Programme on Innovation, Higher Education and Research for Development (IHERD)

Background document

Research Universities:

Networking the Knowledge Economy

Final Report

A Working Paper on Policy Implications

Seminar co-hosted by OECD/Project IHERD, Sida/Sweden and Boston College, USA

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For further information, please contact IHERD Coordinator Ms. Åsa Olsson at asa.olsson@oecd.org

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Executive Summary

INTRODUCTION: RATIONALE FOR THE SEMINAR

Governments the world over have recognised that one prerequisite for realising knowledge economy is that higher education, research and innovation systems need to be more tightly linked to economic and social development. Costs of research have been growing exponentially since the end of the Second World War and the need to coordinate public research with that from industry and other nongovernmental actors has become important. Policies designed to structure national innovation systems to ensure increased returns on public investments in terms of economic growth, inclusiveness and social prosperity needs to be underpinned by more detailed information on the role of different actors in the R&D system and their ability to connect to cutting edge research which is currently taking place in transnational research networks. This information is necessary for policymakers so they know how they more efficiently can take advantage of the different actors to promote innovation and social development.

Research universities stand at the pinnacle of academic systems everywhere. They are central to a nation’s capacity both for research and for advanced education although the institutional landscape varies across countries. Some countries have a public R&D structure which includes universities, community colleges, polytechnics, research institutes, national laboratories, think-tanks and non-governmental organisations whereas other countries have a more homogeneous system. Regardless of the country, all have a specific division of labour amongst institutions. In developing countries the bulk of research is conducted in research universities.

The governance of public R&D has become more challenging because while research financing remains for the most part national, research itself is being conducted in increasingly transnational and global networks.

Governance of R&D have important implications for research universities and thus they need to develop responsive management to both be able to compete globally and to contribute to national and local development, which require good governance of the research university, talented faculties and students and solid resources for success.

Today, relatively little is known about how research systems and their associated knowledge systems actually work. Varied socio-economic conditions further complicate investigation and prevent the design of any model applicable to all situations. Interesting questions arise: Are international research networks accessible and what are their terms of engagement? What is the ability of transnational research networks to maintain a link between research excellences and local relevance? How can international research networks promote national capacity-building?
MAJOR OECD STRATEGIES AND FRAMEWORKS

The IHERD Programme (Innovation, Higher Education and Research for Development) comprises three priority areas which concern research universities: i) strengthening the policy relevance of research; ii) better informed policy-making; and iii) policy coherence with regard to investment in innovation, higher education and research. These objectives require the involvement of research universities, whatever their specific socio-economic context may be. Thus, the IHERD Programme becomes a platform to promote policy dialogue in this area amongst OECD members and other economies. Research universities will take part in this debate as they can help link national development priorities to the global knowledge society.

Proposing strategies and frameworks in priority areas for national development is a main OECD task and strength. Because a number of these tools relate directly to the IHERD seminar, its conclusions could be shaped into policy advice for an interested audience of policy-makers, higher education authorities and the academy, as well as for the public at large. Four frameworks have helped contextualise the seminar and each has implications for research universities:

- Tertiary Education for the Knowledge Society
- The OECD Innovation Strategy
- OECD Strategy on Development
- OECD Gender Initiative

In 2008, the OECD published a comprehensive international review of tertiary education policy. Its goal was to help countries share successful initiatives and policy options to maximise the contribution of tertiary education to national economic and social objectives. The eight challenges for tertiary education are identified: governance/steering, funding, quality assurance, equity, contribution to R&D and innovation, the academic career, labour market links and internationalisation. For the research universities it is important to define its appropriate location within the wider landscape of the sector and reconcile its priorities with wider national development agendas.

Innovation is critical for the global economy, given the fragile recovery to the 2008 crisis and the complexity of current economic, environmental and social challenges. Research - university, public and private – plays a central role in discovering new knowledge which translates into innovation. The 2011 Innovation Strategy concerns multiple disciplines and stakeholders, from education and training to business environment, societal infrastructure and action to create and diffuse knowledge. Although each government has specific development objectives, innovation is a common priority covering multiple policy domains.
The strategy emphasises that: i) education empowers people to innovate; ii) SMEs are a vital part of the national business sphere; iii) R&D should attract public and private investment; iv) strong science capacity underpins breakthrough innovation. Everywhere, networking is the key tool for sharing new knowledge and good practice. Innovation highlights the status and performance of research universities which are central to national capacity in this domain. Several trends are emerging: i) the Super RU model will likely continue to dominate Big Science based on basic research and top ranking tables; ii) many OECD country universities also rank well due to their solid research credentials, efficient infrastructure and cooperation mechanisms; iii) more middle-income countries (MICs) are providing the necessary support to build one or several world-class universities with efficient research management capacity; iv) low-income countries (LICs) face difficult choices regarding policy change as their education and science needs are numerous; v) Africa remains problematic for R&D and innovation issues since further investment in established research universities (including their academic networking) competes with the potential of newer drivers for development such as ICT and micro-credit.

The OECD Development strategy endorses the OECD as a policy-sharing hub for core member states and a wider audience of economies to promote development cooperation. It recognises the paradigm shift in the global economic landscape over the past fifty years which includes new centres of economic gravity, diverse growth and development models, changing modalities for development funding, and risks for development posed by poverty and global problems. The strategy, implemented in partnership with the UN and the World Bank, assumes that all countries can share lessons and improve policies based on inclusiveness and flexibility. The Development Strategy resonates with IHERD’s emphasis on strengthening research universities in middle and low-income contexts as central components of development policies. Four factors are significant: i) the role of universities as established knowledge-generating institutions in emerging nations; ii) monitoring the widely varied R&D and innovation landscapes in emerging countries; iii) increasing international mobility in tertiary education balanced by robust local research capacity; iv) African science (often located in research universities) is essential for long-term development but needs support from much stronger national research systems.

The OECD Gender Initiative is designed to contribute to the ongoing global campaign for gender equality including the economic aspects involved. It is built on three areas namely education, employment and entrepreneurship since these enhance economic opportunities. Four pillars underpin the Gender Initiative: i) data on barriers to equality; ii) indicators to measure progress; iii) evidence about women’s entrepreneurship; and iv) good practice for policymakers. The strategy involves numerous OECD directorates and a Final Report will be published in 2012. In relation to research universities, academia is a predominantly male precinct in leadership and faculty careers, although women now dominate enrolment numbers and certain fields of study. Too few universities are run by women and the scarcity of women professors and researchers in science-related fields is a continuing problem. The academy should take note of current research on workplace attitudes and practices about gender equality so as to make its optimal contribution to socio-economic development.
POLICY IMPLICATIONS OF THE SEMINAR DISCUSSIONS

NETWORKING AFRICAN RESEARCH UNIVERSITIES

- Overall strengthening of linkages with regional and international networks for university cooperation, research management, quality assurance and with learned societies
- Encouraging internationalisation via academic co-publications and interaction with learned societies
- Investing in research infrastructure such as libraries, laboratories,
- Remuneration system supporting researchers to
- Focus on improving teaching and scientific sides of the research universities
- Linking African RUs more closely with national and local business to train the skilled human capital need for the job market and to facilitate technology transfer
- Encouraging more African female academics in university leadership and as teaching and research faculty
- Further strengthening ICT capacity to underpin networking in university research

These initiatives should be complimented

- Attempting to recast the map of African universities so as to identify - and reinvest in - a select number with recognised basic science expertise which may form a Pan-African network and linking to counterparts in other regions

- Complement this initiative with serious reinforcement in a network of reputable universities with applied research capacity which can address regional development issues (e.g. universities in the SADC sub-region) and link to counterparts in other emerging economies (i.e. South-South cooperation).

(Note: The above two proposals assume the continuation of the African university sector, which will likely be the case. However, there is debate that further major investment in this area should be carefully considered in relation to better returns from other means of knowledge delivery, including ICT.)

Networking Women in the Academy

- Supporting university networks with initiatives to promote female academics as university leaders (e.g. ACU, IAUPL, IOHE) and replicating these efforts
- Supporting networks which promote female academics in research careers, especially in science-related disciplines (such as EPWS, SWE, TWOWS, WISE) where women are fewer and may need to hone their networking skills
- Networking initiatives in emerging economies which promote women in the academy and in professional life (e.g. the Asian University for Women in Bangladesh: ANWST which is the Unesco-supported Arab Network for Women in Science and Technology).
Networking Young Researchers

- Establishing national networks of young scientists via communication mechanisms such as ICT platforms and award schemes (e.g. the Indian Young Scientists Network (IYSN); the Young Scientists Network (YSN) based at Zurich's ETH University; post-doctoral fellowships managed by the New Zealand Royal Society; the Qatar Science Leadership Programme (QSLP); fellowship programmes in Brazil offered by national (e.g. CAPES) or federal (e.g. FAPESP) agencies)

- Replicating these bodies at the international level (e.g. Voices of Young Scientists (VOYS) with a data base of 5,000 experts; the International Network of Young Scientists (INYS) supported by the British Council; the Third World Network for Scientific Organisations, TWNSO, which is supported by the Third World Academy of Science, TWAS)

- Offering opportunities to young researchers from other regions to participate in networking initiatives via specific scholarship schemes (e.g. the Burkina Faso Young Researchers Network supported by the IDRC, Canada; the Australian Prime Minister's Australia-Asia Endeavour Awards).

Networking Research Universities for Global Sustainable Growth

- Firstly, sustainable growth is the principal and overarching policy goal for all linkages described above. Hundreds of thousands of networking initiatives exist - some global, some regional or national in their scope and focused on the wide variety of actors related to socio-economic development. A small sample is as follows: the United Nations University (UNU), the Unesco Chairs Programme, the ACU Research Management Network, NEPAD, Universitas 21, WUN, IARU, LERU, along with and the traditional networks exemplified by academies of science and learned societies. In all these instances, universities and the academy are central players with regard to generating and disseminating the knowledge needed for development worldwide.

- Secondly, in terms of policy, a very large segment of this networking is undertaken by civil society organisations or by quasi-governmental organisations (sometimes called “quangos”) with the support of governments. This, in itself, underscores the critically important knowledge partnership between the public sector and the academy which can only grow stronger in the future. This is because knowledge for sustainable socio-economic growth is the common purpose.

- Thirdly, a variety of new factors will gain prominence: as the research landscape grows more complex, maintaining the necessary tension between global and local problem-solving will become more important. This will require enhanced dialogue and cooperation both amongst public policy departments and amongst government, the private sector and the academy. Silo thinking (which can still be found in certain contexts) will - hopefully - become a thing of the past as it offers no positive strategies to address the complexities of development. As the world grows increasingly more interlinked (due to ICT facilities), understanding the potential of networks and leveraging these for optimal results will become standard practice.
Fourthly, academia must now demonstrate its clear social engagement in national and international development in more visible ways. This responsibility involves possessing the necessary research capacity - which, for MLIC countries, means work in progress. These contexts are very individual in scale and capacities. Although regional “motor” economies exist (e.g. Brazil for LAC), each country needs its own knowledge base which can be applied to resolving local issues. Relevant social engagement then becomes a component of policy choice. Personal statements by experts at the seminar documented the various aspects in play while cautioning that there is no “one size fits all” model for these economies:

- **Malaysia**: research collaboration at country level and focused on community issues enhances overall national research capacity.
- **Israel**: international research cooperation, though facilitated by ICT, must overcome disadvantages of geographical distance and especially the subtleties of cultural differences so as to nurture mutual understanding.
- **Qatar**: building a true research culture is a lengthy and expensive investment but one which is essential to long-term growth and prosperity; finally, policy-makers must face this reality.
- **Kenya**: despite the asymmetries of capacity in North-South research collaboration, partnering institutions always benefit from this cooperation.
- **Slovenia**: for small economies seeking to reinforce research capacity, the sheer broad scale of international research cooperation is particularly beneficial.
- **Mexico**: agency (i.e. commitment to international collaboration amongst scholars) is perhaps even more vital that institutional support for enduring and successful academic research.
- **India**: given rising revenue from R&D services (US $878 million in 2010-11), this BRIC economy must provide better research management infrastructure for international research collaboration in STI areas, while also supporting research applied to local development (which is often social science-related).
- **Egypt**: the present flux in MENA countries offers a unique opportunity to re-tool performing national systems and institutions to reinforce international research collaboration to benefit future regional development.
- **Ethiopia**: African ownership of research management remains a desirable goal, though more difficult since more donors (e.g. China, India) are now engaged in international in research collaboration.
- **Nicaragua**: for South-based partners, international research collaboration moves from dependence, through empowerment to autonomy but this process will not achieve optimal impact without a robust national research policy framework.

An analysis of the experiences described by the main participants correlated closely to the four selected OECD policy frameworks (tertiary education, innovation, development and gender), with numerous illustrations of key components (i.e. governance, the academic career, research management, funding, support for RDI, labour market links, quality assessment, ICT capacity and internationalisation). In addition, four overarching policy areas were signalled: **African development, women academics in research careers, support for young researchers and research**
relevant for sustainable, socio-economic development. Importantly, research capacity in different socio-economic contexts was illustrated by national and regional experiences from Malaysia, Israel, Qatar, Kenya, Slovenia, Mexico, India, Egypt, Ethiopia and Nicaragua. An expert from academic publishing pointed to forthcoming ICT-based developments to open wider opportunities for the MLIC research community.

**Conclusion: Towards Equitable and Dynamic Research Networks**

The seminar illustrated networking in several ways: i) how organisations such as the OECD associate the nations of the global economy, which then devolves to national institutions such as research universities; ii) how intrinsic capacity and sufficient resources can nurture academic networking; iii) how important OECD frameworks link research university networks to national policy-making; and iv) how future social change will reshape academia, thus requiring research university networks to continually modernise their capacities. A robust and collaborative response from research universities will best ensure their enduring importance.

**Conclusion: Towards Equitable and Dynamic Research Networks**

**Networking the Global Economy**

Holding this seminar under the auspices of the OECD, with its core mandate to foster economic growth in national economies, was important. This recalled the importance of establishing closer linkages amongst economies of varying scale as the world makes a collective effort to rebuild growth and prosperity after the global crisis of 2008. Hosted by the IHERD Programme (a donor-funded activity), the seminar continued the networking focus by facilitating interface amongst experts from amongst high, middle and low income countries with regard to their place in the knowledge economy. Last but not least in this process, the academics gathered at the event demonstrated both awareness that their expertise plays a major role in socio-economic development and commitment to reinforcing their networking traditions in new ways.

**Nurturing Academic Networking Capacity**

The varied experiences of the seminar demonstrated that building networks to underpin knowledge systems is a common imperative for countries and vitally important for enhanced economic performance. It is essential that these networks possess the capacity to offer equitable access for interested stakeholders and that they enjoy the intrinsic capacity and external support to carry out their linking function with optimal effect. Networks which are too elitist or
too passive in their operations will ultimately wither away as they possess no credible reference for providing new contacts and reinforcing collaboration. The critical nature of the seminar discussions articulated the challenges involved in building and sustaining these entities. In particular, networks offer valuable opportunities either for cooperation amongst stakeholders with the same profile or for wider interaction with partners in the public and private sectors, since all of these have a vested interest in supporting the knowledge economy.

**Linking Research University Networks and National Policy-Making**

This paper has studied networks in relation to the guidelines suggested by important OECD policy frameworks. While not prescriptive, these tools provide useful advice to governments eager to improve their performance in the knowledge economy by reorienting certain sectors and structures in cooperation with their private sector and civil society partners. Each of the frameworks discussed - for Tertiary Education, Innovation, Development and Gender Equity - has clear ramifications for the future profiles and operations of the academy which will remain a cornerstone of knowledge systems.

**Reappraising the Components and Impact of Research University Networks**

Looking ahead to 2050, it is already known that major social changes are already in progress and these will profoundly affect currently held assumptions and paradigms. New demographic patterns and rapid acceleration in cultural diversity are at the forefront of these imminent global transformations. From an economic standpoint, it is predicted that full recovery from the 2008 crisis could take another twenty years. Throughout this period, the Tertiary Education sector will be deeply concerned by these changes, with universities likely to be the institutions most pressured to reorient provision of their traditional research and teaching functions. According to opinion-shapers in the sector, signs of change are already evident: for example, the President of MIT (Professor Rafael Reif, an electrical engineer by training) believes classic university models will be radically reshaped by ICT potential; another instance is the “100 Under 50” Report of the Times Higher Education (June 2012) which identified young institutions - mainly in Asia - poised for future leadership due to their innovative approaches. So, the term ‘world-class university status” may be ripe for reappraisal. This will focus on approaches to governance, institutional leadership, investment and fundraising, quality and critically oriented teaching, facilitating basic or applied research and innovation, ever stronger ICT capacities, nurturing the modern academy (including greater gender equity) and enhanced international outreach and collaboration. All of these aspects figured prominently throughout the seminar discussions on research universities as knowledge networks.

As history has shown, knowledge networks, including research universities, are entities in continuous evolution. For the latter group, adapting to the changes ahead and choosing the best policies to address this process constitute their most pressing challenges. Current dangers are numerous, inter alia, significant changes in conditions for securing academic tenure and the risk
of politicised ownership of R&D and innovation. Thus, a robust and collaborative response is required to reaffirm the enduring importance of the academy. Adherence to a policy of "stronger together" and demonstrating this collegiality through more intensive cooperation in equitable and dynamic academic networks could be the most intelligent strategy for assuring the optimal future of research universities.

The main papers addressed a wide range of aspects specific to research universities and the actors essential for their networking. Authors and their discussants represented all regions of the world so the global scope of the experiences tabled was assured.

Topics covered were:

Addressing the national and global knowledge economy;

The regional and international networking of universities;

Researcher mobility; Managing academic knowledge networks;

Centres of Excellence and Research in Africa;

Building national research capacity; North-South partnerships between research universities;

Internationalisation, research and the knowledge society: Implications for the Middle East and North Africa (MENA) Region;

The impact of ranking systems on middle-income country research universities;

Learned Societies as a bridge between research, policy-making and funding;

Research universities, technology transfer and job creation.

Major Policy Linkages
Policy Implications

Introduction

Research Universities under Scrutiny

In choosing the title of Research Universities: Networking the Knowledge Economy, the seminar sought to focus on the powerful role played by these particular academic institutions in promoting economic growth and social wellbeing. This recalls a remark from the Final Report of the 2010 OECD/IMHE Conference which stated “today universities are crucial motors of the knowledge economy and so they become key partners for governments.” This role is characterised by multiple facets and complex tensions which require constant dialogue amongst the concerned stakeholders, namely governments, the institutions themselves, actors in the national and global economies (including the private sector) and society at large.

Higher education is now a major industry worldwide. Expansion has been dramatic with more than 200 million students, 40,000 post-secondary institutions, and billions spent on the higher education enterprise. Academic institutions have always been highly complex entities with close affinities to large corporations in terms of size, scope and organisation. Today most countries have a range of academic institutions with different missions and the presence of the private sector within the higher education landscape has become an established reality. Expansion has brought diversity of purpose. Certain higher education institutions address the growing demand for access, both from national populations as well as from international students. Others, notably research universities, align academic research to national economic growth and social development, thereby linking up to the national and global knowledge economy.

Research universities stand at the pinnacle of academic systems everywhere. They are central to a nation’s capacity both for research and for advanced education. Furthermore, depending on their quality and resources, they are part of the new global knowledge economy and can attain “world-class” status. Top research universities in industrialised countries (often referred to as the Super RUs) usually dominate the global ranking tables. In contrast, their counterparts in middle and low-income countries have, if anything, more important missions because they are the engines of local knowledge development and natural leaders of their own evolving academic systems. As these systems become increasingly complex and as the need to nurture knowledge networks for research grows ever more essential, the success of these institutions is crucial for national development policy.
Exploring the Dynamics of Research Universities and Knowledge Systems

At the present time, relatively little is known about how research systems and their associated knowledge systems actually work. There is only a modest research base concerning the higher education enterprise and information within countries and across national boundaries remains limited. Yet, recent research findings would suggest that cutting-edge research (notably that in science-related fields) is best conceptualised in transnational research spaces, which are often virtual in character. Moreover, the most robust research available from R&D and Innovation policy studies (led by scholars such as Maria Nedeva of UMIST/ Manchester University) seems to conclude that a strong and well-performing national system is a prerequisite for entry and participation in this newly emerging transnational research area (Nedeva :2012, Luukkonen and Medeva: 2010). Also, large-scale international research networks may provide opportunities for universities from emerging and developing countries to connect with scientific investigation, even if the latter’s overall research capacity is small. Interesting questions are then posed: To what extent are international research networks accessible and what are the terms of engagement? What is the ability of transnational research networks ability to maintain a link between research excellences and local needs? How can international research networks promote national capacity-building?

Consequently, the management of R&D and innovation has emerged as a specialised area within higher education institutions. Over the past two decades, new modalities in these fields have evolved against a backdrop of major changes in the wider tertiary education sector as a whole. These changes have been charted by seminal reports published by, inter alia, the OECD (e.g. Tertiary Education for the Knowledge Society Volumes 1 and II, 2008), the World Bank (e.g. Higher Education in Developing Countries: Peril or Promise? 2002), and UNESCO (e.g. Higher Education, Research and Innovation: Changing Dynamics, 2009) . New modalities include the attraction and management of research funding, liaison with funding bodies, more effective project planning and implementation, more sophisticated approaches to monitoring and evaluation processes, publications, research dissemination and, in some cases, the commercialisation of research outcomes.

Since many universities now operate with multi-billion dollar budgets, their sheer scale requires highly competent leaders and managers. For research universities which aspire to be world-class in their performance, leadership presents special challenges in the present context of the knowledge economy. This role requires persons of exceptional talent whose responsibilities are multi-faceted, inter alia: defining a mission for the institution and its creative strategy for change in an evolving social context, responding to policy opportunities, protecting scholarship for quality research, encouraging bold experimentation in teaching and learning, forging alliances with stakeholders, spearheading fund-raising efforts and communicating to concerned partners the institution's activities. This leadership agenda is
realised through efficient and effective management strategies which clearly demonstrate the institution's contribution to local and international development (Kearney and Yelland:2010). However, although excellence in leadership and management assure the aspect of good governance, two other components are also necessary namely gifted faculty and students and solid resources. When all three conditions are present, an institution is equipped to perform at the best possible level and so to enjoy “world-class” status (Salmi:2009).

Graphic 1. Excellence in Graduate Education Delivered by World Class Universities

In the research area, institutional managers have a dual responsibility: on one hand, they develop and implement research policy, and on the other hand, they play a key role in ensuring that the researchers themselves have adequate skills in areas such as grant writing and management, team leadership, research student supervision, and writing for a wider public and competence in the ethics of science. In middle and low-income countries, the actual research resources available to institutions can often be scarce. So it is even more important that these be effectively managed. Similarly, while there is a growing recognition in these contexts that strong research universities need both gifted leaders and also professional managers and administrators, there is insufficient training provided to those who are charged with these forms of leadership.

Furthermore, the majority of universities recognise the need for internal data and analysis to assist them in knowledge organisation and management. As a result, greater capacity-building in this area has become urgent. Scholarly journals and online resources are important conduits for disseminating research and analysis, but, like the higher education media, they flourish in
some parts of the world but not in others. Over the past twenty years, access to scientific knowledge in developing countries has made considerable strides forward. In this regard, the efforts of bodies such as the International Network for the Availability of Scientific Journals (INASP) have been particularly instrumental. Nevertheless, clear imbalances continue to exist and impede equality of access to vital knowledge.

Seminar Hosts

The seminar benefited from the orientation and support of three partners:

- OECD’s IHERD Programme (Innovation, Higher Education and Research for Development) which aims to increase knowledge and awareness of policy and management instruments in higher education, research and innovation, and to share this knowledge with middle and low-income countries so that they are better equipped to plan, produce and use research and innovation for sustainable economic growth;

- the Swedish International Development Cooperation Agency (Sida/Sweden) which is a public sector agency working on behalf of the Swedish Parliament and Government and charged with the reduction of poverty to improve the quality of people’s lives. The projects supported by Sida are part of Sweden’s Policy for Global Development embracing areas such as economics, the environment, knowledge, health and social development, culture, human security and international cooperation. Regarding modalities, special emphasis is accorded to capacity-building and research notably strengthening universities, research infrastructure and research cooperation for science and socio-economic development;

- the Centre for International Higher Education (CIHE) of Boston College which has long and distinguished experience in observing the complex conditions which permit research universities to thrive. In this work, the scholarship of Professor Philip Altbach, the CIHE Director, has provided invaluable input both in collaboration with his immediate colleagues (Altbach et al.:2009, Albach:2012) and with experts from a wider context (Altbach and Salmi:2011). For the seminar, the CIHE commissioned scholarly papers which offer a detailed, research-based discussion of the principal elements of knowledge infrastructure so as to better understand the realities and future prospects of research universities in middle and low-income countries. Special focus was given to the international knowledge networks that are so crucial to the success of these emerging institutions and that permit them to be both globally linked and locally relevant.
Last but not least, the global perspective of the seminar should be strongly emphasised. The debate studied key aspects of knowledge networks for research so that the experiences of these entities in high-income countries could be discussed alongside similar efforts in emerging economies in this same area. This analysis accorded equal attention to both the creation of knowledge and to its uses. For this reason, the seminar debates were able to study the dynamics of these networks, their methods of communication and the challenges related to strengthening their operation in an ever-more complex global environment. Network theory requires consideration of various aspects such as the profiles of the actors involved, their motivations, attitudes to collaboration (including sensitive issues such as achieving shared understanding and trust) modus operandi (which encompasses differences in cultural perceptions and work habits), accrued benefits and ways in which networking can be leveraged (Castells:2009). These important perspectives were reflected throughout the seminar discussions.

Contextualising Research Universities in the OECD Context

OECD/Programme IHERD: Links to Research Universities

A closer scrutiny of IHERD shows how its three priority actions necessitate direct linkages with research universities:

➢ **STRENGTHENING THE POLICY RELEVANCE OF RESEARCH**

Policy-relevant research and its complement, evidence-based policy-making, constitute the primary objective of IHERD in relation to higher education, research and innovation. This will be achieved by stimulating a shift in the research agenda so as to review and reorient existing research, commissioning new research which is directly attuned to development goals and by fostering closer networking with researchers and their institutions in the IHERD field worldwide. As a result, the OECD will become a more powerful policy reference not only to its core member states but beyond in more varied socio-economic contexts. In both industrialised and emerging economies, this objective requires the involvement of research universities which are a pillar for knowledge generation and its applications to enhance public policy-making and to stimulate national development.

➢ **BETTER INFORMED POLICY-MAKING**

The OECD has long espoused the view that integrated IHERD systems are the necessary base for economic advancement. In the current knowledge economy, governments in all parts of the world now recognise that these systems (which are closely linked to economic development)
are a pre-requisite for competitiveness. A good example is Chile, one of the newest members of the OECD. In an interview with CNN’s Business reporters on 15 October 2012, President Sebastian Pinera stated that his aim is to build his country into a high-income economy by 2020. To do so, renovation of higher education, research and innovation policies would constitute, in his opinion, an essential base for progress.

By using IHERD as a platform to promote policy dialogue amongst its members and other economies and to widely disseminate the results, the OECD will facilitate a more informed base for policy-making.

As strong research universities will be a cornerstone of this policy, it will be necessary to renovate higher education policy so as to build world-class institutions which will allow a country to compete in the global economy.

- **Policy coherence with regard to investment in innovation, higher education and research**

As the economic downturn continues, governments need to increase their returns on public investment through improved policy coherence and systemic efficiency. One way to reach this goal is to identify and build upon complementarities in the higher education and research systems, notably in specific sectors need for national development.

The OECD intends to promote policy coherence through encouraging partnerships with key development actors such as the International Forum for Research Donors (IFORD) and by convening multi-stakeholder dialogue amongst governments, the research community and the private sector. These initiatives will necessarily involve the participation of research universities since these are major players in each national context with reliable linkages to the global knowledge society.

**Major OECD Strategies and Frameworks**

Proposing strategies and frameworks in priority areas for national development is a main OECD task and strength. A number of these tools related directly to the IHERD seminar so that its conclusions could be shaped into policy advice for an interested audience of policy-makers, higher education authorities and the academy, as well as for the public at large. Four frameworks helped contextualise the seminar and each has implications for research universities:
Tertiary Education for the Knowledge Society

Due to the increasing importance of Tertiary Education policy for national agendas, the OECD undertook a comprehensive international review of this area from 2004 to 2008. Tertiary Education is wider in scope than Higher Education which is primarily university-based. The Review aimed to help countries share innovative and successful initiatives and to identify policy options to maximise the contribution of tertiary education to national economic and social objectives.

Today, there is wide recognition that Tertiary Education is a major motor for economic competitiveness in an increasingly knowledge-driven global economy. This presents new imperatives for countries, namely i) to ensure higher-level employment skills; ii) to sustain a globally competitive research base; and iii) to improve knowledge dissemination to the benefit of society. Four major missions channel the contribution of this sector to socio-economic growth:

- the formation of human capital (primarily through teaching);
- the building of knowledge bases (via research and knowledge development);
- the dissemination and use of knowledge (through interactions with knowledge users);
- the maintenance of knowledge (i.e. the inter-generational storage and transmission of knowledge).

Over some fifty years, Tertiary Education has evolved from predominantly university-based teaching and research into a much more diversified space which encompasses newer types of institutions such as polytechnics, university colleges or technological institutes in addition to universities. The reasons for this change are significant: to develop a closer relationship between tertiary education and the external world, including greater responsiveness to labour market needs; to broaden social and geographical access to tertiary qualifications; to provide high-level occupational training in more applied ways; and to meet the growing diversity of qualifications and expectations of secondary school graduates. As a result, institutions do more than teach, train and research, as they can also provide consultancy services to government and industry and engage with wider communities, both locally, regionally and internationally.

The main trends characterising this transformed sector are: the expansion of tertiary education systems; diversified provision; more heterogeneous student bodies; new financing arrangements; a stronger focus on accountability and performance; new forms of institutional governance; and the rise of global networking, mobility and collaboration. Consequently, eight new policy challenges have emerged for decision-makers: steering/governance, funding, ensuring equity; quality assurance; reappraising the contribution of the sector to R & D and innovation; redefining the academic career; promoting links with the labour market; and addressing internationalisation (OECD, 2008).
Implications for Research Universities

Against this backdrop, Institutions must find their appropriate location within the sector. This means that individual priorities need to be reconciled with wider national social and economic agendas. Each institution – including the archetypal research university -is expected to demonstrate its specific responses to the eight domains (listed above) considered critical for the future. Hence, well-managed and autonomous institutions are the model considered to produce the best results.

Graphic 2: Aspects of Institutional Autonomy

In reality, this change has forced a profound reflection amongst those institutions -hitherto unchallenged as to their profile and impact - to reassess their strengths and eventual lacunae with a view to consolidating or repositioning themselves in the traditional landscape of research and research-based teaching. Therefore, it may be argued that the challenges presented by the sector’s transformation have been beneficial to restating the crucial importance of universities as a type of tertiary education institution.

Recent years have seen research universities respond to major new challenges regarding their mission, performance and impact. In all cases, a defining benchmark for success resides in the fundamental combination of facilitating governance, top talent and ample resources, as proposed by Jamil Salmi of the World Bank in his research on these institutions in extremely varied world contexts:

- The best-known institutions, known as Super RUs, are the most generously endowed, enjoy mega-status in a very limited environment and constitute an elite network which is difficult to emulate elsewhere. Members include the Ivy League universities in the USA and the Russell Group in the United Kingdom. Their common brand of reputation and production has secured their place as cutting-edge and research-generating knowledge hubs. The brand of these Super RUs is such that their modus operandi is unique due to their vast resources and stellar-level research and teaching faculty.

- Next comes the category known as World Class Universities (WCUs) which may hold a privileged place inside national systems due to their judicious management of resources and talent, encouraged by sound governance and management structures. In the main, these are both research and teaching universities as they must perform well in both areas. The most important test for such institutions is the university ranking tables (e.g. Shanghai Jiao Tong, THE, QS and others) which list institutions according to stringent and varied criteria. These institutions are often strongly science-based and their ranking may well be enhanced by the existence of a Medical School on campus. The WCU phenomenon and race for top slots in the ranking tables has convinced countries of the
need to nurture a select number of top research-oriented universities as part of their Tertiary Education systems.

- The most complex category is that comprising institutions which are research universities in name but whose leadership, faculty and output may never permit them to reach the top echelons of the ranking tables, either regionally or globally. Nevertheless, these institutions are the main academic conduits for knowledge networking in lower income countries. Thus, the policy decisions regarding their development and reinforcement are particularly sensitive and have far-reaching implications for national development.

Today, universities everywhere face a common challenge as they must address the tension between the pursuits of knowledge generation *per se* and their specific role in attaining national development priorities. Socio-economic contexts play a crucial role in this challenge and political stability is essential for success in certain middle and low income countries. For these reasons, OECD policy proposals in Tertiary Education are attracting worldwide attention as governments seek to benefit from the benefits offered by the knowledge economy. In this process, judicious choices are essential.

### The OECD Innovation Strategy

Innovation has become a frequently used term in recent discourse related to the global economy. In the wake of the 2008 crisis, the world faces a fragile recovery process with many economic, environmental and social challenges. While no single policy can be expected to resolve this situation, innovation has emerged as a key component for improving economic performance and social wellbeing. Though innovation has always existed, today this is a more complex process involving a wide range of actors and their specific talents. In the past, innovation was largely the domain of basic scientific research which was carried out in research and university laboratories, whether public or private. In contrast, innovation now interests civil society, notably the philanthropy sector, and also individuals who may undertake entrepreneurial ventures to explore their possible socio-economic impact. As a result of these changes, current policies related to innovation should be adapted to the present environment and the multiple actors involved so as obtaining maximum benefits. This does not in any way deflect attention from the imperative to promote innovation resulting from science, engineering and technology (SET). In today's ICT-connected world, it is to be expected that new discoveries and applications in these fields occupy a special place as drivers of economic development and growth. For this reason, international cooperation in these areas has particular importance.

This framework is a rolling process which is regularly updated as economic conditions change and as the SET and ICT sectors evolve. Numerous concerned parties from both the public and private sectors follow this process with great interest. Not surprisingly, the latest version - The 2011 Innovation Strategy – has attracted particular attention, on one hand, because innovation
is seen as a possible job creator in the ongoing economic downturn, and on the other hand, because the most impressive success stories come from young companies whose CEOs and staff are frequently under 30 years old.

The 2011 Innovation Strategy is the outcome of three years of dialogue and analysis of good practice. In this regard, it concerns multiple disciplines and stakeholders, as well as the interface amongst these. The policy guidance provided covers a wide spectrum of issues from education and training to business environment, societal infrastructure and action which fosters the creation and diffusion of knowledge. As each government has its own social and economic objectives, different innovation strategies will be necessary to achieve these. This flexibility is inherent in the OECD approach which advocates taking into account the interplay of different policy domains and the need for supportive mechanisms which facilitate their interaction at local, national, regional and international levels.

Graphic 3: The 2011 OECD Innovation Strategy

The process leading to the articulation of this strategy has highlighted certain issues for special consideration:
People must be empowered to innovate, hence the role of education which can provide quality and relevant content and skills so that students will learn - and continue to learn - throughout life.

In the business sphere, small and medium-sized countries are vital actors which can translate ideas and knowledge into jobs and wealth because they are more flexible than large companies. Thus, government support for these dynamic enterprises is vital.

Basic R&D provides the foundation for future innovation and is thus an essential investment by the public sector but also increasingly for private sources. In certain countries (e.g. Australia), investment is fairly equally distributed between these two areas.

Science is the sine qua non for major innovative advancements known as "step changes" (e.g. the Internet or breakthrough medical vaccines against deadly diseases). Access to this sort of innovation is vital and can be facilitated by international networks which enable talented and creative people to collaborate. Governments - in cooperation with the private sector - must facilitate this collaboration by putting in place the necessary ICT-connected platforms to share data and experiences.

As seen by the OECD, innovation is a horizontal and multi-policy effort which can provide a coherent climate where new knowledge and its applications can flourish. In this regard, it resonates closely with the Mode 2 Knowledge theory advanced in the 1990s by an eminent group of experts in science and education including Michael Gibbons, Helga Nowotny, Peter Scott, Simon Schwartzmann and Martin Trow. Mode 2 Knowledge claimed that growing societal complexity required new approaches to problem-solving and called for better measurement indicators to demonstrate that innovation has many facets (including the intangible) and impacts on all areas of society (Gibbons et al:1994). Last but not least, the Innovation Strategy constantly refers to connection and networking as essential tools for the many stakeholders involved (OECD, 2011).

**Implications for Research Universities**

The current emphasis on the economic importance of innovation constitutes a real litmus test for research universities. An analysis of the necessary factors involved this domain (e.g. robust SET and ICT capacity, investment in R&D, enabling business environments, creative approaches to education and training) shows whether a country is able to respond to opportunities arising from a pro-Innovation policy climate. The status and performance of public or private research universities is central to this national picture. Five trends merit comment:

- The Super RU model will likely continue to dominate Big Science based on basic research. This profile is currently found mainly in the USA and UK where internal institutional resources are abundant and where the external infrastructure (such as Councils for Research and Science and Technology and Learned Societies) is solid. Big Science is a small and elite field open to top faculty with an excellent academic track record including publications. It is a very mobile area which seeks and welcomes
international talent, though this is often a source of brain drain for promising scientists from MLIC backgrounds.

- In OECD countries, a sizeable number of research universities have sound research reputations and operate in the favourable climates which are now advocated as necessary. In SET fields, they have efficient research management mechanisms for cooperation with the public and private sectors such as Technology Transfer Offices and science parks. Such institutions rate rather well in ranking tables.

**Graphic 4: Share of Science and Engineering Doctorates in OECD Countries 2007**

- Next, MIC countries are striving to ensure that they can count world-class universities - several or even just one depending on a country size and resources - amongst their tertiary education institutions. Examples are the National University of Singapore (NUS), Campinas in Brazil and King Abdullah University of Science and Technology (KAUST) in Saudi Arabia. This objective requires strong government support to help provide the necessary conditions in governance, resources and the rewards are evidenced by presence in the various university ranking tables. Often, these institutions are located in countries which are trying to strengthen their overall external environment for R&D and innovation by establishing the required infrastructure and bodies to manage this.

- Low income countries (LICs) face the hardest choices regarding research universities. They are dealing with enormous problems at all levels of education and their investment in high-level scientific research is restricted. Moreover, research infrastructure is limited, fragile or non-existent. Examples are small island states vulnerable to climate change, those with single-sector economies (e.g. Caribbean states where tourism is the economic base) or those depending on one major economic commodity which needs linkage to innovation in agriculture or minerals (e.g. Zambia’s copper resources). Their unique conditions are such that they need to maintain close links to relevant research via efficient networking including ICT access.

- Africa remains the most problematic region for R&D and innovation issues. The debate on the relevance and level of investment in its research universities is ongoing, despite the fact that many countries have some type of research and funding infrastructure (e.g. research institutes, University Grants Committees) which date from their colonial pasts. In the academic area poor scientific capacity and publications have characterised this region. In contrast, much attention is given to support for the potential of innovation in other areas, such ICT, micro-credit for SMEs, new energy resources, as these offer leapfrog opening for development. Thus, academic R&D must fight for survival and major rethinking of strategies, along with pragmatic choices, can be expected. More than ever before, university networking constitutes a crucial link to the global academic
environment. University-based NGOs (e.g. AAU, ACU, AUF) and schemes such as the UNESCO Chairs Programme play important roles in this process.

Across all these trends, significant academic-oriented factors stand out, notably the role of university R&D in national research, the importance of university networking to help strengthen innovation capacity, and the growing influence of university ranking tables. The challenges for research universities to sharpen their profile and focus their areas of excellence will surely grow more urgent in the near future.

The OECD Strategy on Development

At the OECD’s 50th Anniversary Council Meeting in 2011, Ministers endorsed a new vision and framework in which the Organisation would implement a comprehensive approach to development and move towards more inclusive policy-sharing for its core member states and for economies beyond. The Strategy on Development (2012) is based on the OECD’s accumulated experience in this field, on promoting effectiveness and impact of international development cooperation, as well as on its inter-disciplinary experience in public policy making. This initiative links to the OECD’s support to the role and action plans of the G20, dating from 2008 when the Organisation was requested to provide analyses, data and policy recommendations related to the main subjects of debate and decision.

The Strategy’s rationale recognises the paradigm shift in the global economic landscape over the past fifty years which includes: i) new centres of economic gravity; ii) diverse growth and development models; iii) changing modalities for development funding; iv) evolving patterns in the geography and nature of poverty (found often in middle-income countries as well as in low-income states); v) the negative impact of socio-economic inequality; vi) the correlation between development and global challenges such as climate change, natural resource scarcity, and food and energy insecurity; and vii) the multifaceted consequences of economic and financial crises. The strategy, to be implemented in partnership with the UN Millennium Development Goals and the World Bank, has as its main goal “higher and more inclusive growth in the widest array of countries”, thus reiterating the purposes of the OECD High-level Forum on Development Aid held in Busan, Republic of Korea in 2011, after earlier meetings in Paris, Accra and Rome.

The approach to the strategy builds on the OECD’s core economic experience and expertise, thus leveraging its comparative advantages in this domain. The heterogeneity of growth and development models will be a major factor for consideration and other OECD policy frameworks and partnerships will need to be adapted to a much more diverse range of contexts. Four areas of thematic focus have been selected: i) innovative and sustainable sources of growth; ii) mobilisation of resources for development; iii) governance for development; and iv) measuring progress towards development.
Levels of engagement will address: supporting national capacities to design policies consistent with development; contributing to global processes and development architecture; and strengthening interface with development economies. All parts of the OECD Secretariat are committed to involvement in this Strategy so as to share expertise in the optimal manner. In its objectives and action modalities, the Strategy assumes that all countries can prosper by learning lessons from one another, sharing ideas and improving policies based on inclusiveness and flexibility.

**Implications for Research Universities**

The Development Strategy resonates strongly with IHERD’s emphasis on strengthening research universities in middle and low-income contexts and placing them at the heart of development policies. Four factors have special significance:

- The role of universities as established knowledge-generating institutions in emerging economies. It is a fact that, until now, broad sectors for knowledge generation and research and involving multiple actors for this purpose have largely been located in high-level economies (HICs). In these contexts, research universities have fulfilled their mission alongside an array of research institutes, specialised organisations and think tanks, both public and private, which operate with sophisticated research objectives and generous resourcing. In contract, the research universities in middle and low income countries assure the core of high-level knowledge, international training and research activity to a great extent. In recent years, middle-level countries have invested heavily in their best research universities to ensure that they can interface effectively - and on relatively equal footing - with wealthier counterparts. Though certain institutions may be struggling in difficult contexts, their devotion to their core mission remains unchanged.
Charting and monitoring the widely varied R&D and innovation landscapes in emerging countries will show that research universities are key actors within this space. The knowledge economy is strongly oriented to scientific research and capacity and it is here that strengths and weaknesses of research universities in certain MLICs assume special significance. Success stories abound when governments have proven their commitment to these institutions by recognising their status and investing in their growth. The examples of research universities in Singapore, Chile, the Gulf States and South Africa illustrate this objective. Further proof comes from the various ranking tables which are increasingly adding new institutions from non-OECD economies to their lists of innovative and successful knowledge hubs. However, elsewhere, the picture is less rosy and hard choices must be made by public authorities to find the necessary support if their ambition is to compete in the realm of "world-class universities".

Increasing international exchange and mobility in tertiary education requires that local research capacity be retained and reinforced via more effective university research management and international research collaboration underpinned by stronger local ICT capacity. Many of the problems related to weak knowledge capacity can be traced to the brain drain. Certain countries (e.g. China and Brazil) have ensured return schemes and considerable effort has been made in relation to brain circulation and in mobilising the Diaspora. However, academic mobility is a growing domain and attractive conditions for teaching and research remain likely to attract future faculty from MLICs where facilities are limited. Efforts to design and implement sustainable capacity-building
projects should be a top priority for national authorities, for research universities and for donors.

- Despite progress in recent years, Africa still faces massive development problems. Many of the points listed above concern Africa in very serious ways. African academia enjoyed a successful heyday in the 1960s and 1970s when newly independent countries built institutions based on the European model for educated elites who then took essential posts in government and in the private sector. This era included the rise of African science capacity which abruptly stopped when policies promoting basic and secondary education came into favour. Today, Africa must urgently renovate its R&D and innovation capacity – firstly, to manage its vast indigenous wealth and secondly, to compete in the global knowledge economy. This will require sound national research systems, the retention of top researchers, improved data collection, greater presence in scientific publishing and research-based policy-making. Whether African research universities can rise to this challenge is a hot topic for debate. Finding workable solutions becomes pressing as the region cannot be disconnected from the rest of the world economy. In this regard, efficient schemes to network universities with research capacity still generate benefits which justify support.

### The OECD Gender Initiative

This strategy is designed to contribute to the ongoing global campaign for gender equality and, in particular, to highlight the economic aspects involved. Women constitute half of the world’s population and often form the majority of the workforce, albeit at lower levels of employment. While providing equal educational opportunities remains a fundamental objective, increasing the participation of qualified women in leadership and management roles has become the major thrust of gender advocacy and activism. Here, the barriers remain high and strong resistance to equal decision-making in political and socio-economic domains is an unfortunate reality. While huge steps forward have been taken, notably in education, accessing the natural benefits of this (such as equal pay scales and higher living standards) remains problematic for many women worldwide.

In this context, the OECD has built its strategy on three areas namely education, employment and entrepreneurship since these are key pathways to better economic opportunities. Four pillars underpin the Gender Initiative: i) data on barriers to equality; ii) indicators to measure progress; iii) evidence about women’s entrepreneurship; and iv) the collection of good practice for policy-makers.

**Graphic 6: Internal rates of return to tertiary education showing benefits for women graduates in OECD countries**
The strategy involves numerous OECD directorates and specialised centres, inter alia, social policy, education, finance and enterprise, public governance, science, technology and innovation, statistics and development cooperation. This acknowledges the fact that gender equality relates to numerous areas of expertise and is thus a common priority. A Final Report will be published in late 2012 and will include analysis of issues such as the economic case for gender equality, retaining girls and boys in school, choosing to study sciences or humanities, achieving gender balance in company boards, parental support to handle work and domestic responsibilities, characteristics of women entrepreneurs and facilitating their access to credit.

**Implications for Research Universities**

Although women may now form the majority of overall enrolment numbers in certain fields of study, the academy continues to be a predominantly male precinct in its leadership and faculty career paths. In general, too few universities are run by women, with female leadership notably absent in the top research institutions. Since this is true both in high income countries and emerging economies, the problem clearly has global proportions. When appointments are made at the president and vice-chancellor levels (e.g. Harvard and MIT in the USA and the Vice-Chancellors of Cambridge and St Andrews in the United Kingdom), the discussion usually includes elements of tokenism and political correctness. Some exceptions do exist – for example, the Philippines can boast that 39% of all Tertiary Education institutions are led by women. This is unusual, both in Asia and in the world.

In particular, the scarcity of women professors and star researchers in science-related fields is a long-standing problem with no solution in immediate sight. The reasons for this bleak picture are well known and include the problem of girls who lack confidence to tackle science subjects at secondary schools level, the lack of flexible workplace conditions for young female academics juggling career challenges and domestic duties, and the absence of a female presence in the often esoteric and closed circles of academic decision-making. Fortunately, exceptions do exist - for example, Elinor Ostrom of Indiana University who won the Nobel Prize for Economics in 2009 and Baroness Susan Greenfield, a Cambridge University Chemistry professor who is a past Director of the Royal Institution, a British think tank for science. However, the occasional examples of good practice cannot compensate for the reality that university politics and academic leadership remain generally outdated in relation to gender equality and, to date, their track record to remedy this situation is not sufficiently impressive. Even when institutional policies to support this principle are in place, the top echelons of the academic landscape is curiously devoid of women, thus contrasting sharply with the better results achieved in politics and business which are parallel domains where power is traditionally male.

The academy should take heed of current research on workplace attitudes and practices which promote equal opportunity and generate tangible social benefits for men and women alike. These are described in *Womenomics* (Shipman and Kay, 2009) which advocates a redefinition of career paths for women, based on their success when able to take advantage of flexible
workplaces. When such opportunities are ignored, the academy does itself a grave disservice as it cannot make its optimal contribution to socio-economic development.

Policy Implications of the Seminar Discussions

Each seminar presentation constituted a particular narrative to illustrate the diverse ways in which research universities contribute to networking the knowledge economy and the range of academic actors involved in this process. The overall discussions - i.e. presentations, reactions and general debate - demonstrated that the content of the case studies resonates with the major policy proposals contained in the OECD strategies outlined above.

Narratives Related to Research Networks and Their Actors

Session 1: Advancing the National and Global Knowledge Economy: The Role of Research Universities in Developing Countries

Philip Altbach, Boston College, USA

Policy Points

- Contribution of RUs to R&D and innovation; academic research careers; capacity for research management and funding; quality standards; networking RUs to promote internationalisation and access to knowledge.

Research universities (RUs) are central to the knowledge economy and thus their role and definition within the field of research cooperation needs to be fully understood. These institutions are unique because of their mission and strengths and can be considered to sit at the top of a higher education system. In the USA, the California example is noteworthy for its pyramid consisting of top research universities (e.g. Stanford and Berkeley), solid state institutions and a layer of community colleges. This model also characterises the higher education sector in other OECD economies.

Traditionally, RUs have trained the academy of the future and play a significant role in providing and supporting national leadership. Their origins are found in three areas: the post-colonial college, the Humboldt research-intensive model and the American Land Grant universities dating from 1863.

In contrast, such systems are rare in middle and low-income countries. While the USA may boast over 200 research universities within a system of some 4 000 institutions, even nations with massive populations are far from this scenario. By way of example, China is aiming to have some 100 top RUs within the next few decades. At the present time, it has around 9 RUs based
on the Ivy League model (e.g. Tsinghua, Beijing, Fudan, Zhejiang), out of roughly 3,000 institutions catering for 20 million students.

However, with the advent of the knowledge economy and in the context of post-massified higher education, the profile of RUs has sharpened as has their place as part of an overall higher education system. They play a key role in relation to national growth policies but, at the same time, retain their voice as social critics thanks to the principle of academic freedom. They are invariably highly internationalised, preferred by gifted students, use English as the main or dual language of instruction and are strong in the science and technology fields. They are principal actors within global academic networks due to their capacity to communicate knowledge and can boast a distinguished faculty (including Nobel Prize laureats) who are frequently cited in key academic journals. Their facilities include major libraries and laboratories as well as cutting-edge ICT capacity, all of which can be maintained due to their ample resources including endowments. RUs attract international faculty and students who are usually highly skilled in ICT as a means to share and disseminate research findings (e.g. the use of academic blogs for this purpose). However, the RU academy is one area which should be monitored closely to ensure that proper career structure is preserved, especially in the face of the emerging trend to reduce and even eliminate tenure. While RUs are part of a national system, some may be private institutions in certain contexts (e.g. Japan and Latin America).

It is important to now increase the knowledge base concerning the profiles and capacities of RUs in emerging economies to better understand their impact. Encouraging research capacity adapted to the priorities of the country is another vital objective. This has become urgent due to the growing gap between this type of institution and those at lower levels which does not help to build the strong systemic capacity needed in these contexts.

**DISCUSSANT: AHMAD O. HASNAH, QATAR FOUNDATION FOR EDUCATION, SCIENCE AND COMMUNITY DEVELOPMENT**

Building RUs as part of sound higher (or tertiary) education systems in middle and low-income countries (MLICs) is a challenge on a massive scale. But this must be tackled given the reality of the global knowledge economy which depends heavily on brain circulation. Hence, this is a long-term investment for economic growth requiring careful policy choices and evaluation of the modalities used to access and share knowledge. RUs in high-income economies have an obligation to provide expert advice to their counterparts in emerging economic contexts and to share essential resources (e.g. labs and electronic libraries).

MLICs face a range of specific and sensitive issues, inter alia, the preservation of academic freedom which is a driving force for positive social change, the continued use of national or regional languages for educational instruction since these are part of natural cultural heritage, an enabling environment (e.g. simplified immigration and visa regulations) which can attract the presence of international faculty and students, and more flexible use of resources (e.g. 24
hour labs) to facilitate access to study. Funding is a particular problem for MLICs and certain models such as endowment or alumni support schemes may not be appropriate to these contexts. Last but not least, perhaps the thorniest question is which type of research should be pursued in emerging economies. This inevitably requires choices and there is usually strong justification for applied research useful for local problem-solving rather than to engage in the elite field of “Big Science”. In this vein, more economic solutions for knowledge-sharing must be identified such as cross-border delivery and the establishment of knowledge hubs.

**Graphic 7: Qatar: investing in the Knowledge Economy**

<table>
<thead>
<tr>
<th><strong>Qatar: Investing in the Knowledge Economy</strong></th>
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<tbody>
<tr>
<td>• Leading Gulf State for investment in higher education &amp; scientific research</td>
</tr>
<tr>
<td>• 2.8% of GDP on scientific research</td>
</tr>
<tr>
<td>• HE and RDI infrastructure with international standards</td>
</tr>
<tr>
<td>• Role of the private sector (e.g. cooperation with banks and companies)</td>
</tr>
<tr>
<td>• Scholarships and mentoring awards</td>
</tr>
<tr>
<td>• Student loans with marginal interest</td>
</tr>
<tr>
<td>(Source: Dr Iman El Kaffas, Egypt, 2007)</td>
</tr>
</tbody>
</table>

**General Discussion**

This highlighted a number of issues which are pressing given that the higher education domain is ever more competitive and subject to controversial evaluation measures (e.g. ranking tables) which can exert strong influence on national policy-makers forced to juggle important choices with limited resources. Key priorities are: i) convincing governments to invest in research for long-term benefits; ii) fostering a culture of institutional governance to interact with public policy-making; iii) securing government funding support for building one (or several) top RUs in MLICs and protecting these in times of political or socio-economic downturn; iv) recognising that RUs will necessarily develop their profiles to deal with their specific contexts which is especially important in the lower income countries and includes the special case of African RUs; iv) building inclusive higher/tertiary education systems rather than elitist islands of excellence; and v) promoting a culture of the social responsibility amongst RUs to help one another on a global scale.
Session 2: Reimagining Internationalisation in Higher Education: International Consortia as a Transformative Space

Reimagining Internationalisation in Higher Education: International Consortia as a Transformative Space

Marc Tadaki and Christopher Tremewan, Association of Pacific Rim Universities (APRU), Singapore

Policy points

- PURPOSES OF UNIVERSITY NETWORKS; POLITICAL IMPACT OF ADVOCACY; MOBILIZING ACADEMIC RESEARCH FOR REGIONAL AND GLOBAL SUSTAINABLE DEVELOPMENT.

Networking is a key mission for academic non-governmental organisations and similar types of consortia. APRU, whose secretariat is based at the National University of Singapore (NUS), brings together institutions from this vast region stretching from Asia through Oceania to the Americas. APRU is the academic arm of the political entity known as APEC (Asia Pacific Economic Cooperation) which has been set up as a light and flexible structure in Singapore with meetings hosted on a rotating basis through the region. In this regard, its role reflects that of its counterparts in other regions such as the Association of African Universities (AAU), the European Universities Association (EUA) and the Association of Commonwealth Universities which interact respectively with the African Union, the European Union and the Commonwealth Secretariat which has 54 member nations. In the present international context, increased attention is given to the quality of networks, the motivations of their actors (e.g. mutual self interest) and to the impact of their actions (e.g. collective benefits). The dynamics of competition are examined and capital is assessed for its real or symbolic value. Given the plethora of such consortia, their purposes and strengths have assumed new importance as has the concept of agency which may be critical, transformative or associative in intention. Established thinking would suggest that individual institutions such as universities have much to gain from collective action, whether this be traditional (such as exchanges) or innovative (such as collaborative degrees) in nature.

Globalisation is a complex phenomenon which must reconcile opposing forces. For example, convergence (such as the predominance of English) sits alongside divergence (exemplified by the gap between high income and emerging countries). As a result, every country or institution must navigate its path through varying contexts and their practices, all the while seeking to reinforce the linkages which accrue from networking. Similarly, the globalisation of certain academic trends is desirable in certain cases but not in others. For instance, international student intakes and harmonised degree length (such as that advocated by Europe’s Lisbon Process) are generally seen as positive. In contrast, charging full tuition fees, uniform academic salaries and identical government investment per student cannot be standardised. Despite these challenges, there are many academic, economic and socio-cultural benefits from enhanced international exchange - inter alia, enhanced understanding, the promotion of excellence and the competition for talent, and opportunities for revenue generation and capacity development - which now form part of the organisational strategies of universities.
Against this background, understanding consortia and their networking purposes has assumed greater significance. Originally set up as for exchange and sharing, these bodies now face much higher stakes in the global economy and so factors such as their size, compatibility, complementarity and scope of action can determine the success of their missions. Today, the functions of consortia and their ability to be identified as academic champions must be better understood because they are valued as spaces for imagining and producing innovative outputs on a global scale. This is witnessed by their move from traditional action (e.g. research collaboration, benchmarking) to new activities such as large-scale open courseware, professional Masters’ degrees, project-specific disciplinary networks and the creation of deep partnerships amongst two or three universities. As a result, agency and structure of these bodies are now more interlinked, their discourse is productive and aimed at priority issues (such as responses to the university rankings process) and the real power of their networking capacity receives greater attention. In this regard, the work of Manuel Castells on network theory has proved particularly relevant (Castells: 2009). Control of membership (networking power), standard-setting for members (network power), hierarchy amongst members (networked power) and deciding on the strategic direction for a consortia (network-making power) all find their place as these bodies seek to improve their management and impact within the overall academic space.

**Graphic 8: What University Consortia Do**

<table>
<thead>
<tr>
<th>Traditional aims</th>
<th>Recent developments</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Student and staff mobility</td>
<td>• New collaborative degrees</td>
</tr>
<tr>
<td>• Academic exchanges</td>
<td>• Massive open online courses (MOOCs)</td>
</tr>
<tr>
<td>• Curriculum development</td>
<td>• Professional masters degrees</td>
</tr>
<tr>
<td>• Joint course delivery</td>
<td>• Reduced opportunities to find large-scale research funding</td>
</tr>
<tr>
<td>• Research collaboration</td>
<td>• Project-specific resource networks</td>
</tr>
<tr>
<td>• Joint bidding for research projects</td>
<td>• Institutionalizing disciplinary networks</td>
</tr>
<tr>
<td>• Benchmarking</td>
<td>• Creating deep partnerships across 2-3 unis</td>
</tr>
</tbody>
</table>
Applying these principles and practices to the specific case of APRU as a university network raises some interesting points for analysis. As a situated resource, APRU’s current membership is comprised of 42 elite research universities. It is a top-down model, offers a regional narrative rooted in East-West relations, represents clear networking value in terms of presidential politics and privileges opportunities for various levels of institutional staff to meet. Particular concerns are very uneven participation by members, the need for a stronger funding base and a less pronounced regional value in a global world. The challenges ahead include finding a common narrative to unify and mobilise both APRU’s members and its secretariat, to assume a more visible role in the innovation debate (which is dominating economic discussion) and to avoid replicating existing power hierarchies. In defining this niche, opportunities for intervention will widen to emphasise the power of research universities as drivers of innovation (e.g. green growth, energy, health research) with credible strategies for defining indicators and benchmarking modalities.

Innovation is now dominating the search for economic growth and requires concerted cooperation amongst governments, the private sector and civil society. Thus, networks of research universities, such as APRU, must identify and adopt mobilising practices which both leverage their own strengths and enhance their role as a key civil society actor cooperating in the development process national, regional and global levels.

**DISCUSSANT: ALMA MADONADO-MALDONADA, MEXICO**

Academic consortia can be global spaces and their potential to positively benefit the wider higher education context is considerable. Thus, they are well equipped to take part in global governance. However, they are very numerous and their quality is often in question. For this reason, analysis of their strengths and weaknesses, clarifying niche and mission and using their special attributes (e.g. soft power for lobbying purposes) are essential in order to assess their role as forces for change and innovation.

For consortia of research universities seeking to enhance their capabilities, the relation between their respective narratives and practices must be constantly examined, as must their role in current cognitive and ethical debates, their interaction with peer bodies and their actual contribution to the global knowledge base.

**GENERAL DISCUSSION**

Debate focused on the real mandate of consortia composed of research universities. Some felt research should remain the province of academics while university networks should concentrate on political linkages and influence. Others considered that networks could easily have differing motivations and that this variety of profile was advantageous. It was agreed that the boundaries separating research, its socio-economic applications and political importance
are shifting quite rapidly. More frequently, these dimensions tend to overlap. For this reason, consortia with varying profiles and missions each have their place. From a wider standpoint, the moral mandate of academic networks to contribute to region-building, global knowledge capacity and cultural dialogue whether through their advocacy skills or via actual research collaboration is one of their critical strengths to be carefully nurtured.

Session 3: Merle Jacob, Lund University, Sweden and Lynn V. Meek, Melbourne University, Australia: Scientific Mobility and International Research Networks: Trends and Policy Tools for Promoting Research Excellence and Capacity-Building

Policy points

Changing academic research careers; equitable access to knowledge; academic research for R&D and innovation; research mobility and internationalisation of higher education.

Recalling that science has always been an international domain without frontiers for its experts and their cooperation, the global knowledge economy has made research (notably in science-related areas) essential for innovation which helps drive social and economic wellbeing. In the higher education sector, following years of focus on the issues of access and teaching and the resulting massification of systems, there is a new emphasis on research and on the collaboration modalities which are used in this area. This includes networking which may range from informal collegial association to formalised research endeavours.

International research collaboration, which fuels the innovation driving development in the knowledge economy, depends greatly on research mobility. This academic activity has now become institutionalised and supported by universities, national governments and supranational bodies, as well as by funding agencies. Increasingly, scientific output and its impact are based on international collaboration which, for developing countries, tends to mean largely south-north linkages to render research capacities more equitable. The exponential in co-publications is a clear example of the benefits of such cooperation. Furthermore, research students are growing in number with a shift of policy emphasis from undergraduate to the graduate and post-doctoral levels. The gloomy and seemingly insoluble debate on the brain drain has given way to the win-win notion of brain circulation and the potential offered by diaspora knowledge networks. Sound research training and dynamic locations for post-doctoral study are considered to be key determinants of the extent and robustness of research networks. Consequently, academic free trade has become a highly desirable area of activity.

Throughout their careers, researchers accumulate scientific capital which is both human and social. The former is based on skills and knowledge acquired via formal training and can be best accessed at the leading world-class universities. The latter refers to membership of international research networks which operate as conduits of knowledge. The most valued access to this capital is through interaction with star researchers and their laboratories.
Though the university has never had the monopoly on knowledge, it can be argued that this is the key institution in today's global knowledge economy. On one hand, it produces knowledge workers whose skills are essential for today's labour market; on the other hand, its research output contributes directly to scientific innovation. To a large extent, universities are the victim of their own success and are now pressured to assume new roles (while keeping traditional functions and values) and to contribute to innovation and wealth creation to an extent and with expectations which are often unreasonable.

Regarding the policy implications of research networks, these are certain to burgeon in scale and importance in the coming years since the resolution of major global problems and stimulating equitable economic growth will require the widest possible collaboration. Research universities will be central players in this action. The academic scientific mobility involved can be very beneficial and this will operate at various ways. While international research stars are likely to network at a meta-level in "Super RU" contexts, local scientific talents will be equally important but will need leadership and management skills to realise their potential. This is a long term investment for policy -makers who must learn to understand what motivates good scientists and exercise patience to witness the eventual outcomes of cutting-edge research.

**Graphic 9: Policy implications for research mobility**

- Regional & international scientific networks & mobility will increase in scale and importance
- Universities, research universities in particular, key institutions
- The big questions (eg climate change) require large-scale collaboration
- Academic/scientific mobility potentially beneficial to all – but requires "policy patience" and nurturing
- Policy must take account of what motivates scientists
- Local “academic stars” can play bridging role – but require research management and leadership skills

**DISCUSSANT: NORZAINI AZMAN (MALAYSIA)**
While mobility does characterise the academic researcher and cited publications are a universally recognised indicator of scientific excellence, the reality of the research environment in middle and low-income countries is beset with problems and it would be a grave error to minimalise this fact. The research community is very small and retaining talented academics is essential for national capacity which can address development priorities. MLICs continue to lack sufficient research leadership and management skills which include monitoring and measuring the impact of local research. Striking the right balance between international research (i.e. Big Science) and generating knowledge relevant and applicable to local issues remains elusive, despite the fact that it is often stated as a major policy objective.

**GENERAL DISCUSSION**

While it is true that research mobility and collaboration have improved, many participants, notably those from emerging economies, felt that the brain drain remains a reality and is thus a major impediment to equitable economic development. The challenges for Arica remain especially acute in this regard since low-income countries are located at the outer periphery of international research activity. As knowledge is constructed socially, inadequate research conditions invariably disadvantage its generation in MLIC contexts. Intellectual capital is the most valued resource for universities everywhere. Unless attractive reintegration schemes are in place, talented graduates can easily be lured by better career opportunities. At the moment, some 70% of new Chinese and Indian PhDs remain in the USA after graduation. This is a trend replicated elsewhere which means that high-income countries are the main beneficiaries of academic free trade. Research mobility thus remains a complex area where economic motivation is matched by factors such as security and ease of lifestyle.

**Session 4: Gerard A. Postiglione, The University of Hong Kong, China:**

*Anchoring Globalisation in the Hong Kong’s Universities: Managing Academic Knowledge Networks and Research Output*

- **Policy Points**

  GOVERNANCE; FUNDING; R&D AND INNOVATION; ACADEMIC CAREER; INTERNATIONALIZATION VIA RESEARCH NETWORKING.

The Third Millennium is known as the Asian Century due to the success enjoyed by its countries. A third of the world’s R&D budget is spent in this region which, by 2050, is aiming to raise the incomes of three billion Asians so they have OECD-level per capita incomes and the regional GDP may double.

In the higher education sector, it is a priority for Asian research universities to join regional and global knowledge networks and thus they strongly support international research collaboration.
The success of this policy is witnessed by the growth rates in science and engineering publications between 1999 and 2009: 16.8% in China (which now accounts to 9% of world output), 10.1% in the Republic of Korea and 10% in Thailand and Malaysia. In contrast, the USA share declined from 31% to 26% and the EU dropped from 36% to 32%. For co-authored science and engineering articles, the Chinese share grew from 5% to 13% from 2000 to 2010.

The eight Hong Kong universities can be studied against this background and four of these figures highly in both the QS and THE ranking systems: Hong Kong University, Hong Kong University of Science and Technology, the ICTy University of Hong Kong and the Chinese University of Hong Kong. This can be attributed to Hong Kong’s enabling environment which is built on light government steering and institutional autonomy, performance-based academic governance to reward output, academic freedom, attractive salary and tax conditions for foreign faculty, and internationalism which is promoted through bilingual education. In terms of its own economy, the main driver of Hong Kong’s growth has shifted from low-cost labour to knowledge networks and innovation in little over a decade.

**Graphic 10: Hong Kong University Rankings**

<table>
<thead>
<tr>
<th>QS Ranking</th>
<th>Times Higher Ed. Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>HKU 23 (Asia 2)</td>
<td>HKU 34 (Asia 2)</td>
</tr>
<tr>
<td>HKUST 33 (Asia 1)</td>
<td>HKUST 62 (Asia 7)</td>
</tr>
<tr>
<td>CUHK 40 (Asia 5)</td>
<td>CUHK 151 (Asia 15)</td>
</tr>
<tr>
<td>CITYU 95 (Asia 12)</td>
<td>CITYU 193 (Asia 20)</td>
</tr>
</tbody>
</table>

“Boston is the Hong Kong of the West”

Hong Kong academics are very active in research collaboration. Amongst four Asian systems, Hong Kong ranks second to the Republic of Korea, ahead of China and Japan in this area. On a wide scale, Hong Kong activity is approaching levels in Australia, Canada, the USA and the UK. An interesting point is Hong Kong’s tendency to look westward for collaboration. This is due to economic integration across Asia which is not leading to regional cooperation in university research to the extent expected.
Modalities in place for research funding are both generous and flexible. The 2012-13 Collaborative Research Fund of the Universities Grants Committee increased by 50% to US$10 million and this body also funds one-off projects involving interdisciplinary collaborative research. Links with China itself are encouraged and there is cooperation with the 973 Plan China which focuses on basic STI research and is coordinated by the National Scientific Foundation.

Hong Kong universities are cast as scholar hubs for innovation which make research output available to government, industry and academia worldwide. For example, the Institute for Advanced Study at the Hong Kong University for Science and Technology (HKUST) positions itself as a global source of innovation for the region through its networks for collaborative research in medicine, the environment and ICT technology. Furthermore, strategies are prepared to protect this globalisation policy during regional and global recessions (such as temporary salary reductions and sustained student loans levels).

**DISCUSSANT: GILI DORI, ISRAEL**

Against the background of higher education expansion since the 1960, the Hong Kong response to globalisation has facilitated and enhanced knowledge exchange. In terms of network analysis, Hong Kong offers useful examples concerning motivation, modalities and partners. In particular, Hong Kong can operate comfortably in Eastern and Western academic contexts. Moreover, its ability to work well on a global scale likens it to global ICTies which transcend their local contexts. In such an environment, it is important to identify the star researchers as these powerful individuals are driving innovation. As well, the Hong Kong case shows that research networks can be leveraged to reap greater benefits (though, it was noted with regret that female academics were less present in STI networks, thus reiterating the need to correct a persistent global trend).

**GENERAL DISCUSSION**

Hong Kong joins others (e.g. Israel) in showing that dynamic higher education systems can be quickly constructed. Features which helped this success occur include the naturally international Chinese context and the entrepreneurialism of Hong Kong itself. And, the policies of specific institutions (such as HKUST) clearly attract and motivate talented researchers. Timing can be a key aspect in launching new approaches and the reintegration of Hong Kong into China was a significant event. However, caution must be used when considering applications of this model elsewhere. For example, the Republic of Korea has two ST universities but not the same bilingual context; in the Arab region, the King Abdullah University for Science and Technology (KAUST) in Saudi Arabia cannot call upon the same Diaspora of researchers for faculty posts.
Institutional research (IR) is an essential activity and service for all leading research universities. IR refers to research which supports institutional planning, policy formulation and decision-making. An IR office gathers and analyses data which contributes to managing the constant changes needed to maintain institutional reputation and acclaimed output. This can have various models regarding structure, staffing and mandate to ensure its contextual relevance.

IR was introduced into universities worldwide in response to sectoral change following the massification of higher education, new university-government relations, the professionalization of university administration (known as new managerialism) and the need to deal with increasing internationalisation including the emergence of national and global ranking tables. IR has an external function to provide information on the institution to government or to its various stakeholders. As well, it collects data on internal operations, stimulates networking by linking its constituents and facilitates the learning capacity of the institution. In particular, for those which are - or are aiming to become - world-class research universities with top faculty and students, ample resources and good governance, IR is an essential support.

**Graphic 11: Functions of Institutional Research Offices**

**The Functions of Institutional Research**

**External function**
- Provision of information about the university to government agencies
- Provision of information to various stakeholders of the university
- Provision of information for national or global rankings

**Internal function**
- Research on a wide range of issues related to the university’s functionality
- Stimulation of collaboration and horizontal connections that facilitate a broad organisational view among university constituents
- Facilitation of organisational learning capacity

An efficient IR office requires staff able to deal with four areas, each of which requires a specific intelligence (i.e. knowledge of the area and good networking contacts in these): i) technical skills to analyse mass data; ii) expertise in specific issues in higher education such funding
models or quality assurance modalities; iii) knowledge of the institution's socio-economic context so as to position its action; and iv) social intelligence to network with key actors nationally and internationally. IR staff will interact continuously with the administration and faculty, be involved in collaborative projects to ensure knowledge exchange and undergo regular professional training to maintain their knowledge of the sector.

DISCUSSANT: ANGELA HOU, BOSTON COLLEGE, USA

The importance of IR is witnessed by the many studies undertaken in its field which are available online and show how institutions in different contexts approach this issue. Obviously capacity counts so there is no general model. However, it is interesting to ascertain why a certain type of IR service is chosen and how universities deal with this service in accordance with their research or teaching profile.

GENERAL DISCUSSION

In addition, it should be noted that an IR office can also deal with outreach to industry to ensure technology transfer and the commercialisation of research for innovation - though if this activity is highly developed, its own office may exist. Though the knowledge needed by IR staff varies, each type of competence needs to have its own network so as to interact with key counterparts inside and outside the institution. Lastly, an IR office attests to a certain maturity of institutional management which should please governments pushing for greater efficiency when policy choices are evidence-based.

Session 6: Olugbemiro Jegede, Nigeria: Centres of Excellence: Contextualising Research Excellence in Africa

➢ Policy Points

African Higher Education and R&D and Innovation Policies; Assuring Quality Education and Research; The African Academy and Research Capacity; Sustainable African Ownership of Locally Relevant Knowledge; Linking to International Knowledge Networks.

The multiple challenges related to African research (e.g. institutions, management and funding, retaining regional capacity) now stand alongside those of the wider tertiary education landscape (e.g. access for large youth populations, teaching faculty, labour market linkages), as well as other pressing educational needs (e.g. persistent illiteracy, teacher shortages). Debate is ongoing concerning the best delivery modalities (notably the increased use of ICT) rather than massive and costly re-investment in traditional infrastructure. For these reasons, the choice and type of Centres of Excellence (CoE) to build research capacity require careful assessment.
Despite current problems, there remains general agreement amongst social thinkers and national leaders that education is the most powerful force to bring about necessary socio-economic change in Africa.

It is an accepted fact that the higher education sector was in much better shape and standing during the colonial era and until African independence. Thereafter, a period of political unrest coincided with the need to tackle urgent social problems. This caused serious damage as key donors moved support to preferred areas such as Basic Education. As a result, the university sector has battled for decades to cope with dwindling resources. This struggle has both prevented the renovation necessary to deal with the new realities of tertiary education and also exacerbated the brain drain. With the advent of the global economy, knowledge capacity has become vital to assure national competitiveness and Africa is ill-prepared for this trend. Successful policies adopted by emerging economies (such as the BRIC nations) have accelerated awareness that sustainable socio-economic development will depend on locally relevant capacity which can also link to international knowledge flows. Universities are major actors in this process but the first African institution to figure in the global rankings is Cape Town at number 317. Much is currently at stake for Africa and the region can no longer afford costly errors with regard to policies and infrastructure.

When establishing or renovating Centres of Excellence, key aspects are their governance, funding and other support, ability to share expertise via networking, and self-assessment capaICTies. These are essential whatever the CoE’s profile may be: e.g. a stand-alone structure, a hub for research-based innovation activity, or a unit within specialised areas such as the private sector or the development community. Examples of CoE initiatives are numerous: the leadership CoE supported by the German DAAD, Carnegie’s Consortium for Advanced Research Training and the Water Centres created by NEPAD in south and west Africa. Moreover, the Arusha Convention emphasised the need for intra-continental academic mobility to ensure that African states advance together towards a truly equitable regional knowledge economy.

Two overarching priorities exist: firstly, Africa must increase its knowledge base (both skilled labour and strong research capacity), and secondly, the region must create new types of platforms for generating locally relevant knowledge and networking with cutting-edge research. Africa must be part of this debate which will affect its next choices. Though Africa has been viewed as the weak link in the global economy, its important commodities have changed this thinking. Knowledge networks of varying sorts - national, regional and international - have the potential to underpin its future economic development. Furthermore, a number of world-class universities (which are to some extent a particular type of CoE able to concentrate and network academic expertise) will be an essential component of the African knowledge economy. The process to create these knowledge platforms and their components must begin forthwith.

**DISCUSSANT:** JAMES JOWI (ANIE, KENYA)
Until recent years when the reality of the global economy has hit home, Africa’s debate on research universities has lacked vigour. Perhaps this has been due to the absence of the necessary elements required (forward-looking governance, robust funding, a critical mass of scholars, upcoming research students, modern infrastructure and top ICT facilities). Instead, the focus has been on development problems, the MDGs and - in the tertiary education field - on the access issue to meet rising demand for study. Now, Africa is responding to the global dynamics of the knowledge economy and one example of this is the African Universities Ranking System (although the leading institutions listed are predominantly South African). Therefore, the region faces a moment of important choice: what sort of research is the priority for Africa and what sort of research universities are needed to undertake this? Poor choices will be costly to remedy.

**Graphic 12: Mode 2 Knowledge - Relevant Research for African Development**

**General Discussion**

Concern was expressed that much of the past donor aid and experimental projects related to university research had been inappropriately designed and were irrelevant to the region's needs. As a result, Africa did not own the research produced so that this could be used with optimal impact. Now, a fast-track agenda is necessary to catch up with global trends. Modalities such as South Africa's 67 Research Chairs in 23 universities are exemplary. Moreover, there are major changes afoot regarding donor aid due to tough times in OECD economies and because Africa's basic economic wealth in the commodities area is changing donor perceptions. The region does have a small number of flagship universities with strong reputations (such as Legon in Ghana, Makerere in Uganda, Moi in Kenya, Cairo in Egypt) which could form a network to boost a new African research agenda.

**Session 7: Anshumali Padayachee, Charmaine Williams and Brigitte Smit, SANTRUST, Durban, South Africa: Building National Capacity with the Support of International Research Networks: The Santrust Experience**

- **Policy Points**

  - **Capacity -building for research expertise; sustainable research training in Africa; regional impact; internationalisation to mainstream knowledge in the global economy.**

This experience focused on capacity -building in the area of doctoral education, illustrated that Africa can design innovative programmes to strengthen academic research, despite the consistently grim picture portrayed on a consistent basis and though donor support is still
available. Santrust is a research initiative which was established to move from aid to sustainability. It is an NGO able to interact with international partners within a knowledge network paradigm and its success to date would permit it to easily adapt to the changing academic context. Particular emphasis should be placed on its evolution from a donor-dominated model to a south-led and south-relevant initiative which can function as part of the community of international knowledge networks. This is significant given that the higher education internationalisation discourse continues to be contested in South Africa. Santrust targets a very precise problem of African higher education, namely, the scarcity of PhD graduates in African universities. Though South Africa’s 23 institutions have global outreach for historical reasons, indigenous research – notably in STI-related domains – remains a major problem. This issue will have serious policy implications in the near future in terms of Africa’s ability to compete in the global economy.

The motivation for internationalisation has shifted from capacity-building in and for the south to internationalisation as a preferred way to generate mainstream knowledge. Globalisation (including increased emphasis on competition, university ranking and cross-border delivery of higher education) has been the driving force behind this shift of position. Though some countries have risen to the challenge, others retain a deep suspicious of this process with the result that internationalisation has several interpretations in Africa. This distrust extended to the projects funded and monitored by major partners such as IGOs and development banks since these were often considered irrelevant and their outcomes have not guaranteed the necessary local capacity. Sustainability did not occur and today, African researchers who are trying to collaborate with networks and partnerships are confronted with this non-existent or very weak base in their own region.

Experts - from and on -African higher education have argued that policy-makers should review their cooperation strategy to achieve the kind of collaboration that they want. This will require the mobilisation of domestic resources in tandem with development funding so that Africa can claim ownership of its own research development. This will necessitate more vigorous African participation in knowledge networks which currently dominate the academic landscape, build mutually reinforcing knowledge and experience and permit capacity development to flow in various directions (rather than the classic north/south stream).

Santrust’s history demonstrates its trajectory from developing the base for a research culture via donor support (1997-2003), to building partnerships for research capacity (2003-8), to claiming its own international research space (2008-13). In practical terms, the doctoral training is producing a new African academy which is young and with a visible female presence, training African scholars who may teach and supervise research in their own countries to counter the brain drain and promote collaboration between the natural and social sciences to place knowledge in context. Santrust’s pre-doctoral programme is an intensely personal experience designed to help candidates to gain self-confidence, to take ownership of their research and to select research topics which are relevant to local and international scholarship. Constant self-appraisal of responses to issues and constraints allows this future academy to
assess its strengths and weaknesses, thus providing a roadmap for African communities of practice to network comfortably with peers worldwide.

**Graphic 13 : Modules of the Santrust Pre-Doctoral Programme**

Though African higher education is the weakest region from a global standpoint, it remains very international due to its donor relations and the presence of other key south actors such as China and India. Santrust has achieved impressive results to date, notably with its 100% graduation rate for the 752 doctoral candidates and its efficient management of doctoral training where high costs are a major hurdle. Important questions now are how best to export this model elsewhere in the region, how to add a stronger component of international exposure into the training process, and how to capitalise on the ownership of research capacity and its outputs (as advocated by the 2005 Paris Declaration on Aid Effectiveness and the 2008 Accra Accord on Assistance, both sponsored by the OECD).

**DISCUSSANT: DAMTEW TEFERRA (ETHIOPIA/UNIVERSITY OF KWAZULU-NATAL)**
Given their Santrust training, the performance of these new African PhDs could be more easily tracked, including their involvement in international networking. This might permit the lessons learnt to be more widely disseminated since this innovative model may legitimately be considered ground-breaking as regards building African research capacity.

Session 8: Marcelo Knobel, Tania Patricia Simoes, Univerdidade Etadual de Campinas (Unicamp), Campinas, and Carlos Henrique de Brito Cruz, FAPESP, Sao Paolo, Brazil: North-South Research Partnerships between Research Universities: Experiences and Best Practices

- Policy Points

Research collaboration and funding in a BRIC context; university research for R&D and innovation; academic careers; internationalisation.

According to the British Royal Society, international research collaboration has numerous benefits, for example, access to advanced scientific facilities and funding, exchange of knowledge for local and global problem-solving, intellectual fora which stimulate creativity and innovation and the engagement of emigrant researchers. But, challenges also exist such as competition between public and private research, failure to observe ethical practices, high costs for weaker economies including brain drain, and their difficulties to form a critical mass of scientists. These issues demonstrate why actually establishing and sustaining world-class universities is no easy task (Royal Society, 2011).

Research collaboration is undergoing radical changes at the present time with implications for emerging economies. In 1970, some 8 000 scholarly journals were published worldwide, while in comparison, this number rose to over 31 000 in 2011, according to a report by The Wall Street Journal. Furthermore, changes have taken place regarding the top 10 producing countries where Chinese and Indian authorship has gained ground. More frequent use of self-ICTation is yet another factor of the process. However, perhaps the most important dimension for researchers middle and low income countries is the rapid rise of co-authored publications which is giving a totally new dimension to the former "publish or perish" mantra. Historically, high-level scientific research capacity has been much scarcer in non-OECD nations and this remains true for certain parts of Africa, Asia and Latin America. While top research universities are concentrated in a select number of locations, countries in all regions are now giving priority to establishing world-class universities - either one or several institutions depending on resources available - so as to network with big science which is influencing economic development. Because the global map of research universities is also being transformed, researchers in all regions are able to increase their linkages with peers elsewhere. The impact of co-authored papers will be a critical domain for monitoring in the coming years. This trend will clearly affect the methodologies used to establish current ranking tables. But also, co-authorship could lead to the emergence of quite new academic destinations for researchers seeking to work
with rising stars in their chosen field. Thus, certain universities could witness a rapid rise in their reputations as hubs for research excellence.

As a BRIC nation (with 200 million people and the world’s 8th GNP), Brazil is experiencing an economic boom and is naturally interested in strengthening its research capacity, notably in STI fields. Brazil leads LAC countries in R & D intensity and is ranked 21 in the 2012 Shanghai Rankings with six universities in the top 500 worldwide. BRIC research cooperation with the G7 has burgeoned since 2004 and Brazilian researchers regularly co-author papers with peers abroad, notably in Germany, United Kingdom, Argentina and Spain, posting an impressive ICTation record. The universities of Sao Paulo are the main drivers of this elite research cooperation and the majority of Brazilian PhDs graduate from these. In addition, funding resources for research capacity is very generous. Under Brazil's federal capacity-building plan, US $1.5 billion is available to send students abroad for research training under the Science Without Borders scheme and the Sao Paulo Research Foundation (FAPESP) offered research grants worth US $500 million in 2011. This level of support helps ensure that future Brazilian academics benefit from two years' experience abroad before being appointed as faculty.

Graphic 14: R&D intensity in Ibero-American Countries 2009

However, this progress needs to be studied in relation to challenges arising from the broader landscape of higher education. Brazilian international cooperation concerns teaching universities to a significant extent degree and a new law passed in 2012 aims to open access to tertiary education by offering 50% of places to minority groups. Regarding social science research, this tends to focus on local issues and is not published internationally.

Discussant: Eldo Mathews, India

The evident increase in research cooperation, both north-south and south-south, is laudable. However, R&D in MLIC contexts involves very different priority setting and risk-taking processes. Government interference to direct scientific research is more likely as well. Given the importance of understanding the local context, it is regrettable that social science research does not have the same status or networking for international collaboration. Lastly, it should be noted that innovation often takes place outside universities (e.g. in areas such as agriculture where the Innovation Council of India is a major actor) and this is true for other MLIC countries too.

General Discussion

It was noted that, as co-publications gain ground, this modality may supersede rankings and ICTations in impact. Hence, the metrics to measure academic success are shifting fast and a clear warning was given with regard to the expected impact of this change. A further aspect
related to scientific capacity in MLICs is the tendency for key actors (governments, university and industry) to pursue separate agendas which hampers concerted planning to reinforce research. Another issue is how to promote internationalisation in universities which are not research-focused. This case study demonstrated that the specific ICTies of each country context can be very influential factors e.g. Brazil needs faculty to meet demand for higher education and tenure is a tradition, whether the academic is research-active or not.

**Session 9: Nazli Choucri, MIT, Boston, USA: The Knowledge Economy in the Mena Region and the Future of Arab Higher Education**

- **POLICY POINTS**

  Higher education policy-making in changing political contexts; challenges for governance, quality, academia and labour market links; leveraging ICT potential for internationalisation.

This presentation comprised three dimensions: i) the knowledge economy in the cyber era; ii) higher education in the MENA region; and iii) the future of this sector for Arab countries. Academic networking both within the region and beyond, faces particular challenges in the wake of the Arab Spring.

Today, electronic and networking communication is standard practice with institutional mechanisms and support systems to ensure their smooth operation. With regard to social media, these can be venues to communicate views (including those which are contentious) and facilities for mobilisation as well as for political organisation and behaviour. In this regard, they are challenging traditional knowledge norms. New aspects for knowledge systems include innovative approaches to intellectual property rights (IPR) and the impact of the open source movement. Collaborative research and its findings are greatly enhanced through better E-networking and dissemination techniques. The sharing of courses worldwide has significant implications for the way in which research universities operate, notably as to how teaching and research are undertaken. In 2001, Open Courseware offered ICT-based delivery and diffusion of materials but the latest advances (e.g. MITX 2011) offer a totally new learning experience via interactive, on-line courses, prototype curriculum using circuits and electronics, large-scale participation, customised learning styles and collaborative exchanges amongst students. However, this exICTing academic environment is not available with uniform access or quality worldwide.

Higher education in the Middle East and North African region (where high urban populations and fertility rates are common) is characterised by similar problems. Today, Education is a predominantly public sector good which is influenced by various cultural legacies and extremely politicised. It has few connections to the economy, industry or business, oversight of performance is limited and only minimal attention is given to students’ careers and futures.
Reform is constantly discussed but action is quite restricted and external policy advice in this domain is often confusing.

Structural barriers impede progress: bureaucracy lacks effective oversight, no mechanisms exist to link education to employment opportunities, and minimal interaction - both inter-Arab and intra-regional – impedes international networking and collaboration. Furthermore, approaches to reform vary widely with different costs and benefits for each model of education and research management (e.g. centralised management, a commercial approach to education, the importation of foreign skills). Consequently, models tend to be autonomous and there is little learning from shared experience. Nevertheless, the MENA region can boast a number of “assets in place” which can help assure quality higher education. For example, female participation is high and the best students are world-class. Leapfrogging has permitted rapid adaptation and use of advanced ICT technologies has facilitated international collaboration, not only in higher education but also in the media and political life (e.g. documenting the Arab Spring). As well, the use of Arabic on the Internet grew by an astounding 1575.9% from 2000 to 2007.

Graphic 15: Assets in Place for Arab Higher Education

<table>
<thead>
<tr>
<th>Assets-in-Place for Quality Arab Higher Education</th>
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<tbody>
<tr>
<td>• Large female participation in higher education</td>
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<tr>
<td>• Best students are world class</td>
</tr>
<tr>
<td>• Rapid adaptation &amp; use of advanced information technologies</td>
</tr>
<tr>
<td>• “Leapfrogging” in ICT, exploration, innovation in use enabled by cyber access</td>
</tr>
<tr>
<td>• Local capacity of cyber use in youth-led “Arab Spring’</td>
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<tr>
<td>• Increased International Collaboration</td>
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<td>• Growth in use of Arabic on the Internet</td>
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The scene is set for a more positive future era in Arab higher education but which vision will be chosen? Structural barriers could be eliminated to permit educational models to function well or current assets could be better leveraged. Unfortunately, inaction could threaten progress and so every effort must be made to avoid this path. Strategies to counter this possibility include seizing reform opportunities which would show immediate results, adopting policies which target small but important changes, introduce accountability measures at all levels, reward
excellence in teaching and research, facilitate the expression of the student voice, expand the use of cyber materials and prevent confusion in policy advice from external sources.

**DISCUSSANT: MANJA KLEMEMIC** *(SLOVENIA)*

The profound political changes in the region have ramifications for its academic collaboration on a more global scale. To this end, second language capacity is important for faculty and students. Improved ICT access should not neglect access to scholarly journals to encourage publications. Overall, in the face of regional volatility, it is difficult to discern the main drivers of reform within higher education, to understand which problems are truly indigenous to the region and to know which countries are genuinely seeking international best practice for reform. Soft issues (including research collaboration) then become important to identify and address.

**GENERAL DISCUSSION**

Current political and social changes are complex and prevent any common future direction for the countries in the region. As a result, strategies which can have positive impacts (such as ICT access, enhanced research collaboration and academic exchanges) may not be totally successful. A particular feature of the region is the extremely varied attitudes to crucial higher education issues such as ICT potential, the introduction of governance and accountability policies in universities, international cooperation in higher education via enhanced academic exchanges, acceptance of the principle of academic freedom, linking higher education to labour market opportunities and innovative teaching and research which can be resisted by conservative faculty clinging to academic authority. Because countries of MENA region express varied visions of higher education, their attitudes to the profile, role and activities of research universities also differ greatly. As a result, drawing comparisons to suggest common policy goals inside the region is difficult and so observing the progress and impact of new institutions (such as KAUST University in Saudi Arabia, the UAE’s Masdar Institute of Science and Technology and Education ICTy in Qatar) tends to be done on an individual basis.
Policy Points

Research assessment modalities; measuring quality; R&D and innovation; equity of access to the global research culture; contribution of research to social development; research challenges for MLICs

When looking at the purposes of research, global ranking systems are currently a powerful instrument because they measure outputs (i.e. publications), impact (via ICTations), process (e.g. collaboration) and the contribution of research to economic growth. Other factors affecting research assessment include levels of economic development, the maturity and robustness of higher education systems, language use and regional cultures. Patterns of research collaboration can vary amongst scholars, disciplines, institutions, sectors and countries. Benefits of this cooperation can range from the domestic to regional to international and today, multiple authorship of papers has become the norm. Cooperation for Triple Helix is especially important because of its contribution to socio-economic innovation. This may be carried out in different ways: for example, in the Republic of Korea, Triple Helix research is found in several locations, whereas in Saudi Arabia, this is undertaken mainly in universities.

Equity is a critical feature when measuring systems of higher education or research in relation to the benchmarks established by the leading Ranking Tables. High-income countries, which have the most mature systems of higher education and research, dominate the rankings. And, these are the countries which attract talented scholars, thus provoking brain drain. Middle and low income incomes have always been at the periphery of research excellence and many of their scholars have often been hampered by their inadequate proficiency in English. Though this is changing quickly (e.g. for the BRIC nations and others), the world's poorest economies remain extremely disadvantaged because they are weak in the main areas used to rank institutions.

Although research collaboration is the norm in STI fields, more needs to be known as to why and how this takes place and about the profiles of the researchers involved. Moreover, certain Ranking Tables are justifiably controversial since they take no account of socio-economic differences. As a result, the gulf in research capacity may become even more pronounced. Thus, alternative modalities (e. the European Rankings Project) are needed to permit a fairer assessment based on the wide variations in research contexts.
DISCUSSANT: EDMUNDO TORES-GODOY, UNAN-LEON, NICARAGUA

For MLIC countries today, the key question is how to measure the social impact of research. There is no easy answer as social relevance has many definitions according to context. Moreover, this concept is closely linked to the sector of applied research where important choices are inevitable and mistakes can be costly. Research cooperation and publications - as one output of this - are separate areas with equal merit. This means that the criterion of “publish or perish” is being challenged by new approaches privileging open access to knowledge (e.g. the 2012 UK Finch Commission which has recommended that all publicly funded research should be available online free of charge). Lastly, because all nations live in the global economy, it is assumed that those investing heavily in R&D and Innovation are doing so for benign purposes. Otherwise human security would be at risk.

GENERAL DISCUSSION

This focused on accepting the tension between basic science (where results may take years to appear) and applied research (where showing impact is desirable but often difficult). Furthermore, various measurement models and indicators for this area are frequently controversial. Ranking systems are one example of this debate. Nevertheless, assessing the
impact of knowledge and research is an important principle and modalities such as the British Research Assessment Exercise (RAE) can have useful adaptations in other contexts.

Session 11: Dianne McCarthy and Marc Rands, Royal Society of New Zealand, Wellington, New Zealand: Knowledge Networks for Research: Learned Societies as a Bridge between Research, Policy-Making and Funding

- **Policy Points**

  - Learned societies to promote science and gather the research community;
  - Interfaces with government for advisory services and research management;
  - Ensuring quality standards for research; implications for establishing these bodies in MLICs.

This presentation analysed another type of civil society organisation relevant to the higher education sector, notably Royal Societies. While the case study of New Zealand covered aspects of context, the history of this body and its particular role in relation to national science and research policy, it was emphasised that the mandates and activities of these bodies can vary considerably. New Zealand, a small island nation in the South Pacific with just over 4 million people, is distant from world markets and major population centres. Half of the country’s export earnings come from the efficient primary sector based on agriculture. Similar in size to the United Kingdom or the state of Colorado in the USA, its universities and research institutes are located throughout the country. Scientific research is mainly publicly funded (which differs from other contexts), covers a wide range of fields and lies at the centre of the national economic development strategy.

The research landscape of the country comprises some 22 000 researchers and research students of whom 66% work in higher education, 23% in the private sector and 11% in government departments and Crown Research Institutes. New Zealand has a strong tertiary education sector and, in 2009, led the OECD for its numbers of international students. All of its eight universities engage in research (with a robust post-graduate student cohort) with other institutions handling professional training and education in a Maori cultural context. The Performance Based Research Fund (PBRF) assesses the productivity of researchers which is then aggregated for their institutions. In addition, Centres of Research Excellence which are inter-institutional networks and university-hosted, bring together researchers to work on commonly agreed work programmes. Their aim is to produce internationally acclaimed research and to assist the country in its shift to becoming an innovation-led economy. Crown Research Institutes (8 in number) are actually businesses owned by the government to undertake research for the national benefit, primarily for central and local governments and for the private sector markets. Each CRI is aligned with a productive sector or with a grouping of natural resources. Regarding R&D, gross expenditure in 2010 was NZ $2.4 billion (40% by
business, 33% by higher education and 23% by government). Most of the 27% devoted to basic research is carried out in universities. As well, 37% goes to applied research and 35% is given to experimental development. The government-set funding priorities privilege biological industries and high-value manufacturing and services but also support energy, the environment, natural risk management and health.

**Graphic 17: Research Science and Technology Funding Priorities**

Against this background, the Royal Society undertakes its multiple functions as mandated by Parliamentary Act namely, research management (including support for researchers at all career points), research funding, advocacy for science, technology, and the humanities (e.g. organising the Speaker’s Science Forum in Parliament), setting codes of professional standards and ethics for the research community in these fields, and providing policy advice to government which involves consultation, position papers, briefings and reports. It is the funding role of the Society which distinguishes it from its counterparts elsewhere. Working in partnership with government and the private sector, it acts as both a contractor and funding agent, managing a wide range of awards, fellowships and journals and New Zealand membership of international scientific unions and associations. Due care is taken to ensure that the Society is working independently from government.

Because learned societies are national for which can assemble researchers across institutions and disciplines, they are an authoritative interface between the research community and policy-making and ensure that a country networks closely with the science community worldwide. The small scale of the New Zealand context permits its Royal Society to act as a bridge between
academia and government to facilitate the dialogue which is necessary for optimal policy-making. This work, coupled with their international activities, illustrate the contribution of learned societies to national and global research networking.

DISCUSSANT: SAMILHA SIDAHOM PETERSON (EGYPT)

Since it is widely held that science should remain independent, bodies which manage its main aspects such as research and funding should, ideally, be independent themselves. Royal Societies and similar bodies, such as Academies of Science, can be usefully compared for their functions and also for their autonomy as they are amongst the principal guardians of academic freedom. For MLICs which will want to set up this type of organisation to help network their researchers, it is essential to identify best practice because the resources available for these purposes are usually meagre and erroneous choices are costly. For countries emerging from political crisis, the dimensions of autonomy and academic freedom will be paramount. For those with more stable and democratic governments, a multi-function model may well be very attractive as the investment will be worthwhile. However, the pros and cons of each function need to be frankly discussed.

GENERAL DISCUSSION

This type of organisation is often purely advisory in big countries, the AAAS and the NSF being two examples from the USA. But these bodies also exercise a lobbying function which may not be appropriate in certain contexts. Since Royal Societies have networking value on two levels - amongst themselves and in relation to their contacts with research universities – enthusiastic support for their existence indicates a healthy respect for knowledge on the part of policy-makers. For example, the Moroccan Royal Academy of Sciences is only a few years old but its influence has grown considerably as the country has evolved towards a constitutional monarchy.

Session 12: Christian Brodhag, Ecole des Mines de St Etienne, France: Research Universities, Technology Transfer and Job Creation: What Infrastructure for What Training

- POLICY POINTS

Higher Education and R&D and Innovation; New Approaches to the Triple Helix; Training Students for the Labour Market; Fostering Entrepreneurship

The present world context is a mixed landscape where the various components must interact despite their inherent contradictions - i.e. the knowledge society with its emphasis on R&D and
innovation as drivers of development co-exists with the current fragile economic recovery to the 2008 crisis including chronic unemployment. This situation calls for fresh approaches to resolve problems and closer interaction amongst the actors of the Triple Helix namely governments, industry and the research community (including universities). The aim is to create the sustainable economic growth and employment which are proving so elusive.

To date, the traditional approach to innovation can be described as market pull and technology push with the business firm as the centre of action and linking to the research and academic communities. This is documented in major policy statements on innovation such as the OECD's Oslo Manual. In contrast, a new vision aiming for sustainability is based on quite different elements where an open and collaborative approach to innovation is the pull with the push factor coming from fledgling areas such as environmental regulation. In this vision, the firm is replaced by a broader business ecosystem where the firm's core activity interacts with an extended range of actors (e.g. standard-setting bodies, suppliers direct and secondary customers) and also beyond this with multiple stakeholders such as trade associations, investors, labour unions and competitors. This broader vision requires the networking amongst Triple Helix actors to be much more productive.

Furthermore, this vision recognises the reality of different types of knowledge such as academic (based on discovery and analysis) or tacit knowledge (comprising people's beliefs and convictions). Because innovation is a constantly evolving domain, it is evident that the knowledge and regulations related to this will be changing too. Therefore, it becomes essential to understand "knowledge in context" which can be a very complex exercise necessitating new types of modalities and evaluation criteria. Tools such as the Institutional Analysis and Development (IAD) Framework, designed by the 2009 Nobel Prize economist Elinor Ostrom of Indiana University, are intended to offer different ways to study the components of complex situations (e.g. exogenous variables, action arenas, participants, interactions and networking and outcomes).

The new vision of Innovation has six authorities (traditions, politics, institutions, standardisation, science, medias). Each of these functions as a legitimization process but does not necessarily recognise the legitimacy of the others. Together, they constitute a community of practice operating in an action arena and it is important to identify the role of research (and of research universities) in this space. Because academic knowledge can mediate amongst wider societal forces, this illustrates the engagement of science in society in areas such as business ethics and corporate social responsibility.

Research universities emerge as one of the new innovation communities and it is essential to network both these institutions and their faculty and students and also to leverage their capaICTies and impact. In addition, students must be trained to deal with the new action arenas of the future where they will be the decision-makers and managers. The training process can benefit from the opportunities offered by ICT and by experimental schemes such as Integrated Poles of Excellence (IPE) where multiple partners are associated with the teaching and learning
activities. As recipients of such training, graduates should be well equipped for tomorrow’s labour market as they will have acquired entrepreneurial skills to become job creators.

**Graphic 18: The Role of Research Universities as Communities of Practice and Action Arenas**

The role of research universities as communities of practice and action arenas

- **Institutions**
- **Standardization**
- **Politics**
- **Traditions**
- **Medias**

**Role of science**
- Communicate formal knowledge and rules
- Facilitate translation and evaluation
- Epistemology and ethics

**Discussant: Asa Olsson OECD/Project IHED**

In the present climate of weak economic recovery, unemployment and the associated danger of jobless growth are amongst the most serious concerns for countries worldwide. Young people are especially vulnerable. The OECD is placing major emphasis on job creation which requires skill acquisition at all levels of the workforce and especially in the R&D and innovation areas. Documents such as the OECD Skills Strategy and Frascati Manual are designed to provide guidelines for governments in this challenge. Unfortunately, job loss has become commonplace, though its consequences are different. Those with tertiary level qualifications are more likely to find new work opportunities. For people with lower level (or minimal) qualifications, numerous schemes are in place to provide initial training (or re-training), according to the types of jobs which exist. An appropriate level of ICT capacity is generally essential.

Innovation - which can occur in many contexts but is often associated with some type of ST competence - is viewed as a promising source of employment as new inventions - or even entirely new sectors (e.g. green growth) - emerge and require skilled workers. Certain areas attract entrepreneurial graduates who then become job creators. This raises the issue of
teaching entrepreneurial skills throughout the education process where educational research is still very new.

So the questions are: Who are the job seekers? What are their skills? Are they entrepreneurial so as to be job creators? How is education preparing students for this type of labour market?

**General Discussion**

Academics are experts in theory but sometimes less interested in the application of their ideas. However, with such urgent socio-economic problems to be resolved, policy-makers are seeking fresh ideas which may work in practice. Also, today, there is the issue of transparency which demands that the activities of even the most reputable RUs are easily understood by the community at large. Academics are therefore brokers who can negotiate with other stakeholders - this is true in general but particularly so in MLIC contexts. It also shows that the modern academy plays multiple roles in the development process in all types of economy.

**Major Policy Implications**

This section demonstrates the synergies between core statements made by the main participants and the policy options suggested by the OECD in its recent frameworks. Thus, experts in similar academic groupings to those in the Boston College seminar may become more aware of current policy recommendations and implement those which are relevant for their future action.

As important background data, the priorities of the four specific OECD policy frameworks discussed in the paper should be recalled:

- **Tertiary Education 2008**: steering/governance, funding, quality, equity/access, R&D links, the academic career, labour market links, internationalisation

- **Innovation 2011**: driving growth and addressing social challenges, helping recovery from the 2008 crisis, policies to reflect innovation occurring today, empowering people to innovate, unleashing innovation in firms, knowledge creation, diffusion and application
DEVELOPMENT 2012: building on core expertise and experience, leveraging comparative advantages, applying a more comprehensive and inclusive approach, adapting frameworks, upgrading skills and deepening partnerships

GENDER 2012: equitable approaches to education, employment and entrepreneurship to realise the potential of women

Examples of major policy linkages were as follows:

POLICY REVIEWS

These exercises, which are stock in trade for the OECD, show that countries put great store by inviting an objective appraisal of the appropriateness and impact of their policy choices. The reviews target areas of specific topicality, as signalled by the OECD in terms of how these areas impact on sustainable economic growth, amongst member states and associated nations. A sample of recent reviews (2009-2012) demonstrates the importance of the areas under scrutiny:

- Tertiary Education Policy: Poland, Chile, Colombia, Egypt, South Africa, Republic of Korea, Japan, China, Netherlands, Russian Federation, Australia.

- Science, Technology and Innovation Policy: Sweden, Slovenia, Peru, Russian Federation, Mexico, Republic of Korea and South East Asia

- Reviews of ICTies and regions central for economic growth: Berlin, Rotterdam, Seville, Penang, Parana, Lombardy, Pasa del Norte (Mexico).

Beyond the OECD, numerous countries are assessing their capalICTies to help drive economic development, inter alia, Malaysia, Morocco, the Gulf States, Baltic nations, Caribbean states such as Trinidad and Tobago (which has an economy based on both energy and tourism). The message behind these reviews is clear: economic opportunities do not wait. In each case, the notion of context is vital, given the range of socio-economic variables in play. So, why do countries, regions or ICTies ask for review? The answer lies in their understanding of their particular strategic importance and their wish to reinforce their capalICTies to manage this successfully - firstly, for national growth and secondly, to use this base to help position their country advantageously within the global economy.

GOVERNANCE AND MANAGEMENT ISSUES
Altbach capacitated these to be a sine qua non for institutional excellence, along with Meek and Jacob who claimed that good governance and dynamic institutional leadership ensure the quality of research; Postiglione considered that this factor creates the necessary enabling context for sound research capacity, as exemplified by the recent success of Hong Kong universities. Brodhag took this analysis of context further into the area of the university’s social responsibility to help prepare students for today’s labour market. Chirikov suggested that institutional research provides valuable advice both to governance actors and to institutional leaders and managers on current trends in support of their overall steering role.

- **ACADEMIC CAREERS IN TEACHING AND RESEARCH**

These career paths are fast evolving as countries must satisfy access demands (via teaching) and also support a solid research base which embraces international talent. Altbach alluded to the dearth of doctoral faculty in certain regions, which is directly addressed by strategies in South Africa (e.g. the SanTrust Programme) and in Brazil (via generous schemes for research grants). McCarthy and Rands considered that Learned Societies can - and must - help recognise, nurture and reward academic talent, while Tremewan and Tadaki contended that university-based NGOs need to clarify their respective political and academic roles for optimal impact. Measuring the success of research careers by criteria such as co-publications and ranking tables may require serious reappraisal in the near future as context-relevant research and new approaches to metrics gain new importance.

- **STUDENT ACCESS TO RESEARCH OPPORTUNITIES**

This is a varied landscape: Meek and Jacob spoke of broader opportunities for mobility and recognition of international talent at the global level; Knobel cited Brazilian strategies to attract talented students (both undergraduate or graduate); McCarthy and Rands referred to the role of learned societies in recognising and nurturing young research talent; Choucri warned of the challenges posed by highly populated nations in middle and low income countries as this phenomenon already requires forward-looking strategies in tertiary education and RDI policies; the SanTrust experts described the approaches to special programmes which raise the level of African doctoral credentials. However, amidst this diversity of context, there was general agreement that raw talent irrigates knowledge creation and so this must be effectively identified and harnessed.

- **RESEARCH FUNDING**

Today, this responsibility is shared between the public and private sectors and, as noted by Altbach, this is another building block for knowledge production. Support ranges over a wide range of sources: generous government and local support (Brazil and Hong Kong); prudent use of available funds managed by support bodies such as Learned Societies (New Zealand); and
moving from donor aid to sustainable self-ownership (South Africa/SanTrust). Other schemes yielding significant support include philanthropy and alumni pledges. When there is adequate funding provided by multiple sources, this clearly indicates agreement that the academy must access networks so as to perform creditably in the knowledge economy.

- **PROMOTING R&D AND INNOVATION**

The respective policy recommendations for tertiary education and R&D and innovation converge on this specific point and this reflects the importance of these fields for the knowledge economy. While Education features as a key element in the Innovation Strategy, this is rather to promote creative teaching which will hone critical skills and entrepreneurial attitudes amongst students as these will be vital for their careers. In contrast, the RDI targets institutions which seek the status of world-class research universities. Examples (both old or new) in all regions attest to the necessary policy choices and measures which must be taken in this regard. Examples are the University of Manchester Institute of Science and Technology (UMIST)/UK, Chalmers University of Technology/Sweden, Georgia Tech/USA, Monterrey Institute of Technology/Mexico, Tshwane University of Technology/South Africa and the Masdar Institute of Science and Technology in the UAE and the new Hamad bin Khalifa University in Qatar. While some of these also teach the humanities and social sciences, as befits a traditional university, the science focus is strong. In the future, it is likely that institutions aiming for world-class status as research universities will be under increasing pressure to sharpen their mission and strengthen their capacities in the SET disciplines.

Certain institutions in MLIC countries will find this a daunting challenge. However, with the support of visionary governance and ample resources, success stories are already evident and can offer valuable lessons. Postiglione pointed to the rise of top Hong Kong institutions, notably HKUST, in record time. Altbach ICTed Israel as another context where major investment has nurtured dynamic research institutions. Meek and Jacob alluded to the critical importance of research reputation for universities which - as knowledge hubs - aggressively compete to attract and retain top researchers. According to Shin, Lee and Kim, natural corollaries of this are factors such as the publications track record of star faculty and elevated positions in university ranking tables. Chirikov noted that one key function for institutional research capacity is to monitor the university’s progress, both as a leader in scientific research and as an actor in the national economy via innovation and technology transfer. Brodhag concurred with this view and took the process one step further since innovation can translate into job creation in today’s high tech-driven labour market. In stark contrast, Africa and certain parts of the MENA region (due to political instability) confront major challenges to strengthen RDI research excellence in their leading universities. Hard choices will be essential regarding institutional mission and whether the primary focus should be applied (not basic) research, given the pressing needs of local and regional socio-economic development. Sustained public support and investment (whether public of private) are also vital for progress. Despite the numerous difficulties involved, these countries concur that connectedness to regional and international research networks is an imperative for their development. Moreover, there is cause for optimism when bodies such as
the African Ministerial Council for Science and Technology (AMCOST) propose initiatives such as a Pan African Intellectual Property Organisation (PAIPO). This demonstrates the political will to establish regional bodies to deal with important areas and with counterparts in other parts of the world.

• **LINKS WITH THE LABOUR MARKET**

Employment in the knowledge economy requires new types of academic credentials (e.g. Bioinformatics, Nanotechnology), which are often earned through research-based teaching in universities. Brodhag insisted on the role of tertiary education Institutions, including world-class universities, in preparing students for this new and highly-skilled labour market. Here, the firm cannot be seen in isolation as it part of a broader innovation system which involves multiple stakeholders and processes. Young graduates must learn how to function in this more complex and many-faceted environment (described as "communities of practice with their own action arenas"), including its obligatory networking and often international aspects. Such capabilities are very urgently needed in emerging economies (e.g. Choucri for the Arab region and Jegede for Africa) but lingering political and socio-cultural barriers are preventing the progress required so that education and employment opportunities are better matched for students.

• **QUALITY ASSURANCE MECHANISMS**

Quality assurance regarding academic performance can be measured by various mechanisms such as research assessment exercises, peer review and cited publications. For research universities, a key issue for their quality has become their standing in ranking tables. While the criteria for these differ considerably, publications—more precisely co-authored papers—have rapidly gained importance as a major indicator in recent years. Postiglione and Knobel reported on this phenomenon from the Asian and Latin American regions. In contrast, Jedege and Jowi deplored the lack of relevance of these tools in the African context. One of the most discussed examples was Chinese research collaboration which has burgeoned in recent years and with obvious advantages for the institutions where the scholars are located. Yet, behind this rise, there is growing awareness that the indicators used do not apply in all regional contexts. By way of example, when Triple Helix conditions do not pertain in a certain context, why retain this sort of indicator since it is largely irrelevant? Shim, Lee and Kim expressed concerns as to the validity of these particular quality mechanisms, insisting that other criteria (e.g. the maturity of higher education and research systems) were more pertinent. Postiglione alluded to other options such as the government-led Research Assessment Exercise, used in the United Kingdom. One particular source of disquiet is the fact that not only are rankings tables managed by independent sources (inter alia, QS and THE) but their weight has grown exponentially. As a result and to restore a sense of reality, other exercises are in train such as the Multi-rank system and the webometric ranking of African universities. In addition, Ian White, an expert from the British academic publishing sector, reported on the latest initiatives
to ensure automatic E-publication for publicly funded research and on tools for mentoring and networking (such as AuthorAID, Research4Life, INASP), which aim to broaden access to knowledge networks and cater for academics from MLIC contexts. In the near future, it would seem that assessing the quality of research excellence will be better served by the new and more relevant criteria will be available to carry out assessment.

- **ICT Capacity**

Altbach reiterated that this aspect forms part of the essential resource base for world-class research universities because it facilitates the networking which assures the creation and sharing of knowledge. Choucri described the knowledge economy in the cyber era which offers ever increasing venues for electronic and networking communication. This includes the Open Source movement which is revolutionising access to knowledge and challenging traditional norms related to teaching, learning and research collaboration. With regard to the professional applications of ICT, Brodthag distinguished between using this for practical purposes such as the collection of data and best practices and its much newer benefits as a tool for social networking. Because this aspect bridges time and space, the modern workplace becomes an environment which is constantly interconnected to facilitate the interaction of global and local communities. However, it was recalled that excellent ICT capacity remains the privilege of high-income countries, although the catch-up process underway in many emerging economies is rapidly bringing positive results. Jegede for Africa and Choucri for the Arab region attested to the rapid adaptation to and use of advanced information technologies which is significantly influenced by the large youth populations (with active female participation) in these regions. Consequently, education and research and business are amongst the many domains where practices must change due to the impact of ICT. Due to the less sophisticated technical infrastructure and weaker human capacity which persist in low-income countries, ICT usage may be growing but still faces problems of sustainable delivery. Time and heavy demand from all areas of the population will resolve these issues and this could happen with surprising speed due to high demand. As a result, both local connectivity and also international and intra-regional networking could witness significant improvement.

- **Internationalisation**

At the outset, Altbach reminded the seminar that this policy component, perhaps more than any other, affirms the inherently global nature both of the academic profession and of universities as institutions with local and global outreach. In terms of research networking, numerous allusions to the benefits of international contacts were made throughout the discussions: Meek and Jacob commented on the rise in career mobility for researchers and on the benefits resulting from global brain circulation; Choucri noted that international linkages usually enhance opportunities for regional development (both in the MENA region and elsewhere); Postiglione referred to China’s historical experience of commitment to international outreach; Knobel illustrated how modern policy choices and strategies can rapidly create a diverse and
international academic environment; Tremewan and Tadaki studied how NGOs with an international mandate can best achieve their mission; McCarthy and Rands showed how national learned societies assure contacts with the academy worldwide; and internationalisation received priority rating on Chirikov’s proposals for institutional research agendas. Till now, the market value of international higher education has tended to attract more attention than the global interaction amongst the research community worldwide (which becomes a sort of “brains without borders” movement). This situation is now changing fast. Due to its physical and virtual networking, research is amongst the most mobile professions which is fully in keeping with its contribution to the global knowledge economy. Last but not least, this mobility requires support from other policy areas (such as immigration) to offer researchers smooth career transitions.

**Overarching Policy Issues**

**Networking African Research Universities**

- Attempting to recast the map of African universities so as to identify - and reinvest in - a select number with recognised basic science expertise which may form a Pan-African network and linking to counterparts in other regions

- Complement this initiative with ‘serious reinforcement in a network of reputable universities with applied research capacity which can address regional development issues (e.g. universities in the SADC sub-region) and link to counterparts in other emerging economies (i.e. South-South cooperation).

*(Note: The above two proposals assume the continuation of the African university sector, which will likely be the case. However, there is debate that further major investment in this area should be carefully considered in relation to better returns from other means of knowledge delivery, including ICT.)*

- Overall strengthening of linkages with regional and international networks for university cooperation, research management, quality assurance and with learned societies

- Encouraging internationalisation via academic co-publications and interaction with learned societies
• Linking African RUs more closely with national and local business to train the skilled human capital need for the job market and to facilitate technology transfer

• Encouraging more African female academics in university leadership and as teaching and research faculty

• Further strengthening ICT capacity to underpin networking in university research

**Networking Women in the Academy**

• Supporting university networks with initiatives to promote female academics as university leaders (e.g. ACU, IAUPL, IOHE) and replicating these efforts

• Supporting networks which promote female academics in research careers, especially in science-related disciplines (such as EPWS, SWE, TWOWS, WISE) where women are fewer and may need to hone their networking skills

• Networking initiatives in emerging economies which promote women in the academy and in professional life (e.g. the Asian University for Women in Bangladesh; ANWST which is the Unesco-supported Arab Network for Women in Science and Technology).

**Networking Young Researchers**

• Establishing national networks of young scientists via communication mechanisms such as ICT platforms and award schemes (e.g. the Indian Young Scientists Network (IYSN); the Young Scientists Network (YSN) based at Zurich’s ETH University; post-doctoral fellowships managed by the New Zealand Royal Society; the Qatar Science Leadership Programme (QSLP); fellowship programmes in Brazil offered by national (e.g. CAPES) or federal (e.g. FAPESP) agencies

• Replicating these bodies at the international level (e.g. Voices of Young Scientists (VOYS) with a data base of 5 000 experts; the International Network of Young Scientists (INYS) supported by the British Council; the Third World Network for Scientific Organisations, TWNSO, which is supported by the Third World Academy of Science, TWAS)

• Offering opportunities to young researchers from other regions to participate in networking initiatives via specific scholarship schemes (e.g. the Burkina Faso Young Researchers Network supported by the IDRC, Canada; the Australian Prime Minister’s Australia-Asia Endeavour Awards).
Firstly, sustainable growth is the principal and overarching policy goal for all linkages described above. Hundreds of thousands of networking initiatives exist - some global, some regional or national in their scope and focused on the wide variety of actors related to socio-economic development. A small sample is as follows: the United Nations University (UNU), the Unesco Chairs Programme, the ACU Research Management Network, NEPAD, Universitas 21, WUN, IARU, LERU, along with and the traditional networks exemplified by academies of science and learned societies. In all these instances, universities and the academy are central players with regard to generating and disseminating the knowledge needed for development worldwide.

Secondly, in terms of policy, a very large segment of this networking is undertaken by civil society organisations or by quasi-governmental organisations (sometimes called “quangos”) with the support of governments. This, in itself, underscores the critically important knowledge partnership between the public sector and the academy which can only grow stronger in the future. This is because knowledge for sustainable socio-economic growth is the common purpose.

Thirdly, a variety of new factors will gain prominence: as the research landscape grows more complex, maintaining the necessary tension between global and local problem-solving will become more important. This will require enhanced dialogue and cooperation both amongst public policy departments and amongst government, the private sector and the academy. Silo thinking (which can still be found in certain contexts) will - hopefully - become a thing of the past as it offers no positive strategies to address the complexities of development. As the world grows increasingly more interlinked (due to ICT facilities), understanding the potential of networks and leveraging these for optimal results will become standard practice.

Fourthly, academia must now demonstrate its clear social engagement in national and international development in more visible ways. This responsibility involves possessing the necessary research capacity - which, for MLIC countries, means work in progress. These contexts are very individual in scale and capacities. Although regional “motor” economies exist (e.g. Brazil for LAC), each country needs its own knowledge base which can be applied to resolving local issues. Relevant social engagement then becomes a component of policy choice. Personal statements by experts at the seminar documented the various aspects in play while cautioning that there is no “one size fits all” model for these economies:

- Malaysia: research collaboration at country level and focused on community issues enhances overall national research capacity.
Israel: international research cooperation, though facilitated by ICT, must overcome disadvantages of geographical distance and especially the subtleties of cultural differences so as to nurture mutual understanding.

Qatar: building a true research culture is a lengthy and expensive investment but one which is essential to long-term growth and prosperity; finally, policy-makers must face this reality.

Kenya: despite the asymmetries of capacity in North-South research collaboration, partnering institutions always benefit from this cooperation.

Slovenia: for small economies seeking to reinforce research capacity, the sheer broad scale of international research cooperation is particularly beneficial.

Mexico: agency (i.e. commitment to international collaboration amongst scholars) is perhaps even more vital that institutional support for enduring and successful academic research.

India: given rising revenue from R&D services (US $878 million in 2010-11), this BRIC economy must provide better research management infrastructure for international research collaboration in STI areas, while also supporting research applied to local development (which is often social science-related).

Egypt: the present flux in MENA countries offers a unique opportunity to re-tool performing national systems and institutions to reinforce international research collaboration to benefit future regional development.

Ethiopia: African ownership of research management remains a desirable goal, though more difficult since more donors (e.g. China, India) are now engaged in international in research collaboration.

Nicaragua: for South-based partners, international research collaboration moves from dependence, through empowerment to autonomy but this process will not achieve optimal impact without a robust national research policy framework.
Conclusion: Towards Equitable and Dynamic Research Networks

Networking the Global Economy

Holding this seminar under the auspices of the OECD, with its core mandate to foster economic growth in national economies, was important. This recalled the importance of establishing closer linkages amongst economies of varying scale as the world makes a collective effort to rebuild growth and prosperity after the global crisis of 2008. Hosted by the IHERD Programme (a donor-funded activity), the seminar continued the networking focus by facilitating interface amongst experts from amongst high, middle and low income countries with regard to their place in the knowledge economy. Last but not least in this process, the academics gathered at the event demonstrated both awareness that their expertise plays a major role in socio-economic development and commitment to reinforcing their networking traditions in new ways.

Nurturing Academic Networking Capacity

The varied experiences of the seminar demonstrated that building networks to underpin knowledge systems is a common imperative for countries and vitally important for enhanced economic performance. It is essential that these networks possess the capacity to offer equitable access for interested stakeholders and that they enjoy the intrinsic capacity and external support to carry out their linking function with optimal effect. Networks which are too elitist or too passive in their operations will ultimately wither away as they possess no credible reference for providing new contacts and reinforcing collaboration. The critical nature of the seminar discussions articulated the challenges involved in building and sustaining these entities. In particular, networks offer valuable opportunities either for cooperation amongst stakeholders with the same profile or for wider interaction with partners in the public and private sectors, since all of these have a vested interest in supporting the knowledge economy.

Linking Research University Networks and National Policy-Making
This paper has studied networks in relation to the guidelines suggested by important OECD policy frameworks. While not prescriptive, these tools provide useful advice to governments eager to improve their performance in the knowledge economy by reorienting certain sectors and structures in cooperation with their private sector and civil society partners. Each of the frameworks discussed - for Tertiary Education, Innovation, Development and Gender Equity - has clear ramifications for the future profiles and operations of the academy which will remain a cornerstone of knowledge systems.

**Reappraising the Components and Impact of Research University Networks**

Looking ahead to 2050, it is already known that major social changes are already in progress and these will profoundly affect currently held assumptions and paradigms. New demographic patterns and rapid acceleration in cultural diversity are at the forefront of these imminent global transformations. From an economic standpoint, it is predicted that full recovery from the 2008 crisis could take another twenty years. Throughout this period, the Tertiary Education sector will be deeply concerned by these changes, with universities likely to be the institutions most pressured to reorient provision of their traditional research and teaching functions. According to opinion-shapers in the sector, signs of change are already evident: for example, the President of MIT (Professor Rafael Reif, an electrical engineer by training) believes classic university models will be radically reshaped by ICT potential; another instance is the “100 Under 50” Report of the Times Higher Education (June 2012) which identified young institutions - mainly in Asia - poised for future leadership due to their innovative approaches. So, the term ‘world-class university status” may be ripe for reappraisal. This will focus on approaches to governance, institutional leadership, investment and fundraising, quality and critically oriented teaching, facilitating basic or applied research and innovation, ever stronger ICT capabilities, nurturing the modern academy (including greater gender equity) and enhanced international outreach and collaboration. All of these aspects figured prominently throughout the seminar discussions on research universities as knowledge networks.

As history has shown, knowledge networks, including research universities, are entities in continuous evolution. For the latter group, adapting to the changes ahead and choosing the best policies to address this process constitute their most pressing challenges. Current dangers are numerous, inter alia, significant changes in conditions for securing academic tenure and the risk of politicised ownership of R&D and innovation. Thus, a robust and collaborative response is required to reaffirm the enduring importance of the academy. Adherence to a policy of “stronger together” and demonstrating this collegiality through more intensive cooperation in equitable and dynamic academic networks could be the most intelligent strategy for assuring the optimal future of research universities.
Annex 1

Papers presented by the principal participants

Day 1

- Philip Altbach, CIHE, Boston College, USA - Advancing the National and Global Knowledge Agenda: The Role of Research Universities in Developing Countries

  Marc Tadaki and Christopher Tremewan, APRU, Singapore - Reimagining Internationalisation in Higher Education: International Consortia as a Transformative Space

- Merle Jacob, Lund University, Sweden and Lynn V. Meek, Melbourne University, Australia - Scientific Mobility and International Research Networks: Trends and Policy Tools for Promoting Research Excellence and Capacity Building

- Gerard A. Postiglione, The University of Hong Kong, China - Anchoring Globalisation in the Hong Kong’s Universities: Managing Academic Knowledge Networks and Research Output

- Igor S. Chirikov, The Higher School of Economics, Moscow, Russia - The Right Knowledge for the Right Decision: Developing Institutional Research Capacity at Research Universities

- Olugbemiro Jegede, Nigeria - Centres of Excellence: Contextualising Research Excellence in Africa
Day 2

- Anshumali Padayachee, Charmaine Williams and Brigitte Smit, SANTRUST, Durban, South Africa - **Building National Capacity with the Support of International Research Networks: The Santrust Experience**

- Marcelo Knobel, Tania Patricia Simoes, Univerdidade Etadual de Campinas (Unicamp), Campinas, and Carlos Henrique de Brito Cruz, FAPESP, Sao Paolo, Brazil - **North-South Research Partnerships between Research Universities: Experiences and Best Practices**

- Nazli Choucri, MIT, Boston, USA - **The Knowledge Economy in the Mena Region and the Future of Arab Higher Education**


- Dianne McCarthy and Marc Rands, Royal Society of New Zealand, Wellington, New Zealand - **Knowledge Networks for Research: Learned Societies as a Bridge between Research, Policy-Making and Funding**

List of Personal Statements by Discussants

- Norzaini Azman (Malaysia)- Reflections on Two Asian Region Research initiatives
- Gili S. Drori (Israel)- The Challenges of International Collaboration in Academe
- Ahmad O. Hasnah (Qatar)- Qatar Foundation for Education, Science and Community Development
- Manja Klemencic (Slovenia)- International Research Collaboration in the Western Balkans
- Alma Maldonado-Maldonado (Mexico)- Two Examples of Research Collaboration in Mexico
- Eldho Mathews (India)- Understanding the Changing Landscape of International Research Collaboration in India
- Samilha Sidahom Peterson (Egypt)- Challenges and Opportunities for the Research Collaboration in the MENA Region
- Damtew Tefera (Ethiopia/University of Kwazulu-Natal)- International Research Cooperation: The Untold African Success Story
- Edmundo Torres-Godfroy (Nicaragua)- Cooperation for University Research Capacity building in a Lower Middle-Income country: the Case of UNAN-Leon in Nicaragua
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<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>AAU</td>
<td>Association of African Universities</td>
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<tr>
<td>AAA</td>
<td>Accra Agenda for Aid, sponsored by the OECD in 2008, to monitor progress towards more effective donor aid and ownership by emerging countries of their development (as per the 2005 Paris Declaration on Aid Effectiveness.)</td>
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<tr>
<td>AAAS</td>
<td>American Association for the Advancement of Science (also known as Triple AS)</td>
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<tr>
<td>ACU</td>
<td>Association of Commonwealth Universities (which sponsors a Research Management Network Programme)</td>
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<tr>
<td>AGI</td>
<td>Africa Governance Initiative</td>
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<tr>
<td>AMCOST</td>
<td>African Ministerial Council for Science and Technology, convened by the Africa Union</td>
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<td>ANWST</td>
<td>Arab Network for Women in Science and Technology</td>
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<tr>
<td>APEC</td>
<td>Asia Pacific Economic Cooperation</td>
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<td>APRU</td>
<td>Association of Pacific Rim Universities</td>
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<tr>
<td>AUF</td>
<td>Association des Universités Francophones</td>
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<tr>
<td>Author AID</td>
<td>An initiative to help scholars from developing countries to publish and otherwise communicate their research</td>
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<tr>
<td>BRIC Nations</td>
<td>Brazil, Russia, India, China</td>
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<td>Busan</td>
<td>The OECD-sponsored high level forum on aid held in Busan, Republic of Korea in 2011 which followed earlier meetings in Paris, Accra, and Rome.</td>
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<tr>
<td>Acronym</td>
<td>Full Form</td>
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<tr>
<td>CAPES</td>
<td>The federal agency for academic staff development, Brazil</td>
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<td>CEO</td>
<td>Chief Executive Officer</td>
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<td>CERI</td>
<td>The OECD Centre for Educational Research and Innovation</td>
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<td>CIHE</td>
<td>Centre for International Higher Education (Boston College, USA)</td>
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<tr>
<td>ICT</td>
<td>Communication and Information Technology</td>
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<td>DAAD</td>
<td>German Academic Exchange Service (Deutscher Akademischer Austausch Dienst)</td>
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<td>FAPESP</td>
<td>The Sao Paulo Research Foundation, Brazil</td>
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<td>Frascati Manual</td>
<td>OECD document setting forth a methodology for collecting R&amp; D statistics</td>
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<td>EPWS</td>
<td>European Platform for Women Scientists</td>
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<td>Finch Commission</td>
<td>A public enquiry in the United Kingdom to examine ways to widen equitable access to research findings and scholarly publications</td>
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<td>GNP</td>
<td>Gross National Product</td>
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<td>G8</td>
<td>The group of eight of the leading world economies (Canada, France, Germany, Italy, Japan, Russia, United Kingdom, USA)</td>
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<tr>
<td>G20</td>
<td>The group of the twenty leading economies (South Africa, USA, Canada, Mexico, Brazil, Argentina) China, Japan, Republic of Korea, India, Indonesia, Russia, Turkey, European Union, Germany, France, United Kingdom, Italy, Saudi Arabia, Australia)</td>
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<tr>
<td>IARU</td>
<td>International Alliance of Research Universities</td>
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<td>IAU</td>
<td>International Association of Universities</td>
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<td>IAUP</td>
<td>International Association of University Presidents</td>
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<td>IDA</td>
<td>Institutional Development Analysis Framework created by Elinor Ostrom, Nobel Prize winner in Economics, Indiana University, USA</td>
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<td>IDRC</td>
<td>International Development Research Centre, Canada</td>
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<td>IMHE</td>
<td>The OECD Programme for the Institutional Management in Higher Education</td>
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<td>INASP</td>
<td>International Network for the Availability of Scientific Publications</td>
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<tr>
<td>IOHE</td>
<td>Inter-American Organisation for Higher Education</td>
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<tr>
<td>IPE</td>
<td>Integrated Pole of Excellence</td>
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<td>IPR</td>
<td>Intellectual Property Regulations</td>
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<tr>
<td>INYS</td>
<td>International Network of Young Scientists supported by the British Council</td>
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<td>IYSN</td>
<td>Indian Young Scientists Network</td>
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<tr>
<td>KAUST</td>
<td>King Abdullah University for Science and Technology, Saudi Arabia</td>
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<tr>
<td>LAC</td>
<td>Latin America and the Caribbean</td>
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<tr>
<td>LERU</td>
<td>League of European Research Universities</td>
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<td>LDCs</td>
<td>Least Developed Countries</td>
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<tr>
<td>Lisbon Process</td>
<td>An action plan of the European Union between 2000 and 2010 to promote a knowledge-based economy in the region. (Also known as the Lisbon Agenda or and Lisbon Strategy)</td>
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<tr>
<td>Massification</td>
<td>The term denoting a higher education system where a high (and majority) percentage of the traditional student cohort (18-25) are enrolled in courses.</td>
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<tr>
<td>MENA</td>
<td>Region Countries located in the Middle East and North Africa.</td>
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<td>MDGs</td>
<td>United Nations’ Millennium Development Goals</td>
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**MIT**  Massachusetts Institute of Technology

**NSF**  National Foundation for Science of the USA

**NEPAD**  New Partnership for Africa’s Development, established in 2001

**OECD**  Organisation for Economic Co-operation and Development

**OECD GI**  OECD Gender Initiative

**OECD Green Growth Strategy**  A strategic vision including the creation of necessary policy frameworks to guide national and international policies so that the potential of green growth is realised for all countries. This strategy will be presented to the OECD Ministerial Council Meeting in 2011.

**OECD Innovation Strategy**  A set of principles for fostering innovation in people (workers and consumers), in firms and in government. The scope of innovation as well as its modalities and locations are analysed so as to help governments formulate far-reaching policies for their national contexts.

**OECD Skills Strategy 2012**  Guideline for governments to train their workforces for the knowledge economy, and especially to promote innovation and entrepreneurship.

**ODA**  Official Development Assistance

**Oslo Frascati Manual**  OECD guidelines for collecting and interpreting technological innovation data

**PAIPO**  Pan African Intellectual Property Organisation, which is a proposal under discussion by the African Union

**Paris Declaration on Aid Effectiveness**  A process launched by the OECD in 2005 as a roadmap to raise the quality and impact of donor assistance

**R & D**  Research and Development

**RSNZ**  Royal Society of New Zealand
SADC | Southern African Development Community

SETI | Science, Engineering, Technology and Innovation

Shanghai Rankings | Ranking system established by the Shanghai Jiao Tong University, China

THE Rankings | Ranking system established by the Times Higher Education newspaper

QS Rankings | Ranking system established by Quacquarelli Symonds, a firm with activities in education consultancy

RAE | Research Assessment Exercise, used in the United Kingdom

Research4Life | A collective name for four programmes which, together, provide developing countries with free or low cost access to academic publishing

SWE | Society for Women Engineers

STI | Science, Technology and Innovation

TWAS | Third World Academy of Science

TWNSO | Third World Network of Scientific Organisations

TWOWS | Third World Organisation of Women Scientists

Triple Helix | The relationship between government, industry and research

UNESCO | United Nations Educational, Scientific and Cultural Organisation

UNESCO Chairs Programme | A university networking scheme to link institutions for teaching and research in development-based disciplines

UNISA | University of South Africa

Universitas 21 | An international network of leading research-intensive universities in thirteen countries
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<tr>
<td>UNU</td>
<td>United Nations University</td>
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<td>VOYS</td>
<td>Voices of Young Scientists</td>
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<td>WCUs</td>
<td>World Class Universities</td>
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<td>WISE</td>
<td>Women in Science and Engineering</td>
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<td>WUN</td>
<td>World University Network</td>
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