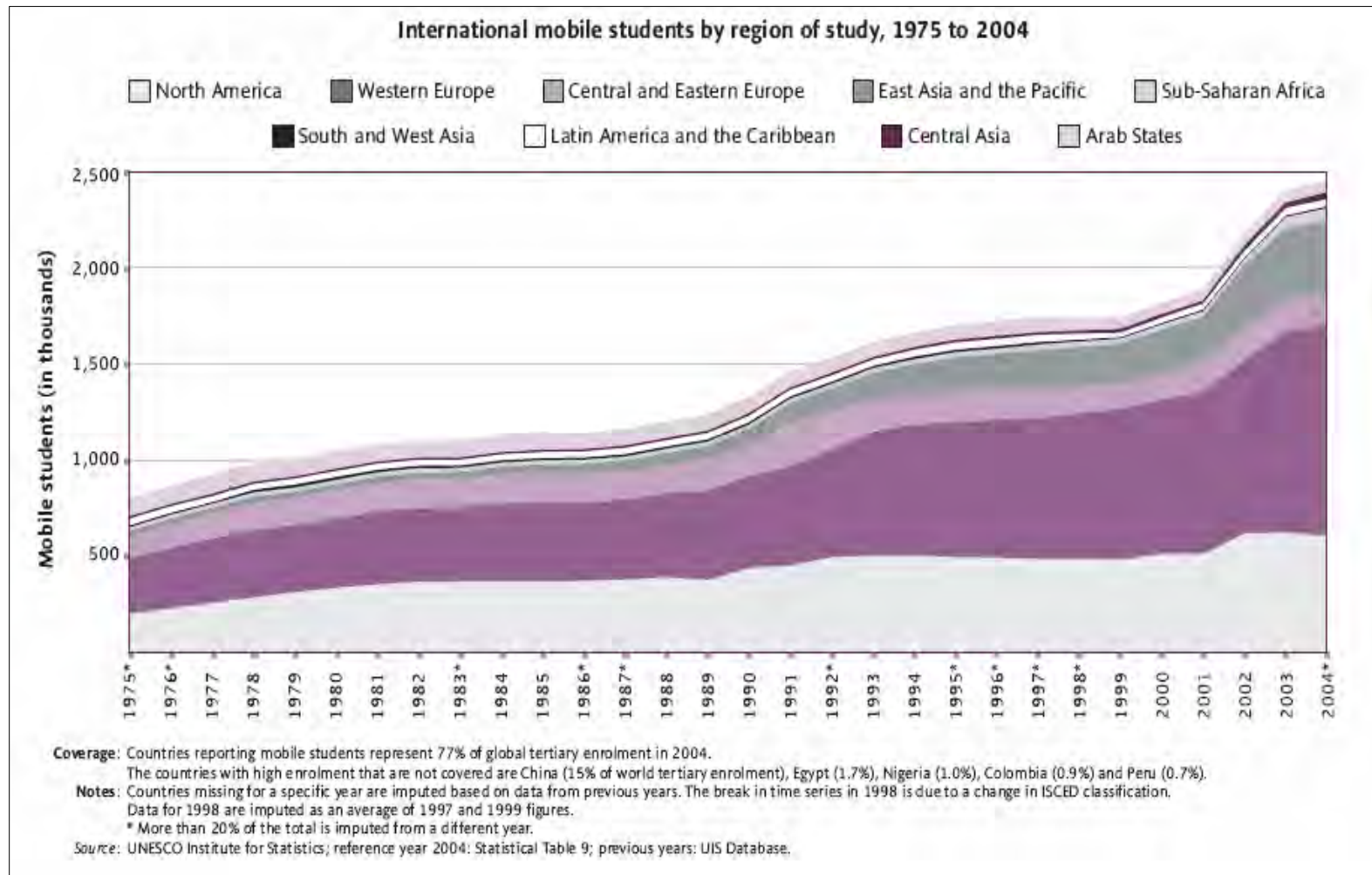
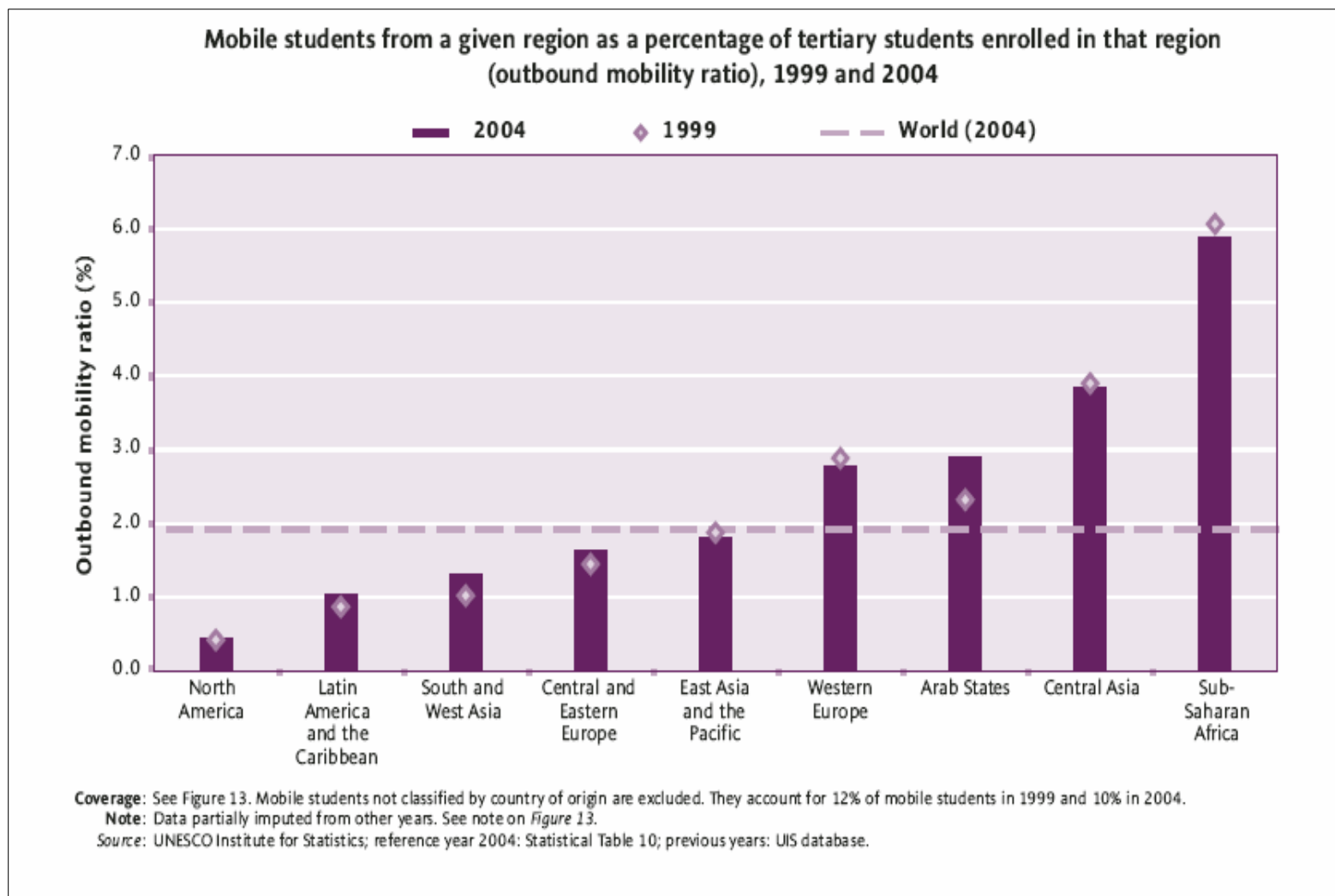


Chart 2. Mobile Students from a Given Region as a Percentage of Tertiary Students Enrolled in that Region (Outbound Mobility Ratio), 1999 and 2004



A recent methodological account came to the conclusion that data on foreign students are losing their relevance as indicators of student mobility, because the more persons move internationally in the course of study, the less studying in a different country (from that of citizenship) indicates genuine student mobility, i.e. the crossing of a border for the purpose of study. Moreover, international data on foreign students are far from complete in including temporary mobility and doctoral study abroad (Kelo, Teichler and Waechter, 2006). Yet the available data suggest that incoming students from other countries comprise more than 10 per cent of all students in various economically advanced countries, and that of the students from some low- and middle-income countries, more than half study abroad.

Recent overviews frequently point out that most foreign students are citizens of China and India. Such an emphasis on absolute data does not take into account the extent of study abroad, i.e. the proportion of students from certain countries studying abroad or the proportion of foreign students among all students in a given country. Table 1, in contrast, shows that the percentage of students from all Arab countries studying abroad was more than five times that of Chinese students studying abroad in 1999 – this at a time when the absolute number of Arab students studying abroad had almost reached the absolute number of Chinese students studying abroad.

**Table 1. Study at Home and Abroad for Arab and Selected Countries**

<i>Country</i>	<i>1999</i>	<i>1999 corrected</i>	<i>Population (1997, m.)</i>	<i>Study Abroad per million</i>	<i>Study at home per million</i>	
Arab	111,854	120,602	253.4	476	3,168,445	12,474
China	95,899	106,036	1,227.0	86	7,364,000	6,002
India	48,348	52,932	962.0	55	9,834,000	10,223

Source: Zahlan, 2007, slide 2.

Various trends and policies have contributed to increasing student mobility more or less in tune with overall enrolment trends. On the one hand the sheer necessity to study abroad for students from low- and middle-income countries (because hardly any study programmes exist in the desired areas and levels) is on the decline, as a consequence of expansion of higher education, and of graduate education, in most countries all over the world. On the other hand, a multitude of factors favour an increase of mobility. Among others:

- The more higher education expands, the more attention tends to be paid to distinctions in quality and reputation.
- In some low- and middle-income countries, a lack of study opportunities in certain fields of study might lead students to seek study opportunities abroad, or governments might support their students to study abroad. Two experts from Egypt stated: “Students study abroad for many reasons, but mainly to seek admission in fields either not available in Egypt or in which admission to them is streamlined by the authorities. One such example is to obtain a degree in molecular biology and genetic engineering, both of which are in the list of priorities for overseas scholarships” (Belal and Springuel, 2006: 5).
- Many students hope that “vertical mobility”, i.e. mobility from less reputed programmes and institutions or national systems towards more highly reputed and hopefully “better” ones, will turn out to be valuable. One should bear in mind, though, that the frequency of “vertical” mobility to certain countries and institutions is by no means determined

solely by the academic quality of the host institution: "... now, it is more often influenced by colonial or post-colonial ties or more recent networks, language learning, opportunity for immigration" (Rivža and Teichler, 2007: 459).

- More students from low- and middle-income countries can afford and are willing to take the economic risk of investing into study abroad.
- An increasing number of institutions of higher education in economically advanced countries, in many cases supported and pushed by national policies, are active in trying to attract growing numbers from low- and middle-income countries.

The widespread claim that student mobility is highly valuable and is expanding "exponentially" might create the misleading impression that barriers to mobility tend to fade away. Various experts presenting surveys and first-hand experience in the UNESCO Forum named a broad range of barriers: "lack of administrative capacity at the institutional level as well as the lack of state incentives encouraging the institutions to increased mobility" (Vaboe, 2006: 105), inability to afford the living costs and student fees abroad, exorbitant tuition fees charged to foreign students, security concerns, discouragement of women in some countries to study abroad, mistrust in propagandistic information policies, etc.

### 1.3. The Varying Rationales

In the framework of the activities of the UNESCO Forum, it was pointed out that economically advanced countries differ dramatically in their policies and strategies of stimulating student mobility. Notably, three distinctions are worth mentioning here.

First, some countries have shaped the regulatory system for financing higher education in such a way that their higher education institutions are strongly interested in generating income through fees paid by foreign students. Some experts consider this the most successful strategy of increasing mobility: "Academic mobility (students, programmes, providers) is considered by many as a huge commercial business and is expected to increase exponentially" (Knight, 2007: 2); others argue: "But there is a danger ... if the perception builds overseas that international students are subsidizing Australian higher education and getting little in return, it will eventually reduce enrolments" (Meek, 2007: 76-77). In contrast, other countries stimulate student mobility by other means and pursue a broader mix of educational, cultural and economic objectives including assisting the developmental objectives of the sending countries.

Second, some countries put prime emphasis on non-reciprocal intake of students from other countries and primarily favour "South-North" flows. Other countries appreciate reciprocal and "horizontal" mobility. The European Region Action Scheme for the Mobility of University Students (ERASMUS) programme in Europe supports temporary mobility, and is the largest programme stimulating reciprocal exchange on the assumption that "horizontal" mobility is most valuable for learning from contrasting experience.

In many cases, the rationales differ in governmental policies, institutional strategies of higher education institutions and students opting for study abroad. As regards intra-European temporary mobility, Rivža (2007: 3) observes a growing role of student options. "Taking into account the increase of possibilities due to the information and communication technologies, students, on the one hand, have more possibilities to organize periods themselves. On the other hand, increased independence of students in this aspect diminishes the role of teaching staff and higher education institutions in organizing mobilities".

Third, student mobility takes place in varying contexts of professional mobility. The United States of America (USA) is often named as an example where student mobility serves the recruitment of highly-qualified labour from other countries; Japan and Germany (the latter as regards students from outside the European Union), in contrast, are named as countries where policies to attract foreign students are clearly severed from policies regarding labour mobility.

#### 1.4. Links between Student and Professional Mobility

In principle, international student mobility is linked to professional mobility and migration in various ways.

- Many students in low- and middle-income countries opt for study abroad in general, or choose the field of study or host country, in the hope that study abroad will provide access to a career after graduation in an economically advanced country.
- As already pointed out, some countries pursue immigration policies notably in the sector of highly-qualified labour and take foreign students as a talent pool for recruitment.
- There is an increase of jobs in the process of economic globalization and of growing international links across sectors which call for internationally experienced and competent graduates. Thus, the professional value of study abroad is often viewed as high for graduates, irrespective of whether they return to their home country or find employment abroad.

Actually, little is known about the extent to which student mobility has resulted in subsequent enhancement or, in reverse, to which the high-flying hopes of the mobile students were not fulfilled. As regards South-North mobility, “successes” are named often and “failures” occasionally, but sound data are hardly available. As regards temporary mobility within economically advanced countries, elaborate research has been undertaken: “Studies addressing the professional impact on short-term mobile students in Europe show that the study period abroad turned out to be helpful in the job search process. With respect of income and status, formerly mobile students do not perceive any clear advantage to formerly non-mobile students. Two professional effects of short-term mobility are most striking: formerly mobile students are more frequently professionally active abroad and those who are not employed abroad take over clearly more frequently visible international assignments such as communicating with foreigners, using foreign languages, travelling abroad for professional purposes, using knowledge on other countries, etc.” (Rivza and Teichler, 2007: 465). However, a recent study points out that the professional impact of study abroad in another country starts to decrease “... because study in another country gradually loses its exceptionality as compared to general experiences of internationalization and globalization affecting the daily life of others” (ibid., p. 473).

#### 1.5. “Brain Drain” and “Brain Circulation”

Many low- and middle-income countries face a substantial outflow of graduates – either at the beginning of the course of study or after graduation – who eventually get employed in other, often economically more advanced countries. “Brain drain” is the most frequently employed term in this context to underscore the loss of investment and talent through outflow.

“Brain circulation”, in contrast, is often used to point out that countries facing an outflow of talent (also an outflow of scholars) often experience a “return” in terms of remittances (i.e.



part of the outgoing persons' income sent back to the home country), collaboration of the foreign "diaspora" with their home country, or eventually "reverse mobility". Knight (2007: 11), for example, wrote: "More developing countries are seeing the diaspora as a source of expertise, knowledge and networks rather than only a source of income." Kearney (2008: 6) summarized the arguments presented in one of the Forum workshops as follows: "While the Brain Drain continues to be a reality for many developing countries ... returning experts or the circulation of expertise can offer positive aspects, but require innovative approaches to academic and professional credentials. Examples of this include Silicon Valley IT experts returning to India ... mobilization of the diasporas from Africa and the Arab states, and burgeoning cooperative arrangements such as joint professorships, dual research appointments and laboratories (known as 'collaboratories'), and jointly awarded graduate degrees".


Altogether, however, as was frequently pointed out in the Forum, there seems to be an inflationary use of the term "brain circulation" in order to play down the net losses many low- and middle-income countries suffer from the international mobility of highly-qualified labour, and notably from the international mobility of researchers. Thus, it cannot come as a surprise that calls are often made for the receiving countries of mobility to compensate financially the enormous losses (see Chart 3) of the sending, "drained" countries.

Chart 3. Impacts of Brain Drain

## Impacts of the Brain Drain

*The financial cost*

- \$4 billion is spent annually on the salaries of approximately 100,000 western expatriates who help make up for the loss of professionals in sub-Saharan Africa.
- Policymakers worry about subsidizing the education of students who ultimately go elsewhere.
- The cost of training, for example, a non-specialized doctor in a developing country is about \$60,000 and for a paramedical specialist about \$12,000.



Source: Seddoh, 2006, cited by Mouton, 2007.

It was also pointed out in the Forum that some countries are not just passively and involuntarily affected by “brain drain”, higher education policies rather seem to be an integral part of international flows of the workforce. In some countries, graduates in high demand internationally are “produced” in such a magnitude that they are bound to find jobs related to their study in other countries (see for example the analysis of the situation in the Anglophone Caribbean in Chart 4). Often, one cannot clearly disentangle whether this is an inadvertent “loss” which might be true of the “exodus” of Nigerian medical doctors (see Kearney, 2008: 8) or a deliberate labour export policy, such as teachers from Egypt, engineers from Jordan and trained nurses from the Philippines.

#### Chart 4. Higher Education Policy as Labour Export Policy? The Case of the Caribbean

“Over the last 150 years education in Anglophone Caribbean has always produced more talent than Caribbean economies have been able to absorb. Accordingly, education in the Anglophone Caribbean has long been integrated to the international labour market. Education has been a principal factor facilitating the migration of Anglophone Caribbean people across the world...

Given this history, investment in HE in the sub-region cannot be contemplated only in terms of the needs of Anglophone Caribbean economies but also in terms of the needs of people, wherever they may find economic opportunity. This issue has sparked contending viewpoints. These include:

Loss of graduates through emigration constitutes brain-drain and serious loss to the sub-regions and its development.

Receiving countries should compensate Caribbean countries for the graduates they receive and especially for those that they actively recruit. Remittances from Caribbean emigrants have become a significant element propping up several economies in the Region. Probably...the sub-region is the net beneficiary of the investments in these emigrants. Emigration of educated people from the sub-region has been a safety value that has contributed to the social and political stability of the sub-region....Anglophone Caribbean countries cannot close their doors to emigration of their graduates...where the local and sub-regional economies do not have opportunities in all the areas ...even in areas on which local opportunities exist, strong international demand pulls” graduates. However, there was not any systematic programme to prepare those who chose to work outside the Region and to connect them to the sub-region and to their Caribbean colleagues in the countries of their choice” (Miller, 2007: 70-71).

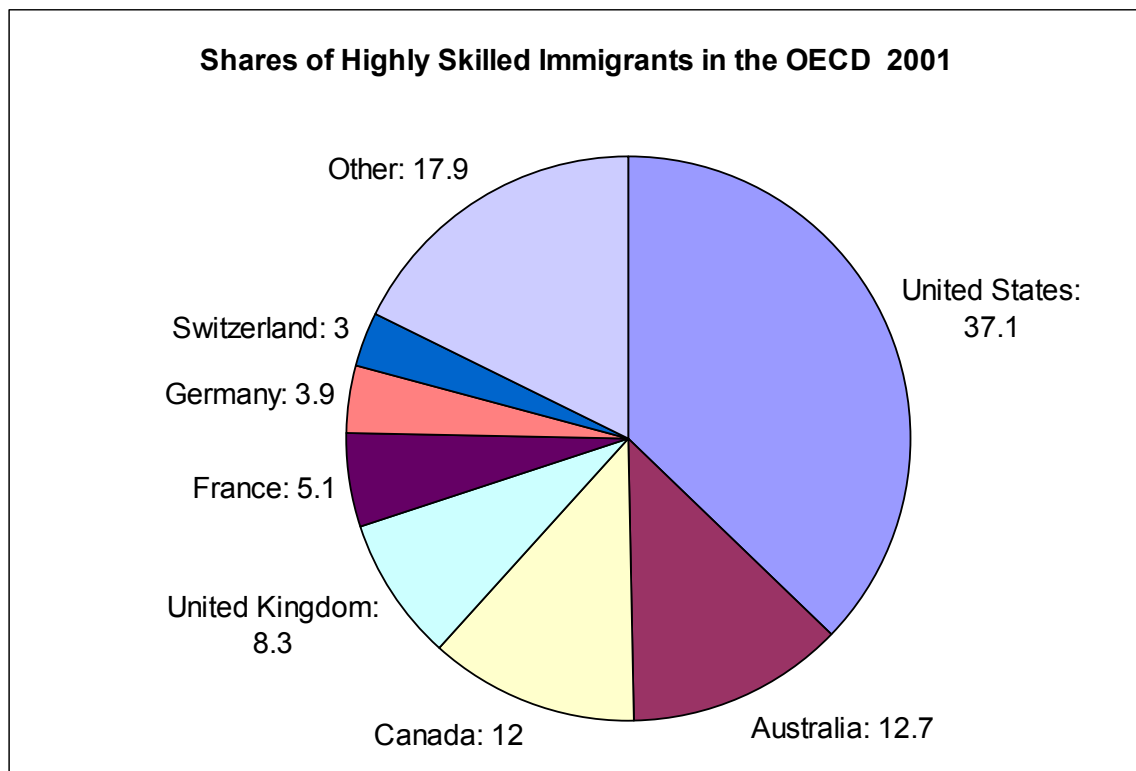
### 1.6. Patterns of Mobility among Young, Experienced Scholars

The UNESCO Forum on Higher Education, Research and Knowledge, as one might expect, paid attention primarily to the international mobility of scholars – academic staff at institutions of higher education and research institutes in general, or specifically graduate students, doctoral candidates, young researchers or senior scholars. No worldwide statistics exist on the international mobility of scholars; yet available data on individual countries and regions show on the one hand that the majority of scholars from some low- and middle-income countries in science and

technology work abroad, and on the other that in some low- and middle-income countries the majority of scholars are expatriates. Most available data do not allow us to disentangle clearly how frequent the South-North, North-South, North-North and South-South flows are.

Chart 5 shows the absolute numbers of high-skilled immigrants in major economically advanced countries. It clearly shows that most highly-skilled persons migrate to the major Anglo-phone economically advanced countries. Actually a substantially higher proportion than that of students studying abroad are in these countries. Considering the population size of these countries, however, we note that Australia, Canada, and Switzerland have a relatively higher influx of highly-skilled persons from abroad than France, Germany, UK and the USA.

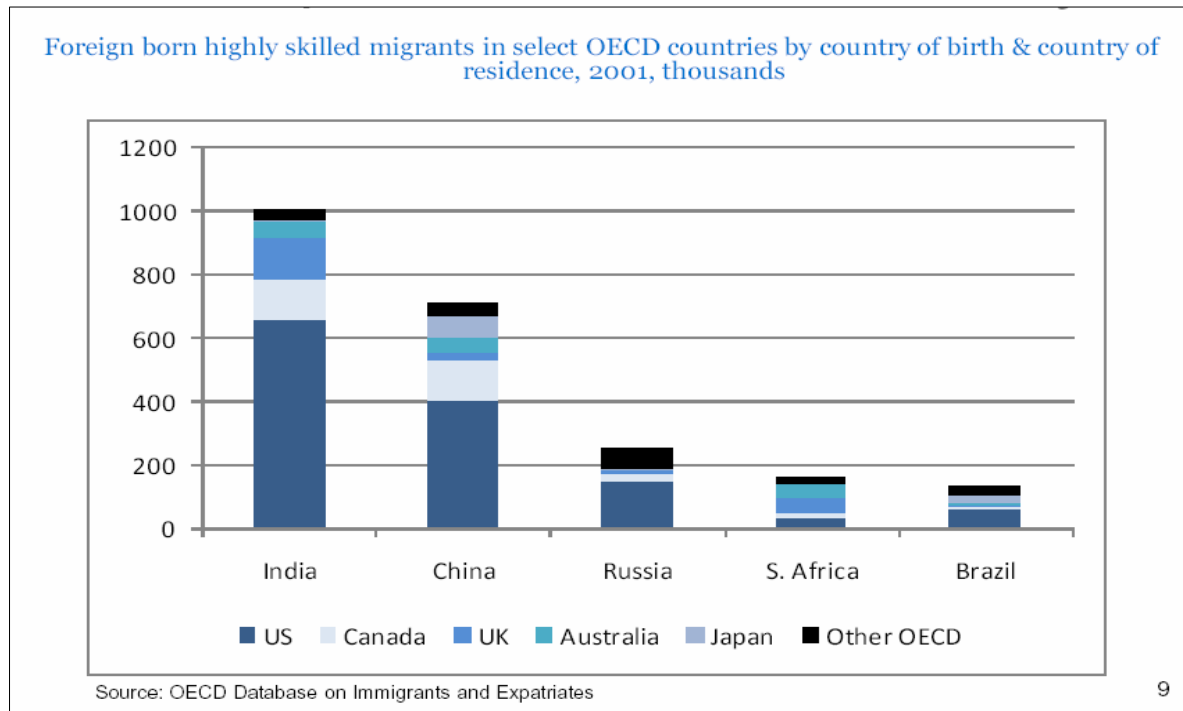
Chart 5. Expatriates Concentrated in the USA, EU, Canada and Australia



Source: OECD, 2001, Database on Expatriates and Immigrants.

Chart 6 shows that about one million highly-skilled persons in economically advanced countries were born in India and about 700,000 in China. Again, the proportion of South African, Russian and Brazilian highly qualified persons (of all the migrating citizens of these countries) was higher than those of Indian and Chinese migrants.

Chart 6. Examples of Non-OECD Mobility



In one contribution to the Forum, two Latin American experts observed a major shift of mobility over time: “The intensity of ... international collaboration has increased over the past century. If at the outset it was the scholars (particularly Europeans) who went to the countries of the South to disseminate experimental research ... and help to create novel research spaces, in the second half of the twentieth century the flow was reversed: it is the researchers of the South who immigrated to the ... North, searching for resources, adequate working conditions, visibility, or even as a matter of human rights ...” (Kreimer and Meyer, 2008: 122).

In-depth studies show an enormous variety among low- and middle-income countries as far as the frequency of mobility, its consequences and the policies addressing it are concerned. On the one hand, low- and middle-income countries vary substantially according to the extent to which they import foreign scholars. Indicators of research output by country, as a rule, refer to locations of scholars at the time when achievements were visible, while they differentiate by the country of origin or the country of citizenship of the productive scholar. But for the long-term development of countries with a high proportion of foreign academics, it will be crucial whether these academics work as isolated experts or whether they have substantial multiplier impact through collaboration with or training of indigenous scholars.

### 1.7. Collaborative and Strengthening Policies

Low- and middle-income countries respond quite differently to the potential and risks of the outflow of talent (those who become researchers in other countries). For example, South-South mobility and collaboration is promoted in some regions among neighbouring countries, in order

to stem long-term outflow and to facilitate mutual enhancement. Collaborative and twinning arrangements are made with laboratories and institutions in economically advanced countries, as well as arrangements of joint supervision of doctoral candidates. Some countries are highly efficient in tapping the diaspora of experts from their country all over the world, and thus ensure that the most talented emigrants contribute to the enhancement of research in their country of origin. Some countries are very successful in the repatriation of those citizens who have become highly reputed researchers abroad. Improved information on “success stories” of that kind might stimulate similar actions in other countries as well.

## 1.8. Improving the Research and Societal Environment

Experts from low- and middle-income countries active in the UNESCO Forum for Higher Education, Research and Knowledge point out that the threat, or actual experience, of losing talent and potential (for research, economic wealth and social well-being) might turn out to be a creative starting point for reconsidering and redressing the situation in the home country. Awareness might grow of deterrent societal and financial conditions for research and academic life in the host country. For example, we note efforts:

- To secure appropriate remuneration which allows scholars to concentrate on research rather than on “moonlighting” in order to make their living.
- To establish rewards for research activities and participatory decision-making processes.
- To reduce “red-tape” bureaucracy.
- To strengthen academic freedom as well as freedom of movement and collaboration.
- To address gender parity and encourage respect of young scholars.

These activities could increase the attractiveness of countries that, historically, have been less welcoming for scholars than most economically advanced countries. Consensus emerged that many low- and middle-income countries could do much more to make conditions attractive for their own research talent.

Some problems of research environments and scholars’ living conditions are similar across low-income countries and might not be taken into sufficient consideration. Professional isolation was named as such an example by an African expert:

“Scientific knowledge advances through dialogue and exchange of views. This will not happen if the local scientific community is not large ... This means that the scientist will not be able to subject his or her ideas, hypotheses or research results to informal peer review through regular contacts with his or her colleagues. The result is that the capacity of the individual to do research withers away ... In fact, escape from isolation is one of the contributory factors to brain drain” (Massaquoi, 2008: 62).

Experts addressing these issues in the UNESCO Forum called for detailed analyzes in individual countries in order to identify areas of improvement. In one country, the salaries of scientists might be quite low in comparison to salaries in other sectors; in another case, lack of incentives might be more crucial than the level of salaries as such. In some countries, talented women might be severely disadvantaged; in other countries, freedom of creative thought might be missing. In some countries, improvement could be realized within the universities and research centres without major environmental change. Finally, self-critical analysis might show that poor management practices and lacking respect for academic creativity discourage high-quality research.

## 2. Internationalization and Globalization

### 2.1. Terms and Concepts

In some respects higher education institutions and research centres have always been international institutions, as efforts were traditionally made to seek the most advanced stage of knowledge all over the world. Getting acquainted with world-wide knowledge was a clear imperative for fields with a universalistic knowledge base, but in many other fields as well, learning from contrast, comparative study and study of worldwide interaction was imperative. In addition, cosmopolitan values were widespread among leading scholars. However it remains customary to talk about higher education and research systems while referring to nations: the regulatory system, the policies and funding practices, the institutional settings, the careers and employment conditions, the study programmes and degrees are all shaped nationally.

Rapid processes of internationalisation and globalisation have been observed in this domain. Experts agree that both terms refer to changes in higher education and research itself, as well as to changes in the context of higher education and research. Internationalization often points to a growth of border-crossing activities amidst a persistence of borders and nations, while globalization often implies that borders and nations as such get blurred in this process or might even disappear. Moreover, specific issues tend to be linked to the individual terms. Internationalization is often discussed in relation to physical mobility, academic cooperation and knowledge transfer, and international education. Globalization, as the preferred reference since the 1990s, is often associated with competition and market-steering, transnational education, and commercial knowledge-transfer (see Teichler, 2004).

As we have pointed out, the physical mobility of students and scholars is often the most visible element of international activities. Internationalization and globalization, however, refer to the wider range of knowledge transfer activities, which might include cooperation across borders, dissemination of knowledge through various media, provision of study programmes across borders, etc.

### 2.2. Trends and Causes

In describing internationalization and globalization both in the context of higher education and research as movements *within* higher education and research, we note four changes:

- The increasing global interconnectedness of economy, technology, society and culture. More enterprises act as “global players”; governments consider actions in the national framework more frequently as determined by the international setting, and more often take actions on national level with one eye on the worldwide “map”.
- Communication, cooperation and knowledge transfer are facilitated by information and communication technology, and by greater opportunities for travel.
- National governments (or regional governments within Federal systems) in many countries of the world have turned to a gradual de-regulation and de-nationalization of their higher education and research policies. This is partly driven by changes in governance concepts whereby detailed governmental supervision is less effective and efficient than a combination of general target-setting, decentralization, and incentive-steering (followed by an expansion of evaluation and reporting activities ex-post steering). Partly,

these policies are a response to the insight that the growing global interconnectedness of knowledge is bound to relativize national policies anyway.

- Finally, we note a growing “commodification” of knowledge and education, where activities of research and teaching are undertaken by institutions regulated by commercial logic; we note a growing streamlining of the purposes of research and education for economic utility.

### 2.3. Consequences for Low- and Middle-Income Countries

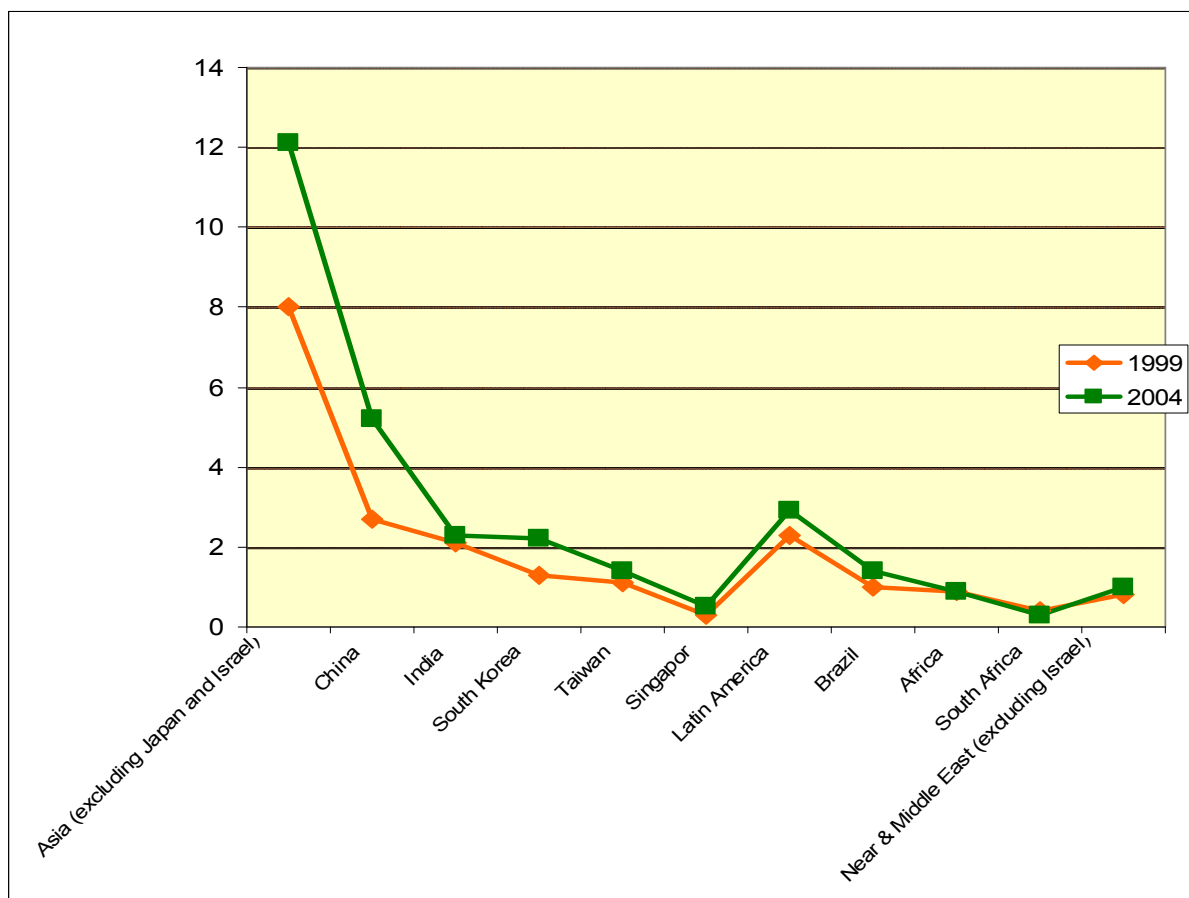
The various analyses presented in the framework of the UNESCO Forum underscore that the recent trends provide opportunities for low- and middle-income countries to get easier access to, and participation in, high-quality knowledge production. And various examples were put forward to illustrate recent improvements in study programmes and research activities. But experts also pointed out the risks involved and the failures. Among the problems named, the following stood out:

- Investments in higher education and research are so impressive in many economically advanced countries that other countries hardly have any chance of catching up. Investments by industry in research and development largely concentrate on economically advanced countries, and only a few other countries (such as Singapore) succeeded in getting a substantial share of research funds from abroad (Sanyal and Varghese, 2006: 5).
- On the other hand, many low-income countries do not consider themselves to be in a position to make the necessary investments and benefit from the increasing opportunities for access to high-quality knowledge. Sanyal and Varghese (2006: 5) point out that “In fact little research in Africa is funded by the national authorities and ... research in these countries is essentially a donor-driven activity”.
- The increased global competition in higher education and research, and the related information systems on “World-Class Universities” and indicators of “cutting-edge” research are more likely to underscore gaps than to motivate the less privileged to “catch up”.
- Transnational education provided or assisted by economically advanced countries might be low in quality, and might exploit those paying for it in many cases; the low- and middle-income countries have limited capacity for reviewing the quality of programmes and preventing the obvious low-quality programmes from spreading on their territory.
- The resource pools for research in many low- and middle-income countries, even if financially sufficient, might be too small to compete with the larger pools of other countries.
- The programme goals of transnational education programmes and the paradigms of research might be so driven by the perspectives of economically advanced countries that the needs of low- and middle-income countries are neglected or even suppressed.

Altogether, the findings of the Forum suggest that the current trends are more likely to widen, or at least maintain, the gap of higher education and research between the economically advanced countries and the majority of low- and middle-income countries. Targeted measures were called for in order to improve the actual developments in low- and middle-income countries, increase the likelihood of quality improvements, and serve their specific needs better than in the past.

The fear of a widening gap is by no means unfounded. Certainly some low- and middle income countries can be viewed as “catching up” according to indicators of research publication. Chart 7 however shows that the world share of publications from South Africa among all publications in selective academic journals has severely *declined* since 1999, and has remained at that lower constant since.

Chart 7. World Share of Scientific Publications in Developing Countries (in %)

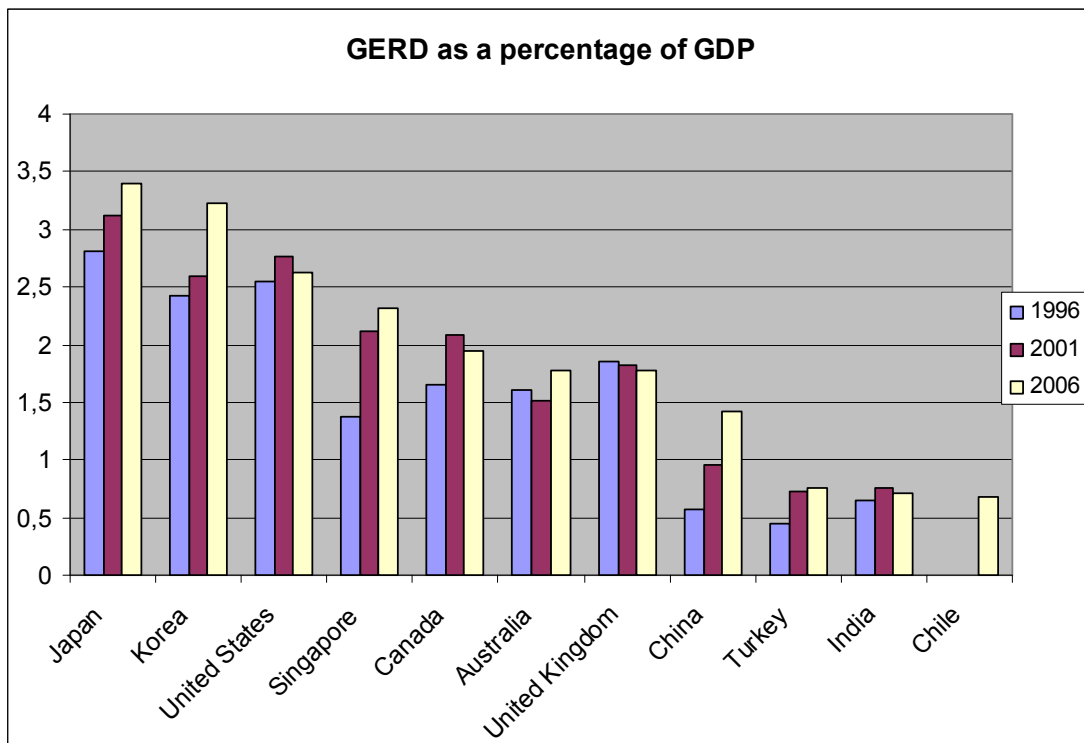


Source: Gaillard, 2008.

Experts agree that most low- and middle income-countries must increase their research expenditures substantially (see in this context Chart 8), but obviously many other factors play a role as well.



Chart 8. Research and Development Intensity in OECD Countries



Source: OECD, 2008, Science, Technology Industry Outlook.

## 2.4. Transnational Education

Learning across borders, recently often called “cross-border education”, is by no means predominantly realized through the physical mobility of students. In recent decades, “transnational education” spread in terms of cross-border study provisions such as distance education, “off-shore programmes”, “branch campuses”, or higher education institutions or study programmes jointly carried out and supervised by institutions and actors from economically advanced countries and host low- and middle-income countries.

The initiative for transnational education often came from economically advanced countries in which the national funding regime encouraged the “import” of foreign students and the “export” of study programmes, and where the native English language facilitates such activities. Even though the financial considerations might have explained these initiatives at the beginning, countries such as Australia increasingly acknowledge an educational value of increased international activity for Australian students and scholars, in that it can “... increase their understanding of other cultures and broaden their scholarship”, they “... benefit socially and culturally from the presence of overseas students”, and “Collaboration with international colleagues enhances the capacity of Australian academics to produce high quality research” (see Meek, 2007: 76).

As regards low- and middle-income countries, one overview mentioned the following possible benefits of virtual-type universities and other transnational educational arrangements: “The positive aspects of the initiation of these new institutions include: widening of learning opportunities at various higher education levels by providing more choice for citizens in any given national jurisdiction; challenging traditional education systems by introducing more competition and innovative programmes/delivery methods; helping make higher education more competitive;

assisting in diversifying the budgeting of higher education and benefiting through links with prestigious institutions, mainly in developing countries (Guri-Rosenblit, Sebkova and Teichler, 2007: 379).

In a document by Bibtana (2007: 98) high hopes were set on the envisaged GATS agreement for treating higher education programmes as a service commodity, with "... the advantages that foreign providers would increase access to higher and adult education, develop higher education and research infrastructures, increase the mobility of students, academic staff and researchers, and increase competitiveness which leads to improved quality". But many observers see problems and risks inherent in the increase of transnational education:

- "Risk can include: an increase in low-quality or rogue providers; a decrease in public funding if foreign providers are providing increased access; non-sustainable foreign provision of higher education if profit margins are low; foreign qualifications not recognized by domestic employers or education institutions; elitisms in terms of those who can afford cross-border education; overuse of English as the language of instruction..." (Knight, 2007: 17).
- As regards the perspectives from Australian higher education, Meek (2007: 77) writes: "... international students who are in institution programmes through offshore schools have become a worry regarding the quality and reputation of Australian education. This is because these students are often enrolled in the courses using different assessment standards and criteria from their onshore counterparts. Further, there have been discrepancies in teaching standards, quality of education and support services in these offshore campuses relative to onshore campuses..."
- Another risk was pointed out: "Real collaborative education programs require responsibilities from both sides. There are examples, however, of one-sided offerings with one partner involved only by name, which is used to bypass certain regulations. The worst case is the one hidden under profit incentives, exploiting the local university's name" (Suwanwela, 2008: 37).
- The views of the low- and middle-income countries are reflected in Bibtana (2007: 106): "All these types of providers are capable of crossing borders without adhering to the rules and regulations of any state. In the absence of national and international regulatory frameworks, the concepts of quality, accreditation and recognition of studies and degrees remain questionable areas." He also states: "The fear in developing countries is that ... cross- and trans-border providers will lead to negative rather than positive consequences such as increased social costs for higher education, the return of the elitist systems, and gradual disappearance of national systems that cannot compete with foreign providers. Some critics consider the agreement as a pretext for the total takeover of higher education by the corporate community, and for monopolizing research for commercial purposes" (Bibtana, 2007: 97).
- An expert from New Zealand points out the tensions between what is relevant in the providing countries and what is needed in the countries the learners come from: "With the increasing internationalization of higher education, developing countries are ill-prepared to absorb and appropriate yet more foreign influences and demands of international organizations ... The needs of institutions to develop within a global academic and research community and thereby adopt the predominant Western models of higher education and the development needs of these countries are often clashing, posing a dilemma between satisfying market forces and the need to nurture education within socio-cultural specificities of the country. The challenge of how to be locally relevant and at the same

time with international standing is a big challenge for these higher education institutions. The internationalization of higher education is making it more difficult for local knowledge to prevail” (Papoutsaki, 2008: 246).

## 2.5. Research and Research Training

The internationalization of research, and also of research training, is often hailed as important in raising the quality of research in low- and middle-income countries. Many examples of “good practice” were named in the analyses presented at the UNESCO Forum. For example, in Latin America and the Caribbean, as experts from these regions stated in a comparative study, “... in all the national cases ... we found that there is generalized agreement that an international orientation in education and training at the doctoral level is worthwhile to help countries position themselves in a world and economy that have changed significantly, and that extensive stays abroad are an important way of achieving this. Motivations are varied: on the one hand, a desire to improve the quality of research graduate training; and on the other, at the level of international politics of countries, an internationality to increase the capabilities of participation and negotiation in an international scientific community and other domains of the economy that require a greater familiarity with increasingly globalized regimes of regulation and control” (Vessuri, 2007: 149).

An interesting case for international collaboration in research was reported in Egypt, in “... the Unit of Environmental Studies and Development (UESD) established at the Aswan Branch of Assiut University, South Valley. This unit has the status of a UNESCO-Cousteau Ecotechnie Chair and all research activities are executed by projects with foreign funding. The Chair is strengthening research capacity in the university, which benefits, in particular, postgraduate studies, by promoting interdisciplinary education and applied research. Highly motivated university researchers and postgraduate students from different departments are working voluntarily for the unit and, in return, the Chair provides facilities for research, training and communications. In addition, the Chair provides small grants from research projects funding for newly graduated B.Sc. students enabling them to work on subjects related to the Ecotechnie concept for their M.Sc. and Ph.D. degrees, supervised by senior staff of the UESD team... The Chair trains junior staff members in research and in proposal and publication-writing” (Belal and Springuel, 2006: 8).

Available statistics suggest that the North-South cooperation plays an important role for the countries in the South:

- For example, Chart 9 shows that Brazilian universities and research institutions undertook almost 300 joint research projects aimed to support post-graduate studies within a framework of major cooperation contracts with three European countries (France, Germany and Spain), as compared to less than 100 with three other Latin American countries.
- Almost 40 per cent of major publications produced at Arab universities and research institutes in 1995, as Table 2 shows, had joint authors from other countries, the majority of them economically advanced countries.

Chart 9. New Initiatives in Brazil in International Cooperation in Support of Postgraduate Studies

**New Initiatives in International Cooperation  
in Support of Post-graduate studies**

Brazil

Joint Research Projects (2007)

Country	Program	Projects
Germany	PROBRAL	76
<b>Argentina</b>	SECYT	48
<b>Cuba</b>	MES	29
Spain	MECD	84
United States	CAPES / UNIV. TEXAS	07
France	COFECUB	122
<b>Portugal</b>	GRICES	93
Netherlands	Univ. Wageningen	18
<b>Uruguai</b>	Universidad de la República	05
<b>TOTAL</b>		<b>482</b>

Source: Ramirez, 2008.

The success of such collaborative models, however, is only sustained if continuous support is provided from the north. “An illustrative example is that of the Pasteur Institute of Tunis, founded in 1893 ... In addition to its contribution to the implementation of public health policy, it is an R&D institution as well as a training ground for about 100 graduate students (Master and Ph.D. degrees) per year ... also in charge of producing vaccines, controlling their quality and distribution. The number of publications in international journals by the Institute’s researchers had reached 322 in 2003 but, thereafter, decreased to 27 in 2004 and 12 in 2005” (Segrera, Bernheim and Vargas, 2007: 137).

There are many cases where an insufficient balance is noted between the partners from the North and the South:

“Research into donor-based programmes of ‘cooperation’ between institutions from the North and South has indicated an inequality in the relationship. ‘Because the Northern donor provides the funding, ... knowledge, ... often decides on the model and activities to be chosen, despite the fact that the Southern institution is obviously being better placed to determine the needs and priorities’... The Northern institutions benefit from these programmes in terms of the internationalization of courses, attracting researchers, establishing collaborations with partner institutions in the South, and getting access to research grounds in developing countries” (Papoutsaki, 2008: 247).

**Table 2. Regional and International Cooperation of Researchers in the Arab World, 1995**

<i>Country</i>	<i>Total number</i>	<i>Joint papers</i>		<i>Main partner</i>		<i>OECD</i>		<i>Arab World</i>		<i>Multi-national</i>	
		No. & (%)	No. & (%)	No. & (%)	No. & (%)	No. & (%)	No. & (%)	No. & (%)	No. & (%)		
Algeria	328	227 (69)	France 151 (65)	187 (81)	3 (1)						
Bahrain	106	29 (27)	UK 7 (24)	11 (38)	3 (10)	6 (21)					
Egypt	1 999	585 (29)	USA 154 (26)	(63) 123	123 (21)	49 (8)					
Iraq	114	34 (30)	USA 5 (15)	20 (59)	12 (35)	0 0					
Jordan	266	95 (36)	USA 23 (24)	58 (61)	18 (19)	12 (13)					
Kuwait	290	117 (40)	USA 25 (21)	56 (48)	26 (22)	17 (15)					
Lebanon	73	32 (44)	USA 14 (44)	27 (84)	1 (3)	4 (13)					
Libya	58	35 (60)	UK 9 (26)	16 (46)	7 (20)	4 (11)					
Mauritania	7										
Morocco	536	395 (74)	France 214 (61)	314 (80)	2 (0.5)	61 (15)					
Oman	84	37 (45)									
Palestine	16										
Qatar	59	36 (54)	Egypt 23 (64)	9 (25)	24 (67)	2 (6)					
Saudi Arabia	1 240	294 (24)	USA 72 (25)	161 (55)	79 (27)	26 (9)					
Somalia	6										
Sudan	112	74 (66)	USA 10 (14)	45 (61)	11 (15)	13 (18)					
Syria	134	81 (60)*	France/UK 16 ea	44 (86)	0	ICARDA					
Tunisia	342	147 (46)	France 87 (59)	122 (83)	3 (2)	17 (12)					
UAE	137	55 (40)	Egypt 11 (20)	26 (47)	22 (40)	6 (11)					
Yemen	30	28 (83)	Egypt/UK 6 ea	15 (54)	8 (29)	4 (14)					
Total	5937	2 301 (39)	754 (33)	1,478 (64)	342 (15)	223 (10)					

\* Incl. 29, ICARDA

Source: Zahlan, 1999.

One report vividly states how the local relevance of research can be undermined in the search for enhancement of research quality:

“Chagas’ disease is essentially one of poverty ... At this time only one drug is available, Benznidazol, it is produced by one international laboratory (Roche), was developed over 40 years ago and is used only for the acute phase of infection ... no drug exists for the chronic phase ... Chagas’ disease is thus considered one of the ‘most neglected illnesses’, affecting the poorest populations of developing countries and enjoying no R&D attention from pharmaceutical companies” (Kreimer and Meyer, 2008: 127).

Paradoxically, the researchers working on this disease have gained international visibility and are involved in international networks. However, these researchers “... must work on the priorities identified by the leaders of each network”, which are “... largely determined by the industrialized countries, supra-national institutions and developed country private enterprises...” (ibid., p. 122). The authors define this situation as “subordinate integration”, where

“... the groups suffering from unfavourable local conditions, can in theory, and sometimes in practice surmount them and gain access to new, significant resources for their activities. This seems to feature ‘democratization’, in the universalized relations around the production of knowledge. However, this abstracting logic for local conditions, at work in the process of internationalization, can lead to increased subordination... The most important effects come

from the latest iterations of research and funding policy, themselves a product of the competition between the USA and the EU ... Thus traditional models for the promotion of S&T are increasingly being replaced with new policies and new instruments: the 'project' as a funding unit is being replaced with 'programmes' and 'networks'" (ibid., pp. 124-125).

Chart 10 provides an overview on the Globelics Network (Global Network for Economics of Learning, Innovation, and Competence Building Systems) established in Africa which aims to support the researchers of the South.

### Chart 10. Globelics – A Network Aiming to Serve the Researchers of the South

"Globelics ... has been conceptualized as a network for 'researchers without borders' (Luc Soete). Its main drive is to take science and knowledge to the 'world country side' from its complacent existence from the 'world city.' All the major Globelics annual conferences have taken place in many developing countries and are likely to continue going deeper and deeper into more remote sites where the reach of knowledge is inaccessible and difficult. The sheer ability to pull of a learning dynamics in difficult circumstances is indeed an achievement in and of itself. The idea is to take the best research and researchers to areas of the world where the opportunities for knowledge interaction, research interaction and training interaction are less than those that exist in the world cities.

The model Globelics offers is vastly different from universities acting as foreign enterprises creating campuses and different types of lucrative and business arrangements. Globelics prides itself in empowering those who benefit most by it namely Southern researchers... They design most of the activities of research communication, exchange and planning by raising also nearly 100 per cent of the funding from local sources. This has made Globelics to evolve as a self-organizing community of researchers capable of generating world wide learning and networking ... It has given Southern researchers not only to continue links with Northern researchers but also to create new ties with Southern researchers.

The result has been impressive given that the cost for the production of the result has been often absorbed locally. Many books have come out at least one or two books each year that get launched at the Globelics meetings during the last four years" (Muchie, 2006: 7).

"Another interesting dimension to the Globelics experiment is the attempt to develop regional networks such as the Africa network on the economics of innovation, learning and competence building, the Latin American network on the economics of innovation, learning and competence building and the Asian network of the economics of innovation, learning and competence building. ...

There has been for three years a Globelics Academy supported by Portugal that has been running in Lisbon where doctoral scholars have been invited at an equal ratio from Africa, Latin America, Asia and the rest of the world. This academy has generated not only networking but also improvement in the way PhD scholars upgrade their research and develop new and fresh theoretical and methodological insights and research linkages" (Muchie, 2006: 8).

"One of the consequences (perhaps unintended) of the Globelics experiment is the degree to which knowledge power mal distribution may be contested by the sheer opportunity for many Southern researchers to open publishing where before they have little chance .Publishing and research is concentrated in the North, but access to Southern researchers through Northern researcher mediation facilitates being published in the best publishing houses and journals. This enhances and upgrades the capacity of Southern researchers. ... It has produced an alternative way of how research capacity at low cost and effective results and output can be developed. It demonstrates a case study of how a research capacity initiative can be organized" (Muchie, 2006: 10).

## 2.6. Pooling Resources between Neighbours

Collaboration between countries in research is increasingly viewed as a necessity in small, economically advanced countries. This was for instance true of the Nordic countries in Europe: “To take part in international relations is generally considered to be of great importance for a small advanced country like Norway, particularly to increase the breadth and quality of research” (Va-boe, 2006: 99). “In addition to Denmark, Finland, Iceland and Norway are small nation states. In recent years there has been a growing concern about the need for extended Nordic collaboration on education, research and innovation, in order to reach the critical mass necessary to fulfil national goals of educational and research excellence in relation to the EU policy and the increasing global trade in higher education (ibid, p. 101).

In some poor regions of the world, including Africa, regional cooperation is viewed as a necessity to ensure minimum resources. Concerning human capacity-building, “... it is quite clear from the nature of the challenges that most countries will not be able to act alone to successfully build their capacity. The training resources are weak. The scientists are isolated and the threat of brain drain prevents the search for training outside the region. Under such circumstances, regional cooperation offers a good alternative. Such cooperation can have three benefits: information sharing, resource sharing and resource mobilization. Information sharing will prevent attempts to re-invent the same solutions or to repeat the same mistakes ... The challenge associated with isolation of scientists will be overcome through regional cooperation. Through resource utilization, sharing the strengths of some institutions in certain subjects will even out the weaknesses of the others. Thus, through cooperation it will be possible to undertake high-level training within the region and thereby minimize the threat of brain drain” (Massaquoi, 2008: 63).

The obvious benefits of regional cooperation might even lead to the establishment of a single university for several small countries, instead of separate small, national universities. The University of the West Indies, founded almost sixty years ago in the Anglophone Caribbean, is such a case (see Miller, 2007: 71-72). But there are cases where cooperation of that kind is missing: “... cooperation between Arab scientists is almost non-existent, despite the presence of a number of Arab regional organizations whose objective is to promote such cooperation. Neither national nor regional Arab organizations devote any real resources to cooperation” (Zahlan, 2007: 157), and this holds true even though common problems exist (which could be addressed jointly).

“The Arab States share a wide range of common scientific and technical problems, thus there should be considerable incentives for co-operation. Most of the Arab World is in a dry zone where water is scarce; this dictates certain research issues in water use in agriculture and in water management. Likewise several Arab countries are oil and gas producers; this provides common technological challenges and opportunities for sharing experiences. Moreover they all share a number of problems in health, and in the application of codes and standards as well as in many other fields” (ibid.).

Many efforts have been undertaken to stimulate cooperation in higher education and research within various African regions. Chart 11 indicates the problems and opportunities of one of the efforts to establish regional cooperation.

### Chart 11. Problems and Opportunities of Cooperation between Neighbours: The Case of the Great Lakes Region of East Africa

“The region has many crises: genocide in Rwanda, civil war in Burundi, political unrest in the Eastern Democratic Republic of Congo...the current approach in universities and research centres consists in working in isolation, in almost complete ignorance of what is being done in other institutions...This state of affairs is conducive to the dispersion of efforts, and to the waste of already very limited financial means.

Equally noticeable is the unfortunate ambition of every university, at its inception, to open faculties in all subject areas instead of concentrating on those that respond to established needs. Why not develop a strong Faculty of Medicine in the Université du Burundi which could welcome students from Burundi, Rwanda, and Eastern Congo, and a Faculty of Law, also serving the whole region, in the Université Nationale du Rwanda? It is essential that a lower-cost approach to HE be devised, and that joint research programmes be developed in the interest of functional networks of researchers and a reinforced framework of university cooperation. ...

At the present, there are not really any joint programmes of teaching and research initiated by the universities of the East African Great Lakes region. They could draw inspiration from the work of the Inter-University Council for East Africa, an inter-governmental organisation ... which facilitates contact between 47 different higher education institutions in Kenya, Uganda, and Tanzania. This Council offers an attractive platform for academic relations between the academics and researchers..., coordinates cooperation, and encourages research collaboration.”

Given their current importance to the region, four areas of research could constitute the basis of cooperative and shared inquiry: “environmental protection, good governance, new ICT based local cultural systems, poverty reduction” (Gahama, 2008: 102-3).

Action plans are made to establish cooperation: “Five stages appear necessary to the gradual establishment of such a network:

- Convincing hesitant researchers that there is strength in numbers, and that the days of the ‘ivory tower’ are over.
- Convincing the political decision-makers of the necessity of such a network.
- Raising funds from the national governments of the Great Lakes region.
- Soliciting the support of the African Union, NEPAD, and UNESCO, who encourage this type of initiative.
- Establishing the actual research centre in a host country to be determined. ...”

The expert reporting this case summarizes: “The principal weakness of such a regional initiative resides in the fact that the various universities may want to appropriate the seat of the regional research centre for themselves, giving rise to rivalry on one hand and resistance on the other...

The opportunity lies in the fact that young researchers will have a chance to work alongside more senior colleagues, at a time when collective research proposals are most likely to win financial support.” (ibid., p. 105).

Various other experts name additional problems: non-hosting countries of the region might feel marginalized; some countries do not contribute financially on a regular basis; if joint centres are decentralized, quality control can be an issue because different rules and practices apply for the various countries involved (see Massaquoi, 2008: 66). Two Latin American experts conclude that strong mechanisms are needed to ensure success in regional cooperation:

“At least three entities will need to be created to ensure regional and functional cooperation in higher education and research. These are:



1. Coordinating and regulatory mechanisms to promote exchanges, advise governments and institutions, and grant approval for the establishment and operation of higher education institutions.
2. A quality assurance mechanism that ensures high standards in all areas of study in higher education institutions.
3. A clearing-house which facilitates nationals of one country undertaking study in another area agreed by the Governments concerned, such that Governments pay in part or whole the economic cost of their students” (Miller, 2007: 73).

All experts addressing the issues of regional partnerships in the UNESCO Forum agreed that, in spite of the difficulties experienced in various cases, many regions of the world have to form regional partnerships in order not to be left behind in terms of research quality and relevance.

### 3. The Academic Profession

#### 3.1. The Changing Environment

Experts addressing for the Forum the situation of the academic profession by and large agree on four, interrelated major changes in the environment shaping academic professional roles. The terms vary, but often refer to popular jargons: “massification”, “knowledge economy”, increasing power of management or “managerialism”, and “competition”. In all cases, the terms employed and analyses presented are ambivalent: potentials for improvement are acknowledged, but risks and dangers are underscored. Altogether, the notion of a “profession under pressure” is more often presented than one of improving quality and relevance and than one of an increasingly satisfying professional situation).

- “Massification”: the increase of student enrolment all over the world is generally seen as a valuable contribution of higher education towards enhancing the living conditions and career perspectives of graduates, as a step towards reduction of historically rooted inequities, and as forming the necessary basis for the “knowledge society”. But enrolment increases are often also seen as creating resource squeezes and undue efficiency pressures. Last but not least, in many countries the growth of enrolment encourages policies of differentiation of higher education institutions, whereby some strive for a close link between research and teaching, while others are clearly shaped by their teaching function. Kogan and Teichler (2007: 9-19) characterized the consequences of massification as follows: “Expansion of student enrolment was identified as the major driver of change, moving the intellectual discourse of the teachers and learners to organized curricula and instruction techniques, leading to a separation of the teaching and research function for many academics, undermining a social exclusiveness of the professoriate, increasing pressures for efficiency, and thus elevating the status of university management and possible government as forces of establishing a compromise between the traditional ideals and the new pressures of efficiency and coordination.”
- “Knowledge economy”: Most academics believe that higher education and research has to contribute to technological progress, economic growth, societal well-being and cultural enhancement. The increasing expectation, in the context of a “knowledge society” or “knowledge economy”, of relevant results of higher education is widely viewed as an opportunity for growth and for quality enhancement. However, fears are widespread that undue pressures for visible utility might undermine a creative environment in

higher education and research, and might consider certain stakeholders, certain purposes and certain directions of innovation while neglecting others.

- “Managerialism”: In many countries of the world, the role of the institutional leaders and the departmental leaders has been strengthened in recent years in higher education and research institutions within the overall steering and governance of that sector. On the one hand, governments were willing to devolve part of their powers, notably those of detailed administrative supervision; on the other, the collegial power of academics to administer their affairs decreased. This is often seen as having led to more rational decisions and higher efficiency, but there are widespread critiques as well: that managers often became the servants of unbalanced external pressures, that managerial control undermined the motivation of academics, and that academic rationales have lost ground in shaping the goals and processes of teaching and research.
- “Competition” is a normal state of affairs in the highly selective and intellectually demanding academic profession, and those academics who strive continuously for the highest level of achievement are generally viewed as desirable. In recent years, however, academic work was increasingly put under the regime of incentive mechanisms, evaluation measures and indicator-based steering, and many critics note a growth of counter-productive effects. These include an over-burdening of academics, too much attention to externally well-funded research objectives, overemphasis on short-term, visible success, imitation of the goals and process of select “World-Class Universities”, and neglect of the less well-paid and less incentive-supported functions of higher education.

It is interesting to note that experts tend to describe the major changes in low- and middle-income countries in similar terms to those in economically advanced countries. This suggests that the trends are in fact similar, often as a result of the global influence of the economically advanced countries – and the spread of higher education governance concepts from the north to the south. However, there are some issues relating to the academic profession which are indicative for low- and middle-income countries.

### 3.2. Employment Conditions

In a substantial number of countries, the salary level of academic staff in higher education and research institutions is far too low to earn a living. “Within developing countries the conditions of work and remuneration of the majority of academics is inadequate ... Academics have to hold more than one job to make ends meet” (Eggins, 2008a: 128). This might lead to irregular presence at the university. For one low-income country, an expert reported: “Many professors increase their earnings by selling books and photocopies, such as of lectures and notes, to students. The professors prefer large classes because they can make more money” (Belal and Springuel, 2006: 7). Some look notably to consultancies for additional income. In some countries, the low pay causes a serious understaffing or staffing on a minimum quality level, because many staff members “... leave for better-paying jobs” (Massaquoi, 2008: 61). Most frequently, the bad pay of academic staff arguably leads them to neglect research, because research duties are less formally controlled in most universities than teaching.

In most economically advanced countries, senior academic staff at universities and public research institutes traditionally had permanent employment contracts, while the situation varied for junior academic staff. In some countries, they had similar contracts as seniors from the very

beginning, in others their employment security grew gradually over time, while in others permanent contracts were only awarded with the appointment to senior positions.

In recent years, employment security for senior staff was called into question. “Job security, once and assumption, is under attack ... Permanent employment is no longer a given and tenure is becoming increasingly rare” (Kirsch, 2006: 6). In Japan, for example, the civil service status for academics at national universities was discontinued. As a consequence, most newly appointed academic staff gets short-term employment, and permanently employed persons could be dismissed if structural changes are made. In Latvia, “... permanent professorships are all but abolished, and faculty members who wish to stay on have to apply again for their own chairs every six years, perhaps competing with young aspiring talents who were recently their own graduate students” (Sörlin, 2007a: 420).

In some countries, and notably in the private sector, teaching assignments are made predominantly on a part-time basis. This might lead to financially unsustainable living conditions of academics, although, as was pointed out for example for Mexico, “... it is not uncommon to have part-time academics that, by virtue of several part-time contracts, are in fact ‘full-time faculty’” (Galaz-Fontes, Padilla-González and Gil-Antón, 2007: 59). In other countries, as in Mongolia and some Central and Eastern European countries, officially full-time employed staff of public institutions work part-time at private institutions, in order to make up for the unbearably low salary (Bat-Erdene, 2007: 10).

In many countries, institutions of higher education forego pay for social security and medical benefits. Apart from the hardships for the individuals, excessive part-time work is criticized for leading to overworked teachers not caring well for quality of teaching and learning, neglect of teaching-related tasks outside the classroom, and reduction of the research role of these institutions. Therefore, minimum standards are set in some countries for the employment of full-time staff. In Mongolia, “... the legal requirement concerning staffing of higher education institutions is that a minimum of 60 per cent of teaching staff have to be full-time faculty members” (ibid.).

Salary levels are diversified in some countries. This might reinforce “... the rise of the academic ‘star’ ... and the compulsive ‘winner-takes-all’ phenomenon with high salaries for successful and entrepreneurial professors” (Sörlin, 2007a: 426). The conditions for promotion are an issue of concern:

- In various low- and middle-income countries complaints are widespread that promotion is a routine which undermines efforts to enhance one’s own achievement and might actually block talent. A report published by the Human Rights Watch (USA based, international NGO)

“referring to Egyptian academicians, stated that promotion at all levels is close to automatic provided one does not stray too far into red line areas. The progression moves from assistant to lecturer, once the Ph.D. is complete. Usually lecturers become assistant professors after five years, and full professors after ten years. Promotion depends on tailoring research to state-imposed standards rather than increasing knowledge in the field. Once a scientist has become professor no other academic promotion opportunities exist and there are no mechanisms for monitoring both research and teaching” (Belal and Springuel, 2006: 9).

- Views vary regarding the strengths and weaknesses of external academic recruitment. It encourages the collection of experiences at various locations, and assessment of external candidates might be less particularistic. On the other hand, internal recruitment might increase institutional loyalty and the long-term build-up of areas of expertise. Therefore, some “... institutions have their own career procedures and development,

and offer possibilities for promotion for the best of academics who are not moving” (Musselin, 2007: 179-180). However as one expert pointed out, institutional loyalty could be reinforced in such a way as to undermine “academic integrity” (Bat-Erdene, 2007: 10).

- At many institutions promotion is tied to formal criteria, such as publishing a certain number of papers in journals (or in specific, highly select journals). These procedures seem to underscore achievement-oriented, fair selection at first glance, but are often criticized as encouraging formal achievement rather than substantive quality, and as neglecting the varied functions of the academic profession.

Various analyses presented in the framework of the Forum touched upon the issue of gender equity in careers. Some experts point out the small percentage of women among academic staff in select countries. Others underscore that the percentage of women varies dramatically among countries in similar stages of economic development or of higher education expansion. Some experts argue that too little is done to support women in coping with their double role as academics and mothers. Others refer to the research: academic productivity varies less according to gender, family status and child care than conventional wisdom might suggest (see Simienska, 2008).

### 3.3. The Growing Complexity of Academic Work

In addressing the work situation for academics in higher education and research institutions, many experts in the Forum emphasized that lack of facilities and poor working conditions are major impediments to quantity and quality of research in low- and middle-income countries. Also, the working conditions for teaching are often characterized as deplorable; for example, “Working conditions in Asia commonly consist of large classes, lectures, few laboratories and rote learning. Often direct teaching is some twenty hours a week. Needless to say, little time is left for research” (Eggins, 2008a: 128).

The analyses undertaken in the UNESCO Forum for Higher Education, Research and Knowledge addressed two other issues which might be viewed as equally challenging for low- and middle-income countries as well as economically advanced ones: first, the growth of complexity of the academic work role and its implications, and second, the links between growing managerial power, increasing evaluation activities and the objectives set for teaching and research work.

Altogether, many experts expressed the view that the professional role of academics was already quite complex in the past, as leaders in their fields setting norms for teaching and research, as responsible persons for curriculum development, as mentors for junior academic staff, as being involved in many matters of administration, as persons in charge of many external and internal functions (see Kogan and Teichler, 2007: 12). As a consequence of rising expectations of their work, many senior academics are expected to take over a larger set of activities or handle their activities in a more “professional” way than in the past.

The bundle of expected tasks tends to vary across regions and institutions:

- Mexican experts presented the following description of extended functions: “... teaching, research, participation in the institution’s collegial life, administrative work, participation in technological development, counselling and taking a central role in service activities, both to the productive and social sectors” (Galaz-Fontes, Padilla-González and Gil-Antón, 2007: 59).
- A French expert, describing the scene in economically advanced countries, points out that the job roles of academics had traditionally been more closely centred on core functions of research and teaching, and that explicit reward had been centred on these core functions. “Today, this is no more the case. Writing proposals, developing contracts, elaborating e-learning programmes, being engaged in technology transfers, etc. are part of the tasks achieved by faculty members ... recognized as important aspects of academic work. In Germany and in the USA for instance, the ability to raise money and to manage research projects based on external funding is one of the criteria of judgement when hiring professors. This diversification of tasks also holds true for teaching. Activities around teaching have evolved and represent a larger scope of tasks nowadays. Giving a class and supervising doctoral students are only one part of the training work. Teaching, engineering, designing learning programmes, finding internships for students also belong to “teaching” today. Furthermore, new missions (or the so called “third mission”) are emerging. They include links with regional, national and international bodies and decision-makers, interaction between scientists and the public at-large and involvement in public debates, public expertise, support to public policy at-large, etc.” (Musselin, 2007: 177-178).
- Changes of teaching and learning functions are described by other experts: “Another challenge is the transformation of teaching and learning. The traditional lecturer delivered the lecture, usually of fifty or sixty minutes’ duration, to packed lecture halls, which could hold anything up to 600 students. During the last ten years more and more emphasis has been placed on the importance of ‘student-centred’ learning, where the teacher acts as manager and facilitator, helping the students to learn at their own pace, and in their own time. The use of technology, with the delivery of technological and resource-based learning materials, changes the nature of the university teacher’s interaction with the student. Many would point out that the time needed to act as an effective and efficient facilitator is considerably more than that needed to deliver a traditional lecture” (Eggins, 2008a: 126).

One way of coping with the growing complexity of the academic role is to differentiate the roles among academics. Some institutions are in charge of both teaching and research, others focus on teaching. Some institutions focus more strongly on basic research, while others strive for immediate utility. Some professors emphasize the core role of teaching and research, while others understand themselves as academic entrepreneurs. In many cases, they have to adjust to teamwork – a competence not always developed among academics.

As regards the link or division of labour between teaching and research, an expert reporting on India underscored that both facilities for research and the possibility to get along with the complex demands of teaching and research play a role in the options academics take. In India, a “... teacher survey reflects their attitude towards teaching and research. A total of 68 per cent of the teachers complain that it is difficult for them to manage research along with their heavy teaching schedule. About half of the teachers therefore abstain from any form of research

along with their teaching. Teachers have very poor exposure to scientific meetings and international conferences. Sharing ideas and information with others who are working in the same or related areas are minimal in the campuses. Teachers expressed their willingness to pursue research if adequate facilities and support for infrastructure are provided in the institution. However, contrary to their complaints on infrastructure facilities only 16 per cent found that it is difficult to get adequate research support from public or private agencies. Teaching and research are not treated separately and no career advancements are provided to the faculty member who has a proven track record in research” (Varghese, 2008: 208).

One expert points out that some functions are increasingly expected at specific stages of the academic career, thus reinforcing the division of labour between academics of different career stages: “Specialization occurs through the evolution in the distribution of tasks during the career achieved by permanent academics ... experimentations are generally achieved by doctoral students and post-docs under the supervision of the *maîtres de conférences* (tenured assistants/associated professors), while the professors raise funds, develop contacts and write project proposals. This increasing share in project management, administrative responsibilities and maintenance of partnerships which occurs with seniority is again not new, but it becomes more and more important, clear and explicit”. In addition, “... the increasing part of contingent staff allows for a specialized distribution of activities among them”, i.e. undergraduate classes given by part-time or adjunct staff (USA), doctoral students with teaching duties (France) or increasing numbers of post-docs taking place in research activities (USA) (see Musselin, 2007: 178-179).

The growing complexity of assignments in higher education and research institutions is taken care of by an increasingly specialized staff, which in part alleviates the functions of the academics and in part calls for greater cooperation:

“The role of academics further changed as a consequence of the expansion and increasing status of ‘new HE professionals’, ‘professional administrators’, ‘middle-level managers’ or similarly termed university-trained persons in HE whose prime roles are managerial support or service provision and who have to be both highly qualified in their domain of shaping the institution and highly knowledgeable in the core functions of the academics. Academics have to adapt in this communication, and acknowledge the fact that while professionals in academic matters, they are amateurs in matters of shaping the university (and must cooperate with a new group of experts who are amateurs in academic matters, but professionals in shaping the university) ... However, simple diarchic assumptions do not hold. There are mixtures of collegial, academic-based decision-making and bureaucratic/hierarchical working. Academics do take over the roles of HE professionals or those of administrative leadership” (Kogan and Teichler, 2007: 14).

The growing managerialism in higher education and research institutions was not viewed as a factor reducing the complexity of the academic job role. Powerful university leaders and faculty deans do not seem to reduce the administrative and decision-making activities of the academics, but they do affect the targeting and modes of involvement.

### 3.4. Decision-Making: An Irreversible Utilitarian Drift?

As a consequence of growing managerial power in recent years, several experts contributing to the Forum cite a change in the internal institutional climate within higher education and research. Obviously, many academics consider the new climate as alien.

- The strong managerial power has changed, as some point out, “... the nature of the relationship between each academic and his/her institution. The university is no longer a place welcoming and sheltering academic activities, it has taken over

the role of an employer. The affiliation (or sentiment of affiliation) to one's institution is progressively transformed into work relationships. The responsibilities and duties of each academic are not only defined by his/her professional group but also by his/her institutional work arrangement" (Musselin, 2007: 180).

- "A powerful force lending support to the growth of managerialism has been assertion of quite penetrative quality assurance procedures that replace the hitherto 'trustful' relationships between academics and their institutions as the belief in 'transparency' has replaced trust in expert and professional knowledge" (Bleiklie and Kogan, 2007: 480).
- "And alongside them may be colleagues whose expertise and experience lies mainly in the business or professional rather than the academic world. Thus, changing boundaries within the academic profession come to change boundaries between academic and other professional worlds. And as boundaries change, they become more permeable" (Brennan, 2007: 21).
- "Moreover, the context in which the above tasks are to be performed has also changed. Among its main characteristics are the following: more students to attend to, internal and external performance-based economic incentives, professional development programmes stressing the attainment of formal degrees rather than competences for actual work, in many instances less than ideal working conditions (office spaces, communication facilities, base salaries, etc.), a highly rigid and segmented academic job market, and a career structure that is not well defined" (Galaz-Fontes, Padilla-González and Gil-Antón, 2007: 56).

The increased pressure for efficiency and visible productivity generated by the management of universities and research institutes is viewed in many respects as successful. Often, it seems to lead to a clarification of job roles, to stronger efforts to take into account the needs of students, to use available facilities and other resources in a more targeted manner, etc. But various questionable consequences of the managerial regime are named: most of them are stated more frequently with respect to private than public institutions.

First, incentives become so important in guiding academic work that low achievement in the case of limited extrinsic rewards seems to be reinforced:

- "It had been, to some extent, the case that faculty members at universities in third world countries, in general, and Arab countries in particular, would embark on research work only when directly connected with efforts leading to their promotion. It is noted, in many cases, that once a faculty member in many of these countries attains his full professorship goals, he/she would tend to retire from doing research altogether, or do little, if any. In the absence of any targeted direction for research from the nation's strategic planning, this is worsened by the fact that research conducted by incumbent faculty members does not serve the needs of any viable industry that would serve the local community" (Khasawneh, Owais and Malkawi 2008: 226).
- According to a research project on faculty perspectives regarding the prevailing research culture in the Philippines, "... many faculty members consider teaching as their main task whereas research is only an add-on activity ... A weak belief in the importance of research certainly affects productivity and the trifocal function in general. The active researchers among the faculty interviewees disclosed that their involvement in research had sometimes reached a point when they began neglecting other functions". On the other hand, "... faculty from private universities emphasized that the policies in their universities pertaining to criteria for faculty promotion are very clear. The quality and quantity of research that they produce are given appropriate merit and have a bearing in their promotion" (Salazar-Clemeña and Almonte-Acosta, 2008: 191).

Second, various authors discuss the impact of increased evaluation and managerial policies to increase research output. Among others, the ranking of "World-Class Universities" is seen as calling for increased research productivity, and various factors seem to reinforce it. For example,

the author of a comparative study in the Netherlands and the UK concludes: "... as noted by some respondents, the push for accountability and research quality assessment resulted also in more productivity since the system did not tolerate the 'idle' academic anymore. Further, the speed of building the credibility in basic research units increased from the pressures for 'relevance' and 'efficiency' coming from the environment" (Leišytė, 2008: 195-196). Some experts, though, name undesirable consequences, such as:

- The search for success in "safe" areas:  
 "... the major concerns for academics in terms of research were the pressure for high performance in research from funding agencies and university management, while also tackling the ever-increasing teaching loads, stratification of research groups, and threats to individual academic freedom ... Research units are afraid to lose out in the competitive environment and be 'punished' (e.g. closed down) in case of underperformance. This makes them to go for 'safe' research themes that will be more likely to secure funding, rather than to be innovative and take a risk (ibid.)".
- The loss of research talents who note that the utilitarian and applied research they are increasingly asked to do at universities is better resourced and paid in other sectors (see for example Sanyal and Varghese, 2006: 10; Kogan and Teichler, 2007: 10; and Siemińska, 2008: 163).
- Some experts point out that concern for formal achievement is reinforced rather than that for academic quality. For example, Mexican experts note a race towards the attainment of advanced degrees:  
 "In the first place, Mexican faculty need to continue their specialized training beyond the formal higher degree that the vast majority holds at this moment. In this regard two main issues need to be confronted. One, faculty training and professional development need to be re-conceptualized. Some programmes such as the Programme for the Improvement of the Professoriate (PROMEP) [*El Programa de Mejoramiento del Profesorado*]), and the internal merit-pay systems that public HEIs have in place, have promoted an atmosphere in which the goal, both institutionally and at the individual level, is to obtain a higher degree in the fastest possible way, and without necessarily much respect for traditional academic values" (Galaz-Fontes, Padilla-González and Gil-Antón, 2007: 56).

Third, the dominant funding, assessment and management regimes are viewed as serving only specific interests and as undermining the search for non-conformist and creative means of knowledge generation. Some experts report such views as widespread among academics, while others point out that they share these concerns. Some examples:

- "The academy's desired state was one in which 'autonomy' or 'academic freedom' was thus the necessary safeguard for the discharge of the university's primary duty, which was to permit intellectual non-conformity as the means of advancing knowledge" (Kogan and Teichler, 2007: 9).
- "The Australian Institute made a survey of academics on this issue. "The survey found widespread dissatisfaction with the erosion of academic freedom, with many respondents complaining of management pressure to produce commercially favourable research and student results ... Among 165 teachers and researchers who responded, 92 per cent expressed concern about the general state of academic freedom. Of those, 81 per cent blamed the increasing commercialization of their university ... About one in five reported that they had been prevented from publishing contentious research results, and 41 per cent said they had experienced discomfort with publishing such results ... Almost half had experienced reluctance to criticize institutions that provided large research grants or other form of support. Approximately 5 per cent said they had experienced pressures to admit and pass full fee-paying students and more than a quarter expressed low levels of satisfaction with the freedom to determine student standards ... The effect of competition, together with the administrative restructuring, on the academic profession has indeed been both positive and negative. The resulting efficiency and quality in educa-



tion and research can be expected, but in reality it can be the opposite by reducing intellectual creativity. Complementarity of competition and collaboration allows for a better balance” (Arimoto, 2008: 42-43).

- “There is a lot of money for universities, but only if they accept to do what the funding agencies, including the state, want them to do. The more money they receive, with decreasing margins per researcher, the more ensnared they will become in their deprived condition. They will grow into grand deliverers with little freedom. They may keep up their high performance academically, and they may even contribute increasingly to research, which is the sought-after version of this logic. But they may as well end up being mediocre in both branches, plus dissatisfied from stress and a mounting identity crisis” (Sörlin, 2007a: 435).
- “... knowing the specific culture of basic research units, research units were very slow to adapt to changes in the environment and they created strategies to preserve their core activities untouched. For example, despite the national research programmes and thematic funding, they still preserved their own research topics by diversifying their funding base. In that sense, sometimes other external donors, such as industry, were influential when it came to problem choice of research. Research units got involved in more applied type of research if they wanted to retain contracts with industry. This was mainly true in the biotechnology field, though even researchers in medieval studies found themselves going for ‘popular’ topics, as for example, the link between Robin Hood and the ‘hoodies’ of today in the UK to get external funding so that they can appeal to a broader audience” (Leišytė, 2008: 196).
- In developing countries,  
“... the dependency on donor agencies for funding research activities poses risks for the independence of academic research, forcing academics to tailor their research depending on donor needs. This dependency is not sustainable, as research is carried out not on a continuous basis but whenever the funds are available” (Papoutsaki, 2008: 247).
- The increase in controls over academic tasks is marked. Some controls are national, such as the Research Assessment Exercise (RAE), UK which results in a classification of research achievement within university departments and awards funding on that basis. Those who fail to achieve to expectation can find their promotion and salary prospects affected (Eggins, 2008a: 128).
- “In small states, where most educational research is funded by the state or by independent international donor agencies, through the state, educators who find themselves confronting evidence that policy prescriptions (which have been strongly endorsed and publicly promoted by fundraisers and employers) are not producing the desired outcomes, make a very rational decision not to speak ‘truth to power’ in order to preserve their employment opportunities. What is of even greater concern is the fact that the more funding that has been invested in the policy prescription, the greater the risk to educators of highlighting its limitations or deficiencies” (Paul, 2007: 5).
- “Rather than an increase in academic power, there is an emergence of other forms and other actors of control on top of academic regulations. As a result, academics are no longer evaluated only by their peers, but also by their own institution or through national devices that public authorities develop in order to control, rank and benchmark their activity. As a whole, there is a global increase in the level and intensity of controls, which often relies on the peer review process” (Musselin, 2007: 181).
- “The problem of unethical science has increased because of the quest for money, visibility and reputation due to competition for survival among not only institutions but also individual faculty members. Recently, a series of remarkable cases have occurred featuring corrupt behaviour in science” (Arimoto, 2007: 38).

Altogether, the discussion in the UNESCO Forum indicates that strong managerial power and a multitude of evaluation devices have become a matter of procedure. The debates of the 1990s about the opportunities and dangers of governmental deregulation and about the principal opportunities and dangers of evaluation mechanisms are not repeated or continued anymore in a similar way in the early years of the twenty-first century. But concern are expressed frequently that the dominant rationales of funding, management and evaluation are geared towards the interests of the financially most potent stakeholders, and towards over-utilitarian strategies in teaching and research. This critique implicitly does not call for the “ivory tower”, but rather for increased opportunities for non-conformist, unexpected and creative knowledge creation as well as for greater consideration of various stakeholders and societal needs.

## **4. Research Training and Young Researchers**

### **4.1. Recent Developments in Economically Advanced Countries**

The move towards the “knowledge society” and “knowledge economy” has spread research over various sectors of society. As a consequence, the universities in some economically advanced countries are (according to statistics of research expenditures) no longer the “... major players in carrying out research”, but “... continue to play a dominant role in research training” (Sanyal and Varghese, 2006: 6).

In recent decades, an expansion and re-structuring of doctoral training and similar research and academic training can be observed in economically advanced countries (see the overviews in Fry, Tress and Tress, 2004; and Teichler, 2006). Obviously, more attention has been paid to doctoral training in higher education and research policy discourses since the 1980s than in preceding decades.

Most experts and policy-makers called for a growth of doctoral degrees, notably for the following reasons:

- Higher education continued to grow in those economically advanced countries, where senior positions are predominantly filled by doctoral degree-holders. Thus, more persons with a doctoral degree were in demand in order to take over the teaching and research tasks characteristic of teaching positions in higher education.
- A doctoral degree became the typical entry prerequisite for high-level academic positions in universities, including in those countries where this was not the case a few decades ago, e.g. Japan and the UK.
- The number of research positions outside higher education, for example in public research institutes and in private R&D, has increased in recent years even more strongly than the number of academic positions in higher education.
- The number of doctoral candidates at universities in economically advanced countries who originate from low- or middle-income countries is growing more rapidly than the number of doctoral candidates from economically advanced countries. Provisions for doctoral work are expanding rapidly in low- and middle-income countries.

Valid international statistics on the number of doctoral candidates do not exist. In the USA, for example, all students at “graduate schools” might be viewed as doctoral candidates (including those with only a bachelor’s degree), while in other countries only those who have already been awarded a master’s or similar degree are included. Mostly, the available statistics only include

those doctoral candidates who are registered as “doctoral students”; this might include all doctoral candidates in countries where a graduate school is a “must”, but only a minority of doctoral candidates where the majority of them are employed or where no obligation exists to enrol as doctoral candidate for other reasons. As a consequence, only statistics on the number of doctoral *awards* can serve international comparison purposes.

Table 3 provides an overview of countries with high numbers of annual doctoral awards, as well as those with a relatively high rate of doctoral awards within their overall population.

**Table 3. Trends in Net Graduation Rates at Advanced Research Qualifications, ISCED 6 Level (1995-2005)**

<i>Country</i>	<i>Graduation rate 1995</i>	<i>Graduation rate 2000</i>	<i>Graduation rate 2005</i>
France	m	1.2	m
Switzerland	2.3	2.4	3.1
Portugal	m	1.0	2.6
Germany	m	2.0	2.4
Sweden	m	2.5	2.2
United Kingdom	m	1.4	2.0
Russian Federation	m	m	1.9
Australia	m	1.3	1.7
United States	m	m	1.3
Israel	m	0.9	1.3
Brazil	m	m	1.3
Poland	m	0.8	0.9
Japan	0.4	0.6	0.9
Turkey	m	0.2	0.2
Mexico	m	m	0.1
Chile	m	m	0.1

Source: Adapted from OECD, *Education at a Glance*, 2008.

Doctoral training in the USA is very attractive for young researchers from all over the world, notably, in the science and engineering fields, and the mode of organizing doctoral training in the framework of graduate schools has had an enormous impact on other countries. This does not mean, however, that the current practices of doctoral training are necessarily viewed as more or less satisfactory. In a recent summary of the debates in the USA, doctoral students are believed to be

- Educated and trained too narrowly.
- Lacking key professional skills.
- Taking too long to complete their degree, or too often not completing it at all.
- Ill-informed about employment opportunities outside academia.
- Experiencing an overly long transition period from Ph.D. completion to stable employment (cf. Kehm, 2007 referring to analyses by Nerad and Heggelund).

Most of these problems are referred to in Europe as well. Most recent studies in Europe “... have identified altogether eleven problem areas in the traditional forms of doctoral education in European universities:

- Traditional master-apprentice models versus schools and programmes.

- Highly regulated and competitive versus rather informal and unregulated admission.
- Status of doctoral candidates: students versus salaried junior research staff (EURODOCS: “early career researchers”), but also regulation of rights and duties of both sides.
- Frequent financial insecurity.
- Increase in numbers of doctoral candidates and degree holders but often not in the ‘relevant’ subjects; competition for the best talent and brain drain.
- Long average duration of the phase of doctoral qualification, with large differences among subjects.
- Lack of proper supervision and quality control of doctoral education and training.
- Mobility and international exchange of doctoral students is lower than expected, but there is increasing competition to attract and keep best talent.
- Large differences in the processes of assessment and validation of performance; problems with issues of independent assessment.
- New trend of ‘professional doctorates’ (and ‘fast track’ options), with relevance and quality concerns.
- Transition into (academic) careers featuring ‘holding positions’ in the post-doc phase” (Kehm, 2007: 112).

In various countries, efforts are made to train doctoral candidates to do and to write-up a masterful work of research, but also to deliberately foster a broader range of related competences. Eggins (2008b: 16), for example, names:

- “Acquisition of formal research methods.
- Development of transferable skills.
- Studies in professional applied activities.
- Innovative teaching methods.
- Training in reviewing methods.
- Publishing in research journals”.

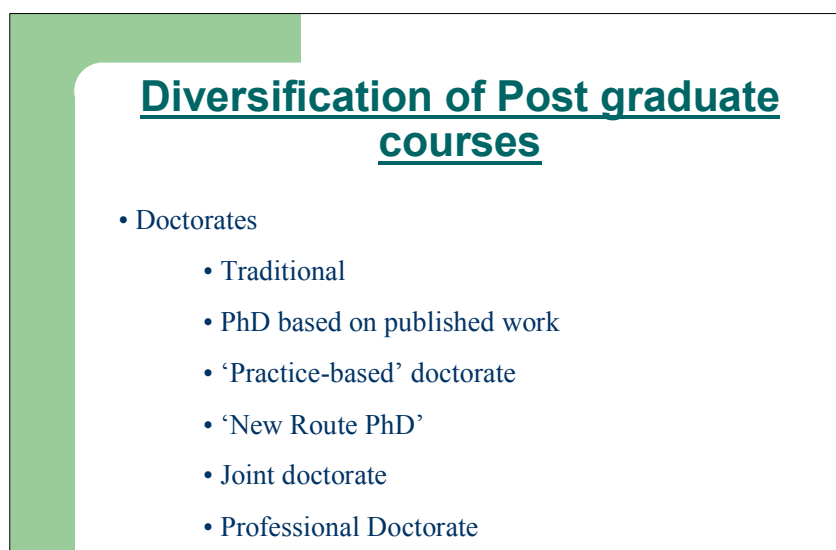
Many experts perceive a trend toward major restructuring of doctoral training, through the spread of doctoral training within doctoral programmes and graduate schools. In fact, there seems to be an increase of collective responsibilities for supervision of doctoral work, of taught courses as part of doctoral training, of enhancing skills beyond the ability to write a research master piece, and of central management of doctoral training within the universities.

It would be misleading, though, to assume that doctoral training in economically advanced countries is adapting to the North American graduate education and graduate school model. Rather, many changes are underway in various European countries leading to various kinds of compromises between the Humboldtian tradition of the individual supervision of the doctoral candidate by a single professor and the American model. Some variations might be mentioned, which are noteworthy for economically advanced countries:

- In Germany, the Netherlands, the Nordic countries in Europe and some other countries, the majority of doctoral candidates are employees at universities and research institutes, expected to be trained and to do productive work concurrently: either fully concentrated on the doctoral dissertation or having additional research assignments. They might be regular employees within the university budget and on regular pay scales, employees within special financial arrangements for doctoral candidates, or employees paid through financial means of research projects. In most European countries, the term doctoral “students” would not be viewed as desirable, even if the candidates re-

- ceive a fellowship or are officially registered as students for purposes of administration and benefits.
- In various European countries, doctoral programmes or “research schools” emerged as one possible option, keeping the opportunity for other universities without such programmes to award doctoral degrees and for professors not involved in such programmes to supervise doctoral students. Thus, doctoral candidates can opt either for programmes or individual doctoral work supervised by one or two professors.
  - Opportunities to work for a doctoral degree without long residential requirements are widespread in many European countries. Often, residential requirements are at the pleasure of the supervisor of the individual dissertation.
  - In most economically advanced countries, the doctoral training phase is not viewed as a movement from the “bachelor” to the “doctor”, but rather from a master-level qualification towards a doctorate. Average “time to degree” in the USA is calculated as about eight years from the bachelor toward the doctoral degree, but for example as about five years on average in Germany from a master-level degree onwards. Various economically advanced countries do not make the American distinction between “undergraduate” education up to a bachelor and “graduate education” thereafter. Even though European countries move in the framework of the so-called Bologna Process towards the introduction of a bachelor-master system, this does not necessarily result into a move towards a similar conceptual divide between the character of bachelor programmes and that of master’s programmes as is customary in North America.
  - In the USA, a clear distinction is made between academic, “Ph.D.”, and other professional doctoral awards, whereby the former are viewed as clearly preparatory for subsequent academic careers, while the latter are viewed as academically less demanding and as clearly leading to other highly qualified professions. In the UK, activities have increased recently to establish “professional” doctoral programmes. Chart 12 shows a variety of doctoral programmes discussed or implemented.

Chart 12. Diversification of Postgraduate Courses



Source: Eggins, 2008.

### Chart 13. Rationales and Modes of Doctoral Study and Research in Economically Advanced Countries

#### **Institutional patterns of the higher education systems?**

- “Will doctoral training be concentrated ... in a small number of top universities, or will a broad range of universities” be involved?
- “What are the potentials and what are the problems of collaborative doctoral programmes between two or more universities ...?”

#### **Provisions and activities**

- “Are ... status of the doctoral candidates and the funding of doctoral work relevant for ... the quality of doctoral work?”
- “What do we know about “completion rates and time to degree?” To what extent are they “indicators of the quality and efficiency of the doctoral programmes?” “What arrangements are embedded into the doctoral students to help doctoral students” to strike a balance between “academic quality” and “societal relevance”?”
- What is the role of publishing during the course of doctoral work? ...
- How do the “training needs” of part-time and full-time doctoral candidates differ? And how do supervision and training programmes differ?

#### **Doctoral programmes**

- Will continental European countries keep a close link between bachelor and master, or will they move more towards graduate schools with a close link between master and doctor?
- “Do we note a convergence or divergence” in doctoral programmes across disciplines?
- “What are the benefits and problems of jointly supervised doctoral degrees ...?” ...
- Do structured doctor programme primarily serve additional competences or do they play a major role enhancing the research capacity? ...

#### **Expected competences**

- To what extent is the doctoral dissertation viewed as ‘productive work or as a tentative result of a learning process?’
- “What competences should be fostered ... beyond the ability to write a dissertation ...?”
- Does employment of doctors outside academia indicate a mismatch or the growing relevance of knowledge on the way to the knowledge society?
- “Are professional doctorates more valuable than academic doctorates for graduates working outside academia?”
- What roles do doctoral competences and titles in R&D and other innovative areas?

Source: Adapted from Teichler, 2008.

### 4.3. Issues in Other Parts of the World

Most low- and middle-income countries have relied, as far as doctoral training is concerned, on the provisions for doctoral training in economically advanced countries. For example, about 80 per cent of students from Arab States involved in graduate training in 2000 were actually enrolled in OECD Member Countries (Kearney, 2008: 8). Many young people went to economically advanced countries upon completion of secondary education, or after the award of a bachelor degree, in order to eventually be awarded a doctoral degree. Also, many universities in low- and middle-income countries send some of their academic staff to economically advanced countries for doctoral study. These activities have turned out to be successful in many cases, but high costs are incurred, the risks of failure are high, the work on the doctoral dissertation is not directly in interaction with other research and teaching activities at home, the work might follow other ra-

tionales than those relevant to the home country, and those eventually awarded a doctoral degree might not return.

Over the years, however, a number of low- and middle-income countries began to set up their own graduate programmes and doctoral training (see Eggins, 2008b; Kearney, 2008). In most of these countries, the process of embarking into graduate education and notably doctoral training was cautious and initially on a small scale. The research base often was too small to embark into these training efforts (see Massaquoi, 2008; Oyewole, 2006; Mollies and Voehl, 2007; Belal and Springuel, 2006; Donwa, 2006; and Hanafi, 2006). In many countries, even the percentage of professors with a doctoral degree has been small. Often, bachelor education was so much based on rote learning that a transition towards independent and creative learning on the graduate level turned out to be difficult (see for example Zahlan, 2007: 149; McGlennon, 2006):

— Belal and Springuel (2006: 10), argue for example with respect to Egypt:

“Gaps in education exist at all undergraduate and postgraduate levels for teaching how to perform research and to write up results. Students are not trained to do research, nor taught how to write scientific papers. This essential part of education is completely neglected in both undergraduate and even postgraduate studies. With very few exceptions, the research topics for post-graduate students are proposed by supervisors who have instructed the students and do not encourage the personal student’s thinking. They use a student as the tool for doing the practical or field work but not for research. ‘Egyptian university graduates are capable only of waiting for orders and executing them. No thinking, no arguing, no questioning; no objecting and not even dialoguing: a personality that does not (and cannot) create or think. This graduate is usually stuck with this type of passive personality for the rest of his or her life.’”

— One expert describes undergraduate education in India as follows:

“In many campuses the teacher acts as information-delivering agent who tends to promote memorization rather than conceptual understanding. The authoritarian nature of teaching-learning practice existing in universities turns students as respectable receptors of a pre-constituted knowledge package. (Varghese, 2008: 202) ... “The existing science courses must be improved by incorporating an active component of student engagement in the learning process ... Teachers should train students in the way to handle the information flood around them ... The assessing mode existing in the universities needs immediate attention. Properly tested and effective evaluation instruments must be used for assessment purposes” (ibid., p. 210).

Consequently some experts suggest enhancing research capacities in various developing countries, whereby research training is also viewed as one of many steps rather than as a key activity, as in a list of proposals put forward by Zakri (2008: 44):

- “... to create and strengthen centres of leadership and excellence , especially in least developed countries, by identifying leaders and research teams, providing them with autonomy, financial stability, modern equipment and access to IT and international peer groups;
- to support fellowships and training programmes that keep researchers up-to-date with the latest information and connected with other research and educational centres around the world;
- to promote cooperation in the South through South-South exchange fellowships for doctoral and postdoctoral researchers...;
- to create institutional networks to address common problems relating to the region ...;
- to publicise and share successful experiences...;
- to create and support merit-based academies in the South that will help promote and sustain scholarship, recognise and reward good work, interact with other academies and scholastic bodies, serve as role models for the young, and engage governments;
- to mobilize expatriates and institutions in the North enabling the ‘brain drain’ to be converted, in part, into a ‘brain gain’...;
- to provide equitable access to knowledge...;

- to engage the private sector as agents for national development by supporting R&D through in-house research, training, recruitment and related modes of support;
- to persuade governments to commit to R&D by investing more...”

Often, masters and similar professional programmes were established first and doctoral programmes followed some years later. Many institutions and countries started involvement in doctoral training in cooperation with scholars and universities from economically advanced countries before taking over responsibilities themselves.

While a doctoral degree has become more or less an indispensable qualification for academic careers at universities with a teaching and research function in economically advanced countries, masters education in many other countries could lead to academic careers. Table 4 shows that about three quarters of doctoral graduates in Latin America subsequently work at higher education and research institutions, but also about half of the masters' graduate.

**Table 4. Destiny of the Holders of Masters Ph.Ds in the 1990s (percentages)**

<i>Type of activities</i>	<i>Masters</i>	<i>Doctors</i>
Business and public services	20.7	10.9
Public and private companies	21.1	5.9
Universities	34.5	68.8
Research Institutes	5.4	8.3
Offices/Consulting	12.5	4.5
Others	5.7	1.7

Source: Velloso cited in Neves, 2007.

Some countries have succeeded over the years to build up an impressive scale and quality of doctoral training. The Republic of Korea and Mexico are often named as countries with a feeble system of graduate education three or four decades ago, but a highly successful one at this time. The consolidation of graduate studies took place in a period of economic growth, which eventually led to the membership of these two countries in the OECD.

Brazil is often named as a country pursuing a systematic strategy of enhancing research potentials, through sending large numbers of graduate students abroad as well as gradually expanding graduate education in the country (see for example Mollis and Voehl, 2007; Ramirez, 2008). In the mean time, more than 10,000 doctoral degrees are awarded annually in Brazil.



### Chart 14. The Development of Graduate Education in Brazil

“The first important aspect concerning the graduate studies in Brazil is that its development was not a result of a spontaneous process, but of a deliberate state policy. It means that, the graduate level grew up in a planned and guided form. The successful experience in the expansion and the quality of the system must be also credited to the continuous public financing and the institutionalization of a systematic evaluation process...

The graduate education national policy history was built up from the Graduate Education National Plans, which outlined the well defined directions for its expansion” Programmes aiming at institutionalization process of the graduate education through “full time scholarship for students; the extension of the Teacher Training Program, and the faculty admission on a regular programmed basis by the higher education institutions” and “the consolidation of the graduate education system; improvement of the course performance; program evaluation; research institutionalization in the universities; and the integration with the productive sector” were implemented (Neves, 2007: 98).

The programme in effect now aims “to promote a fair growth of the graduate education national system aiming at responding to the society demands with quality in relation to the scientific and technological, economic and social development: stability and induction; performance improvement; financing and sustainability, diversification by creating new models; international cooperation and evaluation and quality” (ibid., p. 99).

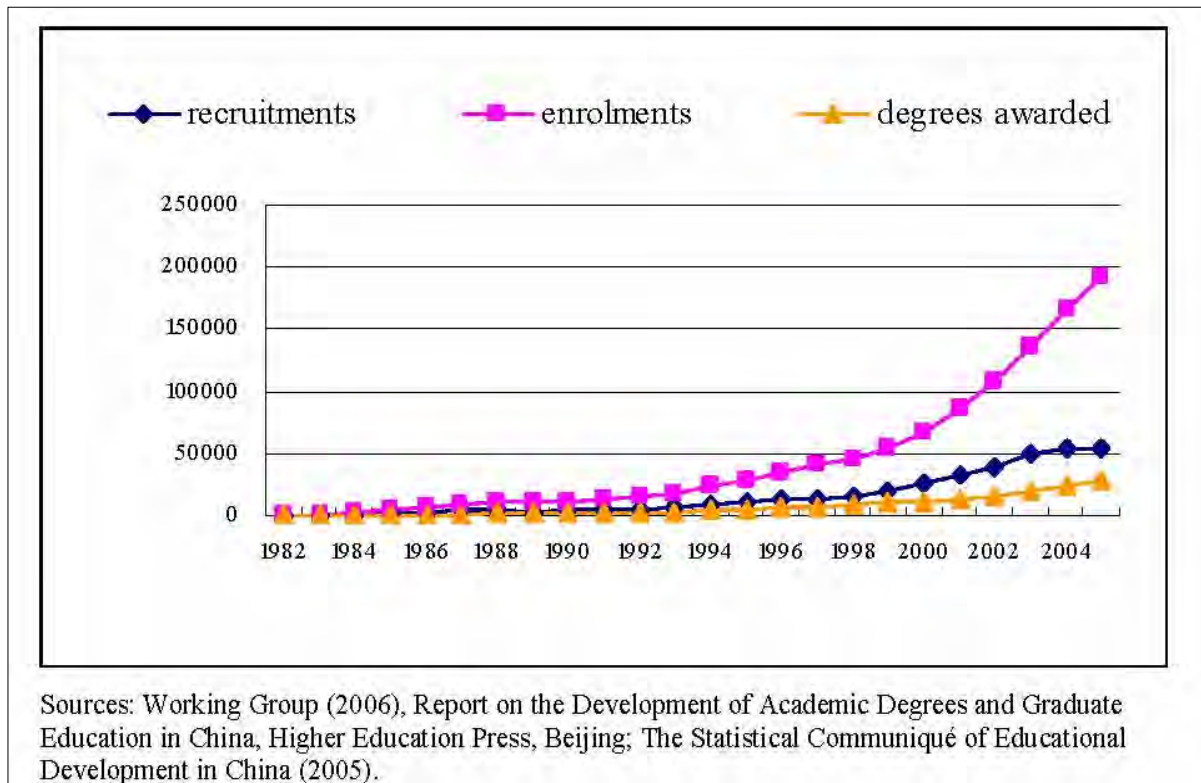
“In short, the graduate education system consolidation has happened due to the following:

- Integration of the graduate programs in the university system institutionalizing the research activity in different institutions;
- Increase in the higher education faculty capacity;
- Creation of a large scholarship program in the country and abroad which has been contributing to the qualification and reproduction of faculty and researchers.
- Structuring of a financing support policy for graduate programs;
- Systematic participation of community academic representatives in the graduate policy formulation process;
- Implementation of a national evaluation system of the programs
- Integration of teaching to research establishing a limited number of articulated courses with the respective course research lines;
- Creation of an efficient dissertation and thesis orientation system;

Articulation of the national academic community with important centres of the international scientific production” (ibid., p. 102).

China is among the countries in which, in recent years, strong efforts have been made to extend the training of young researchers. Since 1999, the number of graduate students increased annually by more than 20 per cent (Chen, Sanders and Wang, 2008: 155). In 2005, fifty-six graduate schools were established and 349 universities and research institutes were authorized to award doctoral degrees (Shen, 2007: 130). The overall enrolment in doctoral education increased from less than 1,000 in the early 1980s to about 15,000 in 1990, to about 50,000 in 1998, and eventually to about 200,000 in 2004 (see Chart 15).

Chart 15. Increases of Doctoral Education in China



Source: Cited in Shen, 2007

This expansion obviously has met a mixed response in China. Critiques are widespread, to the effect that access to doctoral education has become too easy and that a substantial proportion of doctoral students do not seem sufficiently prepared. Many candidates are awarded a doctoral degree, even if invited experts have voiced substantial criticisms of the assessment process. On the one hand, many experts and actors are concerned about the quality; they point out that many supervisors are not well-prepared, facilities are lacking, doctoral training takes place in large classrooms, and the number of doctoral candidates per supervisor is very high; moreover, they claim that high quality cannot be achieved in a large sector of part-time doctoral students. Other actors and experts argue, in contrast, that massification is bound to affect doctoral training as well, whereby high quality is likely to be preserved only in the leading universities and research institutes.

A report presented to the Forum shows that various measures are being taken to assure the quality of training. Among others, professors must be appointed to become “doctoral supervisors”. In 2005, less than 60 per cent of full professors at thirty leading universities in China were entitled to supervise doctoral candidates (Shen, 2007: 135), and this proportion was lower at other universities. In addition, many of the (roughly) two-third of persons awarded a doctor degree who are subsequently employed in higher education and research institutions (ibid., pp. 133-134) must complete a “preparatory training programme” in order to become fully qualified for academic work.

Experts addressing general issues regarding training of doctoral candidates and other young researchers in the framework of the UNESCO Forum agreed in suggesting that low- and middle-income countries should embark onto those training activities even if perfect conditions cannot be assured, but they should develop strategies of mid-term quality improvement. They pointed

out that conditions in the various countries are too divergent to suggest general strategies (Eggins, 2008b; Kearney, 2008). Finally, some experts suggested that research and other advanced training in developing countries should differ from training abroad in ensuring, strategically, the relevance of that training for the development of the respective country and region (Salmi, 2008: 31).

## 5. Quality and Relevance in Higher Education and Research

### 5.1. The Changing Discourse on Quality

Efforts to formulate what constitutes excellent teaching and research have sounded similar over the last few decades and across the world. A representative of Stanford University stated in the framework of the UNESCO Forum for Higher Education, Research and Knowledge that research universities share the following “characteristics”:

- High-quality faculty committed to research and teaching.
- High-quality graduate students, who want to learn to perform research or function with advanced expertise.
- An intellectual climate that encourages scholarship.
- Facilities in which teaching and research can be performed effectively.
- Funding for operations and instruction.
- Research funding.
- Research infrastructure.
- High-quality leadership (Bienenstock, 2008: 34-35).

Similarly, two Malaysian experts propose (with reference to American higher education researcher Philip Altbach) that

- “... to attain research excellence, the university must have the following:
- Top-quality professors.
  - Favourable working conditions (including job security and appropriate salaries and benefits).
  - Academic freedom and intellectual excitement, including freedom to pursue knowledge and to publish freely.
  - Conducive internal self-governance and an entrenched tradition which ensures that the academic community controls the central elements of academic life, such as student admission, degree criteria, and the selection of new academics.
  - Adequate facilities; and
  - Adequate funding for research” (Razak and Mohamed, 2008: 111-112).

Many characterizations of excellent universities and research institutes of these kinds are similar in:

- Defining excellence by “quality”, i.e. by taking for granted that “quality” does not have to be defined but rather is based on common notions.
- Emphasizing quality without any explanation of whether “relevance” is implied in the criteria of quality or is distinct, and whether there are any conflicts for universities and research institutions as far as efforts to enhance quality and relevance are concerned.
- Assuming that a close link exists between excellent research and excellent teaching and learning.
- Pointing out a link between the quality of the environment, the competence of the persons involved, and achievement-oriented behaviour.

Across countries and over the last three or four decades, we note divergences as far as the management of universities is concerned. Of the characteristics quoted above, some put emphasis on university management while others call for strong academic self-governance.

Over the years, the discourse on the quality of teaching and learning in economically advanced countries, and to a large extent in low- and middle-income countries as well, was strongly shaped by the notion of “massification” of higher education. In the process, quality increasingly has been viewed as endangered:

- By the increasing proportion of students prepared for and motivated by quality education, against a declining willingness of governments to keep average expenditures per student on a high level.
- By increasing provision of private higher education, inclined in some cases to “sell” higher education on a low-quality level.

Private higher education often claims to offer study provisions closely linked to the needs of the employment system: concentration on fields in high demand, curricula geared to presumed job assignments, more teaching by practitioners, more practical experience during the course of study, more active help in the job search process etc. As above, various experts stated that often the study provisions at private institutions of higher education are very low in quality. In some cases, the quality might be so low that graduation from these institutions does not open up job opportunities in the areas targeted.

As regards “profit-seeking higher education institutions” in Brazil, Ribeiro (2008: 217) argues that “... teachers are not properly qualified and lack job stability, and a great number of students come to higher education with an insufficient education and a desire for no more than a professional degree.” Moreover, “Most students who go to private, profit-seeking higher education institutions in order to get a degree in law or business (which in Brazil belong to the level of undergraduate studies) are unable to exercise their respective professions when they end their four to five year study ... A very important reason for this failure is the bad quality of studies in Brazil, with the sole exception of those on the graduate level” (*ibid.*, p.216).

Discussions about ways of ensuring quality in higher education concentrated on two themes: (a) measures to enhance quality, and (b) diversification as a means to ensure high-quality education in some sectors of higher education, while accepting other standards and objectives in other sectors.

The discourse on the quality of research was somewhat different. Experts observed that there was a more or less steady growth of research expenditures over the years in economically advanced countries, and that there was a trend towards an increase of the quality of research as well. The expectation of relevance of research also grew along the way to what often is called the “Knowledge Society” or “Knowledge Economy”, and the spread of neo-liberal ideas encouraged some actors to call for or actually implement a reduction of public research expenditure. According to Sörlin (2007a: 429), the rise of neo-liberalism (which does not support state intervention in cases of marked failure), resulted in “... stagnation of research funding and the first serious dip in the rising curve of research spending that characterised OECD countries for four decades”. It is interesting to note that the Lisbon Declaration (2000) of the heads of governments of the European Union calls for an increase in the proportion of the GNP spent on research; but it leaves open the extent to which this aim should be achieved through increased public research expenditures or through increased private investments in R&D.

## 5.2. In Place of Trust: Incentives, Competition, Evaluation

In the majority of economically advanced countries, teaching and research in higher education was shaped by a funding and supervisory system based widely on trust. Government played a role in general target-setting and bureaucratic supervision on the one hand, but on the other provided funds for education and research with a substantial degree of academic freedom, i.e. little restrictions as regards the substance of teaching and research; it trusted that the individual academics would do their best in striving for the quality of their work, and eventually produce relevant results.

Over the recent two or three decades, this regime of trust was increasingly substituted by efforts to ensure the quality and relevance of teaching and learning as well as research. This was realized notably through:

- Increased incentive steering.
- Various means to increase competition.
- Establishment and extension of evaluation schemes.
- Strengthening managerial power within higher education and research institutions.
- Ensuring greater stakeholder influence.

Advocates of such a move, from an environment of trust towards a mix of operational steering instruments to increase effectiveness and efficiency, tend to claim that these mechanisms enhance the quality of higher education and research, while leaving open what the consequences might be for the relationship between quality and relevance.

Relationships between governments, university management and academics, as well as funding conditions, were much less based on trust in most low- and middle-income countries. This notwithstanding, the majority of these countries has taken reform steps in recent years similar to those of economically advanced countries. Many discourses as regards quality and relevance of education and research are similar in low- and middle-income countries to those in economically advanced countries.

## 5.3. Quality and Relevance under New Management

Strengthening incentive and competition mechanisms within higher education is often advocated as a (more or less) guarantee of quality enhancement. “The current ‘Zeitgeist’ assumes that increasing competition as a rule leads to enhanced quality in higher education” (Rivza and Teichler, 2007: 471). However, experts note many instances where increased competition might actually lead to a quality decline:

- “... experts also point out counter-productive consequences of over-competition, such as increasing imitative behaviour among institutions and scholars ... [and] efforts to improve according to indicators rather than according to substance and increasing activities of deliberate disinformation” (ibid.).
- “Moreover, some higher education institutions, in order to increase their competitiveness within given financial frameworks, send home students abroad and admit larger numbers of foreign students which might require more administrative, consultative and academic support. This in return might imply greater risks of quality of learning and successful graduation” (ibid.).
- “Increasing competition between universities is generally expected to cause increasing vertical diversity of higher education institutions. The widespread advocacy of ranking and league tables ... leads to increasing quality awareness of consumers and more targeted choices and, in effect,

steeper quality differences between higher education institutions.” Analyses on ranking only underscore the quality of the leading institutions, but do not provide any evidence whatsoever regarding whether the quality of higher education increases with increased stratification” (ibid).

- “Competition under a situation of inequality in information and distorted values has led to undesirable behaviours. For example, the quality of education has a tendency to be measured by students’ satisfaction and employability. The quality of research is by publication in international journals and lately by the magnitude of citations. Research results which are not publishable, but are of great local benefit to the country or people, are not given credit” (Suwanwela, 2008: 33).
- “Because of the perceived values in the market and imperfect information, some are seen to try to meet quantitative indicators while losing quality. For instance, teaching universities, with expertise in teaching as their competitive edge, are pursuing research for international publication rather than concentrating their efforts on teaching, or selecting research for the betterment of teaching. Local universities are seen to neglect relevant local problems and go for globally publishable ones. Some try to create doctoral education with limitations and must settle for poor quality. Such unhealthy situations would not be sustainable, but much damage could have happened in the mean time” (ibid.).
- “One drawback of the competitive funding based on calls for proposals is that it focuses creative energy on winning the money rather than on spending it wisely, and tends to absorb the time of the most creative people on competition rather than on research” (Sörlin, 2007a: 435-436).

In many low-income countries, the facilities or competences of the academic staff are considered so low that a stronger emphasis on incentives and competition is futile. Emphasis on incentives and competition takes for granted that underutilized facilities and competences are there, which could be driven to a higher level of utilization through stimuli.

Evaluation measures are a more direct way of observing the potential or real functioning than incentives or other competitive stimuli. But evaluation measures as such do not safeguard quality enhancement. Knight (2007: 10), for example, observes

“... the growth in accreditation mills. These organizations are not recognized or legitimate bodies and they more or less ‘sell’ accreditation status without any independent assessment. They are similar to degree mills that sell certificates and degrees with little or no course work. Different education stakeholders, especially the students, employers and the public need to be aware of these accreditation (and degree) mills which are often no more than a web address and are therefore beyond the jurisdiction of national regulatory systems”.

Research funding in higher education is one of the key areas in which a substantial move, from logic of “trust” to logic of incentive and competition, has taken place in many countries.

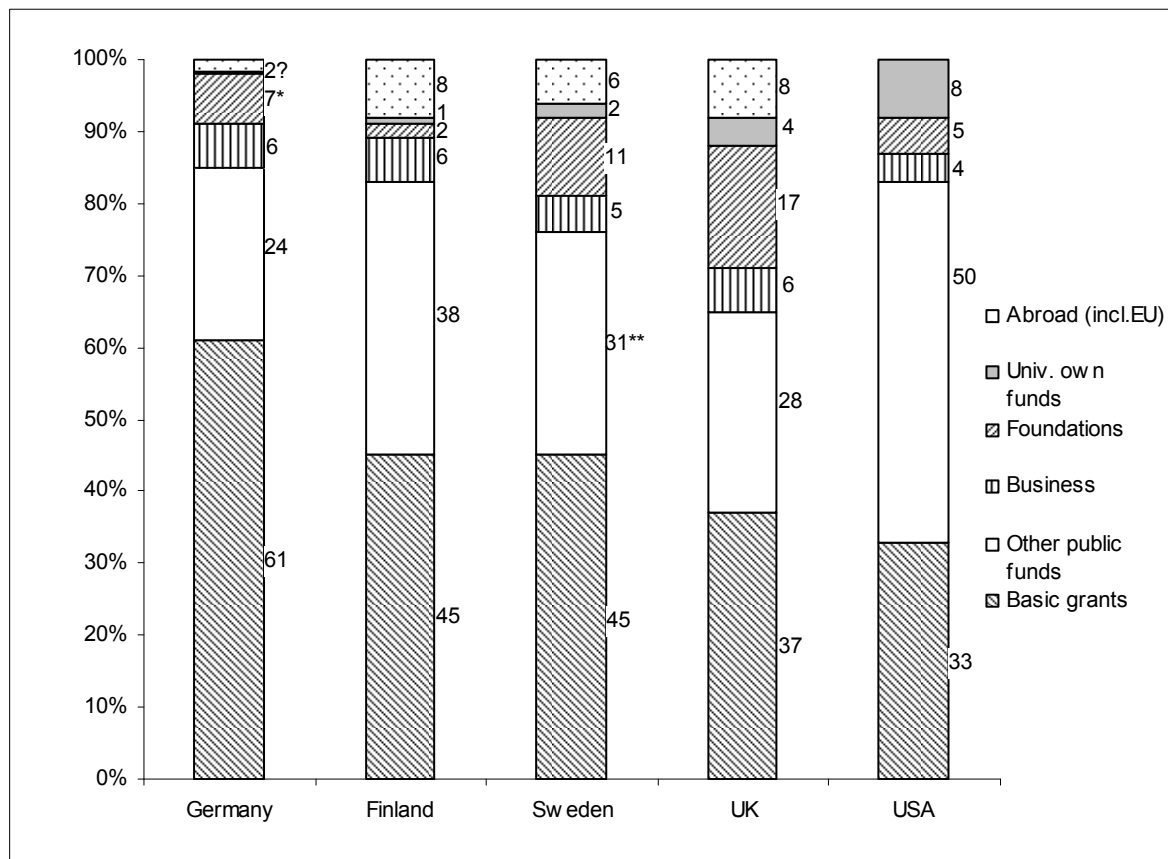
“In principle two different principles have been used for funding of research and HE. Traditionally funding has been allocated as block grants based on some estimate of the needs of the institutions ... This system has increasingly been replaced by some kind of performance-based, competitive funding, e.g. on incentives putting a premium on output and efficiency as measured in terms of e.g. number of graduates and time to exam, number of scientific publications, as well as the ability to acquire external research funds. The move towards incentive-based funding systems has not been a uniform movement. There are considerable differences across countries as to the portion of funds that are based on incentives, the criteria that are used and their overall system effects. One of the implications of the movement is the establishment of procedures and bureaucratic apparatuses aiming at measuring organizational performance, linked to allocation of funding, as an addition to the traditional evaluation of individual performance tightly linked to the allocation of status and prestige” (Sörlin, 2007b: 2).

We can differentiate the following modes of research funding in higher education:

- Research funding through basic funding of the university without any differentials according to expected output. This holds true, for example, if basic funds are allocated according to number of students and academic staff, possibly only differentiated according to disciplines.
- Research funding through basic funding of the universities whereby the amount of funds provided is differentiated by output criteria, e.g. the number of graduates, research publications etc. Basic funding of research is not viewed as obsolete under conditions of primarily competitive funding of research projects; among others, universities need a certain degree of basic funding of major research areas in order to ensure a certain stability of staff and facilities, which is necessary to apply for competitive funds successfully (Sörlin, 2007a: 434).
- Incentive-based funding for universities as a whole; e.g. the allocation of resources to ten top German universities in the framework of the so-called “excellence initiative”. Actually, incentive-based funding of institutions remained more controversial than the other research funding principle. As a consequence, the Japanese Government transformed its initial plan to support thirty top universities into a support programme for “Centres of Excellence” (Huang, 2007: 90), and the German Government agencies kept in their excellence initiative only one third of the initially envisaged funds for the support of 10 top universities, while two-thirds were transferred to inter-university research “clusters” and graduate schools.
- Allocation of public funds to individual research projects undertaken at institutions of higher education. In selected areas, governments prefer to allocate research funds to research units without any visible competitive selection procedure; this holds true if the expertise for a certain field of study is unique or is best served through long-term cooperation.
- Incentive-based funding for individual scholars or research teams by government agencies, publicly-funded research foundations or private research foundations; in those cases, funds are awarded upon application – mostly for individual research projects – or as prizes for prior achievements.
- Research funding by industry, whereby the criteria and modes of funding might vary substantially.

Certain modes of funding likely follow certain criteria and procedures, but each funding system determines its own criteria and procedures. A detailed look at both criteria and procedures helps to identify the relationships between quality and relevance. Chart 16 shows the origin of research funds in five economically advanced countries according to categories somewhat different from those discussed above. In all these countries, the proportion of basic funds for research has declined over the years, while in most cases other public funds have increased; these changes were more salient than changes in the money provided from industry. But even in the early years of the twenty-first century, the proportion of basic grants varies substantially by country, namely between almost two-thirds in Germany and about one third in the USA.

Chart 16. The Distribution of Funds to Research at Universities in 2003 (in %)



\* Estimated Division; \*\* including foundations based on public funding; USA: modified because of the larger level of research, no state funding included under the universities own funds.

Source: Leman, 2007, cited in Sörlin, 2007.

Many documents suggest that this shift of research funding was undertaken primarily for the enhancement of research quality. Many experts, though, note a trend towards a growing weight of criteria of relevance over criteria of quality. For example, Sörlin (2007a: 427) argues that "... the present funding regime for research is the result of an evolution, spurred by massification and at the same time for differentiation. The background logic is only more apparent and manifest in policy documents, since research is more directly linked to innovation and economic competitiveness ... The transformation to a globalizing knowledge-based economy, or at least the perception that this is what is going on at the moment, has been the predominant policy paradigm since the 1990s and explains the focus on innovation systems, the demand on universities for third mission-oriented activities, and the EU Lisbon process. In more general terms, it also explains the growth of research budgets in most nations and the strong tendency of governments to allocate research funds through mission-oriented agencies, with innovation goals, or to formulate the mission orientation of funds directly to the recipient institution".

In an increasing number of research activities, however, researchers are expected to ensure that both quality and relevance will play a major role in their activities. The British expert John Brennan (2007: 20) argues that "Pressures for greater accountability and 'performativity' bring with them new types of requirements for relevance and in particular the need to find measures of it. This means that it has become more necessary to talk about relevance, to explicitly make the 'claim' for it and, to varying extents, to find evidence with which to provide justification for the claim. To be more concrete, if you want to obtain a research grant it is probably more important



today than in previous periods to be able to make a serious claim for the potential societal relevance of the proposed research”.

In many low- and middle-income countries, the establishment of a national research promotion system providing funds for individual research projects on the basis of reviewing and assessing research proposals is viewed as a breakthrough towards quality-driven research funding. The descriptions of these systems often point out more clearly the transparency and fairness of the research promotion system than the weight of quality and relevance criteria. For example, the following “principles of competitive funding” are named for the Indonesian research promotion system:

1. Competition: the number of grants offered should be smaller than the number of competing units;
2. Specific purpose;
3. Autonomy and decentralization;
4. Consistency in carrying out policies;
5. Tiered competition: a reasonable chance to win. Because the level of variation in development of higher education institutions in Indonesia is quite high, institutions of comparable strength should be placed in one group or tier;
6. Objective selection process: transparency and accountability;
7. Evaluation and monitoring: the winners of the competition should be evaluated and monitored periodically;
8. Incentive and disincentive: an incentive by taking part in more prestigious granting schemes and placement in a higher tier. Punishment should be given if the project does not perform well” (Tadjudin, 2008: 81-82).

#### 5.4. Quality and Relevance Rationales in Evaluation

Evaluation mechanisms include the following:

- The regular evaluation of research or teaching of a university department.
- The accreditation of study programmes or higher education institutions, and
- The audit of mechanisms established within institutions of higher education to monitor quality internally.

These differ from general incentive mechanisms, efforts to increase competition in various respects, and indicator-based funding by calling, in principle, for clearer assessment criteria. In principle, evaluation can be expected to assess the “fitness for purpose” of a unit or programme, i.e. the extent to which the quality- and relevance-oriented goals which were set for the specific unit or programme are achieved. Assessment of quality, in this case, does not follow a general standard. Or evaluation can be expected to assess the “fitness of purpose”, i.e. the quality or relevance according to general standards.

## 5.5. Quality and Relevance in Developing Countries

Various contributions in the Forum about expectations of research in low- and middle-income countries emphasize “quality” in teaching and research to the same extent as is customary in economically advanced countries. But this discourse is altogether different in two respects.

First, low- and middle-income countries cannot confine themselves to analyzing the extent to which research as well as teaching and learning in their country are successful according to the prevailing quality standards of the North. Certainly, there is a multitude of publications showing how many (or better: how few) articles deriving from low-income countries are published in international, highly selective academic journals. But many low- and middle-income countries only succeed in encouraging and rewarding research quality according to standards adapted to their current potential.

Also, low- and middle-income countries have had to set their own standards for quality in the evaluation of teaching and learning and in the accreditation of study programmes. For example, Jordanian experts presented the following view in the Forum:

“In third-world and developing countries, you rarely find academic entities who can readily meet any international accreditation standard for inherent limitations of their own. For these reasons, amongst others, a number of developing countries, in their efforts to attain some minimum standards with their academic systems and preserve their integrity, have developed accreditation bodies of their own, and/or have instituted some assessment and review processes to measure the educational outcomes of their own academic institutions. Jordan, being a developing country with limited financial resources, has instituted an accreditation body of its own, and refers to it as the ‘University Accreditation Council’. This local accreditation body operates in pretty much similar ways to their peer organizations around the world by conducting periodic reviews of curricula in the various academic disciplines, assessing the faculty-to-student ratios, reviewing allowable institutional capacity in terms of number of students and equipment that they must avail for student use, etc. Furthermore, Jordan has also required that university graduates, including those of engineering and IT colleges, sit for what is referred to as the ‘University Achievement Exam’. This exam is administered by the Educational Testing Services. These two assessment processes are now helping Jordan to properly review the educational outcomes of its academic institutions, and steer the academic models of the diversity of academic institutions to meet a bare minimum of global academic standards” (Khaswneh, Owais and Malkawi, 2008: 233).

Second, many experts active in the framework of the UNESCO Forum on Higher Education, Research and Knowledge pointed out that research in low- and middle-income countries is driven, and must be more strongly driven, by imperatives of relevance. This does not mean that debates about desirable and acceptable criteria of relevance are less heated and less controversial in low- and middle-income countries. On the contrary, the dominant rhetoric about “quality” of research is less suitable in displacing discourses of relevance. And researchers from developing countries often note that they are expected, by research epistemologically driven by the North, to integrate prevailing themes and paradigms in order to become part of the world-wide accepted community of research “quality” (see Vessuri and Teichler, 2008: 12).

As already pointed out, there are similar debates in low- and middle-income countries as in economically advanced countries regarding whether research should be more or less independent from the expectations of industry. On the other hand, some “mainstreams” of acceptance of relevant research have emerged in low- and middle-income countries. For example, many experts call for stronger relevance of research to the Millennium Development Goals (MDGs) advocated by the United Nations.

What the tensions between research quality and relevance mean for the developing world was summarized in some sectors of the report *Universities as Centres of Research and Knowledge Creation: An Endangered Species?* produced by the UNESCO Forum (Weiler, Guri-Rosenblit and Sawyerr, 2008):

*“Rethinking the criteria for research quality:* There has been substantial criticism at the Colloquium of the notion that there can be a one-dimensional set of criteria for assessing the quality of research regardless of where, by whom, and on what subject it was performed. Instead, there appears to be a need dealing with the assessment of research quality in much more differentiated ways, taking into account the research setting, the kinds of research questions asked, the methodological orientation, and the utilization of research findings. This is not to argue for rank relativism in assessing research, but recognizes that research quality is not entirely independent of its relevance and utility” (ibid., p. 21).

*“Different Functions and Criteria of Research:* While all societies have a need for knowledge, there are differences in the function that university research can serve. Universities such as Stanford that are much more generously endowed and equipped may be able to serve a broader range of functions in a global context, even beyond the needs of their particular environment and society; universities like the University of Ghana need to concentrate first and foremost on the present and future knowledge needs of their own communities. This difference in function is to be kept in mind as one looks at global developments in higher education and research, and at league tables and similar rankings. Relevance and utility of research have to be seen and judged with these distinctions in mind, and are not amenable to one-dimensional rankings” (ibid., p. 27).

*“Rankings, Globalization, and Relevance:* The fascination of all universities with league tables and rankings is as understandable as it is problematic. Clearly, the international political economy of higher education is such that certain universities are, by virtue of their location, much more likely to show up on these tables than others. A very important question against this background is thus why such rankings should matter, and whether they are valid instruments for assisting universities in the assessment of their own utility. How can universities, in other words, reconcile the often conflicting mandates of international competitiveness and of meeting its obligations to the knowledge needs of the local community? In case of irreconcilable conflict, which should take precedence: looking to international competitiveness or meeting local knowledge needs? This question is important not only for universities, but also for those agencies that fund university research; it is important that they, as well, recognize this conflict and the need for universities to balance these conflicting expectations. Faced with this dilemma, it is worth considering much more seriously whether there should not and could not be alternative kinds of ranking that take more explicitly into account the degree to which universities and their research programmes serve the knowledge needs of their local communities and societies, without necessarily compromising the standards of what is internationally considered good research” (ibid., p. 28).

*“Criteria for ‘good’ research:* There is an urgent need for a critical discourse on what we mean by “good” research. The fact that there is no single yardstick for assessing the quality of research across all disciplines, regions, and cultures does not make the question of research quality irrelevant; indeed, it makes it all the more important to place the question of appropriate criteria for assessing the quality of research on the agenda wherever research is being conducted. There certainly are elements that all serious research activities have in common; it is hard to conceive of good research, for example, without decent evidence and without an explicit, transparent set of methodological ground rules. Beyond that, however, different purposes, different kinds, different traditions of research do need to examine critically their own criteria. The process of communicating about these reflections on criteria across the international world of research should be one of the most exciting chapters of future research cooperation” (ibid., p. 30).

## 6. The Cultural Setting of Research

### 6.1. Questioning Western Cultural Dominance

In search of quality enhancement and modernization of higher education and research, low- and middle-income countries often unconsciously absorb, or consciously follow, presumed success stories from economically advanced countries. This is viewed by many actors and experts as appropriate and desirable given universalistic elements of knowledge, increasing global interconnectedness of knowledge, economy and society, and internationally convincing role models for establishing and maintaining efficient and effective organization of higher education and research.

Various experts involved in the UNESCO Forum saw a danger in higher education and research in developing countries being too strongly determined by the higher education and research culture of economically advanced countries. In some cases, they noted carry-over of the colonial past, others signs of neo-colonialism, attempts to equal the North with modernization, and other direct current influences from the North. Some quotations might illustrate these concerns:

- “The university is based on foreign models – the areas of study, the departments and faculties, laboratories, diplomas, pedagogy and courses are all usually the same as in the ex-colonial power. The scientific culture of research staff often revolves around references and problems that are foreign to home-country realities. The de-contextualization of knowledge is not a problem *per se*, but it becomes one when the search for conceptual and methodological equivalency is not undertaken” (Nouroudine, 2008: 141).
- “Most developing countries, having inherited the colonisers’ education systems, are still facing the challenge of shaping their higher education system to national needs ... i.e. South Pacific islands, like most developing countries, share the experience of European colonialism and its concomitant educational values and practices, including its languages, that has resulted in the evolution of education systems largely Eurocentric in outlook ... Colonialism is argued to have undermined ways of knowing and doing and the next stage of decolonization should be de-hegemonization. This can be done ... ‘by finding research and epistemic frameworks that are indigenous’, ‘by asserting the validity of local ways of knowing’ and ‘being in resistance to the intensifying hegemony of mainstream epistemology from metropolitan powers’ ... Western-based education systems ... contribute to the de-legitimization of traditional, indigenous knowledge and a legitimization of the knowledge that enables people to enter the industrial economy” (Papoutsaki, 2008: 246).

The Association of African Universities (AAU) argues with reference to Madagascar: “In the public imagination, the education that was brought by European colonialism is a means of freeing oneself from living conditions that are seen as onerous. Education is a passport to the future and you need a reliable passport that has passed the test. It is often forgotten that the elite education of the colonial times cannot be the mass education required by the current objectives of universal education” (Harison, 2007: 41). Moreover, the AAU notes a lack of much-needed research for alternative education. “Problems inherent in the higher education sector are such that in Madagascar, and possibly in French-speaking Africa, there are few structured subjects and teams in the field of alternative education. One possible reason is that university research is relatively dependent on French universities that do not always include it in their disciplines. Moreover, it does not appear as such in the thematic fields of the *Agence Universitaire de la Francophonie* (University Agency of the French-speaking world). Consequently, some academics working in this field do so in non-university settings, but even then they appear to remain lecturers and researchers and their status as ‘university staff’ follows them everywhere” (ibid., p. 32).

Most experts involved in the Forum note an inability or unwillingness to address local issues, the main problem caused by over-reliance on the epistemic and organizational models of the North:

“For those working in development, whether they seek modernity or greater respect for local people, ‘primitive’ has been replaced by ‘traditional’ or, more recently, indigenous and local, and ‘civilized’ by ‘modern’. ‘Locals’ are problematized, portrayed as deficient in various ways and this deficiency is referred to when legitimizing the intervention of ‘expatriates’. This has an impact on local academics which are seen lacking skills and ‘it is very difficult to shake off the idea that we know more than them and accept that we might even learn from them’. Some methodologies regard the values, beliefs and practices of communities as ‘barriers’ to research or as exotic customs with which researchers need to familiarise themselves in order to carry out their research. This attitude is passed on to locals who believe that culture is a barrier to development. ... There is a need to build on local knowledge and encourage young researchers to provide their insights on the role of research in their countries development and to seek local alternatives to studying their cultures and societies” (Papoutsaki, 2008: 248).

Some experts point out the diversity of cultures that has emerged in low- and middle-income countries. They vary in the influence of the indigenous past and the impact of the North:

“Interpreting the academic profession through the lens of culture ... At the risk of oversimplification, I would like to outline three models or paradigms of the academic profession in India. The first model emanates from the Hindu tradition. The presence of the preceptor or Guru was essential not only for the transmission of religious tradition but also for the acquisition of knowledge. Therefore, the Guru protected the interests of the disciple who became his family member and respected him as a father ... The second paradigm, introduced in the middle of the nineteenth century when the British established universities ... focuses on developments in higher education after independence, i.e. from the 1950s to 1991. After independence, higher education was seen as the engine of industrial and technological growth and also as an agent of modernization and democratization. Merit and objectivity became the criterion for admission of students and recruitment of teachers ... The third phase begins post-1991 when the economy was liberalized. The academic profession is under great stress to perform according to corporate norms, and there is hardly any space for research. Accountability is centre stage in the private for-profit institutions, at the cost of academic freedom and autonomy. Student evaluation of faculty has been introduced in the private sector ... The role and functions of the Guru have influenced the construction of the role of the modern professor. In the process the professionalization of the academic, the dimensions of merit, objectivity, rationality and neutrality along with quality are transformed in the name of tradition. Therefore, it is difficult to talk of the modern academic without reference to the cultural tradition” (Chanana, 2008: 136).

Grappling with the past does not only imply responses to colonial and neo-colonial influences of the North or indigenous cultural tradition. The move from an apartheid society towards a new democratic society in South Africa, or the transition from Soviet-style planned systems in Central and Eastern Europe as well as in Central Asian countries, turned out to be difficult. For some period a vacuum was felt between the abolishment of the old regulatory system and the emergence of a new system. This was not only true of new modes or governance, organization and funding, but an absence of “new values and ethical norms” was also felt for some time (Bat-Erdene, 2007: 12).

## 6.2. Resistance to Beneficial Modernization

Various experts point out that the argument of neglect of indigenous cultural traditions and local needs is also used to resist desirable modernisation. To quote a few examples:

“Academic freedom and autonomy are misused by a majority of the faculty who do not produce good research or good publications. In addition, merit and objectivity become victims in the recruitment and promotion process. Most professors have also not been motivated to publish because recruitment and selection were not entirely based on merit. Again, if they publish it is not in peer-reviewed national and international journals. Or they will publish in local journals, magazines and newspapers. Some departments start their own journals for in-house publications. In most state universities what counts is quantity, not quality. Most of them do not participate in national and international conferences ... There has also been a lack of accountability due to the way the student-teacher relationship has evolved. For instance, there has hardly been any evaluation of professors by students because it fitted in very well with the thinking that the Guru cannot be appraised by the disciple ... There has also been no peer evaluation of faculty performance because of the hierarchical nature of Indian society” (Chanana, 2008: 142).

“Further, the traditional value in the modernization paradigm is that a scholar and professor is known for his/her scholarship, dedication and reputation and should not have to sell or market his/her knowledge and expertise. In this day and age, when the ability to negotiate for salary and to procure funds for research is an important criterion for recruitment and promotion there are scholars, especially of the older generation, who adhere to the traditional thinking, that is, they do not publicize their work or negotiate for better terms and are reluctant to make themselves visible for consultancy, etc. Those who do not, even if talented, are being left out of the race because the current situation demands repackaging one’s expertise and qualifications in the market” (ibid., p. 146).

“When nations cannot deploy effectively national institutions’ (such as universities) knowledge, incentives and policies, they lack the ability to generate a functioning national system of innovation. Under this context it is often the case that the role of a key component of NSI such as universities that produce the research and knowledge system in a country can be devalued. The key to reverse this negative trend is thus to integrate universities as the premier institutions of knowledge-making and production as a core part of a functioning system of innovation. In many African countries the absence of the analytical framework for building functioning national systems of innovation is at the core of the crises of the universities that is still going on right now. The problem is not simply lack of funding; it is much deeper than that. It lies in the failure to conceptualize the central role of knowledge production and diffusion and utilization for bringing about the structural transformation of economies, societies and polities in poorer and developing economies of Africa, Latin America and Asia ... There is a need conceptually to re-centre universities for the making of the national systems of innovation; and conversely to make innovation systems that deploy universities as the key institution for knowledge production” (Muchie, 2006: 6).

Chart 17 provides an example of an evaluation research project on the implementation of development projects. The researchers interested in local conditions for development noted that the technologically sound development project got into problems because those designing the project had not taken into account the local social setting.

### Chart 17. Research on the Neglect of Social Setting in the Design of Development Projects: The Case of Artisan Fishing in the Comoros

“Two instances of artisan fishing were analysed: the *Dispositif de concentration de poisson* (DCP) and the use of motorised fishing craft... The project, as conceived by technical experts and political authorities, introduced these techniques into fishing activities; the objective was to move from coastal fishing to deep-sea fishing, catch more fish, and achieve satisfactory safety conditions at sea”.

This technology offers several advantages: economy of human resources, decreases fuel consumption, increases security, increases success in catching fish. However, “the introduction of this technique did not take into account one important aspect of the working reality of fishermen: the working culture of the trade, and particularly skill-based discrimination... Fishermen privilege those techniques and skills corresponding to the ‘hunter fishermen’... to the detriments of those corresponding to the ‘gatherer fishermen’... The transition from one profile to another cannot be ... through passive adaptation... it requires appropriation, and therefore the active involvement of the fishermen. ... Secondly, the use of motorised fishing crafts: Some fibreglass boats were modified by fishermen in order to overcome their weaknesses in this area of the Indian Ocean... Yet, the high costs of fibreglass hulls was such that not all fishermen ... could afford it, hence their recourse to installing an engine on a traditional pirogue. ... The most significant challenges ... lie in the maintenance and repair. The local social fabric and technical context were not taken into account... The project suffered from the weak participation of the fishermen, and also from insufficient accounting for realities... The stakes are thus not only technical, but also of an epistemological, political and ethical nature. The academic institution must speak to these problems in its mission of teaching and research” (Nouroudine, 2008: 136-7).

Development projects of that kind coordinated by universities, according to the author, could be more successful if the universities were more favourable to participation by external persons: “The research innovation is innovative, but the functioning and organisation of academic teaching and research structures still conform to a classical model. Several obstacles to participation (as per the University’s research policy) are characteristic of this model”: Separation between the university and society.” University as such is a place of elite formation. “As long as it is not in a position to hear and understand the comments of protagonists in socio-economic and political life, true meeting and dialogue between them is impossible.” ... The following improvements are suggested:

- Research structures must devise the means to collaborate with the institutions that manage public life.
- Researchers must collaborate with actors who do not belong to traditional institutions of knowledge production.

The resulting ‘intellectual discomfort’ should be welcomed by universities and their researchers” (ibid, p.140-1).

Various experts active in the Forum discussed obstacles against an inclusion of the perspectives of local needs and indigenous cultures. They often point to a lack of understanding, respect and recognition of “... the value of local knowledge systems” (Papoutsaki, 2008: 243-244) on the one hand. On the other hand, there seems to be a “... lack of confidence of local researchers in conducting research ... and feelings of inferiority related to the perceived superiority of Western knowledge” (ibid.). Other experts name further reasons: “Research results which are not publishable, but are of great local benefit to the country or people are not given credit. Contracted research from industries and business comes with strings attached. Globally common values and commercial benefits are overshadowing local heritage and public contribution. Some universities are sand dominated. They become subordinated and lose their values and local relevance. Market forces are affecting their basic values. Professionalism is eroded” (Suwanwela, 2008: 33).

### 6.3. The Search for New Strategies

Efforts to foster a new research culture in low- and middle-income countries face many challenges. For example, concerning efforts by international organisations to strengthen the local relevance of research in developing countries,

“Paradoxically, when the most diverse international organisations, from the World Bank to the World Council for Science (ICSU) pose the need that research activity in developing countries attend in a more relevant way to the realities and challenges of their societies, the state of affairs for science in those countries ends up in many cases acting as a significant obstacle precisely to the contribution to sustainable social and environmental development and to the transfer and adaptation of technology in contexts of real application. It is undeniable that the challenges for defeating the problems of underdevelopment are huge, but the single-minded solution adopted by the science institutions in the bulk of our countries seems to be neither the most efficacious nor the most efficient” (Vessuri, 2007: 142).

Some experts argue that as scholars in low- and middle-income countries increasingly become aware of the limited scopes taken over from the North, they move towards a paradigm shift:

“Along with the ever-increasing dissemination of western education and knowledge through globalization and the internationalization of higher education, there is also an increasing awareness that the western education system and ways of conducting research have their limitations. New approaches need to be devised or explored within local contexts. There seems to be a paradigm shift towards integration of local knowledge into education systems albeit slow that calls for a need to adapt research priorities and practices to better reflect local points of view. There are mainly two issues in this problematic situation ... the issue of finding appropriate research methods for non-western societies which poses the obvious question of whether different epistemologies require different research approaches ... also the issue of finding appropriate research methods for developing countries” (Papoutsaki, 2008: 242).

Some authors point out that academics and politicians in low- and middle-income countries have developed views and attitudes which counteract the emergence of a reasonable balance between focus on basic research and the pursuit of knowledge for its own sake on the one hand, and relevance of research on the other:

“The research undertaken in many developing countries depends on the interest of academics who are generally trained in developed countries and carry the interest back with them. In many countries, imbalance in the areas or problems for research becomes evident ... Concentration of research is in some areas, with neglect in other needed fields. Basic research resulting from academics’ interest with no immediate use is deemed as waste. Research is thus seen as a luxury with no utility and not relevant to the country’s needs. In turn, decision-makers do not depend on evidence from research. Some even want research findings to support their decisions which are already made. At the same time, the public does not know enough to question. Fragmentation also prevails and the research results from small, disconnected projects are not usable. The limited resources are therefore wasted” (Suwanwela, 2006: 3).

Some authors suggest that developing countries have to find their own way in developing research strategies serving their needs:

“Problems facing developing countries in many regions require reorientation of the way one looks at research relevancy and utility. For instance, there is no satisfactory progress concerning research on ways to overcome problems regarding communication and information distribution over vast areas in the developing world. It is a fact that many recurring natural disasters such as flood, draught, plague and deteriorating farm productivity can improve with proper research ... Research capacities to cope with such situations may be in the form of regional or global networks, but the ability to meet the need in the most peripheral areas must be an important criteria. Developing countries can no longer wait for the mercy of the devel-



oped world to solve their problems through research. They must develop their own capacity for this purpose” (ibid., p. 9).

Other authors suggest that for research planning,

“... the starting points for the development of a locality or a region are the economic, institutional, organizational cultures and human resources, which constitute the potential for development ... This local ability to respond to and take care of its own development and mobilize the economic potential is an attribute of the endogenous development action approach” (Aponte-Hernandes and Molina-Iturondo, 2008: 84).

The Commission on Health Research, in its call for Essential National Health Research (ENHR, see Chart 18), argued among others that:

“Development efforts and solving local problems through local means must be holistically considered. Technological knowledge alone is not sufficient. Understanding the people and the environment, especially their peculiarities, strengths and weaknesses, is essential. The identification and prioritization of problems in a locality requires adequate understanding of the relevant factors in that specific locality. This can come from essential research. Situation-specific knowledge and site-specific data are also crucial. One of the great mistakes in the past was the adoption of ways to solve local problems by solutions imported from elsewhere. Local peculiarity must be taken into account. For example, soil and water management is important for introducing new crops. Social and cultural beliefs, as well as genetic and environmental conditions, are important for sustainable success and compliance with new health measures. Effectiveness, cost-benefit, safety, feasibility and acceptability must be determined along with how to adapt to local economic, socio-cultural and political conditions” (Suwanwela, 2006: 5).

The same Commission also argues:

“Public policies ... must take into account not only scientific evidence but also socio-economic and cultural evidence of local conditions. The answers developed elsewhere may be even harmful if they are applied uncritically in developing countries. Policy and system research are essential for national research and so must be conducted both professionally and holistically. The situation-specific and time-specific information is amalgamated with theoretical or generic knowledge to come up with alternatives or choices, as well as with the information necessary for sound decision-making” (ibid., p. 6).

### Chart 18. Essential National Research

Some experts underscore that some countries have succeeded in designing a science and technology strategy strongly addressing local needs. The activities of the Chilean fund for fostering science and technology development (FONDEF) was named as such an example:

“The main features of FONDEF process are: the combination of international technology transfer and local adaptation; improvement as the base to identify technology innovation and R&D opportunities; understanding of country challenges that demand science and technology contributions; building long lasting relationships among companies, universities and technological institutes; a specific environment: linkages among relevant actors; a specific task oriented to foster science and technology in order to increase the competitiveness of the economy and improve the quality of life of people; fund design to achieve linkages and impact; grants to institutions that can share property of R&D results with researchers and others; promoting competition and open participation; focus in management efficiency and transparency; project evaluation and selection based on: science and technology peer review evaluation and socio-economic evaluation; contracts with institutions in the linkage chain (then, contracts between university, companies and other institutions, from Chile and abroad); combination of quality, relevance and pertinence; promoting leverage and co-financing; promoting good teams, best practices in R&D, particularly in project management and project follow-up and control; implanting appropriate metrics for results and outcome” (Yutronic, 2008: 74).

## 6.4. Towards a Better Understanding of the Potential of Research

Various experts came to the conclusion that the search for solutions to combine cutting-edge research approaches with awareness and inclusion of local knowledge paradigms in developing countries could be strengthened. Particularly if more “research on research” was undertaken and if its findings were well disseminated, and if the results of this research eventually played an important role in shaping the research activities in a broad range of areas relevant for development.

Therefore, the following recommendation was formulated in the Forum:

“We have very little secure and valid knowledge about the conditions under which research is conducted, the factors that make for good or for bad research, the ways incentives or disincentives work in research, etc. One of the urgent needs for the future ... is, therefore, a more systematic programme of rigorous research on research” (Weiler, Guri-Rosenblit and Sawyerr, 2008: 20).

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## Chapter 5

# Comparative Study on National Research Systems: Findings and Lessons

Johann Mouton and Roland Waast

### 1. Introduction

Research and analysis in the sociology of science, and science policy studies, have grown exponentially over the past fifty years. In this process our knowledge and understanding of what drives science and scientific growth in the modern economies of the world (mostly in the North) has increased significantly. Country studies, especially comparative analyzes (motivated by the interests of international bodies such as the OECD and UNESCO as well as the agendas of national agencies such as Sida/SAREC and IDRC), have flourished.

However, and perhaps for obvious reasons, these studies did not prioritize the very poor and underdeveloped nations of the world. Whether this reflected a sentiment that these countries were relatively unimportant in the global economy, or a belief that their research systems are not worth studying because of their relative small contribution to world science, or both, is not that important. There have been a few exceptions, namely countries that at one time would have been classified as developing nations (Brazil, China, India, South Africa and others) but more recently now as “emerging countries” and which receive increasing attention. But the bulk of the poor countries of the world generally did not warrant any attention.

This chapter discusses the findings and lessons of a comprehensive review of national research systems in fifty-two developing nations across the globe.<sup>1</sup>

They are presented as follows:

- (1) The growing gap in knowledge production between developing nations of the world and the rest,
- (2) A discussion of the roots of and reasons for these inequalities.
- (3) Various issues related to human capacity and scientific capital.
- (4) Some observations on the special role of universities.
- (5) Concluding comments on the “de-institutionalization” of science in these countries.

Before discussing the main findings, a brief note on the overall aims of the study as well as key methodologies employed is in order.

### 2. Methodology and Database

At a workshop held on 6 and 7 April 2006 at UNESCO, Paris, the objectives of a proposed study on national research systems were defined as follows:



“... to learn more about research systems in developing/poor countries, and to help strengthen research and research capacity. Thus, the project supports research on and for development so that developing/poor countries may articulate and have ownership of these systems which are key assets for their development”.

Giving further reflection on this brief, the authors subsequently referred to this study as a meta-review of existing country studies. A meta-review (or systematic review) is a study which has both a descriptive and “evaluative” aim; its descriptive aim is to describe and summarize in sufficient detail the key elements of a particular study (i.e. date, coverage, study objectives, data sources, methodologies used and key findings), and its evaluative aim is to make a judgment on the quality of the study being reviewed. This would entail commenting on the reliability and age of data sources, appropriateness of design and methodology, and the extent of the coverage of the study.

Given the large number of countries to be covered and the potential diversity of studies to be reviewed, a two-phased approach was adopted:

- Phase 1: Utilizing the knowledge and resources of a small number of research co-workers to collect relevant material and complete a first round of study mapping (the collection and mapping phase).
- Phase 2: Comparative and integrative review of the first round study maps (the integrative review phase).

Based on previous studies and collaborations, we were able to call upon a number of knowledgeable and well-placed researchers to assist us in the execution of this commission. Most notably we were able to secure the collaboration of Professors Daniel Villavicencio (Mexico) and Venni Krishna (India) and their collaborators, to assist us with the compilation of the Latin America and Asia country reviews respectively. Their key tasks were twofold:

- (1) To work through available and known collections of studies and to systematically summarize all possible sources of information (government resources/ websites/ S&T studies centres), in order to identify studies that meet the criteria for inclusion as outlined above.
- (2) To produce a summary “map” of each study in accordance with a framework we developed.

In addition to being able to call upon the cooperation and resources of these two persons, we were also able – especially with regard to the country reviews for Africa and the Arab region – to draw on recent and current studies being undertaken by ourselves and our immediate colleagues (see End Note), and the study produced a wealth of reports<sup>2</sup>

- Four regional compilations (Africa: 22 countries; Arab Region: 11 countries; Latin America: 14 countries; and Asia: 13 countries).
- Four regional reports.
- A consolidated bibliography.
- A Final Synthesis Report and Template.

In a study of this scope, it is inevitable that some countries or some sectors in particular countries will be less well covered than others. Indeed, this is especially the case where no previous integrated study of that country had been done to date, and also applies to statistical data about different research systems. Utilizing the information provided by the UNESCO Institute for Statistics (UIS) in Montreal, as well as from our own sources, we were able to compile statistical tables that were as up-to-date and complete as possible. Again, however, for some of the poorest

and smallest countries in our sample, the data sources simply do not exist and such gaps could only be filled through in-country studies.

### 3. Growing Gap in Knowledge Production

When one looks at the production of science and technology in the majority of developing countries, the first observation is that there is a *growing* gap between a handful of “emerging countries”, a few intermediary countries (five to ten in each continent) and the bulk of the remaining 100 countries whose productivity remains minute (forty countries), or very small (sixty countries; see Table 1 below).

This is not peculiar to a specific region, even if sub-Saharan Africa has gone through more trials and tribulations, nor is it linked to a decline in publication output. Yet the stagnation of research output means that some countries have lost their relative share compared to the rest of the world. Even in countries that are not very productive there are pockets of good science; the question rather is that of critical mass, and the minimum human and other resources required to maintain scientific quality and build a subsequent generation of scientists.

Table 1. Distribution of Countries According to their Publication Output and Growth over the Twenty-year Period 1987-2006

<i>Ranking by size of output</i>	<i>No. of publications per year</i>	<i>Asia and Middle East (country + 2006 output + growth factor)</i>	<i>Latin America (country + 2006 output + growth factor)</i>	<i>Africa (country + 2006 output + growth factor)</i>
Emerging	6,000 ⇒ 60,000	<b>China</b> 53,000 (x 13) <b>S. Korea</b> 22,380 (x 23) India 19,290 (x 1.8) <b>Taiwan</b> 13,700 (x 10) Israel 9,900 (x 1.5)	<b>Brazil</b> 13,000 (x 5.2)	
Candidates emerging	2,000 ⇒ 6,000	<b>Singapore</b> 5,250 (x 11) <b>Iran</b> 3,710 (x 28) Thailand 2,235 (x 6.5)	<b>Mexico</b> 5,320 (x 4.1) Argentina 4,337 (x 2) Chile 2,220 (x 2,5)	S. Africa 3,850 (x 1) Egypt 2,740 (x 2)
Intermediary >	600 ⇒ 2,000	<b>Malaysia</b> 970 (x 3.5) <i>Saudi Arabia</i> 930 (x 1.3) Pakistan 750 (x 2.4)	Venezuela 820 (x 1.7) <b>Colombia</b> 605 (x 4)	<b>Tunisia</b> 1,080 (x 7.2) <b>Morocco</b> 860 (x 6) <b>Algeria</b> 730 (x 5)
Intermediary =	200 ⇒ -600	<b>Viet Nam</b> 500 (x 8) Indonesia 480 (x 3.4) <b>Lebanon</b> 480 (x 4) <i>Jordan</i> 420 (x 2.4) <b>Emirates</b> 410 (x 12) Philippines 390 (x 2.2) <i>Kuwait</i> 355 (x 1) <u>Bangladesh</u> 350 (x 3)	Cuba 440 (x 4) Uruguay 370 (x 4.7) Peru 240 (x 2)	Nigeria 560 (x 0.6) Kenya 550 (x 1.5) Tanzania 300 (x 3.2) <b>Cameroon</b> 280 (x 6.6) <b>Uganda</b> 260 (x 7) Ethiopia 240 (x 2) <b>Ghana</b> 200 (x 5.6)
Intermediary <	100 ⇒ 200	Sri Lanka 205 (x 1.7) <b>Oman</b> 200 (x 8)	Costa Rica 180 (x 2.4) Panama 145 (x 2.2)	Senegal 140 (x 1.4) Zimbabwe 130 (x 1)

		<b>Syria</b> 145 (x 3.5) <b>Nepal</b> 140 (x 4)	Ecuador 110 (x 2.9)	<b>Malawi</b> 120 (x 4) <b>B. Faso</b> 115 (x 4.6) Ivory Coast 105 (x 1.4)
Small science countries > 100	60 ⇒ 100	<i>Qatar</i> 80 (x 2) <i>Bahrain</i> 55 (x 1)	Bolivia 90 (x 2.8) Jamaica 85 (x 0.7) Trinidad & Tobago 80 (x 1.7) <u>Guatemala</u> 60 (x 1)	<b>Botswana</b> 95 (x 5) Zambia 90 (x 2) <b>Madagascar</b> 90 (x 4) Gambia 80 (x 1.5) Sudan 75 (x 0.6) <b>Mali</b> 75 (x 5) Gabon 75 (x 2.4) <b>Benin</b> 67 (x 4) <u>Namibia</u> 60 (x 3)
“Very” small science countries < 60	1 ⇒ 60	15 countries	18 countries	27 countries
Total No. of countries		40 countries	34 countries	53 countries

Countries are listed in descending order by size of research output (2006).

Legend:

*Arab countries are in Italics.*

Median score (by continent) is underscored.

Countries with a high growth (more than a factor of 3.5 within the 20-year period) are in **bold**.

Data are for 2006 (Science Citation Index – the non-expanded version), rounded to the next ten.

#### Discussion:

- Asia is catching up faster than other parts of the world, with approximately eight countries making tremendous efforts and demonstrating continuous progress (with a growth factor of more than 3.5 between 1987 and 2006). Nevertheless, about one third of the countries remains very small in scientific terms, and seems uncommitted to its development (such as Cambodia, Myanmar, Yemen) and whether rich – Brunei, or poor – Laos).
- The average level of scientific output in South America remains good, but there are significant geographical discrepancies. Most of the Andean countries are lagging behind. Central America countries and the Caribbean seem less interested in research, with the two exceptions of Costa Rica and Cuba. In total, half of the countries on the continent could be classified as being “very small” science countries.
- The proportion is the same in Africa. Moreover, and with the exception of South Africa and the North Africa regions, the gap between Africa and other continents is also huge. Small scientific communities are very sensitive to the ups and downs of politics, policies and funding (local or international). Nevertheless they are capable of recovery, and for the past ten years a few countries have shown noticeable growth – such as the Maghreb countries, but also Botswana, Cameroon and Ghana, and some very poor countries such as Burkina Faso, Malawi and Mali. On the other hand, some scientific communities seem to be collapsing (as is the case of Nigeria and Sudan, where very little growth in output is reported).

The decline of a country in “world scientific capacity” is correlated with that part of the national wealth which is invested in research and development, as well as with the number of re-

searchers in proportion to the population (see Table 2 below). But these correlations are not perfect, and there are other factors to explain the development of science than scientific investment and workforce size.

Table 2. Distribution of countries according to GDP per head and GERD (as percentage of GDP)

	<i>GDP per head ppm</i>	<i>Asia and Middle East</i>	<i>Latin America</i>	<i>Africa</i>
50 wealthiest	> 25 000			
Emerging	15,000 ⇒ 25,000	<b>South Korea</b> 22,000 ( <b>2.6</b> ) <b>Taiwan</b> 29,000 ( <b>2.5</b> ) <b>Singapore</b> 30,000 ( <b>2.3</b> ) <b>Qatar?</b> ( <b>0.7*</b> ) Bahrain 22,000 (0.3*) Kuwait 26,500 (0.2) Emirates 25,500 (0.2*)		
Intermediary >	7,000 ⇒ 15,000	<b>Malaysia</b> 11,000 ( <b>0.7</b> ) <b>Iran</b> 8,000 ( <b>0.7</b> ) <b>Oman</b> 16,000 ( <b>0.6*</b> ) Thailand 7,500 (0.3) Saudi Arabia 15,700 (0.14*)	<b>Brazil</b> 8,400 ( <b>1.0</b> ) <b>Chile</b> 12,000 ( <b>0.65</b> ) Argentina 14,300 (0.4) Mexico 10,800 (0.4) Costa Rica 10,200 (0.4) Uruguay 10,000 (0.2) Trinidad & Tobago 14,500 (0.1)	<b>South Africa</b> 11,100 ( <b>0.8</b> ) Botswana 12,400 (n.a.)
Intermediary =	4,000 ⇒ - 7,000	<b>China</b> 6,800 ( <b>1.4</b> ) Jordan 5,500 (0.35) Lebanon 5,600 (0.2) Philippines 5,100 (0.1)	<b>Cuba</b> 4,300 ( <b>0.65</b> ) Panama 7,400 (0.3) Venezuela 6,600 (0.3) Colombia 7,400 (0.1) Peru 6,000 (0.1) Jamaica 4,300 (0.1) Ecuador 4,300 (0.1)	<b>Tunisia</b> 8,400 ( <b>1.0</b> ) <b>Algeria</b> 7,000 ( <b>0.65</b> ) <b>Morocco</b> 4,600 ( <b>0.65</b> ) Egypt 4,300 (0.2)
Intermediary <	2,000 ⇒ 4,000	<b>India</b> 3,500 ( <b>0.8</b> ) <b>Bangladesh</b> 2,100 ( <b>0.6</b> ) Syria 3,800 (0.2) Viet Nam 3,100 (0.2) Pakistan 2,400 (0.2) Sri Lanka 4,600 (0,1) Indonesia 3,800 (0.1)	Bolivia 2,800 (0.3) Guatemala 2,500 (n.a.)	Ghana 2,500 (n.a.) Cameroon 2,300 (n.a.) Zimbabwe 2,000 (n.a.) Sudan 2,000 (n.a.)
Low income	1,000 ⇒ 2,000	<b>Nepal</b> 1,600 ( <b>0.6</b> )		<b>Uganda</b> 1,500 ( <b>0.8</b> ) Burkina Faso 1,200 (0.2) Gambia 1,900 (n.a.) Senegal 1,800 (n.a.) Ivory Coast 1,600 (n.a.) Kenya 1,200 (n.a.) Benin 1,100 (n.a.) Nigeria 1,100 (n.a.) Ethiopia 1,100 (n.a.)
Very low income <	1 ⇒ 1,000	15 countries	18 countries	Madagascar 900 (0.1) Mali 1,000 (n.a.)

				Zambia 1,000 (n.a.) Tanzania 750 (n.a.) Malawi 700 (n.a.) + 21 countries
Total number of countries		45 countries	33 countries	53 countries
Some comparisons	<b>Sweden</b> 33,000 <b>(3.7)</b> <b>USA</b> 42,000 <b>(2.7)</b> <b>France</b> 30,500 <b>(2.2)</b>	<b>Israel</b> 25,900 <b>(5.1)</b>		

Source: Human Development Reports (UNDP, 2007). Figures for 2005 completed from UIS or Nour (2005) for some Arab countries.

Legend:

Countries are listed in descending order by GERD.

Countries with a high GERD ( $\geq 1\%$  percentage of GDP) are in **bold** letters.

Countries with a reasonable GERD ( $0.6\% \Rightarrow 1\%$ ) are in **bold italics** (Nour, 2005).

Some comments are in order:

- Table 2 should be read in comparison with Table 1. Though there is some congruence with the GDP (per capita), the interest in research is not linked to it in a simplistic, linear fashion. Some rich countries do NOT invest in the development of science (see Trinidad and Tobago, and until recently, most Gulf countries). Much depends on the will and interest of the government, ambient values, and international support.
- Nevertheless, emerging countries (or “candidates emerging”, see rows at the top of the table) are increasingly investing in the development of original research (bold letters). The table also shows the real dynamism of “intermediary countries” such as Cuba or the Maghreb countries. Observers consider, and results seem to confirm, that these countries are creating a reservoir of new wealth.
- Other intermediary countries (and even poor ones) choose to invest in research with the help of international aid. This is the case for Ghana, Malawi and Uganda, while Burkina Faso, Costa Rica or Kenya have more skilfully created a friendly environment for housing international research centres. The choice to invest relies on the availability of a local scientific profession of good quality, working under conditions of adequate infrastructure and funding.

The case of “intermediary countries” (about forty in our sample: not yet “emerging” but considering science, or at least in full possession of the means and capabilities to do so) is especially interesting. It clearly points to those factors that constrain and even impede the rise of research, and the difficulties of successful strategies (even in choosing efficient topics) in a world where scientific achievement on a level playing field has become a rarity: advances are unequally distributed, and jealously guarded, on account of their contribution to local prosperity.

## 4. Roots of Inequality

Our investigation of the fifty-two countries has provided some answers as to why such significant inequalities in world science have developed, and still exist.

*History* plays its role. Latin America is clearly ahead of the other continents, its own inequalities notwithstanding. Colonial times are now very much ancient history, and there is a relative abundance of universities, staff, and reputable establishments (universities or Institutes, private and public). Though the state has more often than not been “abusive” in its treatment of scientists, there has been ample time to develop a “space for science”, and to build socio-cognitive blocs in support of these endeavours (Schwartzman, 1991). Other examples can be found around the world. In Africa, the two main producers (South Africa and Egypt) are countries which have also been engaged in the development of a national science base for more than a century, and were only “semi-colonies”; Thailand is another instance. It must be stressed that sometimes the historical role lays less in “whole countries” than in specific establishments, which are “sanctuaries” for research where and when there is no continuing interest in it. Examples of these could include the Saint Joseph or American Universities in Beirut. In most places there is a specific role for a few establishments, and often the oldest are the most attached to high standards. Renowned scientists may also have a lasting influence, as Nobel Prize winners (such as Abdus Salam [Nobel Prize in Physics, 1979]) or other talents who were the pride of their country and went on to set up deeply-rooted Institutes (such as the Institute of Physiology of Bernardo Houssay in Argentina, or the Oswaldo Cruz Institute in Brazil). Naturally, older institutions and persons may also be conservative and possibly unproductive.

*Development strategies*, past and present, have powerful and enduring effects; Singapore is a good example. For half a century the country has been driven by an export economy and interventionist Government. Beginning with worker discipline and modest technical ambitions, the Government of Singapore moved on to the training of professionals and the production of more technological goods, and now to the growth of a powerful scientific community, featuring high-end training and devoted to strategic or applied research in computer science and biotechnologies. Publications grew in the last twenty years from a low of 500 to over 5,200 in 2006, an “emerging country” score; this shows that the size of a country is not the decisive factor in scientific production.

On the contrary, countries relying on income from natural resources (for instance the oil economies), or striving mainly for the development of services (as in most of the Caribbean countries) do not really need science and research. They may maintain universities, invite top-flight teachers, and support the research they pursue for their own career and the prestige of sponsors (as in some Gulf countries until recently), but their commitment is unclear (as could be seen in the Democratic Republic of Congo and Nigeria, and a number of other places).

There is a clear link between the development of science and industrialization. The nationalist governments that tried to develop import substitution, even when they failed in that plan, generally established a science base which remains a national asset for the country (see Brazil, Egypt for some time, the Maghreb countries and a number of others). It must be stressed that the (re)building of a science base is slower and more difficult than its demise, and that the tribulations of a “to and fro” strategy in support of science leave clear, long-lasting scars.

*Trust in science*: There must clearly be some pact (at least an implicit one) between science and society. For a long time, since the Second World War, the opinion has been that the development of science benefited the people and generated new, salutary technologies. It was the

source of progress for humankind; its support was the duty of the state; and its results should be public goods. This applied to the developing world, too, and free of colonization, its governments entered into the building of higher education and research centres, with the support of international cooperation and funding and with greater or lesser ambitions (enlightening minds, or harvesting rapid, useful results). Scientists organized professionally, but the promises seemed a long time in coming. The liberal way of thinking changed things, and well-being was no longer sought from the state but from enterprises, progress no longer from science but from innovation. The “national” mode of knowledge production fell into disgrace, and more linkages were established with the market economy. This shift, more often than not, led to a withdrawal of state support, and sometimes to the disparaging of local scientists as parasites (as in, Bangladesh, Nigeria and Tanzania).

Of course, even during times of misfortune, science may have a pact with parts of society. This was the case in Asia, in Egypt, in Latin America on several occasions (Argentina, Brazil and Venezuela) during the beginnings of or under dictatorships), and in South Africa during Apartheid. Nevertheless, it seems better that there be some general consensus (or debate) about the uses of science; its best grounding nowadays seems to be in the pursuit of innovation, which implies energetic support from the state for “strategic” and applied research, organized in “clusters” in collaboration with dynamic firms. Malaysia is resolutely on this path, as well as Argentina, Chile and Mexico. Thailand is considering it. Tunisia has made great efforts, and some Gulf countries are now offering excellent facilities to international enterprises and universities, in order to attract and territorialize them. Indeed, this is the choice of emerging countries as well as “candidate” emerging ones. All “intermediary” countries where science is growing fast do the same; some others hesitate, and may lose ground (Morocco). Small scientific countries are not destitute: they may try to find niches of excellence, with the help of international cooperation if necessary (as in Burkina Faso).

The *social environment* of science is an important component of the motivation of scientists. The trust of their employer (often the government) is part of it. But social values all around are yet another dimension; some nations have traditionally held science in high regard, such as Egypt, India, Thailand and Viet Nam. Others have not had such traditions, or they have another understanding of what valuable knowledge is. Political power or material wealth may supersede all other aspirations in imparting a certain kind of status on science; religious values, values related to aristocratic ancestry or to the family, may also predominate and override all other considerations. These tendencies may well interfere with a commitment to science and its standards. Among others, Jordan is a well-documented case of self-censorship for partially religious or political reasons, and of family duties superseding professional obligations. In a number of places, this may reach the point where practising research has no other meaning than fulfilling the formal requirements of building one’s career.

This is why a number of scientists in the developing world aim to work in research centres, where (they believe) they will escape a heavy burden of teaching and too many additional professional demands. At the least, this situation calls for a debate on the interest of promoting local (or regional) “Centres of Excellence”, dedicated to science and with sustainable support, high standards and a relevant focus.

*The popularization of science* is part of the scientists’ trade, as there is a constant need for scientists to develop role models and promote the understanding of science. And there should be appreciation within epistemic communities for different kinds and levels of science: pure and theoretical of course, but also applied, and even development and action research. There are interest-

ing examples of the peaceful coexistence of several circles and arenas for example in biology in Egypt, where a few teams have impressive international credentials, while many others just develop very simple devices (which they even go and sell to peasants in the neighbourhood) to protect local plants from characteristic insects. In India also the participation of engineers and scientists in movements and research centres that develop and diffuse incremental improvements for poor peasants is a well-known and regarded activity. The same is true in many places, especially where research is not well established: see for instance the action research at the University of the West Indies (UWI) in the Caribbean, or in Mozambique (about agriculture). Of course, such achievements are not properly reflected in the international bibliographic databases. But they are very useful to the entire society. The lesson here is that in the developing world, popularization is part of the science system, and it requires support and effort from the scientists themselves – perhaps more than elsewhere.

## 5. Human Capacity, Scientific Capital

At the other end of the production of science, there are of course individuals, the (more or less) talented persons in charge of generating knowledge.

*Numbers matter:* production is roughly indexed on the volume of staff (in countries and establishments), and the larger that is the larger the diversity of topics and approaches. The number of researchers per million people is an index of the interest of the government (and of the people) in the development of the human capital base of science (Table 3).

Table 3. Distribution of countries according to GDP per capita and number of researchers per million inhabitants

	<i>GDP per head ppm</i>	<i>Asia</i>	<i>Latin America</i>	<i>Africa</i>
50 wealthiest	> 25,000			
Emerging	15,000 ⇒ 25,000	<b>Taiwan</b> 29,000 ( <b>2,500</b> ) <b>Singapore</b> 30,000 ( <b>5,000</b> ) <b>S. Korea</b> 22,000 ( <b>3,200</b> ) Kuwait 26,500 (210) Emirates 25,500 (n.a.) Bahrain 22,000 (n.a.) Qatar? (600*)		
Intermediary >	7,000 ⇒ 15,000	<b>Iran</b> 8,000 ( <b>1 300</b> ) <b>Malaysia</b> 11,000 ( <b>300</b> ) <b>Thailand</b> 7,500 ( <b>300</b> ) Oman 16,000 (10*) Saudi Arabia 15,700 (100*)	<b>Argentina</b> 14,300 ( <b>720</b> ) <b>Chile</b> 12,000 ( <b>450</b> ) <b>Uruguay</b> 10,000 ( <b>370</b> ) <b>Brazil</b> 8,400 ( <b>350</b> ) Trinidad & Tobago 14,500 (n.a.) Mexico 10,800 (270) Costa Rica 10,200 (n.a.)	Botswana 12,400 (n.a.) <b>S. Africa</b> 11,100 ( <b>310</b> )



Intermediary =	4,000 ⇒ -7,000	<b>China</b> 6,800 ( <b>750</b> ) Lebanon 5,600 (200*.) Jordan 5,500 (280*.) Philippines 5,100 (50)	Colombia 7,400 (110) Panama 7,400 (100) Venezuela 6,600 (n.a.) Peru 6,000 (230) Cuba 4,300 (n.a.) Jamaica 4,300 (n.a.) Ecuador 4,300 (50)	<b>Tunisia</b> 8,400 ( <b>1 000</b> ) <b>Egypt</b> 4,300 ( <b>500</b> ) Algeria 7,000 (n.a.) Morocco 4,600 (250*)
Intermediary <	2,000 ⇒ 4,000	S. Lanka 4,600 (130) Indonesia 3,800 (210) India 3,500 (120) Syria 3,800 (30) Viet Nam 3,100 (120) Pakistan 2,400 (75) Bangladesh 2,100 (50)	Bolivia 2,800 (120) Guatemala 2,500 (n.a.)	Ghana 2,500 (n.a.) Cameroon 2,300 (n.a.) Zimbabwe 2,000 (n.a.) Sudan 2,000 (100*.)
Low income	1,000 ⇒ 2,000	<i>Nepal</i> 1,600 (60)		Gambia 1,900 (n.a.) Senegal 1,800 (n.a.) Ivory Coast 1,600 (n.a.) Uganda 1,500 (n.a.) B. Faso 1,200 (20) Kenya 1,200 (n.a.) Benin 1,100 (n.a.) Nigeria 1,100 (n.a.) Ethiopia 1,100 (n.a.)
Very low income <	1 ⇒ 1,000	15 countries	18 countries	Mali 1,000 (n.a.) Zambia 1,000 (50) Madagascar 900 (15) Tanzania 750 (n.a.) Malawi 700 (n.a.) + 21 countries
Total number of countries		45 countries	33 countries	53 countries
Some comparisons	<b>Sweden</b> 33,000 ( <b>5,400</b> ) <b>USA</b> 42,000 ( <b>4,600</b> ) <b>Franc</b> 30,500 ( <b>3,200</b> )	Israel 25,900 (n.a.)		

Legend: Countries with a high number of researchers ( $\geq 1,000$  / Million of population) are in **bold**.

Countries with a reasonable number of research ( $300 \Rightarrow 1,000$  / M pop) are in **bold italics**.

## Discussion:

- This table gives an indication of the commitment of different countries to the development of research. It is clearly indexed (though with some discrepancies) on the level of income, i.e. of success in “development”.
- Oil-producing countries have invested less than they could (and should) have done; but clearly the Gulf countries are beginning to prepare themselves for the “post-petroleum” era.
- Several countries in the Southern zone of Latin America are among the most committed to knowledge and innovation. Andean countries and the Caribbean lag well behind, in spite of having some very old and reputable establishments. Costa Rica and Cuba are the two noteworthy exceptions.
- In Africa, Tunisia is by far the most dynamic (and persevering) place for research. The rest of North Africa (and South Africa) are now on the path of mass higher education, hence a larger reservoir of teachers doing research. The rest of the continent lags behind on account of its young (and often elitist) universities.

Other considerations may be more important. One of them is the question of *critical mass* in specific niches. The concentration of knowledge production in most countries has been well-documented: a small number of establishments and scientists produce the bulk of results in most science systems. A more refined analysis (per establishment and per field and topic) may be a good management tool however: it has been well documented in “intermediary” countries (for instance in Morocco or Jordan) that even in leading establishments, there are no more than a score of successful research niches; and within each of these no more than ten very active researchers, and a score of more episodic contributors (Kleiche and Waast, 2008). These persons very often do not collaborate with people outside their own institution (except for international collaborators), and the quality of national research remains fragile. There may thus be problems regarding the reproduction, updating and renewal of research methods, capabilities and subjects. A full range of management questions applies: How to develop relevant international cooperation? How to build appropriate networks? How to consolidate efficient niches?

*The quality of researchers:* Qualifications are hugely unequal across countries. In Latin America, there are numerous universities and their staff complements are relatively large, even though the lecturers are globally less qualified than elsewhere. This does not mean that they are unable to conduct good research, but some commentators have indicated that further training and professional development is required. The same is true for researchers working in mission-oriented research centres (for instance in agriculture) all over the developing world.

Yet qualifications are not everything. “Episteme” is another dimension, and by this we refer to the scope of problems which the researcher considers worth facing, and solving, through “scientific” investigation. This is often a matter of thinking styles (deductive, inductive, retroductive, etc.), education and type of establishment where the scientist was trained (for instance universities versus engineering schools), the science curriculum (with more or less experimental practice), job conditions and expectations, and the research culture (or lack thereof) of the institution itself. It might mean that the scientist is more open to theoretical or applied approaches, or considers problems at specific levels (full complexity at local level, or simplified approach at global level). Such postures differentiate populations of scientists, who have of their own fields of interest and success.

*Profession:* working and living conditions are included in this, and the motivation and orientation of research are dependent on them. Though action parameters are limited (except for national policies), a few comments are in order. For a while (during the 1950s to 1980s), the profession of researcher in research centres was seen as rewarding, and that of teachers in higher education even more so. Students were relatively few, university professors were respected and well-remunerated, and there were fringe benefits. In ex-colonies, many researchers had been trained in the best laboratories of the former metropolis and had excellent networks and links with the international scientific community. They were able to pursue high standards in their own research, and academic freedom was the rule. The 1990s introduced big changes, as university degrees were increasingly seen as the way to advance in society and the workplace. The subsequent demand led to an exponential increase in university enrolments, which forced governments to invest more in building new universities – often with campuses scattered through the whole country in order to avoid dangerous concentrations. But this was also the time when “liberalism” enjoined them to restrain their spending, especially in social and non-productive sectors. Few new teachers were taken on, salaries were cut or frozen, initial expectations about the benefits of science turned to disillusionment, and as a result the esteem enjoyed by the academic profession declined.

In numerous countries [especially the poor ones, under compelling demands from the International Monetary Fund (IMF)], it became almost impossible for a researcher to make a living for his or her nuclear family. The result was the now well-documented brain drain, and a diaspora of academics. Many others acquired a second or third job and de-skilled, managing restaurants, driving taxis, or doing strenuous overtime teaching. A small number live from their research and are hired, for short-term contracts, by international organizations or foreign laboratories (Wight, 2008). This is a new “mode of knowledge production”, far from the previous “national” or academic one with its values and regulations. The hierarchy of disciplines has changed (some are more “marketable” than others), as has the prioritization of values (academic credentials vs. amount of contracts won); and the regulation of the profession is less in the hands of the scholarly community than in those of international laboratories and sponsors.

There are great differences between countries in the way they dealt with the scientific profession in this period, even within the same region. For instance, in Tunisia and Morocco the profession remained a good and respected trade, while in Algeria and in Egypt researchers have been ill-treated. In Burkina Faso academics were always respected, while they have been despised and ruined in Nigeria, a much wealthier country. Much depends on the political regime, the power of academics’ trade unions, the support of socio-cognitive blocs, the type of economy and the national development strategy. What is clear is that countries now resolutely embarking in an innovation policy have always paid (or are now paying) attention to the profession. A good indicator is the ratio of a researcher’s salary to that of liberal professionals, or to that of senior official representatives of authority (army, justice system etc.) (see Box 1).

**Box 1**

**Human Resources and Profession: the Case of Jordan**  
(Extract from P. Larzillière, ESTIME Report on Jordan, here based on  
a contribution from Abdel Hakim al Huzban, Yarmouk University)

According to the regulations of higher education in Jordan, a faculty member in a university is defined first as an instructor whose main job is to teach and whose work hours are teaching hours. In spite of that, job promotions in universities are entirely dependent upon research activity and record.

**Number of credit hours that each staff member should teach per week:**

Lecturer	15 credit hours
Full Lecturer	12 credit hours
Assistant Professor	12 credit hours
Associate Professor	12 credit hours
Full Professor	9 credit hours

The academic ladder for the Ph.D. academic staff in Jordan consists of three ranks. Academic promotion leads to a considerable rise of salary. There is then no real incentive for researchers who have the professorship, so many of them switch to less momentum after this rank; the professorship becomes the ultimate purpose, not the research.

The income of people involved in research work (most of the research in the country is carried out mainly at the universities) is relatively good, compared with those with other careers in both the public and private sectors. All public universities have a (more or less) similar scale for salaries which mainly depends of the professional rank of the research staff (assistant professor/researcher, associate/professor). Research staff who work on large-scale projects and get involved in some administrative work usually get paid for such extra efforts.

**Table showing the rate of salaries in the public universities in Jordan**

Lecturer	J.D. 600-700
Full Lecturer	J.D. 800-900
Assistant Professor	J.D. 900-1000
Associate Professor	J.D. 1,100-1,300
Full Professor	J.D. 1,400-1,600

**The average salary of some professions and public careers**

<u>Career</u>	<u>Salary</u>
General Doctor working in the Ministry of Health	400 J.D
School Teacher in a public school	240 J.D
Army officer	400 J.D

Source: A. H. al Huzban and P. Larzillière, *Jordan: Country report* in ESTIME Project, op cit.

Nevertheless the profession has changed. As recruitment was frozen, a large part of the profession is now made up of a proletariat of “casual or contract labourers”, with poor career prospects and significant turnover. The core funding of establishments is limited. Running costs for research are linked to contracts (individual or not). And setting up a project often requires a sum of minute supports, and significant labour in accounting for their use.

When the state takes interest in the activity, it sets strict evaluation rules for the professionals. For instance, in Latin America a system of “national researchers” spread through the continent, significantly promoting a small number of deserving researchers (Box 2).

### Box 2

#### A Way to Regulate the Profession:

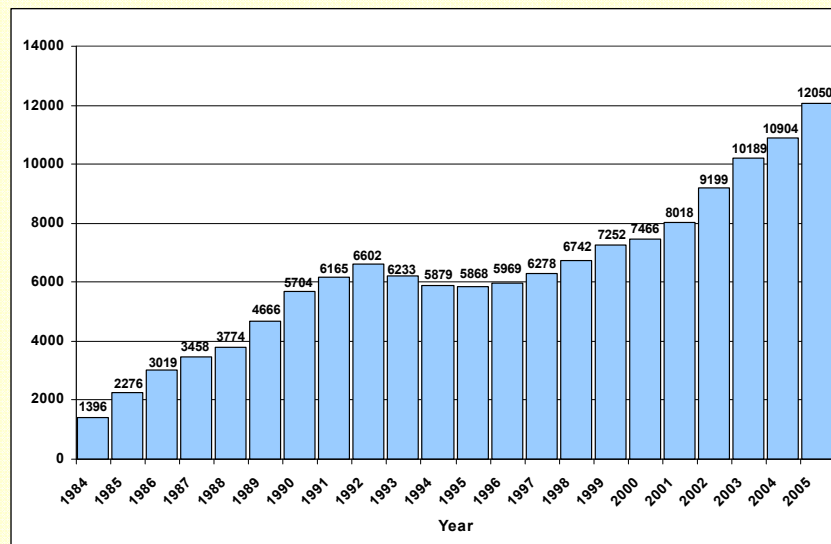
#### The “National System of Researchers” (SNI) in Mexico

by D. Villavicencio; UNESCO Global Report to the UNESCO Forum, January 2008

The National System of Researchers (SNI) was created in July 1984, with the aim of acknowledging and rewarding the work performed by researchers in the country, whether at public universities, public research centers, or some private universities having an agreement with the CONACYT. The quality of work and the prestige of contributions made are recognized on the basis of an evaluation (currently performed every 3 or 4 years). SNI members are given monthly financial incentives ranging from \$800 USD (Junior Research) to \$1,300 USD (for Seniors).

The SNI classifies national researchers in accordance with their accomplishments in science and technology (the first requirement is that they must hold a doctorate) (CONACYT-SNI, 2006). This classification includes five categories: “Candidate” (Junior), Levels 1, 2, 3, and Emeritus. The table below shows the evolution of the SNI and highlights the significant growth in the number of members it has over the last few years.

Figure 1. Members of the SNI, 1984-2005, Mexico



Source: CONACYT, 2004 and 2005a.

It has now been completed by a scheme for budgeting groups (and not only individuals), selected after strict screening. The government may also launch calls for tenders, strive to boost research in remote places (Chile, Mexico) and organize the players in teams, within “clusters”

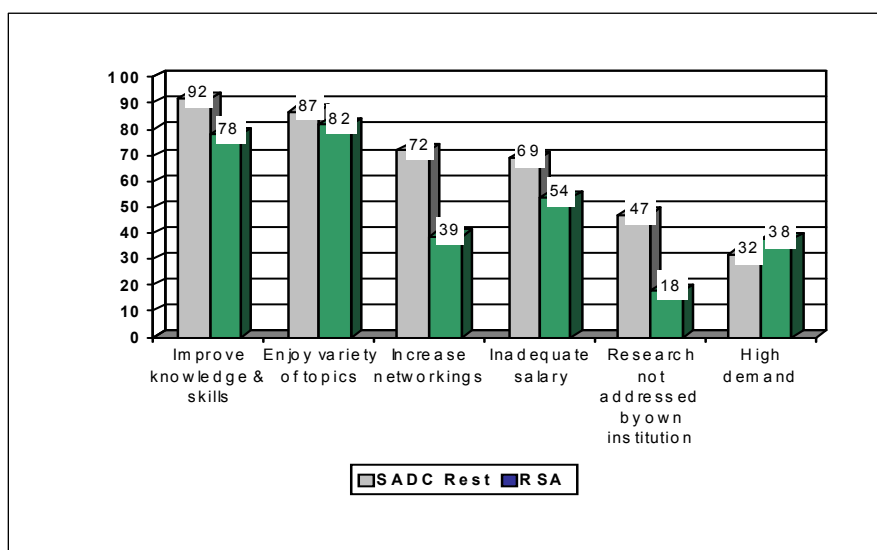
where they are supposed to have business dealings with firms (Malaysia, Tunisia...). In these (favourable) cases, the academy and related institutions have much less control over the quality, choice of topics and orientation of research. In other cases (countries which do not trust science, or seek other results than those valued) it is up to the researcher (or team) to find his/her own budget by persuading sponsors and making international connections. Many academics prefer to refrain from such activities.

*Consultancy work: the normal mode of knowledge production?* Many constraints and poor working conditions persist in low-income countries, increasingly forcing academics to revert to consultancy work; oftentimes this is for international agencies and governments, rather than for local agencies. In a recent study of public science in the SADC Region<sup>3</sup> we collected data (one of the first studies of its kind) on the extent and nature of consultancy activities in these countries. The results show that more than two thirds of all academics in the region regularly engage in consultancy. What are the main reasons respondents provided for engaging in consultancy? Figure 2 below presents a comparison of the South African and other SADC responses. There are some noticeable (and statistically significant) differences. In two areas we notice very little difference: first, the fact that consultancy is undertaken because the respondent enjoys the variety of topics that this brings (87 vs. 82 per cent); second, that consultancy is done because of the demand in the market (32 vs. 38 per cent).

But the other reasons provided demonstrate larger differences between the South African and other respondents:

- Inadequate salary is cited as a reason by significantly more SADC respondents: SA (54 per cent)/SADC Rest (69 per cent).
- Consultancy advances my networks and my career: RSA (39 per cent)/SADC (72 per cent).
- My research interests are not addressed by my own institution: RSA (18 per cent)/SADC (47 per cent).
- Consultancy improves my knowledge and skills: RSA (78 per cent)/SADC (92 per cent).

Figure 2. Reasons for Consultancy



A further breakdown by scientific field revealed significant field differences, but mostly in the expected direction. Respondents in very applied fields (where there are close links with industry and

also government) such as applied sciences and technologies, earth sciences, engineering, material sciences and also social sciences (with policy work) reported high percentages of consultancy engagement. In other fields, such as mathematical sciences, little consultancy opportunities exist.

*Reproduction and brain drain* are two chief concerns of the scientific community today. The proportion of students turning to scientific studies is declining (often on account of poor career prospects in their countries), and there is a crisis in their supervision. Positions have been frozen for long periods of time, professors have left their countries and were not replaced, those who stayed are getting old, and the best students turn to other fields. The need for new supervisors is not only a question of numbers, but of quality. It is important that newcomers inherit authoritative mentors, but also that they import new methods and cutting-edge science, that won't soon be outmoded and will be useful to engineers, doctors and scientific and technological managers on a long-term basis. The same is true for professionals, who should also be enrolled in topical research and sometimes renew their knowledge. A number of our monographs acknowledge that (especially in provincial areas, in Andean and Caribbean countries, and in some countries in Asia) there is a lack of scientific life, and a need for upgrading the teachers' knowledge. Many researchers have deskilled, or given up the activity. Some of them could probably be retrained, and restart in direct or indirect research tasks (advice to government, gathering of funds, and liaison with industry...).

In a recent survey of brain drain in the fourteen countries of the SADC region, the results showed that significant proportions of scientists and scholars seriously consider leaving their universities and countries to look for employment elsewhere. Overall about 20 per cent of all respondents indicated that they plan to move to another country in the future. When the results were disaggregated and South African respondents compared to the other thirteen SADC countries (Angola, Botswana, DRC, Lesotho Madagascar, Malawi, Mauritius, Mozambique, Namibia, Swaziland, Tanzania, Zambia and Zimbabwe), nearly one in four of respondents from the other SADC countries responded in the affirmative to the question.

**Table 4. Do you plan on moving to another country in the near future?**

<i>RSA versus rest</i>			<i>Frequency</i>	<i>Column %</i>
South Africa	Valid	Yes	33	14.0
		No	202	86.0
		Total	235	100.0
Other SADC	Valid	Yes	93	24.8
		No	282	75.2
		Total	375	100.0

Linked to that concern is the *lack of postgraduate courses* organized locally, especially in Latin America and sub-Saharan Africa. Of course, it remains of interest that many good students complete their degree course abroad (doctoral thesis or post doc). But it has been argued (without much proof) that this mechanism encourages brain drain and diverts young researchers from relevant topics at home. "Sandwich programmes" are not an obvious solution, and at best only a short-term one. The necessity of a sensible reproduction of local scientific capacity is the strongest argument for developing graduate training *in situ*; this is a challenge for the scientific community, local and international, and appropriate aid programmes are required. One main principle is probably that the latter should aim not only at capacity-building, but simultaneously at institution-

building: namely, that they help to develop (through specific means in each situation) a sustainable scientific life locally. Good examples of such projects include the networks supported by the Swedish ISP, or the French programme supporting mathematics in Africa, the Southern *African* Research and Innovation Management Association (*SARIMA*), which helps to establish laboratories (supervising doctoral candidates) and insert graduates immediately in regional networks.

Brain drain is of course the reverse concern, and there is a need for figures and studies about this much-discussed question. One first recommendation is that longitudinal surveys be conducted in order to investigate this more systematically. Nevertheless, there are enough scattered data to demonstrate, at least in specific countries or regions, the extent of this phenomenon and its fluctuations.

**Table 5. Brain Drain from the Near East**

Number of scientists and engineers established in USA (born in the Near East), 2000

	Egypt	Lebanon	Jordan	Syria	Palestine	Kuwait	Maghreb
Established in USA	12,500	11,500	4,000	5,000	2,600	2,400	ε
Employed in R&D	4,400	4,900	2,000	1,800	700	1,200	ε
Researchers in the country headcount*	75,000	6,000	6,500		Nd	2,400	40,000
Researchers in the country FTE*	15,000 **	600	750	400 *	Nd	500	8,000

Source: Johnson, J. (NSF), in Barré, R. and Meyer, J.-B. 2003. *Scientific Diasporas*. Paris: IRD.

\* = ESTIME.

According to the NSF, very few scientists from the Maghreb are established in the USA. But scientists from the Maghreb are nevertheless heading for Europe (mainly France), and recently for Canada. A bibliometric study in the social sciences has just proved that 60 per cent of the 100 most productive social scientists from Algeria were now living and employed abroad (50 per cent of the 200 most productive, authoring more than 1/3 of the production in the last 25 years). The proportion of Moroccan authors living abroad is 15 per cent of the 100 most productive (Rossi and Waast, 2008).

According to the Algerian trade unions the number of Algerian scientists established abroad had increased from 2,400 in 1984 to 27,500 in 1994; and 90 per cent of scholarship holders never came back from abroad in 1995. To this should be added the well-known exodus of “highly qualified persons” (among whom a number of leading researchers and academics) during the Civil War of the 1990s (Khelfaoui, 2004).

In 2003, Jean Johnson from the NSF published very detailed figures (op. cit.) on the number of foreign residents holding a degree in Sciences and Engineering and living in the USA. By the turn of this century, Latin America provided about 200,000 degree holders to the USA, nearly half from South America and half from Central America and the Caribbean. Among them, 30 per cent worked in the R&D sector.

For these Latin American degree-holders working in R&D, there are three main patterns:



- Those working in the USA outnumber by far those working in their home (Caribbean) country.
- Those working in the USA are equivalent to those working in their home (Andean) country.
- Those working in the USA are less than those working in their home (Cone) country. But the expatriation is significant among Argentinean (and to a lesser extent Chilean) degree holders: 1/5 to 1/4 of the scientific community has left for the USA. There are a few exceptions, such as Costa Rica and Uruguay.

There is a range of opinions about brain drain. In many countries, the official point of view is that emigrants are despicable traitors, who prefer their own material well-being to their homeland's interests. Added to that is the claim that there is a deliberate "pirating of brains" by the wealthiest countries, at the expense of the poor countries which bore the costs of their education. There are elements of truth in these arguments (especially the second one); but intellectuals are not the only ones fleeing some countries, and there is no reason for them to remain the hostages of governments that do not care (or know how) to use their talents. Some recent studies have convincingly proven that most intellectuals' attitudes depend on the national science policies, and on the movements of international industry. The North African case has been well-documented: as far as the profession is decently treated (status, income, and no tremendous claims) and scientific life can go on, brain drain is much lower (as in Algeria or Morocco) and most students come back home after completing a doctoral degree abroad. They may be giving up lucrative careers in the metropolis, but prefer (managerial) positions in their home environment (Gérard et al. 2008). Another feature is noteworthy: ever since some multinational firms decided to invest in Morocco about three years ago (in high-tech production, and even in development research), the country has had to hastily develop a training plan to double the number of engineers it graduates; it has been able to do it because of the quality of its higher education system, which attracted the interest of said firms in the first place; the same is true in Tunisia.

Another opinion is that there is no real brain drain, but rather a natural flow of scientists to the best places in which to exercise their talents. The "marketplace" of knowledge and know-how will organize their settlement to the best effect, each place in the world will have what it "deserves", and the task of governments is to offer the best conditions to retain the best researchers. This approach has inspired recent, radical measures in some Gulf countries (Qatar and United Arab Emirates [UAE]) that have built grand "Science Cities" and offered facilities to prestigious foreign universities and firms. On a smaller scale, Brazil did the same decades ago when it established in São Paulo a brilliant School of aeronautical engineers (and subsequently an aviation industry). There is some value in this approach. National scientists may come back home (and they often prefer their country, for cultural and personal reasons, so long as a scientific life is possible and career prospects are acceptable). With sufficient incentives, China and Singapore have re-imported from the USA those they needed. And highly-qualified Indian scientists went a similar way to build the computer industry in their home country.

This means that there is room for science management and policies. The "diaspora option" (attempting to liaise between the local scientific community and associations of highly-qualified expatriate nationals) is one tool that was tested (with varying success); targeted enticement in specific developing niches is another one (aiming at firms as well as staff); and the establishment of new postgraduate courses, the layout of science-friendly environments, and support to scientific life are also useful measures in order to curb brain drain. Of course such policies have to be

linked with a fair valuation of the profession and with job creation. At any rate, they deserve genuine international attention and support.

## 6. Specific Role of Universities

There are different sorts of research performers. Each type has its own mission, its style of science and its fields of success. Private research is often dedicated to development and demonstration, bringing incremental innovations in order to develop products and processes that work, and that will reach the market. National Centres are generally specialized in specific spheres of public interest (agriculture, nuclear and space technologies, health) with a continuum from basic to applied research. They are often favoured by governments, which give priority to their funding because they contribute to (nationally) strategic areas and are commissioned to generate more practical outcomes. So is there a specific role of universities?

One can observe that in countries where the state does not treat science “generously”, a few universities play the role of “sanctuaries” for research: all the more for basic science, the American University of Beirut (AUB) and St Joseph in Lebanon; *Université des Sciences et de la Technologie Honari Boumediène (USTHB)* in Algiers, or where government support has vanished the University of the West Indies in the Caribbean, etc. Research is their pride and label, a source of fame in their region; they are the last establishments to give up.

Universities are also able to manage a fuller spectrum of modes of research: from basic to strategic and applied. They have by far the largest staff, often well-qualified and as a rule obliged to carry out original work. They can gather critical masses in relevant niches. Of course, there is little “frontier science” in the developing world, but academics are best-placed to know of recent advances in global knowledge. They can develop “strategic research” prior to the detailed conception of new products; and they can extend their knowledge to significant applications. A good example is the very basic studies of marine biology in Tanzania, which have been extended to the successful breeding of large oysters.

The condition for success lies of course in the talent of its researchers, but also in the management of research (incentives, door-to-door search for contracts, coordination of fundamental and applied research, liaison with other performers), and the ability to address national solicitations, propose novel courses or methods, and fill the gaps of unnoticed, promising niches (see Singapore). For lack of such conditions, the potential (even of research universities, as in Zimbabwe) may remain untapped.

Reciprocally, what is the role of research in Universities? All acknowledge that it should be part of the training of professors and researchers. It is a handy tool for regulating the careers of academics; and it is a source of renown for the institution (the most widespread, if not the only one). It may also be a good link between the university and its immediate constituencies (societies, authorities, businesses) and their needs. But there is more. The role of university is not only to train future academics, but also to train technical workers and managers, and to upgrade their knowledge when necessary. This means that the academics themselves try hard to keep up-to-date on the most recent advances (which make quick progress around the world) in fundamental and technological knowledge. This is impossible without doing research personally, and linking through it with the international movements of science. This is why diplomas from research universities are more highly rated, and more robust, than others.

To sum it up, the *raison d'être* of university research exceeds much of its traditional justification, namely to enhance the quality of training and ensure the reproduction of the academy. These goals are important, but the need for academic research goes beyond them. The university is best positioned to link up with the world scientific community, and with the advancement of knowledge; it is most capable of doing whatever basic research is necessary, but also of mobilizing its results and translating them into ideas for “strategic” implementation.

The function of research for Universities:

- We already mentioned that research was indeed an asset for the *quality of training* not only the training of academics and researchers to be, but the training of all sorts of highly-qualified technicians, whose knowledge will remain relevant on a long-term basis. A complementary task for Universities is the continuing education of staff in productive sectors.
- Research is also part of the *professional ambition* of academics: it is their way to keep themselves up to date, to remain informed of the advancement of world science and to gain a sense of the technological stakes. Equipped in this way, they may aim at competition with other colleagues and laboratories, local and foreign; they may build scientific comparative advantages, choose original topics, select opportune cooperation and carry out autonomous work. They can also enter into contractual collaborations with local users who will take them seriously.

Research also gives institutional *credibility to the establishments*.

- Many Universities deliver good teaching, but research is a label which makes a notable difference (see the Shanghai Jiao Tong Rankings [Institute of Higher Education, University of Shanghai Jiao Tong] of the world’s universities); it guarantees (supposedly) that the best talents are there; and it attracts students and helps to raise funds and contracts.
- Research is also a way to enhance the social mission of the university in its region, through “clusters” of collaboration with local users.
- Research may lead to a long-lasting, national reputation of quality, including in branches which become known for a speciality (see “water” for Kenitra University, etc).

## 7. Conclusion: On the De-Institutionalization of Science in Developing Nations

Science systems in developed and highly industrialized countries have a certain number of clear and evident features, including being dense (well-populated) with highly articulated scientific institutions. “Scientific institution” is understood here to refer to any formal organization or entity which is dedicated to the pursuit of scientific knowledge production, dissemination and utilization. This definition includes bodies that perform R&D such as university centres, laboratories and institutes, as well as R&D performing entities outside the higher education sector. But it also includes scientific publishing houses, journals, conferences, workshops and seminars, which are “organizations” for the dissemination of scientific knowledge. And it also includes bodies such as technology incubators, technology transfer offices, patenting offices and so on, that promote the utilization and commercialization of scientific knowledge.

In a modern science system there are typically a multitude of these scientific institutions that perform clearly articulated functions and roles, and together constitute what could be termed the

“national mode of scientific production”. The “national mode” means that science is conducted for the public good and that the direction of science is shaped and steered by a nation’s most pressing socio-economic needs. It also implies that the state assumes a major responsibility for financing research and development activities.

Unfortunately, few of the features of the modern scientific system apply to many countries in the developing world and especially to the very poor (low-income) countries in our study. Many of the scientific institutions in these countries are fragile, susceptible to the vagaries of political and military events, and severely under-resourced. They also suffer from a lack of clarity and articulation regarding science governance issues, demonstrated by constant shifts in ministerial responsibility for science. In fact, one could even refer to some of these science systems and their associated institutions as operating in a “subsistence” mode, where they struggle to even reproduce themselves. A “subsistence mode” refers to a system that basically produces knowledge for its own use only and does not export knowledge. In fact it does not make a significant contribution to global knowledge production.

It is even debatable whether one can talk of a science “system” in many of these countries, as they do not exhibit typical systemic characteristics. Institutions are not typically aligned through input, process and output flows, and there is no typically systemic behaviour in response to external changes and demands. Rather, the image of an “assemblage” of fragile, somewhat disconnected and constantly under-resourced institutions is perhaps a more apt metaphor to describe the science arrangements in some of these countries, particularly in many countries of sub-Saharan Africa (with the exceptions of South Africa and possibly Kenya, Malawi and Tanzania). However one should also be cautious of over-generalization and over-simplification, as there are some small but robust institutions (universities and research centres) that have survived political changes and economic fluctuations, and where pockets of significant science are still found. In these isolated cases (for example in Botswana, Burkina Faso and more recently Rwanda), science is publicly supported by the government, there is reasonable political stability, and there is good governance of the science system. In many of these cases, there are also well-established links and collaborative networks, including with strong research establishments elsewhere in the world.

*The restoration of research institutions in the developing world:* Much of current scientific inquiry at many institutions in developing countries is under-funded. It is often driven by the individual scientist’s priorities and interests, and is ultimately aimed at advancing the career of the individual academic. We have also shown how investment in R&D in the majority of poor countries is low: despite commitments by ministers of science and technology to strive towards investing at least 1 per cent of GDP on R&D annually, the reality is that most countries spend less than 0.4 per cent. As a result very few governments support public research through a national system of research grants and scholarships, which also explains the high reliance of many scientists on foreign funding.

The solution is straightforward: the symbolic commitment to increased investment in R&D by governments needs to be put into practice. It seems that, despite the rhetoric, governments still view research and knowledge production as a luxury given the huge pressures to address socio-economic challenges such as poverty, infectious diseases, food security and so on.

Since public funding for research is not channelled through a properly articulated and monitored system (e.g. through a national funding agency), the individual scientist and academic at a university receives his or her funding directly from foreign fundraisers (or through the mediation of a local representative). Those who are privileged to receive such funding use it to pursue their own research interests (provided they have first satisfied their sponsor), and also to advance their own careers. This allows them to travel overseas, attend international conferences, and in general

have the required resources to build their own individual research capital, and this focus on building one's own curriculum vitae must be understood within the context of poor academic salaries and working conditions, and a general lack of sufficient research and library resources.

However, this kind of scientific endeavour rarely converts into institutional research capacity; it is not linked, for example, to training doctoral or even post-doctoral students. In fact, there are so few doctoral programmes at many of these universities that "reproducing" existing scientific work through doctoral students is not even possible. The current focus on the individual's own research interests and the advancement of his or her own career also means that such scientific endeavours are not cumulative over time, and do not culminate in the building of a programme or Centre of Excellence that could act as a platform for future research and postgraduate training.

Ultimately, the restoration and improvement of research institutions (and specifically, many universities in Africa) requires a strategy that focuses on institution-building interventions rather than on building the capacity of individual scientists. This does not mean that training of and support to individual scientists, whether they are emerging or established, is unimportant. On the contrary, our proposition is that such individual capacity-building should be embedded in a framework of building the institutions of science. The restoration of research institutions and their development into centres of scientific excellence will only take place if future interventions focus on re-establishing them as such: institutions that are dedicated to the pursuit of science for the common good, and to the attainment of national goals and priorities.

## Notes

- <sup>1</sup> The complete draft reports of individual countries, four regional reports and a synthesis report, were submitted in January 2008 to UNESCO, which commissioned the study. Due to space constraints, this chapter limits itself to the most important, high-level findings of the study.
- <sup>2</sup> The reports of this study are available on the UNESCO website at the following URL: [http://portal.unesco.org/shs/en/ev.php-URL\\_ID=11896&URL\\_DO=DO\\_TOPIC&URL\\_SECTION=201.html](http://portal.unesco.org/shs/en/ev.php-URL_ID=11896&URL_DO=DO_TOPIC&URL_SECTION=201.html).
- <sup>3</sup> Study conducted by the Centre for Research on Science and Technology at Stellenbosch University under commission from the Southern African Regional Universities Association (SARUA); final report projected for release by the end of 2008.

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## Chapter 6

# Measuring R&D in Developing Countries: International Comparability and Policy Relevance<sup>1</sup>

Simon Ellis, Ernesto Fernández Polcuch  
and Rohan Pathirage

### Introduction

The study of knowledge systems relies heavily on the use of Science, Technology and Innovation (STI) indicators, in order to establish cross-national comparisons and to follow-up their evolution over time. Such indicators are traditionally classified in input, output, process, and impact indicators. The quality of cross-national comparisons in terms of knowledge systems is therefore strongly dependent on the quality of the indicators used, both in terms of reliability and relevance.

The indicator most widely used in policy documents worldwide is “research intensity”, which reflects the expenditure in Research and Experimental Development (R&D) as a percentage of Gross Domestic Product (GDP). Another popular indicator could be called “research density”, namely the number of researchers in relation to the total population of a country. For the production of the underlying statistics to these so-called “R&D input indicators”, the methodology proposed by the OECD Frascati Manual (OECD, 2002) is used extensively both in OECD Member countries and in developing countries. The group called “developing countries” for the purpose of this document is based on the standard UN classification (United Nations Statistics Division, “Composition of macro-geographical (continental) regions, geographical sub-regions, and selected economic and other groupings”, to be found at <http://unstats.un.org/unsd/methods/m49/m49regin.htm>). The term “developing countries” is used with the assumption that it does not refer to a homogeneous set of countries, and that the discussion in this document needs to reflect the different characteristics of economies and societies in a rapidly evolving, and developing, “Developing World”. As mentioned by Arber et al. (2008), this group includes countries with “... a wide range of conditions and capacities” in the field of S&T policy and statistics.

This confirms the Frascati Manual 2002: Proposed Standard Practice for Surveys on Research and Experimental Development although originally written for R&D surveys in OECD Member countries, as the most widely accepted international standard practice for R&D surveys.

With the involvement of UNESCO and other international organizations, further development and diffusion has taken place.

However, as discussed in this document, the characteristics of research systems in developing countries differ significantly from the ones that gave rise to the current statistical standard. When producing statistics and indicators, the tension between prioritizing international compara-

bility – embodied in the frequently uncritical application of the Frascati Manual by developing countries – and producing policy-relevant results that reflect the particular characteristics of these countries, becomes once more evident. In this sense, while countries produce indicators for different types of users, ranging from national interest to global comparison, it is frequently the case that this last group of indicators dominates the policy-making agenda (e.g. the targets to reach a certain percentage of GDP spent on R&D). It is therefore important that even if some indicators are produced for international comparison, they still be sound in terms of adequately describing the country's research system.

This tension between policy-relevance and international comparability was empirically tested by the UNESCO Institute for Statistics (UIS) 2003, during the process of reinstating UNESCO's STI Statistics programme (2002-2008). UNESCO had agreed to apply the Frascati Manual methodologies for its data collection in developing countries, following the recommendations of experts and a worldwide consultation (Barré, 1996; Fernández Polcuch, 2006). The hands-on experience gained by applying these recommendations led to the reflections underlying the present paper.

The challenge for statisticians, analysts and policy-makers for the development of STI statistics and indicators in developing countries could be summed up as follows:

**How to obtain cross-nationally comparable indicators while at the same time adequately reflecting the characteristics of developing countries?**

In order to meet this challenge, it is argued that STI statistics for developing countries need to move from a strategy of "adoption" towards one of real "adaptation" in order to enhance policy relevance and better meet the needs of developing countries (Fernández Polcuch, 2008b). The extent to which "adaptation" is needed and implemented depends on the characteristics of each particular country; this ranges from extending the methodology to include new concepts, to actually changing it to reflect very dissimilar realities.

This paper (see Note N° 1) therefore first provides an overview of the current status and context of measuring R&D statistics in developing countries. It goes on to present some of the particular characteristics of R&D practice in developing countries, and the resulting consequences for R&D measurement, discussing the extent to which this implies the need to develop new methodological proposals complementing the ones currently in place (the Frascati Manual). The final section offers some recommendations and concluding reflections.

## **1. The Need for R&D Statistics in Developing Countries**

The need for R&D statistics in developing countries has been widely recognized in various policy documents, particularly those setting targets for national expenditure in R&D (e.g. the famous 1 per cent R&D intensity target). While R&D statistics are widely seen as a relevant tool for evidence-based policy-making, high-level demand for these statistics is still far from being universal.

In recent years STI policies and needs have been further mainstreamed into national and regional development priorities – as in Africa with the establishment of the African Science and Technology Consolidated Plan of Action (CPA) by the African Union, and its implementation through the Science and Technology (S&T) activities of the AU/NEPAD (New Partnership for Africa's Development) process, and are now widely recognized as a lever for development. (Ministerial Round Table: Science and Technology for Sustainable Development and the Role of



UNESCO, 34<sup>th</sup> UNESCO General Conference, 2007). This is accompanied by an increased emphasis on the importance of building and consolidating indigenous R&D capacity, for several reasons:

- Highly-qualified human resources are the main asset for development. The development of human resources is based on quality higher education, and R&D is one of the drivers of quality higher education.
- R&D is central to the development of a capacity to adapt and adopt technologies, which is needed in any technology transfer process.
- Local problems need local solutions, and/or local perspectives in the search for solutions.
- Technologies are not independent from the social context.
- Indigenous knowledge can be used for economic development when mainstreamed through formal R&D.

As identified in various policy reviews, R&D statistics and indicators provide developed countries, as well as developing, with vital information for policy formulation and decision-making, assessment of performance, monitoring and evaluation of progress, making predictions about future trends and identification of priorities. Further, they help understand the strengths, weaknesses, and potential opportunities for development, and to compare between countries. In the context of developing countries, R&D statistics are specifically needed to identify highly skilled personnel, the type of work they do, the institution and sector they work for and whether their work is in line with the national policy and priorities. It is also needed to get information on the amount spent on research, ensure proper distribution of scarce resources, and see that research is carried out efficiently, allowing for practical application of results.

However, STI is still not properly represented in mainstream public policies, such as economic and social policies. Consequently, few resources are often assigned to the production of R&D statistics. Advocacy is required to increase demand for these statistics.

## **2. The Worldwide Availability of R&D Statistics**

R&D statistics are still scarce in developing countries (Gaillard, 2008). The UNESCO Institute for Statistics (UIS), 2003, in cooperation with various UNESCO offices and the Organization's Natural Sciences Sector, has since 2002 led various activities – particularly training workshops – to increase the availability and improve the quality of information. Other partners, such as the Ibero-American Network of Indicators of Science and Technology (RICYT) in Latin America, the European Commission (through projects such as the Evaluation of Science, Technology and Innovation capabilities in the Mediterranean Countries (ESTIME) and MEDiterranean and Ibtikar, Arabic for Innovation (Medibtikar) in some Arab countries, the Association of South-East Asian Nations (ASEAN-ROK) S&T Indicators Project in South-East Asia, and the AU/NEPAD-ASTII [African Science, Technology and Innovation Indicators Initiative (ASTII)] initiative in Africa, have also contributed to this endeavour in various regions (see Table 1).

Table 1. Availability of R&amp;D Statistics by Region

<i>Regions</i>	<i>Countries and territories included</i>	<i>Data published by UIS</i>	<i>Coverage %</i>
<b>Total</b>	<b>215</b>	<b>129</b>	<b>60</b>
<b><i>Developed countries</i></b>	<b>59</b>	<b>50</b>	<b>85</b>
Triad (OECD + EU)	43	43	100
Others in Europe	16	7	44
<b><i>Developing world</i></b>	<b>156</b>	<b>79</b>	<b>51</b>
Africa	54	28	52
Sub-Saharan Africa	46	23	50
Arab States in Africa	8	5	63
Asia	43	26	60
excl. Arab States	31	23	74
Arab States in Asia	12	3	25
The Americas	42	23	55
Latin America (RICYT)	23	19	83
Caribbean & territories	19	4	21
In Oceania	17	2	12

Source: UNESCO Institute for Statistics, 2008.

The reasons for this scarcity of R&D statistics and indicators in the developing world range from frequent lack of interest at the level of policy-makers (possibly implying low policy-relevance and low statistical goals), to lack of resources devoted to statistics in STI, lack of technical knowledge for the production of cross-nationally comparable R&D statistics, and difficulties in applying internationally accepted concepts and methods such as those included in the OECD Frascati Manual (FM). All of these are frequently associated with a lack of general statistics, culture, and weak statistical institutions, in these countries.

Just as measuring R&D in developing countries does not necessarily entail the application of FM in a straightforward manner, increasing the availability of quality R&D statistics implies not only capacity-building activities, but also the development of adequate methodologies that take into account the particular contexts of these countries.

R&D statistics “... are not only important in international comparisons, but are also essential in guiding policy-makers in developing and targeting new policies, ensuring a certain standard of performance and building up a sense of accountability” (Gaillard, 2008). Since STI policies are certainly different in developing countries and in developed ones (and also between developing countries), STI indicators need to be adapted to particular policy needs, and need to provide answers to actual policy questions.

As tools for evidence-based STI policy-making, indicators should not be seen as the sole source of information. In the case of developing countries, there is a whole body of knowledge regarding the STI systems missing or only occasionally available. This absence of “descriptors and narratives” explaining “... the dynamics of R&D systems, R&D practices, informal behaviours and contributions as well as unexpected changes” (Gaillard, 2008) undermines the ability of the various actors involved to design evidence-based policies, thereby leaving statistics orphaned and reducing their level of relevance and direct applicability to policy-making.

Furthermore, it could be argued that some of the “descriptors and narratives” called for by Gaillard not only complement the results but actually precede the possibility of producing quality STI indicators for a given country. In this sense, Kahn et. al. (2008) point out that “... the measurement of R&D is a complex undertaking that pivots on understanding the characteristics of the system of innovation that is the subject of investigation. This entails building a picture of the system of innovation not only ‘as a set of functioning institutions, organizations and policies which interact constructively in the pursuit of a common set of social and economic goals and objectives’ but also through the lenses of economic history, political economy and development theory”.

### **3. R&D Systems in Developing Countries: Characteristics and Impact**

In order to produce accurate and sound R&D statistics, it is important to take into account the particular characteristics of R&D activities in the context of developing countries. R&D performers function within the specific context of a national, cultural, political, financial and economic system, frequently carrying with them the legacies of colonial, post-colonial and other forms of governance (Kahn et. al. 2008).

The characteristics of R&D activities are intimately related with the general socio-economic conditions in developing countries. Some of the characteristics described here occur in most countries, while some present themselves only in a sub-set of countries, or are not relevant for certain other countries. Compared to an “average” OECD Member country developing countries have particular structures in terms of:

- (1) State/Government.
- (2) Research and innovation systems.
- (3) Higher education.
- (4) Statistics systems (weaknesses).

Many developing countries also present particularities in terms of production, dissemination, and access to information, resumed in the term “culture of information”. This is reflected in:

- Lack of demand by policy-makers and other users.
- Lack of willingness to provide information by institutions, universities and businesses.

It is frequently assumed that the main users of STI statistics are governments, businesses and analysts; in developing countries another group of actors plays a key role: international donor agencies, who pose new questions to data, and require a high degree of comparability between countries while also reflecting the specific conditions of the recipient.

All these factors impact directly on the R&D statistics system, as discussed in this document.

Besides the particularities shown, developing countries still need and demand cross-nationally comparable R&D statistics at the global level, in the joint frameworks of increased internationalization and comparison with their neighbours in developing regional policies (such as those of the African Union).

### 3.1. Nature of Research and Experimental Development (R&D) Activities

Contrary to frequent assumptions, in developing countries there is often more ‘R’ than ‘D’ in their “R&D” activities. This is reflected in a strong presence of the government and higher education sectors in the performance of R&D, *vis-à-vis* the private sectors.

Research and Experimental Development (R&D) activities in some developing countries may present particular profiles that do not always clearly align with the methodologies available to measure them. More precise guidelines are needed to deal with:

- Traditional knowledge, its formalization and application.
- Clinical trials.
- Reverse engineering and minor product and process adaptations.
- Community development and other social projects, and
- Religious research.

Cultural characteristics also impact on the way R&D is performed in developing countries. While frequently “mimetic” approaches are followed by taking on board research agendas and practices of developed countries, in other cases R&D activities get more deeply involved with cultural and language environments that condition the way it can be measured, both in terms of process and outcome. In terms of input statistics, however this might have a more moderate impact on methodologies.

A common characteristic of R&D in developing countries is its degree of informality. Informal R&D is difficult to capture and therefore is usually considered beyond the scope of R&D surveys.

These situations create a number of “grey areas”, which need to be addressed to ensure that R&D statistics for developing countries are policy relevant and reflect activities in the countries. Sound criteria need to be established, to increase comparability between countries and capture all the relevant actors involved.

### 3.2 Patterns in Research and Experimental Development (R&D) Funding and Measurement

Developing countries frequently estimate Gross Expenditure in R&D (GERD) based on national budget information. This widely adopted practice leads to inaccurate and often incompatible data, since the FM bases all its recommendation on the use of R&D surveys. However, budget information is cheaper and quicker to obtain and has in the past been able to reflect almost the complete R&D expenditure in certain developing countries, where research systems were overwhelmingly in the public sector and their expenditures accounted for in the budget. This however does not reflect the current state of affairs.

In order to continue using budget information for the purpose of measuring public R&D expenditure, there is a need to produce standardized methodological guidelines to harmonize the use of such budget data and to increase the comparability (e.g. use of executed budget vs. allocations) of expenditure estimates. An agreement as to what constitutes R&D in budgetary documents also needs to be established and formalized. This includes, but is not limited to, boundary issues. The definitions used by ministries of finance for establishing “S&T budgets” are frequently *ad hoc*, and can create confusion between S&T and R&D. The use of different classifications may

limit the availability of some key data, e.g. defence R&D data might be hidden or unavailable – a review of concepts and definitions used worldwide could be an interesting starting point.

The R&D components in the national budget are difficult to identify, and are frequently hidden under other headings. In particular, capital expenditure is extremely difficult to identify. There is often a discrepancy between voted and allocated budgets.

National research systems have a limited absorption capacity to deal with budgetary increases; at the same time, some governments may not follow up on their budgetary commitments, and leave funds in central accounts instead of transferring them to R&D-performing institutions. This might lead to over- or under-estimation of R&D budgets.

In some countries, particularly some members of the Commonwealth of Independent States (CIS), the sources of funds accounted for in the budget are incompatible with Frascati Manual (FM) methodological proposals. Specific guidelines should be developed in order to introduce better matching criteria, thus allowing for a stronger cross-national comparability.

A combination of budgetary records and annual reports from performing units, national budgets and national planning documents is also used in some countries as a source for estimating GERD. When both sources are used, duplication might result, due to the mixture of funding and performing units involved. Problems of consistency may result when trying to reconcile budget and expenditure data from incomplete financial records, and reconciling budget and expenditure for multi-annual projects into annual figures can prove difficult. Similar situations can arise when aggregating financial data from projects involving many different institutions.

Many institutions (especially universities) lack a separate research budget, because research plays a minor role in institutional priorities, and information systems may not readily provide R&D data without costly adaptations. In these circumstances solutions used to estimate the figures may reflect pragmatic IT solutions rather than statistical definitions.

R&D activities are undergoing significant changes in many developing countries. While in the past most of R&D was funded by the government, sources of funds are changing rapidly with the appearance of new players: while enterprises are slowly coming into the picture, foundations and NGOs, especially foreign organizations, already occupy a central role.

Many of these new sources of funds provide support to individuals and groups and not to institutions (Gaillard, 2008), and therefore remain grossly unaccounted for, and seldom declared including for statistical purposes.

In the higher education (HE) sector, the trend towards establishing private universities is not always reflected in an increase in R&D expenditure. To analyse this and other related phenomena, it would be advisable to break this sector into at least two sub-sectors: “Public HE” and “Private HE”. “Private HE” could be further divided into “Government-dependent private” and “Independent private”, according to the definitions used by the UIS for education statistics<sup>2</sup>.

Business enterprise R&D is generally weak when compared to OECD Member countries, and this needs to be taken into account when conducting sample surveys; the absence of data for one large (foreign) company could then lead to significant error (“detective work” is needed, as per Kahn et. al. 2008). R&D might be more frequent in certain sectors of the economy, leading to bias towards data collection in these sectors (see “Concentration and Heterogeneity” below).

Public enterprises still play a major role in some developing countries. Since their sensitivity to policy is different than in the case of private enterprises, the business enterprise sector could be divided in two sub-sectors: “Private enterprises” and “Public enterprises”. Private enterprises might also be disaggregated by ownership, in particular the various degrees of foreign ownership.

While the use of combined R&D and innovation surveys to obtain business enterprise data could be cost-effective, the above consideration about rarity of occurrence of R&D needs to be taken into account and dealt with. Guidelines are needed on the use of innovation or other surveys (e.g. industrial, labour) as sources for estimating R&D data.

### 3.3. Professional Crisis

The late 2000s provide a context of “... professional crisis and changing nature of scientific work in many countries” (Gaillard, 2008). The changes in the roles and activities of university professors impact strongly on the production capacity of R&D data in the higher education sector, which might be the most important sector in many developing countries.

One example of this is the increase in the number of part-time professors, with new types of contracts, who teach or conduct research at more than one university (“taxi-professors”), occasionally even *pro bono*. Frequently, part-time professors do not devote sufficient time to research activities, and do not produce any results in this field. This tendency is especially evident in the private universities of many countries.

On the one hand, low-income countries (LICs) frequently rely on unpaid researchers for their R&D activities. On the other hand, some “researchers” are paid to perform research or are obliged by law to spend a certain part of their time conducting research, but in reality do not, for various reasons. These “barriers” to performing research range from insufficient resources for R&D, to lack of proper environmental conditions for research, to frequently dysfunctional career development and evaluation structures.

In order to calculate the number of researchers in Full-Time Equivalents (FTE) particularly in the Higher Education sector, a common practice both in developed and developing countries is to establish research coefficients, i.e. to estimate the percentage of time an average researcher devotes to R&D as opposed to teaching, administration or other tasks. The establishment of such research coefficients in fuzzy situations as described is especially difficult, and might lead to the need for developing institution-specific coefficients reflecting each university’s characteristics. While this process can be initially difficult, it will in the long term significantly improve the quality of data. In some cases, like many countries in the Commonwealth of Independent States (CIS), FTE figures are difficult to calculate, frequently providing data higher than head counts (i.e., the number of persons counted as researchers, independently from the time devoted to R&D). This is mainly due to researchers employed in several (full-time) jobs, and might happen in other countries as well.

Doctoral students and tutors are difficult to account for, since not all of them may truly be active in R&D. At the same time, in some countries, masters’ students perform research as part of their studies. Structures of master- and doctoral-level courses vary between countries, as do their requirements for R&D activities. According to the FM, master’s students should not be counted as researchers unless they are employed as such. In practice and in countries such as Tunisia, not counting research-masters’ students as researchers would severely underestimate the R&D capacity.

In all such situations, estimating the number of researchers becomes a detective’s task, and the difficulties in estimating full-time equivalents for research, particularly in the Higher Education sector, have not only direct impact on the calculation of the volume of researchers, but also on the Higher Education Expenditure in R&D (HERD) and therefore on the calculation of the total Gross Expenditure in R&D (GERD).

### 3.4. International Mobility

During the last twenty years the internationalization of science, measured through foreign co-authorship, increased much faster in developing countries than in the rest of the world (Gaillard, 2008). This high percentage of international cooperation in developing country R&D presents new challenges for the relevance and impact of R&D, but remains outside the scope of this document.

At the same time, there is increasing international mobility of scientists and engineers, particularly from developing countries to developed countries (usually known as “brain drain”). Gaillard (2007) estimates that for Lebanon, the size of the S&T diaspora is equal to or larger than the S&T workforce at home.

Only a small group of countries has been able to start reversing this trend through very active STI policies, involving large investments in the creation of favourable local conditions for the establishment of “international” scientists.

Some other countries have opted to organize their diaspora of scientists and engineers through “remote mobilisation” (Gaillard, 2008), in order to generate some expected benefits for the country of origin. This presents new challenges for R&D measurement. To what extent does this internationalised scientific community contribute to R&D in its country of origin? This policy question is still unanswered, and requires new methodological approaches. The Careers of Doctorate Holders (CDH) Project looks only partially at this problem. The direct impact on R&D is still unmeasured, and might have consequences for Frascati Manual-type methodologies.

### 3.5. Concentration and Heterogeneity

R&D activities show a high degree of concentration. This happens at the macro-level, in terms of countries, as well as at the micro-level, in terms of institutions or even of research teams and laboratories.

From a World perspective, R&D is concentrated in the “Triad countries”:

“In the Triad countries scientific production (measured in number of mainstream scientific publications) is even more concentrated than economic resources. In 2004, Europe, North America and Japan accounted for 79.5 per cent of world scientific publications, a slight drop, however, from its 1999 relative world share figure (84.4 per cent). Interestingly, although not strictly comparable, the 1999 figure is the same as the one reported by Eugene Garfield for 1973 (Garfield, 1983), although at that time, the USA’s share was much bigger (43 per cent compared to 29.4 per cent in 1999) than that of Europe and Japan (4 per cent in 1973 compared to 8.8 per cent in 1999)” (Gaillard, 2008).

In the developing world, R&D expenditure and output is concentrated in a relatively small group of countries in each region. Examples of these can be found in Gaillard (2008) and Arber et al. (2008). Examples of concentration in terms of institutions can be found in Gaillard (2008), and include the case of the American University of Beirut (AUB) in Lebanon, which, although one of forty-one higher education institutions in Lebanon, produced over half the national output of scientific publications.

The more concentrated focus of R&D activities in particular institutions, or major projects, in developing countries may lead to volatility and inconsistency in related statistics. This situation is exacerbated by the great divergence in the way in which R&D takes place and is measured in different countries and institutions in the developing world.

R&D activities and their institutional framework present distinctive characteristics in different countries. This heterogeneity, while requiring different approaches to produce adequate R&D statistics, is however not randomly distributed. In fact, as proposed by Arber et al. (2008), countries can be grouped according to three different sets of parameters:

- (i) Socio-economic development status.
- (ii) Capacities of R&D systems.
- (iii) Capacities of R&D statistic systems.

For Latin America, Arber et al. (2008) propose the following grouping, which could be adapted for further use in other regions:

**Group A:** Countries with consolidated R&D systems and developed S&T statistics systems (Argentina, Brazil, Chile and Mexico).

**Group B:** Countries with consolidated R&D systems and less developed S&T statistics systems (Colombia, Costa Rica, Cuba, Panama, Uruguay and Venezuela).

**Group C:** Countries with incipient R&D systems (Bolivia, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Nicaragua, Paraguay and Peru).

A methodological proposal on measuring R&D in developing countries will need to consider the common features of developing countries, as well as the specific characteristics of each group.

It could be argued initially that one (small) group of countries presents no major difficulties in applying the Frascati Manual (FM). These are the “*Group A* countries” as characterized by Arber et al. (2008), which are already applying current Frascati Manual standards, and coping in a relatively straightforward way with the challenges faced. Arber et al. (2008) suggest that, in order to close the gap in their capacities for constructing R&D indicators, these countries need to establish fluid exchanges of experience with more experienced countries, rather than specific adaptations. Some of these developing countries might already be OECD members (e.g. Mexico, Chile soon, etc.) or might be providing data for the OECD’s surveys (e.g. Argentina).

Nevertheless, FM standards do not consider the particular types of R&D as discussed earlier here, nor do they include foreign antennas, as proposed below. Therefore, a statistical picture of these countries’ research systems remains incomplete when FM methodologies are simply applied as follows:

“Group B countries” might be able to adopt most of the concepts in the FM, but need to adapt their statistical processes to the corresponding methodological proposals. These countries need specific guidance on how to establish and consolidate sound R&D statistics systems, frequently within relatively weak statistical frameworks. The classification of developing countries into these different groups remains to be undertaken.

These countries have been producing scattered STI statistics, without regular R&D surveys. Most frequently, their statistics do not cover all sectors, and proceed mainly from administrative and other secondary sources, not necessarily fully compatible with FM standards. It could be suggested that these countries do not comply with all Frascati Manual specifications, and are generally not in the position to do so in the short term. These countries would be the initial main beneficiaries of a future annex to the OECD Frascati Manual, compiling methodological guidelines to help them develop simpler harmonized procedures, while also taking into account the particularities of their research systems.



In the remaining “Group C countries”, R&D systems are limited to a few government and university institutions and the participation of the business sector is quasi-nonexistent and usually unaccounted for. At the same time, these countries have very limited resources for STI policy and management, let alone STI statistics. In this framework, the STI statistics function is not institutionalized, and is usually carried out part-time by a (often under-trained) civil servant whose other tasks include various STI management activities. It therefore frequently depends on the goodwill of the person involved, and the particular interests of the manager, rather than on the impetus of questions posed by the policy-maker. This is an important obstacle for generating an STI statistics system.

While “Group C countries” have similar characteristics regarding most of the issues presented for “Group countries”, they require attention to further data and information not necessarily within the scope of the FM (e.g. statistics on other S&T activities other than R&D). There is, therefore, a need to develop and standardize more policy-relevant indicators for these countries, while still developing R&D indicators. However, since all countries need some level of indigenous R&D activity, they also need the appropriate tools with which to measure them

### 3.6. Internationalization of R&D: Foreign Antennae and Other Structures

In developing countries there is an incipient perception of internationalization as a means of improving the quality of S&T Activities (STA), strengthening capacities, and taking the benefit of the technology transfers which could arise from the alliances and networks generated. In some cases, STA can more simply be used as an initial launch pad for development (Arber et al. 2008).

Another aspect of the internationalization of R&D has its roots in the colonial past of many developing countries. Foreign “antennas” (i.e. foreign research centres, with foreign researchers and foreign funding) are R&D-performing units (within a given country) directly funded by foreign R&D institutions. A few examples of these are the Institut de recherche pour le développement (IRD) established in Senegal, Institut Pasteur branches in some African countries, the Smithsonian Tropical Research Institute in Panama, and some major foreign astronomical observatories in Chile and other countries. The existence of foreign antennas has a direct impact on R&D measurement and on the use of R&D indicators for policy-making.

International organizations may also play a significant role in R&D in a given country, involving local staff and addressing local issues. These organizations might also have a significant weight in the total GERD, if they are included. In some “smaller” countries (in STI terms), the figures corresponding to R&D personnel and expenditure of foreign antennas or international organizations can potentially significantly distort the countries’ R&D indicators. This is another expression of the concentration process discussed above.

The current breakdown for sectors of performance, as proposed by the FM and widely applied (government, higher education, business, and private non-profit), does not provide sufficient tools to deal with foreign R&D performers outside the business enterprise sector. Foreign antennas do not fit under the FM definition of any of the performing sectors. While international organizations and foreign antennas would squarely fit into the definition of the “Abroad” sector, the FM only considers this sector as a sector that provides funds to R&D and not as one that actually carries out R&D activities.

Therefore, establishing foreign antennas as a separate sector of performance might in some countries make the resulting data more policy relevant.

While foreign multinational companies tend to be dominant in developing countries' markets, R&D decisions are usually taken at headquarters (in developed countries). Recent trends in internationalization have also given rise to a new form of foreign research laboratories set up by foreign companies to cater the R&D needs of their headquarters, frequently with little involvement of the local innovation system beyond the provision of a low-cost but highly-qualified R&D workforce.

These new forms of R&D outsourcing also call for special attention, particularly from the point of view of the receiving country, since they provide a significant opportunity for scientific and technological growth, in terms of quantity, quality and international involvement of its R&D workforce. When such a foreign research centre is largely run from abroad, it can be very difficult for the host country to obtain complete data on finance and personnel.

Globalization of higher education services is leading many universities from developed countries to open branches in developing countries. These campuses set up by foreign universities present very particular situations, not accounted for in the FM. For example some foreign campuses adopt the same recruitment procedures for researchers, and entrance qualifications for students, as their home institutions, while other foreign campuses adopt criteria closer to those of their host countries. Under these circumstances the conditions for R&D activities and the status of researchers can vary considerably. R&D projects might be managed in a centralized way at headquarters, and with professors moving into the countries for short-term assignments, accounting of R&D expenditure can be difficult. The impact of this process on national R&D requires further studies in order to conceive adequate methodologies for its measurement.

Clinical research on behalf of foreign pharmaceutical corporations accounts for an important part of GERD in some developing countries, especially when analyzing R&D in Medical Sciences. In the same sense, foreign researchers "visiting" for research may impact the corresponding statistics. Foreign funds, and not only those coming from foreign companies, can be very important and are very difficult to trace.

What is the relevance of total Gross Expenditure in R&D (GERD) or personnel figures, including "foreign antennas" and other consequences of internationalization, if a high percentage of R&D activity (i.e. expenditure) is completely beyond the control and influence of national R&D policy or even the strategic R&D decisions of companies in the country? How can a country reach national spending targets (such as the 1 per cent goal frequently stated in policy documents) if the underlying expenditure is basically immune to policy decisions at the national level?

### 3.7. More than R&D Indicators

In the field of STI statistics and indicators, it is argued that broader Science and Technology Activity (STA) indicators are needed; this is based on the updating of the traditional UNESCO definition which, beyond R&D, now includes Science and Technology Services (STS) and Scientific and Technical Education and Training (STET). Some examples have been produced by the Ibero-American Network of Indicators of Science and Technology (RICYT) in Latin America, however overall quality and particularly international comparability are still low due to the lack of adequate guidelines. These statistics would also be important for the analysis of the maturity of the technical system, and its potential for adapting to technological changes, as well as for appropriating technical transfers (Arber et al., 2008). In the longer term, after consolidating the more widely-used R&D statistics and following the provisions of the UIS Immediate-, Medium- and

Longer-Term Strategy in Science and Technology Statistics (UIS, 2003), the definition of S&T services would need to be thoroughly revised and updated.

Developed countries' R&D and innovation systems have been widely studied. These studies provide the framework for the interpretation of R&D indicators, since statistics alone cannot fully explain the characteristics of R&D in developing countries. In order to apply and more significantly develop a culture of applying R&D indicators in (evidence-based) policy-making, more knowledge is needed regarding various aspects of the so-called systems. This involves studies on the dynamics of R&D systems (macro), as well as R&D practices (micro), including analysis of informal behaviour.

The traditional input data which are captured through R&D surveys do not reflect the "barriers" to performing research described in this chapter. In order to capture this aspect it is desirable for developing countries to conduct specific types of studies or surveys to complement the traditional input data. This would provide more information on the problems faced by researchers, and would allow policy-makers to address the barriers that prevent researchers focussing on their work.

Additional studies need to be conducted to establish baselines and a sufficient body of knowledge on how R&D is performed in different countries; the science system within the context of the broader political, economic, education and social systems; the history of science in the country under review; the governance of science in the country, and available policy documents; knowledge and R&D performers; informal STI structures (academies, associations, trade unions, journals, virtual colleges, etc.); considerations on research as a profession, including status, salaries, etc.; the specific role of international donor and funding agencies in funding and determining the country's research activities, programmes and policies; research outputs (postgraduates, publications, papers and patents); and scientific cooperation and agreements (Mouton and Waast, 2008).

### 3.8. Weakness of the Statistical System

As discussed in the Annex to the Oslo Manual on "Innovation Surveys in Developing Countries" (OECD, 2005) the weaknesses in statistical systems and practices in developing countries present serious challenges to the quality of the results potentially obtained from R&D surveys. This needs to be taken into account in the process of designing data collection procedures, as well as in the analysis of their results.

"Group B" and "Group C countries" frequently require specific actions in terms of institutionalizing STI statistics. Establishing sound and sustainable STI statistics systems requires a good deal of political support, as well as infrastructure and staff training. High staff rotation and turnover weakens institutions, causing drops in the quality of data. Therefore, sustained training and capacity-building is needed. One key actor in this system is the National Statistical Office, and where STI statistics production is located outside of it (i.e. in a ministry or council), obtaining "Official Statistics" status for R&D Surveys can help ensure that statistical production is regularly resourced and produced according to strong technical standards. An adequate legal framework is therefore also needed. The STI statistics unit should deal with budgetary analysis, and be in close relation with the unit conducting innovation surveys.

Another tool for improving R&D data collection is close integration with the country's Science, Technology and Innovation Management Information Systems (STIMIS). These systems, such as CV-LAC (*Latin American and Caribbean*) in Latin America, are a frequent source for the

production of R&D statistics; however, they need to be handled carefully since they were not originally conceived for statistical purposes, and need adjustment to produce comparable statistics taking into account the potential bias due to the definitions used and the coverage obtained. Private sector organizations are also frequently not covered by these systems. A balanced approach using both STIMIS and surveys in a consistent fashion should be established.

STIMIS may also provide an overview of the research system and a good framework for establishing proper registers for R&D surveys. Other possibly useful sources for establishing registers and survey frameworks are associations (trade, academic), learned societies, and S&T services institutions; registers or databases of scientists and engineers; and databases of scientific publications, patents and other IP documents. Business registers, based at National Statistical Offices (NSO), are another frequent weak point in the system. In order to conduct meaningful surveys in the business enterprise sector, it is of foremost importance to improve their quality and keep them up-to-date. In the case of institutions in the private-non-profit sector (PNP) these tend to be very volatile, hindering the construction of the framework and the estimation of missing data.

In order to cope with possible resistance in terms of data provision by key institutions, as well as to increase the quality of the information, it is recommended to establish user-producer networks, as well as various levels of consultation with stakeholders. In some countries universities are autonomous, and might therefore be less willing to provide information to the government. All opportunities to exploit pre-existing personal ties need to be used, particularly in smaller countries, while actions such as partnering with business associations, or conducting face-to-face visits by statisticians and project leaders, may all increase the probabilities of success of a survey, in terms of both response rates and data quality. Thorough training of interviewers is required so that they understand, and can explain to non-specialists, the technical definitions and concepts involved in R&D, innovation, and other STI statistics. This also will improve response rates and the quality of the data received.

Particular attention needs to be paid to professional questionnaire design, as well as to the frequency of surveys. While the use of other countries' survey questionnaires for inspiration is encouraged, questionnaires need to be thoroughly adapted to local situations, both in terms of specific language issues, as well as in order to reflect the ways in which information can be made available in the country. The expertise of the National Statistical Office (NSO) can be a key resource in this process. To improve the quality of the statistics, multiple questionnaires covering the different sectors should be developed, based on thorough consultations with users and producers, while aiming to limit the cost implications and to maintain high inter-sectorial comparability standards.

Last, but not least, appropriate procedures need to be developed for estimating missing data, particularly in the first few survey rounds, when no previous information is available and data quality can still be low or difficult to assess.

## **4. Conclusions and Recommendations**

Research and Experimental Development (R&D) activities and their institutional and social context in developing countries present characteristics that differentiate them from the ones underlying Frascati Manual concepts and methodological guidelines. The characteristics of research systems as described in this document have both direct and indirect consequences on R&D measurement practices and methodologies, and it is beyond the scope of this chapter to propose solu-

tions to all the issues raised. However, the depth and extent of the issues presented here demonstrate both the importance of collecting sound statistics and information on research systems in developing countries, and the need to develop proper methodological guidelines that enable developing countries to produce policy-relevant, cross-nationally comparable STI statistics.

This last endeavour, the establishment of guidelines for measuring R&D in developing countries, has been recently taken up by the UNESCO Institute for Statistics in agreement with the OECD, in order to produce a document guiding the critical application of the OECD methodologies in developing country contexts. At the same time, some of the issues raised in this document may also affect European Union (EU) countries and OECD Member countries in a similar way to developing countries, and therefore might merit consideration by the OECD in a future revision of the Frascati Manual.

While the issues outlined in this document stem from expert views and discussion with statisticians from and within various developing countries, the need for further discussion with STI statisticians and experts in research systems worldwide is recognized. The wider the consensus reached in this discussion, the more significant the resulting guidelines will be, allowing for countries to produce more relevant studies of their research systems. This is necessary in order to advance the design of policies for and our own understanding of the contributions of science, technology and innovation to poverty alleviation and growth at national, regional and global levels.

## Notes

- <sup>1</sup> A previous version of this paper has been presented for discussion to the OECD Working Party on Science and Technology Indicators (NESTI) in June 2008 (Fernández Polcuch, 2008a). It draws heavily on the outcomes of the Advisory Meeting to the UIS S&T Statistics Programme, held in Montreal, Canada in December 2007, as well as on a number of papers commissioned by UIS to Jacques Gaillard (Gaillard, 2008), Michael Kahn (Kahn et al. 2008), and RICYT (Arber et al., 2008).
- <sup>2</sup> A “Government-dependent private institution” is a private institution that receives at least 50 per cent of its core funding from government agencies. Institutions should also be classified as government-dependent if their teaching personnel are paid by a government agency, either via the institution or directly.  
[http://www.uis.unesco.org/ev.php?URL\\_ID=5750&URL\\_DO=DO\\_TOPIC&URL\\_SECTION=201](http://www.uis.unesco.org/ev.php?URL_ID=5750&URL_DO=DO_TOPIC&URL_SECTION=201)

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# Chapter 7

## On the Way from the Forum: A Future Research Agenda

Mala Singh

### Introduction

At its core, the Forum for Higher Education, Research and Knowledge had a simple but ambitious mission, to: (i) facilitate an increase in the pool of knowledge that is available and usable for social and economic development, and (ii) contribute to the strengthening of the systemic and institutional dimensions of its production, dissemination and utilization, especially in low-income countries (LICs) and middle-income countries (MICs). The official representation of the Forum's vision as well as the premise of many of its publications, presentations and discussions was linked to the idea of the knowledge society, both as the target and the "engine" of social development. The broad goal of the Forum was "sustainable development" and its more targeted objective was to increase the data and information profile of knowledge systems in LICs and MICs, and to strengthen their effectiveness and capacity to respond to developmental priorities. Its proclaimed politics was on the side of a UNESCO position asserting the importance of higher education's role in social and economic development, in contrast to an earlier World Bank view which had prioritized primary education to the detriment of higher education. More substantially, the Forum wanted to support LICs and MICs in diminishing the development gap between themselves and high-income countries (HICs) through improved systemic capacities to generate and deploy knowledge. Its normative vision was linked to a fairer and more evenly balanced global development agenda, premised on a clear ownership of development decision-making within LICs and MICs and a more equitable distribution of knowledge-based benefits across HICs and LICs.

The author's reflections in this chapter are not primarily on the extent to which the Forum achieved its concrete objectives relating to systems data and systems strengthening but rather on its ambitious and sometimes ambivalent politics of development. Given its use of a discursive framework that has become almost global commonsense and its upholding of a normative position with which few would disagree, added to that its opportunity to draw on research and policy expertise from all regions of the globe – what new understandings emerged from the Forum in relation to the knowledge-development nexus? The author focuses on the question of whether and how the work of the Forum helped to advance beyond received thinking and current policy "commonsense" the relationship between knowledge systems and socio-economic development, accounting seriously for context in relation to low-income and middle-income countries while also operating within a globalized knowledge society and innovation discourse. This question is related to the larger assumptions about social development that underpin the Forum's concerns, especially its "knowledge for development" premise, and the implications of this for

higher education and research systems in the developing world. In addressing this, the author of this chapter touches on some possibilities for a future research and policy agenda.

## 1. Setting the Scene

What constituted the *rationale* and *objectives* of the Forum?<sup>1</sup> The six key propositions are the following:

- (1) The central role of knowledge and of the institutions and systems that produce and deploy it is a fundamental premise for social and economic development in high-income countries (HICs), with innovation as the key rubric for linking research, society and industry in mutually interactive ways.
- (2) A vast amount of information, statistics and trend analyses is available on higher education, research and innovation systems in HICs, for example, through OECD projects in higher education as well as others relating to economic development, social change, etc. This is a store of knowledge that is, in itself, a valuable policy tool and resource for planning, co-operation, benchmarking and monitoring. Little or no such information exists for LICs and even for MICs, with negative consequences in those regions for the research and training work of the academic and research community as well as for informed policy-making and planning at institutional and system levels.
- (3) The Forum was to be an ‘Arena for Researchers’ to share information on higher education, research and knowledge issues. Developments and trends in higher education and research systems across the world would be highlighted from research which was already underway or had been especially commissioned for the Forum. With a special focus on LICs and MICs, the Forum would seek to increase the global knowledge base about existing as well as emerging systems of higher education, research and innovation. Through this exercise, it hoped to identify strategies to help strengthen local knowledge and research systems, institutions and professional capacities. In such a process, the facilitation of the necessary policy interventions at national, regional and international levels was also anticipated. The focus on strengthening systems was seen as a more effective route to the building of sustainable national capacity, taking the task beyond a narrow focus on selected individuals and institutions or on strengthening capacity in particular disciplinary or thematic areas.
- (4) The Forum would proceed on a different ideological and strategic premise from, for example, the World Bank regarding the role and importance of higher education to social and economic development, especially in developing countries. The Forum emphasized the importance of contextualization in the shaping of local, national and regional research and knowledge systems and products, especially in applying global knowledge resources; and it sought to facilitate the collection of R&D information and the development of indicators and assessment systems within parameters that are adapted from but not reducible to OECD templates.
- (5) The Forum was clear about the scope and limits of its mandate and work. It wanted to develop a global picture of higher education and research systems with a special focus on but not confined to the developing world. The Forum was not set up to be yet another funder of disciplinary or thematic research but rather to be a catalyst for stimulating and bringing



to the surface research on higher education and research systems, and to draw on and connect to existing research initiatives, organizations and networks. In the case of significant gaps, it could commission research.

- (6) The Forum targeted researchers as well as policy-makers and policy analysts, and premised itself on notions of “evidence-based” policy. As such, it was more than a research exercise to advance the pursuit of knowledge for the sake of deepening theoretical and empirical understandings: it was quite explicitly a policy-enabling exercise, in a way similar to OECD research on knowledge systems in HICs, and intended to assist policy and planning at national, regional and international levels. The intention was to assist the further development of higher education and research systems in LICs and MICs which, in turn, could help to optimize their contribution to social and economic development in their countries and regions.

The Forum functioned at different geographical and operational levels, with oversight structures and intellectual activities arranged internationally as well as in all the world’s regions. Through this arrangement, it succeeded in drawing into its orbit a greater number and range of research and policy activities and participants, gave more autonomy to regional structures, and allowed for greater recognition of their research priorities than if confined to the international level alone. It opened up new spaces and opportunities for researchers and analysts to focus on and exchange information and insights about higher education and research systems, especially in the developing world. Among the participating researchers and policy-makers, it focused attention on the specifics of national and regional systems within a multi-region comparative framework, some little discussed before in a global context. It also stimulated debate about the constituent components and conditionalities of working and workable knowledge systems, and about the responsibilities and obligations of different role-players in this regard. The work and products of the Forum have increased our data and information base on formerly uncharted higher education and research systems, often establishing a baseline in some LICs and helping to make existing data more comprehensive and coherent. This was despite ongoing worries about the accuracy and completeness of information, the paucity and quality of analyses of the gathered information, and the possibly distorting influence of OECD-type templates.

Although concerns were expressed about representation at some of the international meetings (who present could speak on whose absent behalf), the Forum started to make visible more researchers from, and more research on, the developing world. This took the profile of researcher participation beyond the small number of “usual suspects” in the established UNESCO networks and case study focus areas, resulting in new and expanded networks. No doubt the Forum provided rich opportunities to initiate or strengthen co-operative research relationships across and within national and regional contexts, bringing great individual benefit to all involved but also giving effect to the task of building international co-operation in research on higher education and research systems. The Forum began, in a small way, to open up the possibilities for comparative research in higher education within a common framework that encompassed the HICs, MICs and LICs, beyond the usual apartheid line of OECD members and non-members. This was true despite the ever-present and recognized danger that the priorities, templates and understandings of relevance, quality and “good practice” of the HICs could well dominate systems thinking in very different contextual settings in the LICs and MICs (see Chapter 4, Teichler and Yağcı in this volume).

The levels of analytical rigour and depth as well as interpretive capacity in respect of the gathered data and information were hugely uneven, as was to be expected in an initiative that had such a vast regional and national spread and involved researchers with such diverse levels of expertise and capacity. In relation to this issue, there were constant reminders that the task of gathering more reliable data and producing more sophisticated analyses was far from over; caution was often advised on drawing strong conclusions from some of the available data; and sharp questions were posed as to the analytical potential and explanatory or policy significance of the data. The attempt to build strong and sustainable links with existing research and policy organizations in the different world regions – to act as a catalyst for, build on, and draw on projects that were already underway – was less successful than intended. The links were often *ad hoc* and event-bound, sometimes because of co-ordination capacity challenges in the identified partner organizations.

A fuller accounting of the achievements, influences and shortcomings of the Forum, especially in relation to downstream impacts on the participating researchers and affected national knowledge systems and organizations, is possible only with more information and analysis than available at the moment. Any larger claims about the influence or impact of the Forum would require more substantial quantitative and qualitative research tracking. Even then, a great deal would remain unknown and unknowable, given the multiple and multi-level individual and organizational dynamics of the project. The longer-term influence on policies and approaches within UNESCO itself (such as the formation of an inter-sectoral platform) and within other international organizations, including the OECD (revision of existing templates for gathering and analyzing data and information from LICs and MICs) remains to be seen.

Underpinning the Forum was a mix of political, policy and research interests linked to a diverse variety of international, regional, national and institutional settings. The Forum re-iterated the current policy valorisation of “knowledge” and “innovation” in the relationship between higher education (especially its research function) and social and economic change, as evident in the macro-policy frameworks of the OECD, UNESCO, the EU, the World Bank, etc. However, despite its strong policy intent, an account of the Forum cannot be a simple policy narrative since it was simultaneously a project involving a political and normative agenda, a particular ideological framework (not always sufficiently interrogated), and a variety of both similar and contending intellectual perspectives and aspirations. This meant that the politics of knowledge, (for example, in relation to differential power balances across and within countries and regions, or between “knowledge experts” and other societal stakeholders) was never too far below the surface of its objectives and activities.

Given its global scope and ambition, the involvement of a cast of hundreds of national and international role-players, and the absence of a formal evaluation, the gap in the Forum between intent and reality helps to provide a view of what the Forum turned out to be in its achievements and shortcomings, both of which point to new possibilities. In this particular case, the Forum’s planning was complicated by the need to accommodate diverse concerns that cohere only in part: the intellectual concerns of researchers; policy considerations in respect of national knowledge systems and international organizations; the objectives of the funder; and organizational commitments and cultures in the form of UNESCO’s political mandates as well as its internal bureaucratic and jurisdictional peculiarities.

As expected in projects of this kind, and with all the serendipity and unpredictability associated with the private and organizational ambitions of a large multi-national group of researchers and policy-makers, the Forum gave expression to more than it expected, failed to achieve some

of what it intended, and helped to surface important research and policy gaps still to be addressed. Its most important contribution was to create a global platform for cross-cutting policy reflection and research initiatives on the relationship between knowledge systems and social development, especially in LICs and MICs. Despite its shortcomings, it provided a global “Arena for Debate”, an enabling resourcing and logistical umbrella, and multiple opportunities to strengthen important processes of knowledge-sharing across different boundaries, for example, between HICs on the one hand and LICs and MICs on the other, and across national and regional priorities, and disciplinary and thematic research concerns, in a process which was found valuable by many participants. It was a critical beginning in addressing a dearth of information and analyses on knowledge and research systems in the vast geo-political area of LICs and MICs, but within a framework that allowed for an integrated approach, international research co-operation, and comparative research across all countries and world regions.

## 2. The Forum: Lineages, Ambitions and Realities

The UNESCO Forum on Higher Education, Research and Knowledge did not represent itself as originating in a policy *tabula rasa*, but as rooted in global historical events with very specific objectives and commitments. As is often stated in the official documentation and emphasized again in this volume, the Forum traces its historical foundations and policy roots to the World Conference on Higher Education held in Paris in 1998 and the World Conference on Science held in Budapest in 1999. These two world conferences which took place on the eve of the twenty-first century both invoked the language of a new “social contract”. They highlighted the need to think anew in an era of globalization the connection between higher education, science and society, and signalled their belief in the determining role of knowledge in social and economic development and the concomitant social responsibilities of higher education as central to this reflection. As a follow-up initiative to the two world conferences and seeking to give more concrete and practical effect to the grand normative commitments and policy ideals of these global events, the Forum evolved its own objectives, understandings, priorities and work modalities in relation to the knowledge-society-development nexus. The presumption of a “social contract” between knowledge systems and society, especially in relation to the developmental role of higher education, underpins the work of the Forum and provides the continuity with the vision of the two world conferences.

In addition to the stated connection to the ambitious vision of the two conferences, there is an ideological lineage that is worth tracing in the Forum’s work. This is a set of conceptual and political connections to a post-Second World War history of development discourses and their policy manifestations, echoes of which are implicit in the Forum’s founding premises but rarely engaged with in a reflexive way. These are strands from much older philosophical debates about modernity, and related political and policy struggles around what constitutes the drivers, modalities and indicators of social development and human progress. These debates include, for example, hypotheses about “modernization” as the route to social progress for “traditional” societies (going back to the Enlightenment, but in heightened form in the post-Second World War reconstruction); critical perspectives from dependency theory about the negative repercussions of development for “peripheral” countries which are integrated into global systems on the terms of powerful countries in the “centre” (challenging modernization theory in Latin America and elsewhere in the 1960s and 1970s); and reflections on the socially responsive role of “development”

universities, e.g. in post-independence Africa (Rostow, 1960; Cowen and Shenton, 1996; Leys, 1996; Ake, 1996; CODESRIA Bulletin, Nos. 3-4, 2005).

The global crisis caused by oil price increases in the 1970s, which paved the way for the ascendancy of market ideologies, marked another phase in the history of development discourses, bringing different emphases and indicators to the meanings and modalities of human development. These reshaped the discourse in a way that made the fundamentals of economic growth almost synonymous with social development, leaving the broader political, normative and cultural dimensions of development to being more symbolic than substantial. Hence, the market “solution” is advocated in the 1980s and 1990s as much for social development in the LICs as for global economic competitiveness in the HICs. In that continuing history, the advent of the Information and Communications Technology (ICT) revolution and changes in the nature of post-industrial societies (Bell, 1973; Mansell and When, 1998; UNCTAD, 2008) in the last two decades of the last century have brought the issue of knowledge and its social and economic benefits firmly into the orbit of twentieth century development discourses. Such discourses have been used to represent (as well as contest) the engine of social change and human progress, as well as to reconfigure the link between the fate of LICs/MICs and the powerful interests of HICs. The knowledge society/knowledge economy and innovation discourse has become the dominant contemporary political and economic formula for hypothesizing the causes and conditions of social and economic development and human progress, not only in OECD member countries but in the developing world as well. Higher education institutions and public research institutes are, together with other private sector knowledge-producing enterprises, now routinely represented as constituent parts of “national systems of innovation” whose defining mandate is the advancement of economic growth and the competitive positioning of national economies within regional and global economies (OECD, 1997; Edquist, 1997; Patel and Pavitt, 1994).

The knowledge society framework was accepted in broad terms by the Forum as the conceptual platform on which to stimulate research and debate and to support knowledge and research systems for the purposes of social and economic development in LICs and MICs. However, the knowledge society and innovation discourse has also become part of the macro-economic policy thinking and policy-making of the Bretton Woods institutions (World Bank, 2002; 2008), gaining immense power and global influence through, for example, the World Bank’s support of development projects in the form of loans and technical assistance and through its research and policy advice. The strong connection to economic competitiveness is also clear in the European Union’s Lisbon Agenda which uses the innovation and knowledge economy discourse in its policy platform for maximizing the economic power and competitiveness of the EU (European Council, Lisbon, March, 2000). The Forum signalled its difference from the earlier “rate-of-return” position of the World Bank on the role and value of universities in developing countries, but did not engage further on possible key differences in approach to the commonly held knowledge society platform for development. In speaking of “knowledge-based development”, the Forum invoked the requirements of sustainable development and stressed the importance of links with society as well as industry (see Chapter 2, Olsson and Mkandawire in this volume). Nevertheless, a theoretically and politically substantial alternative position on the “broader social, ethical and political dimensions” of knowledge-based societies (UNESCO, 2005) did not emerge under the umbrella of its work. Thus, the Forum remained ambivalently within a knowledge society discourse which has become generalized across different ideological perspectives regarding the constituent ingredients for development success.

The discussion papers and publications from the first Global Seminar in 2004 (Neave 2006; Sörlin and Vessuri, 2007) sought to engage critically with issues of knowledge, power and politics embedded in the knowledge society discourse and the overlaps and differences between the notions of the “Knowledge Society” and the “Knowledge Economy”. However, as the Forum evolved, it appeared to take a more “technocratic turn”, in focusing on the pragmatic task of mapping existing or evolving knowledge and research systems in general and with a special focus on research on knowledge systems in the areas of agriculture and health. In this specification of focus, which was itself a valuable, practical step forward, there remained a gap in the historical and conceptual analysis of the knowledge society platform as the basis for social development. Some key considerations in relation to the knowledge-social development nexus remained unaddressed. What lessons could be carried forward from the earlier history of development discourses and their practical applications and consequences in LICs and MICs? If knowledge is central to development, what range of knowledge types and fields is required in order to shape a conception of development in a knowledge society that addresses political and economic imbalances, unequal social relationships, and diverse ethical and cultural norms in addition to economic growth and competitive productivity? To be able to address these questions, did the knowledge society discourse itself have to be recast in somewhat different theoretical and political terms in order for it to be apposite to the current development needs of LICs and MICs?

In the Forum debates, there were perspectives ranging from an optimistic view similar to earlier modernization beliefs that one first needed to get onto the knowledge society “ladder” to be able to move forward and upward (see Suwanwela as cited in Chapter 3, Meek and Davies, in this volume), to other more cautious, even pessimistic positions that were sceptical of the “catch-up” premise in the knowledge society discourse. The latter view evinced concerns that the political interests, competitive positioning and resourcing power of the HICs would widen rather than narrow the gap between rich and poor countries (see Chapter 4, *ibid.*). In addition to this worry, concerns were also expressed about the weight of the market in higher education and the associated negative impact of “hegemonic models and dominant international guidelines” on ideas about research performance, the productivity of higher education, and the social responsibilities of the university (see Ordorika, 2006, as cited in Chapter 3, *ibid.*). These caution-filled views reflect concerns about the sometimes overly smooth and unqualified relationship between knowledge systems and social and economic development as emerged in some Forum thinking, and the potential risk of entrenching globally formulaic, perhaps inappropriate, understandings of knowledge and innovation in new and emerging knowledge systems.

The necessity to contextualize systems thinking, policy frameworks and knowledge-based strategies, and a concern about the use and usefulness of standard OECD data collection templates in LICs and MICs, was often highlighted in the formal Forum position as well as by many participants in the discussions. LICs and MICs were urged to use “knowledge for development” in an appropriately contextualized fashion, especially the adaptation of new technologies to position themselves better in a global knowledge regime (see Chapter 2, *ibid.*). At the level of vision and value, this is an almost self-evident proposition. On the ground however, it is the very capacity to contextualize and develop targeted strategies that is a decisive missing factor in many countries of the developing world. A UNRISD analysis of how poor countries deal with poverty issues holds powerful resonance for the Forum’s concern about capacity in developing countries, and provides a persuasive explanation as to why a universalized knowledge society discourse is easily invoked in and for developing countries. Poor countries are inclined towards “universalistic

policies” when addressing poverty issues because “... targeting was simply too demanding in terms of available skills and administrative capacity” (Mkandawire, 2005 and 2006).

In any case, the Forum recognition of the priority of contextual determinants (reminiscent of the recognition of “diversity” of societal forms within earlier modernization debates) did not lead to a sustained engagement with the possibility that the knowledge society discourse itself could house different, possibly contending, paradigmatic conceptions about human development and social progress. Hence, a sufficiently distinctive new theoretical or policy perspective did not emerge that could have been used for an appropriate revision of an organizing concept for development that was itself contextually rooted in HICs but had assumed the status of a global model. While the Forum was not as unsophisticated as to postulate the HICs as models or templates for emulation, a fuzzy assumption did prevail that the current social and economic successes of high-income countries were due to effective knowledge systems and their ability to position themselves strongly in a globally competitive environment, and that LICs and MICs could achieve similar benefits and advantages through investing in strong knowledge systems. This obscured the role of other historical, political and economic factors in securing and maintaining the power of HICs.

In sum, the Forum’s invocation of a “knowledge for development” strategy, embedded as it was in a largely un-interrogated knowledge society/innovation discourse, gives it an ambivalent place in a tradition of optimistic development discourses going back to the early modernization debates. Such discourses often espouse rational-instrumental choices for LICs and MICs to make about development goals and trajectories; manifest a faith in development progress depending on the “right” policy and investment choices being made; maintain a silence about the myriad asymmetries of power between HICs and LICs and the causes thereof; and assume that knowledge-based development in the current conjuncture is sufficient to dislodge such asymmetries.

### **3. Research and Policy: Looking Forward**

If an *overview* of the work and achievements of the Forum yields only a grainy, perhaps fading snapshot whose main features are interpreted differently by different viewers, a *forward look* to an evolving research, policy and political agenda is no easy task either. This is not because of a shortage of issues but because of the challenge of identifying strategic priorities among the large number of concerns that surfaced in the Forum while maintaining an appropriate systems focus.

There are a number of unresolved and ongoing debates that have come up and that could benefit from continuing research and policy attention. The tasks in this regard range from:

- Conceptual interrogation and clarification.
- Theory-building.
- Improved data collection and analysis.
- Strengthening links between research and policy-making, and
- Undertaking more internationally cooperative and comparative research.

The author of this chapter has focused on only a few of these, divided into two categories. The first addresses the dimensions of knowledge systems, trends within them, and strategies for increasing their coherence and effectiveness. These kinds of issues are addressed more fully in the analyses of Teichler and Yağcı; Meek and Davies (see Chapters 3 and 4 *ibid.*). The second deals with framing issues that shape our understandings and expectations of knowledge societies, and our conceptions about the relationships between knowledge systems and social development. It

should be clear that the issues raised in the two categories have implications for each other across this analytical demarcation.

### 3.1. Dimensions of Systems

Not surprisingly, many of the papers and discussions in the Forum reflect similar ongoing struggles in all world regions over the appropriate strategic choices and balances to be struck within knowledge systems. Such systems all have to engage with increasing accountability demands, competing priorities, and inadequate, often shrinking resources. The system contours reflect many different kinds of trade-offs, e.g. between basic and applied research, between additional support for innovation-friendly disciplines and fields and diminishing attention to less commercial fields of study and research, between general formal education and vocational training, between industry links and those with other societal stakeholders, between the advancement of public goods and private goals, between local knowledge (including but not synonymous with indigenous knowledge) and global knowledge, between locally contextualized evaluation systems (which may be relevant but too inward-looking) and international systems such as university rankings (which may advance global competitiveness but distort local development priorities), and so on. Such trade-offs and contestations challenge higher education and research systems in HICs, but take on added layers of complexity in LIC and MIC contexts because of more acute policy, resourcing, infrastructure and capacity constraints and different social development needs and priorities.

Some research and policy tasks are quite concrete and easily identifiable from the Forum's special interests or from frequently identified concerns in the discussions and publications. So, for example, the project on the mapping of research systems made visible emerging knowledge and research systems in fifty-two countries, many of which had not featured in systematic studies of science systems before (This project is outlined in Chapter 5, by Mouton and Waast in this volume). This project initiated an invaluable process of building up and systematizing knowledge system profiles of LICs and MICs, albeit within the limits identified by the project leaders. However, already in the first phase, it was clear that, for the collected information to be optimally useful as a research and policy planning tool, it would be necessary to fill in the data gaps, improve the data quality, develop more contextually relevant templates and indicators, and produce more sophisticated and in-depth analyses of available data. Down the line, the development of appropriate comparative research frameworks and reference points, and the production of more comparative research across and within national and regional systems, is also crucial for the project to approximate to current OECD-type profiles for HIC knowledge systems. Analysis of the trends and gaps revealed by the data begin to point to the complexities and contradictions at work in developing and sustaining research systems (see Chapter 5, *ibid.*), but also to the largely unaddressed but critical task of looking beyond the data, to the correlation of emerging knowledge systems with broad-based development strategies.

As more data is gathered and the data profiles are improved, there still remain a number of next-level research tasks. These include, for example, the construction of "ethnographies" of knowledge systems in LICs and MICs. Such accounts could provide deeper analyses of various interactive sub-systems and processes within knowledge systems, and indicate how effectively tensions surrounding national needs, government priority-setting, choices of research themes, international competitive pressures, the priorities of external funders, etc., are being negotiated and resolved, and what the developmental effects are on those societies (Stewart, 1995). The need

to develop revised templates and indicators to collect and analyse systems data and to evaluate development progress in LICs and MICs was highlighted strongly (see Chapter 5, *ibid.*) in this report and supported by many participants. Participants felt that it was necessary to take into account but also to go beyond the templates and indicators in the OECD's Frascati and Oslo Manuals (see Chapter 2, *ibid.* and Chapter 6 by Ellis et al.). Such rethinking and revision should clearly be a matter for primary attention and follow-up within UNESCO and other relevant structures. However, in taking this work forward, the reference points for data collection and analysis might be enriched by a broader understanding of what knowledge counts for development, and what range of innovations are needed for more contextualized development strategies.

Other research issues which were raised in relation to the task of increasing the capacity of knowledge systems in LICs and MICs include an improvement in mobility and "brain drain" statistics and analyses as well as the development of more appropriate policy interventions, to ensure that the benefits of mobility are better distributed across receiving and sending countries. The growing for-profit privatization of higher education in the developing world, especially the phenomenon of cross-border provision (Knight, 2006) and the privatization of key aspects of public higher education institutions as, for example, at Makerere University in Uganda (Mamdani, 2008) are also worth exploring, in order to understand their impact on research and training within emerging knowledge systems. A deeper exploration of the ways in which cross-border and/or local private provision are addressing the different dimensions of increased access, acceptable quality and the advancement of public and private interests is particularly important.

The related policy interventions at an international level and within national systems are also easy to identify. The research task of increasing the volume and quality of information and analyses of knowledge systems requires policy support in the form of enabling frameworks, adequate resources and capacity, a greater official commitment to using data for planning and monitoring, more opportunities for international collaboration, etc. These are crucial policy considerations for the sustainability of knowledge systems, but by no means new issues. The work of the Forum was a reminder of the continuing challenge of connecting the worlds of policy-makers and researchers in the interest of strengthening knowledge and research systems (Anderson and Biddle, 1991; Ginsburg and Gorostiaga, 2001).

In this volume a range of thematic areas are outlined that could serve as useful reference points for future research at global, regional and national levels, especially within a comparative framework (see Chapters 3 and 4, *ibid.*). The many ideas and concerns in the commissioned work, papers and publications provide a rich and diverse set of entry points for a future research agenda. The regional and national research activities are a particularly important source of ideas for follow-up research, since they reflect common challenges as well as distinctive concerns: they provide a good sense of the problems and challenges that are shared across geographical boundaries and historical contexts as is reflected in Chapters 3 and 4 (*ibid.*). The regional and national debates also provide a flavour of what is different in the challenges facing knowledge systems and their researchers in LIC and MIC countries and regions. These distinctive contextual dimensions could benefit from further analyses by researchers from LIC and MIC countries and regions, since they have the potential to yield a different set of interpretations as to what issues were significant for take-up within the Forum in its focus on strengthening knowledge systems. Differences and idiosyncracies in regional interpretations of the knowledge-development nexus and in approaches to research on knowledge systems could also constitute interesting material for comparative research.



Such research might also open up a vast world of information and analyses from more localized research networks, especially where conducted and published in languages other than the mainstream languages of scientific communication and publication. This was an issue that was flagged with strong feeling in some of the Forum discussions. It poses for the Forum a sharp question as to what knowledge claims are credible in constructing a “global” picture of knowledge systems in service of development, if one has not taken account of the work of professional and academic communities that are mostly invisible in global fora and international discussions. Knowledge professionals from such communities may, for example, undertake research but not publish in recognized national and international journals, work with and among highly localized communities, and work and publish in local languages. More generally, there are many political, epistemological and methodological questions which arise regarding the extent to which one can create a “global” account of knowledge and research systems on the basis of partial, possibly inaccurate or contested detail from national systems in vastly different socio-political and economic settings and arrangements in LICs, MICs and HICs, and in a world so differentiated along lines of political and economic power, cultural norms and beliefs, attitudes towards and capabilities for scientific research, etc.

The Forum, in its desire to facilitate the crafting of an inclusive picture of knowledge systems, invited participation and information provision from countries and systems in all world regions. Many LICs and MICs among the Forum country participants are in the process of constructing new higher education and research systems in environments that reflect a great variety of political and economic situations, cultural norms and value systems, and levels of intellectual freedom and participation opportunities. The Forum discussions addressed some of the framing conditions for the effective operation of knowledge systems, for example, issues of state policy capacity, the availability of financial and human resources, policy coherence in the governance of knowledge systems, etc. However, the wide variety of national settings for emerging knowledge systems raises a set of questions explored too briefly by the Forum. These have to do with the framing political and cultural conditions for the growth and expansion of knowledge and research. Are there minimum political and cultural conditions for knowledge societies irrespective of contextual settings, and do these approximate to models usually claimed as applicable in HICs?

From the eighteenth century European Enlightenment comes the strongly articulated view that rational discourse, a scientific approach to all human problems, independent and critical thought about morality, religion and government, individual human rights, and freedom from the restraining tutelage of authorities are part of a package that makes up modernity (in aspiration if not always in achievement). Secularism, democracy and rights discourses which stress freedom of expression, are often viewed as framing conditions, even pre-requisites, for the building of knowledge societies and science systems [Kant, in: Beck, 1963; UNESCO, 2005]. If the above values of the European Enlightenment are accepted as the constituent conditions for a robust practice of science and the pursuit of rationally defensible or empirically demonstrable knowledge, what are the implications of this for building knowledge and science systems in societies that do not have secular and democratic traditions akin to Enlightenment conceptions? It would be useful to explore what models of ‘social development’ are emerging which are linked to knowledge and science systems that are co-existent with religious belief systems and systems of political rule that are not formal or functional democracies. Mouton and Waast cite the case of Jordan and the phenomenon of self-censorship in research under the influence of religion and

politics (see Chapter 5, *ibid.*). Yet countries in the Islamic world have had strong traditions of scientific practice and impressive histories of scientific achievement, including in medieval Islam.

The disjuncture and continuities between past and currently evolving science systems, for example in Islamic countries, are themselves worthy of further exploration. This may help to throw more light on how certain cultural features of societal settings mediate the knowledge enterprise negatively or positively, and impact on the fullness of knowledge society aspirations. An ongoing research agenda in this area could be a valuable contribution to the debate about the impact of socio-cultural norms and values on emerging knowledge systems in LICs and MICs. This is also not a new debate and there is already a substantial literature on the relationship between tradition and science and the pursuit of alternative forms of modernity in, for example, India (Visvanathan, 1997).

The Forum paid a lot of attention to the human resource and capacity challenges facing the construction and strengthening of knowledge and research systems in LICs and MICs. Issues of student and professional mobility, “brain drain”, and the training of young researchers, Ph.D. students and supervisors were among the specific issues addressed as well as the larger question of expanding access to and participation in higher education and research systems. In respect of the latter, the issue of gender as a determinant of exclusion from the knowledge system was flagged, just as it has been in other UNESCO initiatives (UNESCO, 2005). This is indisputably an issue requiring further research and policy attention. However, the question of who participates in, utilizes, benefits from, and is excluded from national and global knowledge/science/research systems, especially in highly stratified and non-homogenous societies, is shaped by a large range of other exclusionary factors that include race, class, ethnicity, language, political affiliation, ideology, religious affiliation, location in the centre/periphery divide or the rural/urban divide, etc. In the face of such a range of possible exclusionary factors, the further mapping of evolving knowledge systems will need to pay greater attention to contextual histories of inclusion and exclusion, and adapt whatever indicators are in use in ways that address these relevant factors and their likely impacts on the development of systems. In such systems mapping, the identification of the policy interventions (if any) that seek to mitigate the effects of such exclusions will also provide useful insights into how system capacity constraints are being addressed.

The developmental potential and power of knowledge in the Baconian sense is a key premise of the Forum’s work but the more Machiavellian and Foucaultian dimensions of the knowledge-power nexus have not received sustained attention in the many debates. The pragmatic approach of the Forum, especially in the systems mapping exercise, sometimes created the impression of an untroubled, almost benign relationship between knowledge and development. The complex mediations of knowledge by unbalanced distributions of socio-political and economic power and inequitable access to resources and information at global and regional levels, as well as within national systems and sub-systems, could benefit from greater exploration. The technocratic approach associated with knowledge society/knowledge economy and innovation discourses has contributed to the creation of an environment of ostensibly “de-ideologized” policy discourses, terminologies and analytical frameworks – an environment within which the knowledge-power nexus has receded into the background.

In 1995 a UNESCO publication entitled “Science and Power” (Mayor and Forti, 1995) sought to address the inter-relationships between science, politics and democracy. It proceeded from an acknowledgement of the power and benefits of scientific knowledge but also its uneven distribution within and across countries, as well as cautioning against a romanticized view of science and its liberating potential. This is a perspective that is worthy of attention in any continuing

Forum activity. As much as knowledge has the potential to be deployed positively for the purposes of social development, knowledge systems can also be used to shore up illegitimate and disabling policies and social arrangements as well as to operate as sources of dissent and the basis of legitimate challenges to those in power. Exploring the complex relationships between knowledge and power at multiple levels (between HICs and LICs/MICs, between policy-makers and researchers, between scientists and other citizens, between different disciplinary domains as in the applied sciences and humanities, etc.) would bring firmly back into the picture many issues of power that have become obscured in a technocratic understanding of knowledge society/innovation discourses.

Also under-addressed in the Forum debates and warranting further research attention is the relationship between knowledge and ethics in emerging knowledge systems. This issue is not only about the development and strengthening of policies and guidelines for acceptable professional and ethical conduct in all research undertakings, but also about setting possible research boundaries. Questions about whether all knowledge is to be pursued wherever it might lead, and what the acceptable normative, cultural and sustainability limits are on the pursuit of scientific and technological knowledge, are important issues for ongoing debate and future policy development for knowledge systems in LICs and MICs. In many policy and research systems in HICs, there are already boundaries established, for example, in relation to genetics research on human cloning. What contextual imperatives (including socio-cultural value orientations) are likely to translate into research boundaries within new and emerging knowledge systems in LICs and MICs, and what will be the implications of this boundary-setting for social and economic development in those contexts?

### 3.2. Framing Issues

A central Forum premise was that knowledge societies with strong and responsive higher education and research systems are key to social and economic development in LICs and MICs. This premise turned out to be less straightforward than imagined, containing as it did a number of unspecific terminologies, conceptual ambiguities and theoretical silences. Like many globally structured projects with a range of political and research agendas, the Forum's work and concerns evolved over time (see Chapter 2, *ibid.*). The spotlight on higher education systems expanded to include a focus on research systems and science policy issues. This brought more explicitly to the forefront the notion of "innovation" and the connection to industry and technological development. Given the centrality of the key notions of "knowledge system", "science system", "research system", and "innovation" to the goals of the Forum, the meanings, differences and overlaps between and among them could benefit from a more rigorous analysis, both at the level of the global project but also within regional and national arrangements. A national knowledge system, for example, could include the formal higher education system but also other formal and informal knowledge-generation and application settings (research councils or research NGOs). The science system could include all institutions and organizations that generate and deploy scientific knowledge (industrial firms as much as higher education institutions). The representation of innovation's critical link to economic growth has a very specific technology and industry overlay but the literature on innovation already points to the search for a broader reading that would include the social dimensions of innovation.

The generality and lack of specificity of key terms allowed for a variety of interpretations and focus points in the work of the Forum, especially in contexts where emerging systems had a

wide, often uncategorized variety of system architectures, overlapping governance jurisdictions and unclear research arrangements. This brought useful first-level information, data and snapshots of higher education systems, science and research systems and other related structures and arrangements into the growing information “pool” of the Forum. However, any future Forum research will require greater attention to the specifics of system architecture and the interaction of sub-systems within it. The facilitation of capacity development, for example, will need to be more specific about which systems and sub-systems are being targeted for attention. System design and governance issues, policy coherence and priority-setting across different sub-systems (higher education institutions, science, technology and research structures) may all need different kinds of developmental support, depending on contextual priorities. The continuing struggle to contextualize knowledge systems and make them more developmentally responsive in LICs and MICs would also require more wide-ranging and creative interpretations of the notion of innovation, including studies which go beyond the understandings of the “social dimensions of innovation” as largely referring to the social factors surrounding technology diffusion.

A second challenge arises from the grounding of the Forum’s work in the knowledge society discourse, without sufficient indication of whether this carried additional or alternative dimensions to the current dominant understandings across different ideological perspectives and policy frameworks. The Forum, as is clear, was seeking to respond to the acute shortage of data, weak infrastructure and limited capacity in the higher education and research systems of many LICs and MICs. In its pragmatic focus, the task of theorizing the frameworks for understanding systems and their political and normative underpinnings was much less addressed. The conceptual and theoretical gap in its advocacy of the knowledge society/innovation discourse as the premise for linking knowledge systems and social development did not allow for much critical reflection, particularly on the fact that the knowledge society “solution” is the latest staging post in a series of explanatory theories about social progress in the history of development discourses. This is a history of which many LICs and MICs have had direct experience, and from which lessons from the past may be useful for new development interventions based on knowledge.

It is clear that gathering and analyzing data about knowledge systems is challenging enough in its technical dimensions, and that adding a reflective “sociology of knowledge” dimension to the task of systems-mapping would exacerbate existing capacity problems. Nevertheless, the commitment to knowledge contextualization in the Forum, and the strong recognition of the need to make a proper study of the infrastructure, resources, data sources, trends and gaps in very specific national contexts and settings, could be given greater substance through some attention to the historical and political settings within which knowledge systems have to respond to social development priorities. This in turn might have the benefit of allowing for a more critical engagement with knowledge society notions and their applicability as explanatory constructs and development formulas. The multi-dimensionality of such analyses would be better secured by research teams whose skills span different disciplinary fields. Future attention to this dimension in the continuing mapping and analysis of knowledge systems could focus on the development of a more reflective frame to extend information-gathering into a critical engagement with notions that have become foundational for social and economic development in LICs and MICs. This may furnish a richer picture of locally evolving, knowledge-based societal forms and a less abstract account of the nature of their ostensible development benefits for local populations.

Knowledge society terminologies, premises and approaches and their implications for higher education institutions and research systems have become a ubiquitous part of current policy and research frameworks for establishing a tighter relationship between higher education and

society, especially the economy (Stehr, 1994; Castells, 1995; World Bank, 2002; UNESCO, 2005). For all the emphasis on taking seriously the diversity of contextual settings, knowledge society and innovation discourses are rehearsed with great similarity in the policy positions of governments, scientific organizations, development and funding agencies, higher education institutions themselves, and in the premises of many research analyses across the world. Yet their content and implications for system-building and their transferability into realistic strategic choices and actions in different national settings, especially in LICs and MICs, vary greatly and are not self-evident or uncontested even in HICs (Brennan, et al. 2008). Remoe for example points to the links in OECD member countries between R&D policy, industrial policy and innovation policy, as well as tensions between an unrestricted economic growth agenda and a commitment to sustainable development. "Innovation policy typically obeys an economic growth imperative. There are no system limitations to the innovation-driven economy. ... environmental policy ... or its modern version, sustainable development policy, contains imperatives linked to system limitations, such as the carrying capacity of the globe's ecosystems" (Remoe, 2005). Such qualifications and critiques are important cautionary signals in a reflective engagement with the main lines of current development policy "commonsense" and the nature of its applicability within LICs and MICs.

In the light of the above, a central task for any future research agenda is the construction of a sturdier bridge between notions of "knowledge society and innovation" and the goal of "sustainable development" in LICs and MICs. Such a connection would have to go beyond normative proclamations towards a more concrete political and policy platform. On such a platform, the notion of "knowledge" as a development lever could be appropriately expanded in its societal applicability, and a basis established for a closer correlation between the benefits of a knowledge economy and technological innovation and the broad-based achievement of human development in its political, socio-cultural, ethical and environmental dimensions. This presumes that, important as this task is, putting institutional and systemic architectures and capacities into place for knowledge production and utilization is a necessary but not sufficient condition for a "thick" conception of human development to be given effect. Such a task requires political, theoretical, empirical and policy attention by researchers and policy-makers alike, and could provide a powerful foundation for the Forum's knowledge-based approach to development. The problem mentioned earlier of capacity to undertake this kind of task, especially in LICs and MICs, is no less serious than that relating to data collection and trend analysis. In going forward, both kinds of capacity will need attention in order to give effect to "development as critical understanding" in contrast to "development as administration" (Van Ufford and Giri, 2003). Such work requires the combined expertise and experience of researchers across all the world's regions, including those from HICs.

For the Forum, unfinished business includes creating spaces and opportunities for clearer terminologies, more rigorously interrogated discursive frameworks, and stronger theorization and hypothesis-building to support the construction of clear pathways between knowledge systems and development objectives. The unfinished business of the Forum need not require a totally "new beginning", as many development paradigms have sought in the "marketplace of development" (Van Ufford and Giri, 2003: 15). Just as it tried to be a catalyst for research on knowledge systems, the Forum could play a role in bringing together strands of research and policy developments which are already underway on modified or alternative theorizations of the knowledge-society-development nexus: activities and reflections that are premised on the search for a better balance between social, cultural and economic dimensions in knowledge society/innovation dis-

courses and which are addressing more directly the politics of knowledge within development challenges. There are already examples of such work and approaches within UNESCO (UNESCO, 2005), within the UN system (UNRISD, and UNCTAD) and beyond (GLOBELICS, CODESRIA, and CLACSO).

The Forum's work could also usefully be informed by other current projects that are researching the futures of higher education (European Science Foundation Project, 2008). Some of the above projects are concentrated specifically on the developing world; others are looking primarily at European or OECD higher education and research systems. The findings and recommendations from research and policy projects on higher education and research systems in HICs are often influential as "cutting-edge thinking" or "good practice" in LIC and MIC contexts, again highlighting the need for a critical interrogation of such perspectives for their applicability to other socio-political, economic and cultural settings.

#### 4. CONCLUSION

The quest for a critical engagement with the knowledge society and innovation discourse as the platform for a project on knowledge systems and social development is not to deny the role and significance of knowledge in contemporary development agendas, especially for LICs and MICs; nor is it to dismiss innovation as an organizing principle for progress. It is rather to explore new policy and research possibilities in a re-theorization of notions like "knowledge society" and "innovation" as *part of* their contextualization within social development agendas for higher education and research systems. The current global financial crisis and the discrediting of market fundamentalism in ensuring unlimited economic growth and social well-being may well be a partial Schumpeterian correction of excesses within the market itself, and hence limited in its exploration of substantial alternatives. However, the conjuncture does open up the conceptual and political space for disaggregating a development "black box" (common to UNESCO as much as to the OECD and the World Bank) that contains a suite of concepts and ideas including knowledge societies, knowledge-based development, development through economic growth, progress through innovation, sustainable development, etc. This would make it possible to separate out their range of meanings, and understand better the affinities and tensions among them as well as the weight and trumping power of the different constituent elements. Global initiatives such as the Forum can create the opportunities to rethink and re-theorize currently accepted organizing principles for social development, and help set new discursive and policy directions for it. Can the Forum, working strategically with some of the above-mentioned organizations and initiatives, facilitate the emergence of a new knowledge society and innovation discourse that pushes the boundaries of the current "commonsense" conceptions and allows for a more creative look at knowledge systems and their development roles and responsibilities, especially in LICs and MICs?

In closing the loop a decade later with the upcoming World Conferences on Higher Education and Science planned for this year:

- What can the Forum report on the health of the "social contract" in relation to the knowledge-society-development nexus?
- What are the most powerful and compelling research and policy insights on knowledge and social development that the Forum could take to the World Conferences, with a view to orienting their deliberations?

The data profiles and analyses of emerging knowledge systems in LICs and MICs constitute a vital early building block, but one which remains limited in its ability to speak politically and normatively to the demand for a qualitative status report on the new social contract between knowledge and society. A re-commitment to a formulaic “knowledge for development” strategy will not suffice either. Attention to lists of research gaps that emerged in the work of the Forum, some of which have been outlined in this paper, is likely to be valuable but does not necessarily constitute a basis for a different theorization of knowledge and development, and a different practice that is better suited to the needs of LICs and MICs.

A choice for a critical re-engagement with past and current development discourses and practices, and a theoretical and empirical exploration of what counts as development within a knowledge society as well as of what knowledge counts for development, looks like a retreat into academicism. It may, however, be the most grounded and future-oriented option, within a conjuncture where a number of policy certainties and their accompanying development prescriptions have become decidedly shaky in the face of current global social and financial crises.

## Note

- 1 Much of the summary of this chapter reflects the positions outlined in official documents and publications of the Forum, but it also includes some interpretations by this author. The “Forum” is an abstraction and a movable feast, which stands at different times for officially documented goals and approaches, the views of Forum decision-makers and officials, and frequently or strongly expressed views and concerns of the researchers involved as well as other participants with organizational policy interests. The analysis of the Forum presented in this chapter reflects the author’s point of view, unaccompanied by any claim about its explanatory or evaluative definitiveness.

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Thandika Mkandawire is the Director of UNRISD. He is an economist specialized in the promotion of comparative research on development issues. He studied economics at Ohio State University and the University of Stockholm and has taught at the Universities of Stockholm and Zimbabwe. He holds a Doctorate in Letters from Rhodes University. From 1986 through 1996, he was Executive Secretary of the Council for the Development of Social Science Research in Africa (CODESRIA) based in Dakar, Senegal. Prior to taking up his appointment with UNRISD, he was Senior Research Fellow at the Centre for Development Research in Copenhagen. He has published broadly on the social sciences in Africa and on problems of policy-making, adjustment and democratization.

**Johann Mouton**

Johann Mouton is Director of the Centre for Research on Science and Technology and professor in the Department of Sociology and Social Anthropology at the University of Stellenbosch. He received his Doctorate in Philosophy at the Rand Afrikaans University in 1983. He is the author of 7 books on research methodology including *Understanding social research* (1996), *The Practice of Social Research* (2002, with E. Babbie) and *How to Succeed in your Masters and Doctoral Studies* (2001). He is Programme Director for the Masters and Doctoral programmes in Social Science Methods, the Masters and Doctoral programmes in Science and Technology Studies and for the Postgraduate diploma in Monitoring and Evaluation Methods at Stellenbosch University. He is on the editorial board of five international journals including the *International Journal of Research Methodology*, *Science*

and Public Policy and Minerva. He has published more than 40 articles in peer reviewed journals, written more than 40 research and evaluation reports and given more than 100 papers at national and international conferences. He has received two prizes from the Academy for Science and Arts in South Africa including one for his contribution to interdisciplinarity in the social sciences in South Africa. His main research interests are science policy, higher education knowledge production, philosophy and methodology of social research and monitoring and evaluation studies.

### **Berit M. Olsson**

Until 2008, Berit Olsson was the Director of the Department for Research Cooperation, SAREC, at the Swedish International Development Cooperation Agency (Sida). She was responsible for formulating the Sida policy for university support in the early 90s and directs the current orientation of bilateral support in line with national strategies for research. Before joining SAREC, she taught Endodontics at Lund University and was a visiting professor at the University of Connecticut. She wrote her Ph.D. on Oral Health in Ethiopia and has carried out research in Mozambique and Sudan.

### **Rohan Pathirage**

Rohan Pathirage is an Assistant Programme Specialist in Science and Technology (S&T) at the UNESCO Institute for Statistics (UIS), Montreal. He has been working at the UIS since the beginning of 2005 and is responsible for coordinating the Global S&T Survey at the UIS. His area of expertise is related to measuring S&T statistics. Before joining the UIS he had more than five years of service as a Scientific Officer at the National Science Foundation of Sri Lanka. He holds a Masters in Applied Statistics.

### **Ernesto Fernández Polcuch**

Ernesto Fernández Polcuch is a specialist in Science, Technology and Innovation Policy, with a M.Sc. in Science, Technology and Society from the National University of Quilmes, Argentina. He currently works as a Programme Specialist for Natural Sciences at the UNESCO Windhoek Cluster Office. As leader of the Science and Technology Statistics team at the UNESCO Institute for Statistics, Montréal, from 2002 to 2008, he has been responsible for producing world-wide S&T statistics, developing methodologies for S&T&I data collection in developing countries, and producing various analytical reports on issues such as Women in Science. Until 2002 he worked with RICYT, the Ibero American Network on Science and Technology Indicators, since its establishment in 1995, as Technical Secretary and later R&D co-ordinator. He has published numerous papers related to S&T&I statistics, S&T&I policy, and Higher Education policy.

### **Mala Singh**

Mala Singh is Professor of International Higher Education Policy in the Centre for Higher Education Research and Information at the Open University in the UK. She was the founding Executive Director of the Higher Education Quality Committee which manages the quality assurance responsibility of the Council on Higher Education (CHE) in South Africa. She has a doctorate in Philosophy and was formerly professor and head of the Department of Philosophy at the University of Durban-Westville. She has published in the fields of philosophy, higher education and quality assurance. She has been a Visiting Fellow in the Southern African Research Programme at Yale University and a Fulbright Scholar at the New School for Social Research in New York. She is a member of the European Register Committee, the Advisory Committee of the Association of African Universities' project on quality assurance, and the University Quality Assurance International Board in Dubai. She serves

on the editorial boards of Higher Education Policy and the Journal of Higher Education in Africa. She is a member of the Academy of Science of South Africa.

### **Ulrich Teichler**

Ulrich Teichler is a Professor and the immediate past Director of the International Centre for Higher Education Research (INCHER-Kassel) University of Kassel in Germany. He was a chairman of the Consortium of Higher Education Researchers (1988-89, 1992-98) and President of EAIR (1997-2001). His expert and consultancy activities include those for UNESCO, OECD, World Bank, Council of Europe, European Commission, and national governments as well as various international and national university organisations. He has been awarded the Research Prize of the Council on International Educational Exchange (1997), the Comenius-Preis of the UNESCO (1998), and the Doctor honoris causa of Turku University (2006). He published more than 1,000 academic publications notably in the following areas: higher education and the world of work, international comparison of higher education systems, and international cooperation and mobility in higher education.

### **Roland Waast**

Roland Waast graduated from the Ecole Polytechnique and the Sorbonne, Paris. He first practised research in Madagascar as a rural sociologist, then in Algeria (where he was a professor at the Institute for Statistics and Planning). He was head of a department of social sciences at ORSTOM (1981-1986). Since 20 years he has specialized in the social studies of science. He is emeritus senior researcher at the Research Institute for Development studies (IRD, France). He is also the founder of the international network ALFONSO, co-director of the review Science Technology and Society and an expert for the European Commission. His interests are particularly in the development of scientific communities, science indicators and evaluation methods. In 2000 he launched for the European Commission a “state of the sciences in Africa”. In 2002-2004 he organized the evaluation of the Moroccan Research System. Since then he participated in the European ESTIME project, assessing the scientific and technological capabilities in the South Mediterranean countries.

### **Yasemin Yağcı**

Yasemin Yağcı studied Political Science and Public Administration at the Middle East Technical University, Turkey. She continued her education at the University of Turku, Finland. She wrote her master's thesis on the transformation of the higher education system in Turkey since 1980s. In December 2007, she started her doctoral studies at the International Centre for Higher Education Research (INCHER-Kassel), University of Kassel, Germany. Her doctoral work is on the social dimension action line and the implementation of the Bologna Process in Germany, Finland and Turkey. Since the beginning of her doctoral studies, she has worked as a research assistant at INCHER-Kassel in different research projects, i.e. Bologna Beyond 2010, Re-Europeanisation of the Turkish Higher Education, Progress in Higher Education Reform across Europe – The Bologna Process.

PART III

ANNEXES I - V

# **Annex I**

## **UNESCO Forum on Higher Education, Research and Knowledge Publications List of the UNESCO Forum 2001-2009**

### **BOOKS**

#### **Systems of Higher Education, Research and Innovation: Changing Dynamics.**

UNESCO Forum Research Report, 2009.

V. Lynn Meek; Ulrich Teichler and Mary-Louise Kearney (eds.).

(INCHER publishing, Kassel University, Germany, 2009).

#### **Universities as Centres of Research and Knowledge Creation: An Endangered Species?**

Hebe Vessuri and Ulrich Teichler (eds.).

(Sense publishing, the Netherlands, 2008).

#### **Higher Education in the New Century.**

Philip Altbach and Patti McGill Peterson (eds.).

(Boston College/Sense publishing/UNESCO Forum 2007).

#### **Key Challenges to the Academic Profession.**

Maurice Kogan and Ulrich Teichler (eds.).

(INCHER, Kassel University/UNESCO Forum 2007).

#### **Knowledge Society versus Knowledge Economy: Knowledge, Power and Politics.**

Sverker Sorlin and Hebe Vessuri (eds.).

(Palgrave publishing, USA, 2007).

#### **Higher Education Research and Knowledge the Asia-Pacific Region.**

V. Lynn Meek and Charas Suwanwela (eds.).

(Palgrave publishing USA, 2007).

#### **Universidad e Investigación Científica: Convergencias y Tensiones.**

Colección Secretaria Ejecutiva.

Hebe Vessuri (ed.).

(CLACSO Libros publishing, Buenos Aires and UNESCO, Paris 2006).

#### **Knowledge, Power and Dissent.**

Proceedings of the UNESCO Forum Global Colloquium 2004.

Guy Neave (ed.).

(UNESCO publishing, 2006).

## REPORTS OF EXPERT WORKSHOPS

**Final Report. Science, Technology, Innovation and Development.**

Manchester, United Kingdom, February 2008.

**Final Report. Trends and Issues in Post-Graduate Education: Challenges for Research.**

Dublin City University, Dublin, Ireland, March, 2008.

**Final Report. OECD-UNESCO International Workshop on Innovation for Development: Converting Knowledge to Value.**

OECD, Paris, January 2009.

**Final Report. Research in Diverse Social Contexts: Tensions, Dynamics, Challenges.**

UNESCO, Paris, March 2009.

**Final Report and Papers. Private Higher Education. Thematic Session at the World Conference on Higher Education.**

UNESCO, Paris, July 2009.

## OCCASIONAL PAPERS

**Challenges of the University in the Knowledge Society Five Years after the World Conference on Higher Education.**

Carlos Tünnermann Bernheim and Marilena de Souza Chaui.

(English/Spanish versions).

(Paris: UNESCO 2004) (UNESCO Forum Occasional Paper Series; Paper No. 4)

**Market Coordination, Research Management and the Future of Higher Education in the Post-Industrial Era.**

V. Lynn Meek.

(Paris: UNESCO 2003) (UNESCO Forum Occasional Paper Series; Paper No. 5)

**From Manpower Planning to the Knowledge Era: World Bank Policies on Higher Education in Africa.**

Joel Samoff and Carol Bidemi.

(Paris: UNESCO 2003) (UNESCO Forum Occasional Paper Series; Paper No. 2)

**Research and Research Training Systems: Towards a Typology.**

Guy Neave.

(Paris: UNESCO 2002) (UNESCO Forum Occasional Paper Series; Paper No. 1)

**Science and Higher Education in the Process of Internationalization.  
Elements of a conceptual framework for Latin America.**

(English/Spanish versions).

Hebe Vessuri.

(Paris: UNESCO 2003) (UNESCO Forum Occasional Paper Series; Paper No. 3 and 3/s)

**The Impact of Global Rankings on Higher Education Research and the  
Production of Knowledge.**

(Printed version available).

Ellen Hazelkorn.

(Paris: UNESCO 2009) (UNESCO Forum Occasional Paper Series; Paper No. 15)

**Sharing Research Agendas on Knowledge Systems.**

**Selected Papers from the 2008 Global Research Seminar.**

(Printed version available).

Heather Eggins.

(Paris: UNESCO 2009) (UNESCO Forum Occasional Paper Series; Paper No. 16)

## REGIONAL PAPERS

### ▪ Africa

**The Roots and Fallouts of Haile Selassie's Educational Policy.**

Messay Kebede.

**Empowerment of Women in Higher Education in Africa: the Role and Mission of  
Research.**

N'Dri Assie-Lumumba.

**Capacity Building in Higher Education in Mozambique and the Role played by  
Co-operating Foreign Agencies: The Case of the World Bank.**

Arlindo Chilundo.

### ▪ Arab States

**Academic Freedom : Problems and Challenges in Arab and African Countries  
Proceedings of the Academic Freedom Conference, Alexandria 2005.**

Abdalla R.Bubtana (ed.).

**Restructuring and Differentiation of Patterns of Higher Education in the Arab States:  
Meeting the Challenges in the Present and Future.**

Proceedings of the 3rd Arab States Regional Committee Meeting 2004.

Zakia Bouaziz and Mohammed Najib Abdul Wahed (eds.).



**Organization, Structure and Funding of Research.**

Proceedings of the 3rd Arab States Regional Scientific Committee, Alexandria, 2005.

Nouria Remouan (ed).

**▪ Asia/Pacific****Implications of the World Trade Organization General Agreement on Trade in Services (GATS) on Higher Education in Asia and the Pacific Part I.**

Occasional Paper N°8.

Papers from the Asia/Pacific Regional Scientific Committee Meeting, Seoul, 2005.

Akira Arimoto (ed.).

**Implications of the World Trade Organization General Agreement on Trade in Services (GATS) on Higher Education in Asia and the Pacific Part II.**

Occasional Paper N°9.

Papers from the Asia/Pacific Regional Seminar Committee Meeting, Seoul 2005.

Akira Arimoto (ed.).

**▪ Europe/North America****Changing Structures of the Higher Education Systems:****The Increasing Complexity of Underlying Forces**

Papers from the 2nd ENA Regional Committee Meeting, 2004.

Ulrich Teichler (ed.).

**Managerialism and Evaluation in Higher Education.****Papers from the 1st ENA Regional Research Seminar 2004.**

Maurice Kogan (ed.).

**▪ Latin America and the Caribbean****La Movilidad Académica en el Ambiente Comercial**

Proceedings of the LAC GATS Seminar, Mexico 2005).

(PERFILES publishing: Journal of UNAM, Mexico, 2006).

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## REPORTS OF THE 2007 UNESCO FORUM REGIONAL RESEARCH SEMINARS

### Summary Reports: Main Findings and Conclusions

- **Europe (UNESCO, Paris, February 2007).**

**Higher Education Policy, Sustaining Diversity: Differentiating Higher Education Systems in a Knowledge Society.**

Ivar Bleiklie, Philippe Laredo and Sverker Sörlin (eds.).

(Palgrave Macmillan, Special Issue of Higher Education Policy, Vol. 20, No. 4, 2007).

- **Africa (Accra, Ghana, March 2007).**

The Contribution of Higher Education to National Education Systems:  
Current Challenges for Africa.

Seminar Proceedings, UNESCO – Association of African Universities (AAU),  
Accra, Ghana, 2007.

- **Arab States (Rabat, Morocco, May 2007).**

The Impact of Globalization on Higher Education and Research in the Arab States.  
Munir Bashur.

(UNESCO publishing, 2007).

- **Asia/Pacific (Hangzhou, China, September 2007).**

Competition, Collaboration and Change in the Academic Profession: Shaping Higher Education's  
Contribution to Knowledge and Research (Selected Papers).

Rose Marie Salazar-Clemeña and V. Lynn Meek (eds.).

(Libro Amigo publishing, Manila, the Philippines, 2008).

- **Latin America and the Caribbean (LAC) (Port of Spain, Trinidad and Tobago, July 2007).**

Research and Higher Education Policies for Transforming Societies:  
Perspectives from Latin America and the Caribbean.

Marcella Mollis and Miguel Nussbaum Voehl.

(UNESCO publishing, 2007).

## COMMISSIONED PAPERS

The following Special Thematic Papers – series posted on the UNESCO Forum Website – have been commissioned from specialized sources to focus on Key Themes for UNESCO's Current Programme.

### **A Reflection on Business Ethics: Implication for the UN Global Compact and Social Engagement and for Academic Research.**

Wallace Baker.

Senior Partner Emeritus, Baker and McKenzie, Paris.

### **Assessment versus Accountability in Higher Education.**

Roger Benjamin and Stephan Klein.

Council for Aid for Education (CAE).

### **The Politics of Knowledge Management**

Nazli Choucri.

MIT, USA and Chair, Scientific Council MOST Programme, UNESCO.

### **Trends and Issues in Postgraduate Education: A Global Review.**

Keynote Address: UNESCO Forum Experts Workshop, Dublin, Ireland, 2008.

Heather Eggins.

Higher Education Consultant, UK.

### **Some Intercultural Issues in Multicultural Societies.**

Jagdish Gundara, Institute of Education University of London,

UNESCO Chair Holder in Intercultural Education.

### **Innovation, Knowledge Management, Research: The ICT Factor.**

Diem Ho.

Director for University Relations,

Member, Academy of Technology, IBM Europe.

### **Worldwide Trends in Higher Education Finance: Cost-Sharing, Student Loans, and the Support of Academic Research.**

Bruce Johnston and Pamela N. Marcucci.

State University of New York at Buffalo.

### **Civil Society Partnerships and Development Policies: Emerging Trends.**

Clara Ikekeonwu, Shirley Randell and Anne Touwen.

International Federation of University Women (IFUW).

### **Implications of Cross-Border Education and GATS for the Knowledge Enterprise.**

Jane Knight.

Ontario Institute for Studies in Education,

University of Toronto, Canada.

**The Role of Higher Education in Obtaining EFA Goals with Particular Focus on Developing Countries.**

Bikas C. Sanyal, Consultant, Paris, IIEP/UNESCO.

**Challenges in Assuring the Dialogue between Cultures.**

Traugott Schoeffthaler, Executive Director, Anna Lindh Euro-Mediterranean Foundation, Alexandria, Egypt.

**SPECIAL INITIATIVE:  
MAPPING AND ANALYZING NATIONAL RESEARCH SYSTEMS**

**Invitational Workshop on the Comparative Analysis of National Research Systems.**

Final Report, Paris, April, 2006.

**Symposium on Comparative Analysis of National Research Systems.**

Final Report. Paris, January, 2008\*.

**A Meta Review: Study on National Research Systems\*.**

Johann Mouton and Roland Waast. Centre for Research on Science & Technology, Stellenbosch University, 2006.

**Regional Syntheses (Africa, Arab States, Asia, Latin America and the Caribbean (LAC))\*.**

▪ **Fifty-one (51) Country Studies\***

*Africa* (17): Botswana, Burkina Faso, Cameroon, Cote d'Ivoire, Ethiopia, Ghana, Kenya, Lesotho, Malawi, Mali, Namibia, Rwanda, Senegal, Tanzania, Uganda, Zambia, Zimbabwe.

*Arab Region* (11): Algeria, Bahrain, Kuwait, Lebanon, Morocco, Oman, Qatar, Sudan, Syrian Arab Republic, Tunisia, United Arab Emirates (UAE).

*Asia* (10): Bangladesh, Indonesia, Malaysia, Nepal, Pakistan, Philippines, Singapore, Sri Lanka, Thailand, Viet Nam.

*Latin America and the Caribbean* (13): Argentina, Bolivia, Chile, Colombia, Costa Rica, Cuba, Ecuador, Jamaica, Mexico, Panama, Peru, Trinidad and Tobago, Venezuela.

\*Posted on the UNESCO Forum Website.

## **FORUM PARTNER PUBLICATIONS:**

### **United Nations Research Institute for Social Development (UNRISD)**

**Education as Social Action: Knowledge, Identity and Power.**

Ashok Swain.

**Targeting and Universalism in Poverty Reduction.**

Thandika Mkandawire.

**Gender and Education: A Review of Issues for Social Policy.**

Ramya Subrahmanian.

**Social Policy in a Development Context.**

Thandika Mkandawire.

**The Riddle of Distance Education: Promises, Problems and Applications for Development.**

Judith Adler Hellman.

**Transformation Social Policy: Lessons from UNRISD Research,**

UNRISD Research and Policy Brief N°5.

**Higher Education Crossing Borders: A Guide to the Implications of the General Agreement on Trade in Services (GATS) for Cross-Border Education.**

Jane Knight.

Commonwealth of Learning and UNESCO 2006.

**International Conference, Pathways toward a Shared Future: Changing Roles of Higher Education in a Globalized World.**

Report of the United Nations University UNU-UNESCO International Conference.

Clare Stark.

UNESCO, 2008.

**The Changing Conditions for Academic Work and Careers in Select Countries.**

William Locke and Ulrich Teichler (eds.).

(INCHER publishing, Kassel University, Germany, 2007).

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## SPECIAL RESOURCES

- **UNESCO Forum Global Archive – Available on the UNESCO Forum Website.\***

A total of 290 Referenced Items: Research Papers and Conference Proceedings.  
(\*Available on request).

- **UNESCO FORUM RESEARCH BRIEFS.**

A total of 120 Research Briefs Summarizing Papers from Forum Events.  
(Access: MOST /SHS Website: <http://www.unesco.org/shs/most/tool?template=edu>).

- **UNESCO FORUM WEBSITE.**

Listing, dissemination and downloading of Forum materials.  
(<http://www.unesco.org/education/researchforum>).

- **COMPENDIUM OF KNOWLEDGE HUBS\***

A collection of *Information Sheets* on major Regional and International Knowledge Hubs (such as Observatories, Archives, Portals, Networks) which gather and store data on higher education, research and innovation systems.

\*Available on the UNESCO Forum Website.

## **Annex II**

### **UNESCO Forum on Higher Education, Research and Knowledge Activities 2001-2009**

#### **Global Colloquia**

2004 UNESCO, Paris.

*Knowledge, Access and Governance: strategies for change.*

2006 UNESCO, Paris.

*Universities as Centres of Research and Knowledge Creation: an Endangered Species?*

#### **Global Research Seminars**

2003 UNESCO, Paris.

*Knowledge Society versus Knowledge Economy: Knowledge, Power and Politics.*

2006 UNESCO, Paris.

*Workshop on Comparative Analysis of National Research Systems.*

2008 UNESCO, Paris.

*Sharing Research Agendas on Knowledge Systems.*

#### **Regional Research Seminars and Scientific Committee Meetings**

##### *Africa*

2002 Senegal; 2003 Zimbabwe; 2004 Uganda; 2005 Mozambique;

2006 UNESCO, Paris; 2007 Ghana.

##### *Arab States*

2003 Egypt (Cairo); 2003 Syria; 2004 UNESCO, Paris; 2005 Egypt (Alexandria);

2006 United Arab Emirates (UAE), 2007 Morocco.

##### *Asia/Pacific*

2003 Thailand; 2003 India; 2004 Japan; 2005 Republic of Korea; 2006 Indonesia;

2007 China.

##### *Europe/North America*

2003 IIEP, Paris; 2004, 2006, 2007 UNESCO, Paris.

##### *Latin America/Caribbean*

2003 Argentina; 2003 Cuba; 2004 Brazil; 2005 Mexico; 2006 Venezuela;

2007 Trinidad and Tobago.

## **Expert Workshops**

2006 Kassel, Germany.

5 to 6 September: *Workshop on the Changing Role of the Academic Professions.*

2008 Manchester, United Kingdom.

27 to 29 February: *High Level Expert Working Group on Technology and Development.*

2008 Dublin, Ireland.

*Currents Trends in Post Graduate Research: a Global Overview.*

2009 Paris, France:

- (i) 28 to 30 January: *Innovation for Development: Converting Knowledge to Value* (in partnership with the Organisation for Economic Cooperation and Development (OECD)).
- (ii) 5 to 7 March: *Research in Diverse Social Contexts: Tension, Challenges and Dynamics.*
- (iii) 5 to 8 July: *Public/Private Partnerships in Higher Education (at the World Conference on Higher Education).*

## **Special Initiative: Mapping and Analyzing National Research Systems**

Invitational Workshop on the *Comparative Analysis of National Research Systems*, Paris, 6 to 7 April, 2006.

Special Forum Initiative: *Strengthening National Research Systems*. International Symposium, Paris, 16 to 18 January 2008.



# Annex III

## UNESCO Forum on Higher Education, Research and Knowledge Special Events Involving the UNESCO Forum 2001-2009

### **Society for Research into Higher Education: Annual Conference.**

(London, United Kingdom, 16 to 18 December 2003).

*Workshop: Higher Education, Research and Knowledge – A New UNESCO Forum.*

### **World Bank ABCDE Conference.**

(Tokyo, Japan, 3 to 5 May 2006).

UNESCO Forum Panel: *Challenges for University Research.*

### **OECD Civil Society Forum: Balancing Globalization.**

(Paris, France, 22 to 23 May 2006).

UNESCO Forum Panel: *Access to Education.*

### **The Fulbright New Century Scholars Symposium: Global Higher Education.**

(UNESCO, Paris, France, 24 October 2006).

*Panels: Access and Equity and the Emerging Global Model for the Research University*

Symposium supported by the UNESCO Forum.

### **Panel: Women and Research: Tangible Progress?**

*(2<sup>nd</sup> Global Colloquium 2006, 1 December 2006).*

Panellists from the Global and Regional Scientific Committees.

### **G8 – UNESCO World Forum: Education, Research and Innovation: New Partnership for Sustainable Development.**

(Trieste, Italy, 10 to 12 May 2007).

Chairs and Rapporteurs from the Global and Regional Scientific Committees.

### **Workshop: Research for Innovation and Sustainable Human Development.**

(UNU, Tokyo, Japan, 29 to 30 August 2007).

United Nations University – UNU-UNESCO International Conference: Pathways towards a Shared Future: Changing Roles of Higher Education in a Globalized World.

UNESCO Forum Participation in Panel Discussions.

### **34<sup>th</sup> General Conference of UNESCO.**

(UNESCO, Paris, France, 16 October to 3 November 2007).

*Round Table of Ministers of Science and Research.*

UNESCO Forum gives Keynote Presentation.

**IBM Academic Days.**

(Zurich, Switzerland, 22 to 23 May 2008).

UNESCO Forum Participation in Panel Discussions.

**IAU: 13<sup>th</sup> General Conference of the International Association of Universities.**

(Utrecht, the Netherlands, 15 to 18 July 2008).

*Panel: The Future of Research in Higher Education.*

**South-East Europe Science, Higher Education and Innovation Policy Forum.**

(Budva, Montenegro, 1 to 3 July 2008).

Conference supported by the UNESCO Forum.

**WCHE+10 Sub-Regional Preparatory Conference for Asia and the Pacific.**

(Macao, 25 to 26 September 2008).

*Facing Global and Local Challenges: The New Dynamics of Higher Education.*

Conference supported by the UNESCO Forum.

**ASHE: 33<sup>rd</sup> Annual Conference of the Association for the Study of Higher Education.**

(Jacksonville, Florida, USA, 5 to 8 November 2008).

UNESCO Forum Keynote Address: *Challenges for Research Systems in the Knowledge Society.*

**WCHE+10 Sub-Regional Preparatory Conference for Africa.**

(Dakar, Senegal, 10 to 13 November 2008).

UNESCO Forum Participation in Panel Discussion.

**WHO: 2008 Bamako Global Ministerial Forum on Research for Health.**

(Bamako, Mali, 17 to 19 November 2008).

Partners: World Bank, Council for Research on Health for Development, Global Forum for Health Research, Mali, UNESCO, and the UNESCO Forum.

UNESCO Forum Participation in Support to Reporting.

**The Higher Education Academy with the Quality Assurance Agency, UK Council for Graduate Education, Vitae (formerly UK GRAD Programme), and the British Library: 2020 Vision – The Changing UK Doctorate.**

(London, United Kingdom, 24 November 2008).

Keynote Address: *Global Trends in Doctoral Education and Research.* On-line title: A Global View of Research and Knowledge Systems: The Doctorate in Context.

**The Alliance for Global Sustainability: Urban Futures: the Challenge of Sustainability.**

(Zurich, Switzerland, 26 to 29 January 2009).

UNESCO Forum Participation in Panel Debates.

**ENQA Workshop: Quality Assurance in Postgraduate Education.**

(Brasov, Romania, 12 to 13 March 2009).

Keynote Address: *Forces Shaping Postgraduate Education - Academic Credentials in a Global Context.*

**International Workshop: Forces and Forms of Changes in Doctoral Education Worldwide.**

(Kassel University, Germany, 23 to 27 March 2009).

UNESCO Forum Participation in Plenary Discussion.

**International Conference: Commonwealth Educational Cooperation – Looking Ahead at 50.**

(Oxford, United Kingdom, 31 March to 1 April 2009).

UNESCO Forum Participation in Panel Debates.

**World Social Science Forum: One Planet – Worlds Apart?**

(Bergen, Norway, 10 to 12 May 2009).

UNESCO Forum Participation in Plenary Sessions.

# Annex IV

## UNESCO Forum on Higher Education, Research and Knowledge Core and Associated Partners 2001-2009

### ▪ UN system and IGOs

Organisation Internationale de la Francophonie (OIF), Gabon  
Commonwealth Secretariat  
International Atomic Energy Agency (IAEA), Vienna  
Organization for Economic Cooperation and Development (OECD)  
United Nations Development Programme (UNDP)  
UN Global Compact Academic Stakeholder Network  
UN Global Policy Forum  
United Nations Conference on Trade and Development (UNCTAD)  
United Nations University (UNU)  
United Nations University Institute for Advanced Studies (UNU/IAS)  
World Bank  
World Health Organization (WHO)

### ▪ UNESCO

Education Sector (Division of Higher Education)  
Natural Sciences Sector (SC)  
Social and Human Sciences Sector (SHS)  
UNESCO European Centre for Higher Education, CEPES/Bucharest  
Institute for Higher Education in Latin America and the Caribbean (IESALC), Caracas  
International Centre for Theoretical Physics (ICTP), Trieste, Italy  
International Institute for Educational Planning (IIEP), Paris  
International Institute for Educational Planning (IIEP), Buenos Aires  
International Bureau for Education (IBE), Geneva  
UNESCO Field Office Network (52 offices)  
Third World Academy of Science (TWAS), Trieste, Italy

### ▪ Member States of UNESCO

National Commissions for UNESCO (192 Member States)  
Permanent Delegations to UNESCO

### ▪ NGOs

Association of African Universities (AAU)  
Association of Arab Universities (AArU)  
Association of Commonwealth Universities (ACU)  
Association Internationale de la Pédagogie Universitaire (AIPU)  
Association of Southeast Asian Institutions of Higher Learning (ASAIHL)  
Association of Universities of Asia and the Pacific (AUAP)  
Agence Universitaire de la Francophonie (AUF)  
Associação das Universidades de Língua Portuguesa (AULP)

Communauté des Universités Méditerranéennes (CUM)  
 Confédération Syndicale Mondiale de l'Enseignement (CSME) – World  
 Confederation of Teachers (WCT)  
 Conseil Africain et Malgache pour l'Enseignement Supérieur (CAMES)  
 Education International (EI)  
 European Association for International Education (EAIE)  
 European Lifelong Learning Initiative (ELLI)  
 European University Association (EUA)  
 Fédération Internationale des Universités Catholiques (FIUC)  
 International Association for Educational Assessment (IAEA)  
 International Association of Universities (IAU)  
 International Association of University Presidents (IAUP)  
 International Council for Engineering and Technology (ICET)  
 International Council for Open and Distance Education (ICDE)  
 International Council for Science (ICSU)  
 International Council of Social Sciences (ICSS)  
 International Federation of University Women (IFUW)  
 Organisation Universitaire Interaméricaine (OUI) /Inter-American Organization  
 for Higher Education (IOHE)  
 Programme de Recherche et de Liaison Universitaire pour le Développement (PRELUDE)  
 RAND Europe, Cambridge, United Kingdom  
 Society for Research into Higher Education (SRHE)  
 International Network for the Availability of Scientific Publications  
 International Network for Quality Assurance Agencies in Higher Education (INQAAHE)  
 World Organization of United Cities and Local Governments  
 Union des Universités de l'Amérique Latine (UDUAL)  
 World Federation for Medical Education (WFME)  
 World Federation of Engineering Organizations (WFEO)

▪ **NGOs of the UNESCO Student Forum**

Association des Etats Généraux des Etudiants de l'Europe (AEGEE)  
 All Africa Students Union (AASU)  
 Asian Students Association (ASA)  
 European Democrat Students (EDS)  
 European Law Students Association (ELSA)  
 European Medical Students Association  
 National Unions of Students in Europe (ESIB)  
 General Union of Arab Students (GUAS)  
 International Association of Students in Agriculture and Related Sciences (IAAS)  
 International Association of Dental Students (IADS)  
 AIESEC (International Association of Students in Economics and Management)  
 International Federation of Medical Students Association (IFMSA)  
 International Forestry Students Association (IFSA)  
 International Pharmaceutical Students Federation (IPSF)  
 International Union of Students (IUS)  
 Jeunesse Etudiante Catholique Internationale (JECI)

European Confederation of Junior Enterprises (JADE)  
Mouvement International des Etudiants Catholiques (MIEC)  
Organización Continental LatinoAmericana y Caribena de Estudiantes (OCLAE)  
World Student Christian Federation (WSCF)

▪ **Foundations**

Brain Korea BK  
Anna Lindh Euro-Mediterranean Foundation for the Dialogue between Cultures  
Carnegie Foundation  
Commonwealth Medical Trust  
Council for the International Exchange of Scholars CIES  
Elias Foundation, Romanian Academy, Romania  
Foundation for the Future  
Institute for the Future

▪ **Parliamentary Associations**

Commonwealth Parliamentary Association  
Inter Parliamentary Union (IPU)  
Parlement de la Francophonie  
Parlatino (The Latin American Parliament)  
Parliamentary Assembly of the Council of Europe  
Parliament of Indonesia

▪ **Private Sector**

IBM/Europe  
KNOWWHY Ltd, Germany  
L'Oréal  
Rotary International  
Saggitarius Ltd., Skopje, Macedonia  
Schlumberger SARL  
International Chamber of Commerce (ICC)  
Junior Chamber of Commerce (JCI)  
World Association of Small and Medium Size Enterprises (WASME)

▪ **Regional Bodies**

Asia/Pacific Economic Cooperation (APEC)  
Caribbean Commission (CARICOM)  
Council of Europe  
European Union  
New Economic Partnership for African Development (NEPAD)  
Southern African Development Consortium (SADECC)

- **Universities, Research Institutes, Ministries, Special Initiatives**

- **Africa**

University of Botswana, Gaborone, Botswana  
 Université de Yaoundé 1, Cameroon  
 Université de Cocody, Abidjan, Côte d'Ivoire  
 Université de Kinshasa, République Démocratique du Congo  
 Pan African Studies and Research Centre in International Relations and  
 Education for Development (CEPARRED), Abidjan, Côte d'Ivoire  
 Addis Ababa University, Ethiopia  
 Ministry of Education, Science and Sport, Ghana  
 National Board of Technical Education, Ghana  
 National Council for Tertiary Education, Ghana  
 University of Education, Ghana  
 University of Legon, Ghana  
 Aga Khan University, Nairobi, Kenya  
 Moi University, Kenya  
 University of Nairobi, Kenya  
 University of Fianarantsoa, Madagascar  
 Mzuzu University, Malawi  
 University of Malawi, Malawi  
 University of Mauritius, Mauritius  
 Ministry of Higher Education and Research, Maputo, Mozambique  
 University of Maputo, Mozambique  
 National Universities Commission, Nigeria  
 Oboafemi Awolowo University, Ile Ife, Nigeria  
 University of Ibadan, Nigeria  
 University of Lagos, Nigeria  
 Kigali Institute of Education, Rwanda  
 Cheikh Anta Dop University, Dakar, Senegal  
 Council for the Development of Social Science Research in  
 Africa (CODESRIA), Dakar, Senegal  
 Centre for Science, Technology and Innovation Indicators, Human Sciences  
 Research Council, Cape Town, South Africa  
 Council on Higher Education (CHE), Pretoria, Republic of South Africa  
 National Commission on Higher Education, Republic of South Africa  
 University of Stellenbosch, Centre for Research on Science and  
 Technology (CREST), South Africa  
 University of Cape Town, South Africa  
 University of Johannesburg, South Africa  
 University of Swaziland (Institute of Distance Education), Swaziland  
 St Augustine University of Tanzania, United Republic of Tanzania  
 Makerere University, Kampala, Uganda  
 Midlands State University, Zimbabwe

National University of Science and Technology, Bulawayo, Zimbabwe  
Zimbabwe Open University, Zimbabwe

▪ **Arab States**

Centre de Recherche en Economie Appliquée pour le Développement, Alger, Algeria  
Université d'Oran Es-Senia, Algeria  
Center for Special Studies & Programs (CSSP), Bibliotheca Alexandrina, Alexandria, Egypt  
Al Azhar University, Egypt  
American University, Cairo, Egypt  
Swedish Institute, Alexandria, Egypt  
Arab Research Centre, Cairo, Egypt  
Al al-Bayt University, Jordan  
Arab Open University, Kuwait  
Private Universities' Council, Kuwait  
American University of Beirut, Lebanon  
Institute of Social Sciences, University of Lebanon  
Centre for Sustainable Development Research, Libyan Arab Jamahiraya  
University of Al-Fateh, Tripoli, Libya  
National Committee for Women's Issues, Beirut, Lebanon  
Palestinian Initiative for the Promotion of Global Dialogue and Democracy  
PEACE Programme (EU-Palestine Cooperation)  
ENA, M'knès, Morocco  
Royal Academy of Sciences, Morocco  
Université de Mohammad V – Agdel, Rabat, Morocco  
Al-Quds University, Palestine  
Hebron University, Palestine  
Girls' College, Saudi Arabia  
King Abdul-Aziz University, Jeddah, Saudi Arabia  
University of Khartoum, Sudan  
El Manar University, Tunisia  
Université de Tunis, Tunisia  
Middle East Competition Program (MERC), Tunisia  
United Arab Emirates University, UAE

▪ **Asia/Pacific**

Monash University, Australia  
University of New England, Armidale, Australia  
South East University, Research Centre of Learning Science, Beijing, People's Republic of China  
University of the South Pacific, Fiji  
Centre for the Study of Developing Societies, New Delhi, India  
Council for Social Science Research (ICSSR), New Delhi, India  
H.R.College, Mumbai, India  
Jawaharlal Nehru University, Centre for Educational Studies, India  
National Assessment and Accreditation Council, New Delhi, India  
National Institute of Educational Planning and Administration (NIEPA), New Delhi, India



National Productivity Council, Regional Directorate Chandigarh, India  
 Panjab University, Chandigarh, India  
 University Grants Commission, New Delhi, India  
 Association of Indonesian Private Universities (APTISI), Jakarta, Indonesia  
 Bogor Agricultural University, Indonesia  
 Centre for Science & Technology Development Studies, Indonesian Institute of Sciences, Jakarta, Indonesia  
 National Accreditation Board for Higher Education, Indonesia  
 National Research Council, Jakarta, Indonesia  
 Universitas Mercu Buana (UMB), Indonesia  
 University of Indonesia, Jakarta, Indonesia  
 University of Pelita Harapan (UPH), Indonesia  
 University of Isfahan, Iran  
 Hiroshima University, Japan  
 International Christian University, Tokyo, Japan  
 National Institute of Advanced Industrial Science and Technology (AIST), Tokyo, Japan  
 Poole Gakuin University, Japan  
 University Establishment Standards Agency (JUAA), Tokyo, Japan  
 Korean Council for University Education, Seoul, Republic of Korea  
 Korean Educational Development Institute, Seoul, Republic of Korea  
 Korean National University of Education, Seoul, Republic of Korea  
 Ministry of Education, Malaysia  
 Universiti Kebangsaan, Malaysia  
 Ministry of Education, Culture and Science, Mongolia  
 Department of Forest Research and Survey, Government of Nepal, Kathmandu, Nepal  
 New Zealand Qualifications Authority (NZQA), Wellington, New Zealand  
 University of Auckland, New Zealand  
 Divine Word University, Madang, Papua New Guinea  
 De La Salle University, Manila, the Philippines  
 Committee of Vice Chancellors and Directors, Sri Lanka  
 Chulalongkorn University, Bangkok, Thailand  
 Tashkent Medical Academy, Tashkent, Uzbekistan  
 Viet Nam National University (VNU), Centre for Education Quality Assurance and Research (CEQARD), Hanoi, Viet Nam  
 Asia/Pacific Higher Education Quality Network (APQN)

▪ **Europe/North America**

Centre for Research in Lifelong Learning and Participation, Katholieke Universiteit Leuven, Belgium  
 Ryerson University, Toronto, Canada  
 University of British Columbia, Canada  
 University of Toronto, Canada  
 Centre for Higher Education Studies, Prague, Czech Republic  
 Aalborg University, Research Centre on Development and International Relations (DIIPE), Denmark  
 Centre National de la Recherche Scientifique (CNRS), France

Ecole Nationale des Ponts et Chaussées (ENPC), France  
INSEAD Business School, Fontainebleau, France  
Institut pour la Recherche sur le Développement (IRD) France  
Université de Nice Sophia Antipolis, France  
Université de Paris VII – Denis Diderot, Laboratoire des Sociétés en développement dans l'espace et le temps (SEDET), Paris, France  
Université de Paris Est (ENPC), France  
Kassel University, Centre for Research on Higher Education and Work (INCHER), Germany  
Zeppelin University, Germany  
Irish Universities Association (IUE), Dublin, Ireland  
Dublin Institute of Technology, Dublin, Ireland  
Dublin City University (DCU), Ireland  
University of Limerick, Ireland  
Open University, Israel  
Agricultural Science and Technology Indicators (ASTI) initiative, International Food Policy Research Institute (IFPRI), Rome, Italy  
Italian Council for Science, Italy  
University of Agriculture, Latvia  
Ss. Cyril and Methodius University, Skopje, Macedonia  
Maastricht Economic and social Research and training centre on Innovation and Technology  
United Nations University (UNU-MERIT), the Netherlands  
Maastricht University, the Netherlands  
University of Twente, Enschede, Centre for Higher Education Policy Studies (CHEPS), the Netherlands  
Wageningen University, the Netherlands  
University of Bergen, Norway  
University of Oslo, Centre for Technology, Innovation and Culture, Norway  
Institute for the Knowledge Society, Poland  
Instituto Superior Técnico, Lisbon, Portugal  
University of Bucharest, Romania  
University Politehnica of Bucharest, Romania  
Consejo Superior de Investigaciones Científicas (CSIC), Centro de Ciencias Humanas y Sociales, Madrid, Spain  
Global University Network for Innovation (GUNI), Universitat Politècnica de Catalunya, Barcelona, Spain  
Universidad Politécnica de Madrid, Spain  
Lund University, Sweden  
Swedish Institute for Studies in Education and Research, Stockholm, Sweden  
Council for Research on Health and Development (COHRED), Switzerland  
Global Forum for Health Research, Switzerland  
United Nations Institute for Social Development, Geneva, Switzerland  
Bath University, United Kingdom  
Brunel University, United Kingdom (Centre for Evaluation of Policy and Practice)  
Cambridge University, United Kingdom  
Kingston University, Kingston upon Thames, Surrey, United Kingdom  
Institute of Education, University of London, United Kingdom

Newcastle University, United Kingdom  
 Staffordshire University, United Kingdom  
 Sussex University, Science and Technology Policy Unit (STPU), United Kingdom  
 Manchester Institute of Innovation Research, United Kingdom  
 Open University, United Kingdom  
 Quality Assurance Agency for Higher Education (QAA), United Kingdom  
 UK Higher Education Academy, United Kingdom  
 University of Manchester, United Kingdom  
 University of Oxford, Department of Educational Studies, United Kingdom  
 University of Strathclyde, Institute for Access Studies, United Kingdom  
 Boston College, Boston, United States of America  
 Centre for Trans Regional Studies, Princeton University, United States of America  
 Cornell University, United States of America  
 Institute for African Studies, Colombia University, New York, United States of America  
 John Hopkins University (Hopkins-Nanjing Centre), United States of America  
 Massachusetts Institute of Technology (MIT), United States of America  
 New York University, New York, United States of America  
 Northwestern University, Chicago, United States of America  
 Social Science Research Council, New York/Washington DC, United States of America  
 State University of New York (SUNY), Buffalo, New York, United States of America  
 Stanford University, United States of America  
 University of Illinois, Urbana, United States of America  
 University of Wisconsin, United States of America  
 Wichita State University, United States of America

▪ **Latin America and the Caribbean**

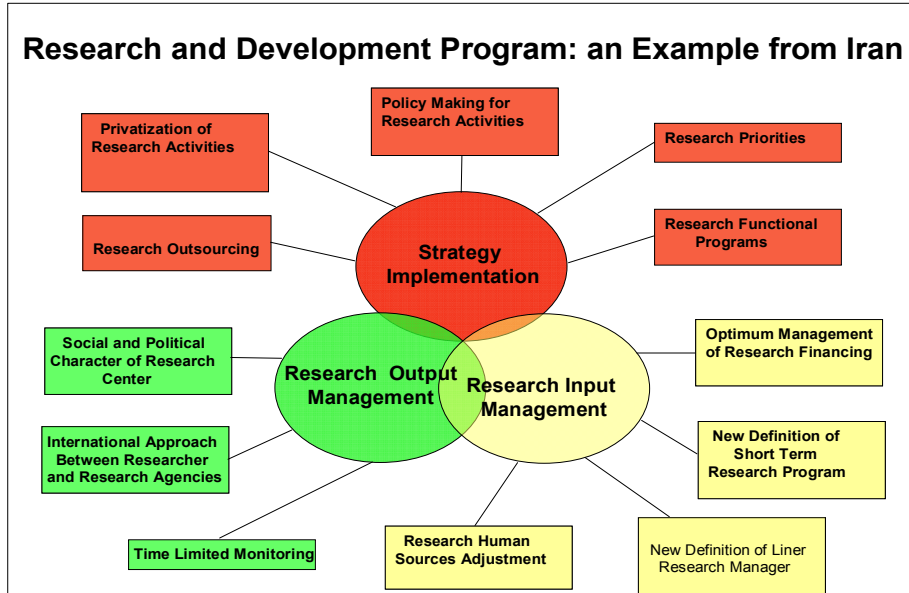
Accreditation Council of Trinidad and Tobago (ACTT)  
 Association of Caribbean Higher Education Administrators (ACHEA)  
 Caribbean Development Bank, Barbados  
 Caribbean Community and Common Market - 15 Caribbean nations (CARICOM)  
 Latin American Social Sciences Council (CLACSO), Buenos Aires, Argentina  
 Universidad Quilmes, Argentina  
 Universidad de Buenos Aires (UBA), Argentina  
 Universidad Nacional de Córdoba (UNC), Argentina  
 Associação Nacional dos Dirigentes das Instituições Federais de Ensino Superior (ANDIFES), Brazil  
 ATLAS, Brazil  
 Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES/MEC), Brazil  
 Federal University of Minas Gerais, Belo Horizonte, Brazil  
 Federal University of Rio Grande do Sul, Brazil  
 Latin American Institute for Advanced Studies (ILEA), Porto Alegre, Brazil  
 Universidade Estadual de Campinas (UNICAMP), Brazil  
 Universidade do Vale do Rio dos Sinos (UNISINOS), Brazil  
 Universidade Federal de Minas Gerais (UFMG), Brazil  
 Universidade Candido Mendes, Brazil  
 Universidade de São Paulo, Brazil

Universidade Federal do Rio Grande do Sul, Brazil  
Universidade Federal do Rio de Janeiro, Brazil  
Universidade Metodista Piracicaba, Brazil  
Universidade Reg. Blumenau, Brazil  
University of Trinidad and Tobago  
University of the West Indies  
Centro Interuniversitario de Desarrollo (CINDA), Chile  
Un Buen Comienzo (UBC), Chile  
Observatorio colombiano de ciencia y tecnología (OCyT), Colombia  
Universidad Nacional, Colombia  
Foundation for the Development of the Central Volcanic  
Mountain Range (FUNDECOR), Costa Rica  
El Centro de Ingeniería Genética y Biotecnología (CIGB), Cuba  
Instituto universitario de ciencias de la educación (IUCE), Cuba  
Universidad de Havana, Centre for Studies on Higher Education (CEPES), Cuba  
Universidad Nacional Autónoma de Honduras (UNAH), Honduras  
Centro de Investigación y de Estudios Avanzados del Instituto Politécnico  
Nacional (CINVESTAV), Mexico  
Universidad Autónoma Metropolitana, Mexico  
Universidad Mayor de San Simón, Bolivia  
Universidad Nacional Autónoma de México (UNAM), Mexico  
Universidad Nacional de Asunción, Paraguay  
University of Monterrey, Interdisciplinary Centre for the Study of Quality of Education  
and Eradication of Poverty, Mexico  
University of Veracruz, Mexico  
National Autonomous University of Nicaragua, Nicaragua  
GRADE Investment, Peru  
UdelaR Facultad de Ingeniería, Uruguay  
Universidad de la República, Uruguay  
El Centro de Estudios del Desarrollo (CENDES), Universidad Central, Venezuela  
Instituto Venezolano de Investigaciones Científicas (IVIC), Venezuela  
Rafael Bellosillo Chacín University, Maracaibo, Venezuela  
Universidad del Zulia, Maracaibo, Venezuela  
School of Science of the Universidad de Los Andes (ULA), Venezuela  
Zulia State Government, Venezuela

# Annex V

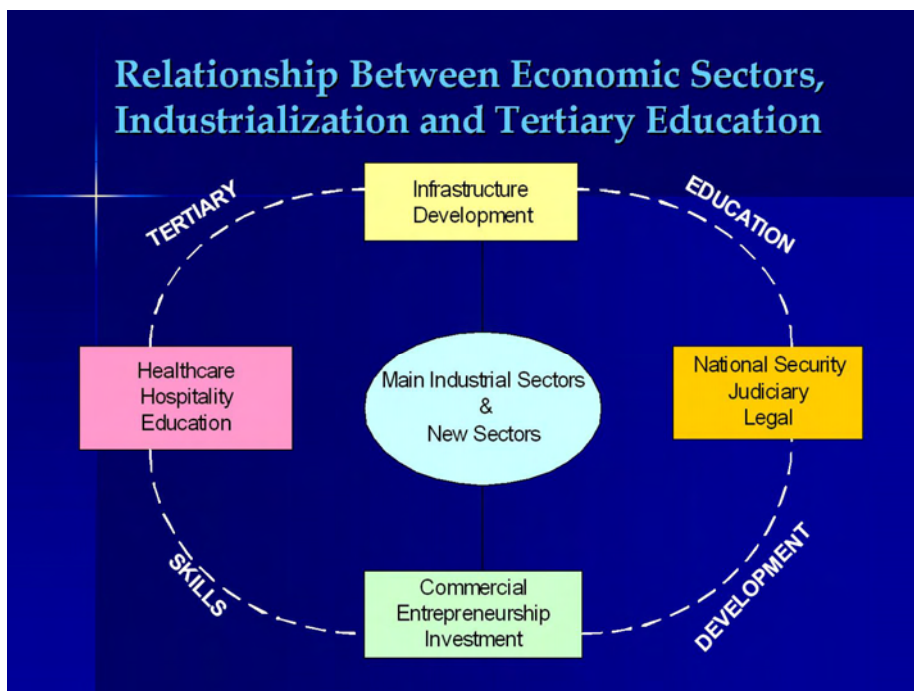
## Collection of Forum Slides and Graphics

Slide 1: Research and Development Programme: an Example from Iran



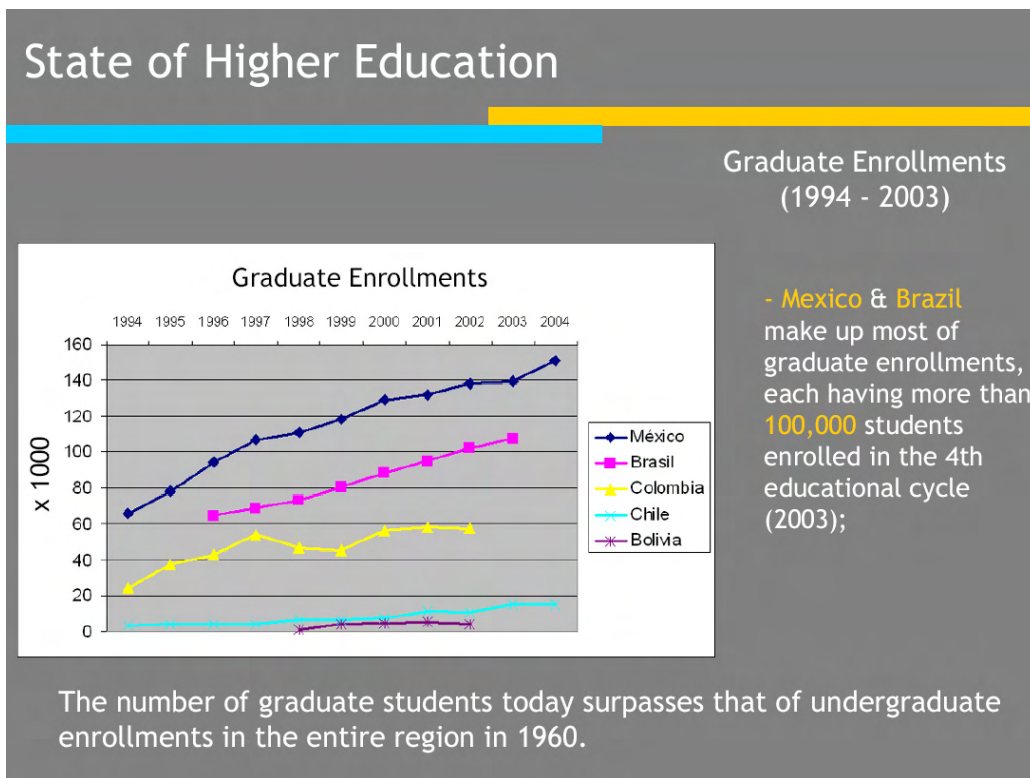
Source: Vaezi, S. K. *A Review of Monitoring and Evaluation Roles in Research Development Programme*, slide 6, Colloquium, Paris, 2006.

Slide 2: Relationship between Economic Sectors, Industrialization and Tertiary Education in Latin America



Source: Ali, E. R. *Tertiary Education and Skills Development*, slide 16, Trinidad, 2007.

Slide 3: State of Higher Education in Latin America



Source: Ramirez, J.A. *New initiatives in International Cooperation in Support of Post-Graduate Studies*, slide 7, Dublin, 2008.

Slide 4: Comparison of US and UK Endowment Levels

### Comparison of US and UK Endowment Levels

US Institutions	Endowments Assets (2006 million \$)	UK Institutions	Endowment Assets (2002 million \$)
Harvard University	28,916	Cambridge	4,000
Yale University	18,031	Oxford	4,000
Stanford University	14,085	Edinburgh	3200
University of Texas	13,235	Glasgow	240
Princeton University	13,045	King's	200

Source: Salmi, J. *Improving Graduate Education in Developing Countries*, slide 18, Dublin, 2008.

## Slide 5: Capacity-building in Africa for Higher Education, Research and Innovation

## Context and Situation Analysis

- Challenges and Opportunities for Human resource capacity building
- **Challenges**
  - Size of the problem
  - Weak human resource available for training
  - Threat of brain drain
  - Weak institutional and infrastructure capacity capacity (e.g. 55% of laboratory equipment out-of-service. Source : ANSTI 2005)
  - Isolation of trained scientists
- **Opportunities**
  - Change in policy of development partners
  - Improved economic performance and contribution of governments to Higher education

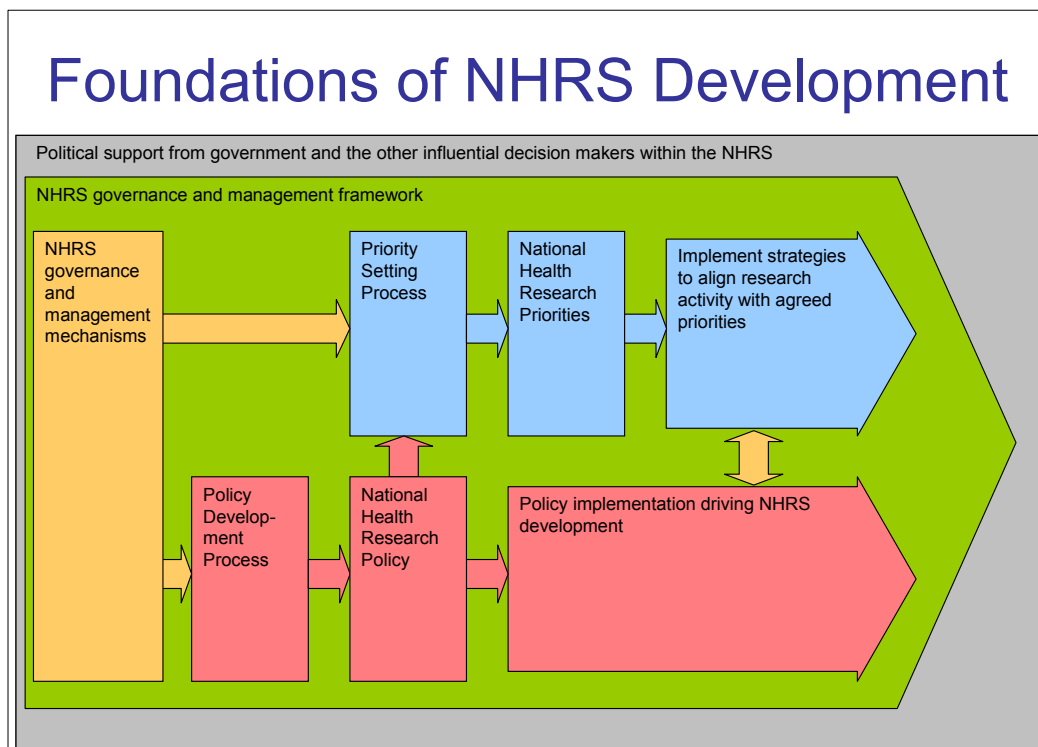
Source: Massaquoi, J.G.M. *Science and Technology Human Resource Capacity Building in Africa – The Role of Regional Cooperation*, slide 4, Colloquium, Paris, 2006.

## Slide 6: Emerging Trends in Higher Education, Research and Innovation

	<i>Conventional</i>	<i>Emerging</i>
• Type	Public	Private
• Approach	Welfare	Market
• Ownership	State	Private
• Mission	Public interests	Private interests
• Motive	Social Service	Profit
• Funding	Grants	Fees
• <b>Govt Role</b>	<b>High</b>	<b>Nil</b>

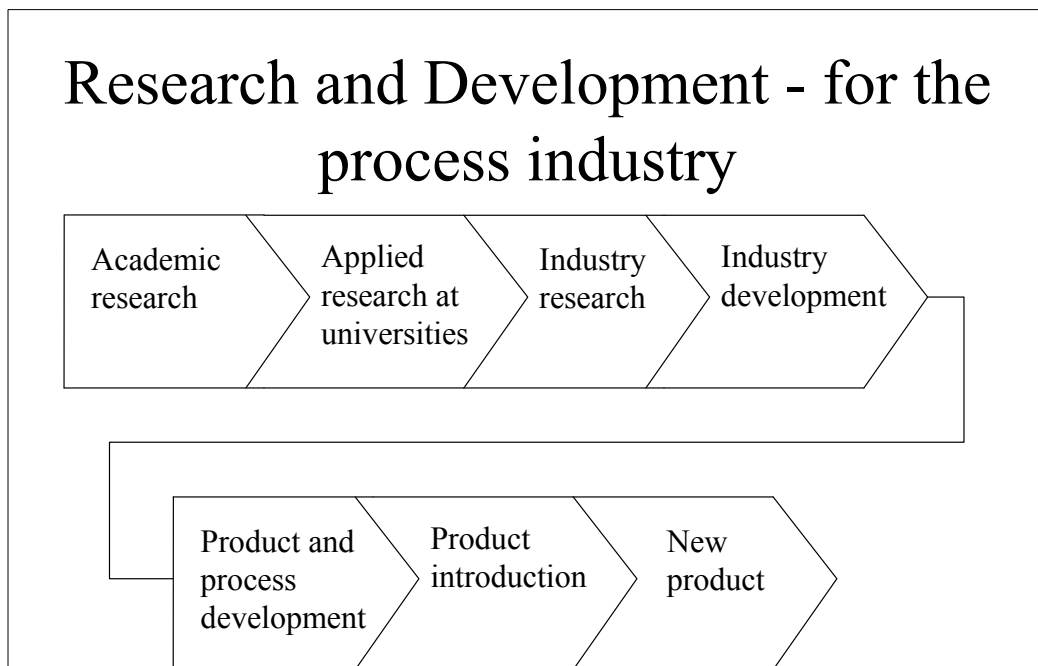
Source: Tilak, J. *Higher Education in Trishanku, Hanging between the State and the Market*, slide 20, Colloquium, Paris, 2004.

## Slide 7: Foundations of NHRS Development



Source: Kennedy, A. *COHRED approach to National Health Research System Assessment and Development*, slide 5, Paris, 2008 .

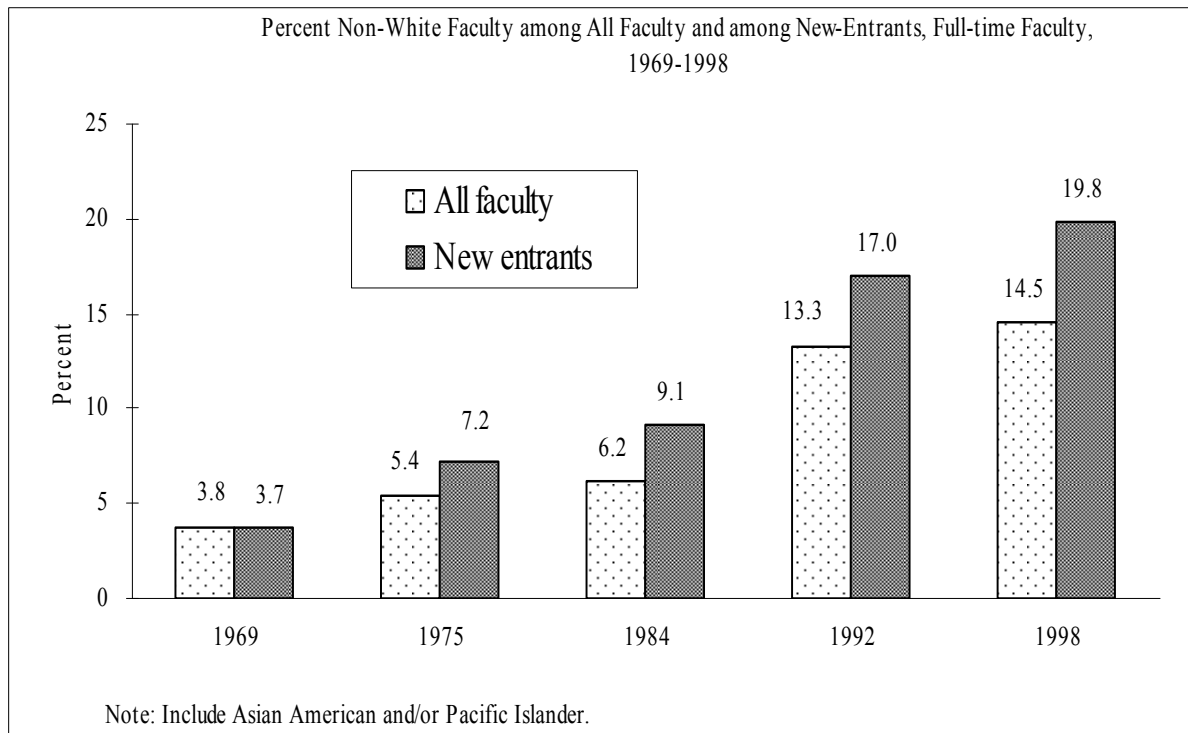
## Slide 8: Research and Development - for the Process Industry



Source: Olsson, B. *Bilateral Research Cooperation*, slide 24, 34<sup>th</sup> General Conference, Paris, 2007.

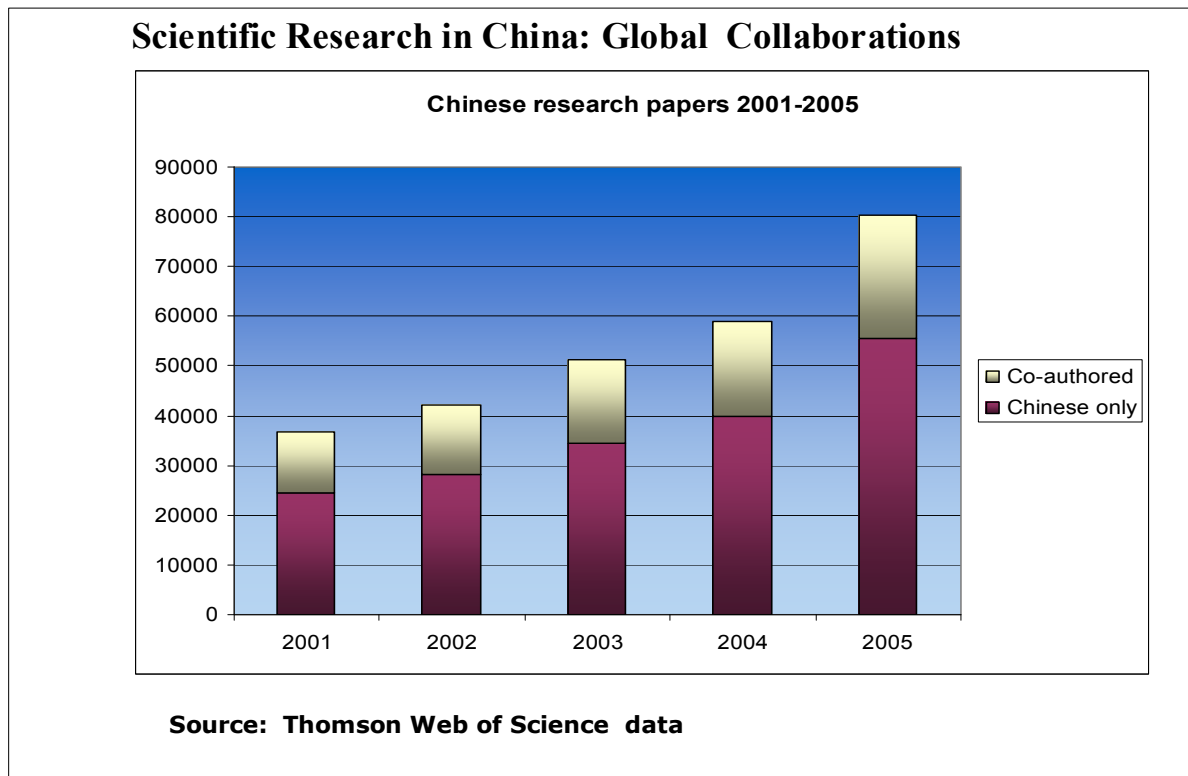


### Slide 9: Increasing Racial/Ethnic Diversity in US Faculty



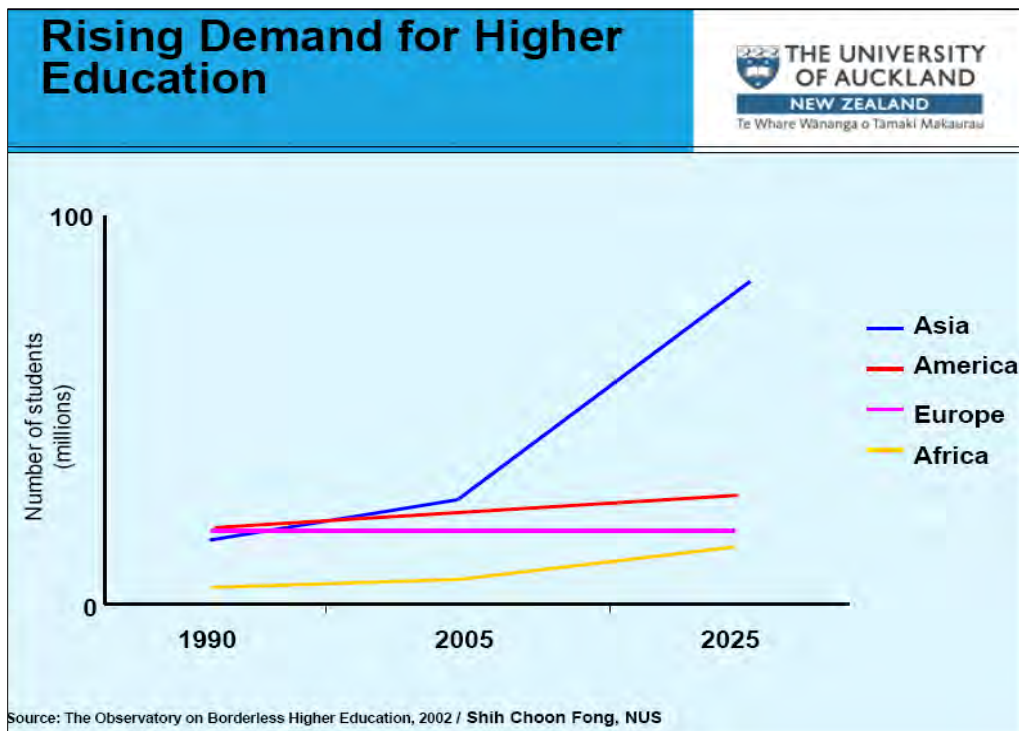
Source: Finkelstein, M. *The Changing Junior Faculty Career in the U.S.A.*, slide 6, Kassel, 2006.

### Slide 10: Scientific Research in China: Global Collaborations



Source: Yang, W. *Internalisation of Research*, slide 14, China, 2007 (source: Thomson Web of Science data).

## Slide 11: Rising Demand for Higher Education in Asia




Source: Tremewan, C. *The New Politics of Global Higher Education- International Networking*, slide 9 DUBLIN, 2007  
(source: the Observatory on Bordeless Higher Education, 2002/ Shih Choon Fong, NUS).

## Slide 12: Funding of Education and Scientific Research

## Funding of Education & Scientific Research

- Governments are the main Source of Funds In Scientific Research (97 %)
- Japan (18 %)
  - Canada, Sweden, Singapore (30%)
- Percentage of GDP
  - Egypt 0.9 %
  - The Arab World 1.5%
  - Europe 2.5%



Source: EL KAFFAS, I. *Funding of Higher Education and Scientific Research in the Arab World*, slide 4, Rabat, 2007.