UNESCO

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la science et la culture

**UNESCO Forum on Higher Education, Research and Knowledge**

# Symposium on Comparative Analysis of National Research Systems

# FINAL REPORT

**UNESCO, Paris, 16-18 January 2008**

# Contents

# Section 1

**Introductory Note**

- **The Brief**

The UNESCO Forum's *Special Initiative: Comparing National Research Systems* is intended to learn more about national research systems in developing countries in order to help strengthen their capacities to better manage their development processes. The project supports research on and for development so that these countries may clearly articulate and have ownership of their systems, which are key assets for their socio-economic progress.

This process relies heavily on scientific and intellectual dialogue to articulate and enhance the links between higher education, research and knowledge. Despite trends towards increased levels of global uniformity, there exits no single answer to what constitutes the most appropriate structures, systems or policies for research and knowledge production. In the search for effective responses, the links amongst policies for higher education, science and social development assume special importance.

- **The Content**

For the Symposium (UNESCO, Paris, January 16-18 2008), the data presented of a global meta-review and country review template , regional reports and country studies of 52 middle and low income countries.

The countries studied were:

- Africa (17 countries) Benin, Botswana, Burkina Faso, Cameroon, Cote d'Ivoire, Ethiopia, Gabon, Gambia, Ghana, Kenya, Malawi, Mali, Nigeria, Senegal, Tanzania, Uganda, Zambia

- Arab States (12 countries) Algeria, Bahrain, Egypt, Jordan, Kuwait, Lebanon, Morocco; Oman, Sudan, Syria, Tunisia, United Arab Emirates

- Asia (10 countries) Bangladesh, Indonesia, Malaysia, Nepal, Pakistan, Philippines, Singapore; Sri Lanka, Thailand, Vietnam

- Latin America / Caribbean ( 13 countries) Argentina, Bolivia, Chile, Colombia, Costa Rica, Cuba, Ecuador, Jamaica, Mexico, Panama, Peru, Trinidad and Tobago, Venezuela

The Country Template is intended to function as a tool for countries to assess their own systems and to compare these with others of similar scale.

- **The Methodology**

The principal purpose of the Special Initiative is the methodology.

Mapping is a strategy currently used by a significant number of organizations in various fields, which are vital for development. For this reason, partners such as NEPAD, WHO, FAO and related health organizations, and the OECD were invited to the Symposium to share their methodologies in key areas of knowledge systems such as agriculture, health, science, technology and innovation (STI) and higher education.

Regarding the Country Template, suggestions for its final format were duly noted, including the addition of a tenth indicator entitled *Tensions, Dynamics and Challenges.* In this way, its use as a tool for analysis may be enhanced.

- **Possible Applications**

Piloting of the country template, either in its entirely or regarding selected components, may be undertaken to assess its applications. As well, this will be available to countries to help them map and analyse their knowledge systems as part of their policy –making exercises.

- **The Special Initiative within the programme of the UNESCO Forum**

The UNESCO Forum is an arena for the promotion and debate with regard to "research on research" and knowledge systems. It is global, regional and national in scope, and operates in partnership with multiple expert bodies. The Special Initiative, which focuses on the analysis of country research capacities , fits within the Forum's overall matrix of diverse activities ( *inter alia*, the Global Colloquium, the Global Research seminar, regional research seminars and commissioned research papers). It can thus benefit from its programme of broader debate, analysis and prognostic advice on systems of higher education, research and knowledge in the 21st century.

# Section 2

**Summary Report of the Rapporteur General:  Key issues**

**I. Introduction**

While knowledge societies are growingly emerging on a global scale, research systems are expected to play a key role   in their shaping and development. However, there is a large diversity between countries in terms of their research systems development. In order to acquire a better documented image of this diversity, a mapping of research systems of low income countries was considered as both desirable and relevant.

**I. 1. Purposes**

i)      Launching a flexible template with appropriate indicators that may be used by those countries interested in mapping their research and knowledge systems, comparing them on a wider scale, and identifying priority needs for policy making and capacities strengthening.

ii)     In order to do so, two activities have been undertaken:
- Mapping of research and knowledge systems from middle and low income countries, with special emphasis on national policies, infrastructure, human capacities, and investment.
- Comparing these research and knowledge systems in order to finally allow each country to see itself in a wider context and to identify areas for further policy actions.

**I. 2. Contexts and underlying assumptions**

*i)      Contextual challenges*

➢ A new economy:
- Emerging and developing knowledge societies and economies:
  - Expectations for S&T are today higher than in any other time in history
  - S&T the main driver of economic growth
  - S&T create new markets and employment opportunities, new culture of development

> ➢ Global waves

- Globalization, with its opportunities, risks and uncertainties, generate a new context:

  - Liberalized world trade
  - Increased competition
  - New international division of labor
  - Knowledge intensive industries and focus on innovation

*ii) Risks (global, regional, national):*

  - Increased inequalities (social, economic, etc.)
  - Growing insecurities (personal, environmental …)
  - Emerging conflicts (ethnic, political …)
  - New threats and dangers (environmental, industrial, …)

In such contexts, there is a growing need to ensure for all the peoples an *equitable access to knowledge, innovation and development*. Thus symposium facilitated this by providing an appropriate methodology for mapping national research and knowledge systems, particularly from low and middle-income countries.

### II.1. Outcomes

Two tracks of discussions emerged in the Symposium:
(a) knowledge on S&T systems
(b) knowledge on how to get knowledge about S&T systems

Sometimes the two tracks were parallel, even divergent; indigenous knowledge vs. external knowledge; reliable knowledge vs. unreliable knowledge. However, most of the time, the discussions were highly convergent. It is out of this convergence that apparently we managed to agree on a set of general trends and developments in the research systems of low income countries.

### II.2. Substantive outcomes

- Significant diversity and important differences between national and regional research systems.

- A growing "knowledge deficit" is affecting low income countries as the result of:

  - de-institutionalization of research structures
  - de-professionalization of existing researchers
  - weak connection between research and higher education
  - emigration of talents (brain-drain)

- A high correlation between knowledge production and economic output both being low

- Low public investment in knowledge production

- Low public trust in locally produced knowledge

- Poor research infrastructure and poor research ethos

- Information on research systems not easily available, less systematic, even non-existent

- Science policy, when existing, is loaded with rhetorics and bears almost no impact on the reality of development

**II.3. Methodology of mapping research systems**

1. **Reviewing (mostly practiced nationally and by such agencies as OECD)**

*Modality:*

  - Description
  - Interpretation
  - Evaluation
  - Prescription

  Lacking explanation

*Criteria:*

  - focused on research policy
  - focused on that development which is based on knowledge

■ focused on getting knowledge about research systems

2. **Meta-reviewing**

- Reviewing regionally and globally country reviews for:

    ■ Comparative reasons
    ■ Identifying major global and/or regional trends and issues

- Take a critical stand on country reviews and suggest a new agenda for reviewing

- Testing reviewing templates

**II.4. Dilemmas and/or complementarities**

When comparing reviewing and meta-reviewing methodologies, certain dilemmas and/or complementarities should be considered:

■ Indigenous and/or external reviewing
■ Internal and/or external reviewing and/or meta-reviewing
■ Knowledge for knowledge sake and/or knowledge for policy making
■ Quantitative indicators and/or qualitative (narrative) descriptors
■ Primary *vs.* secondary analysis
■ Country and/or region/global reviewing
■ Focus on demand for research and/or focus on supply of research

**II.5. Key methodological issues**

The participants seemed to favour that reviewing methodologies which:

• Allow for context dependency, providing opportunities for getting not just national, but also regional and global perspectives

• Built-in flexibility: one size does not fit all countries within any region

- Pay attention to historical and cultural factors which are nationally embedded

- Use indicators which would allow for underlying both individuality and commonness of research systems

- Focus on:

  - national and global contexts
  - institutional and national policies
  - organizations for research (public and private, research oriented and academically oriented, related to sectors (agriculture, industry, services, etc.) or more specialized, etc.
  - researchers (communities, cultures, ethos, etc.)
  - governance
  - markets (are there markets for the knowledge and technologies that are locally produced?)

- Provide an open platform for both national and global communication

### III.    Conclusions

1. The meta-review is in many respects both unique and highly original, since it managed to:

   - provide, more often than not, for the first time, information on research systems from most of the low income countries from all over the world (52 country reviews);

   - provide comparative data on such research systems from a regional and global perspective;

   - test a template with indicators and descriptors for mapping research systems, which has an in-build flexibility and allows for catching out the systems' internal dynamics.

2. The state of research systems in most of the low income countries is a poor one, though regional and country diversity is the hallmark.

3. When existing, science policies are more often than not rhetorical, not well informed or evidence based and reveal major cleavages.

4. There is a range of methodologies for reviewing research systems, but they need improvements.

5. An important agenda of key issues lies ahead with reference to developing research systems in low income countries.

6. The Forum should further follow up such issues:

    - updating information;

    - complement quantitative with qualitative information, indigenous with external information;

    - complement country, regional and global perspectives so as to highlight tensions and conflicts, and provide a dynamic perspective;

    - provide opportunities for cooperation and networking/clustering:

        o between actors within the country (particularly universities, research institutes, economic and political actors …);
        o between countries in the region;
        o on a global scale provided by UNESCO and OECD in close co-operation.

**Section 3**
**Reports on the Sessions**


**16 January 2008 (Opening Session)**

The analyses on national research systems compared at this symposium were those of UNESCO, OECD and NEPAD. Across the three templates, there were positive and negative suggestions and reactions, as well as calls for means of moving forward and better organising future 'research on research'.

- **Positive Aspects**

The main positive aspect evoked was the cooperation and networking already in place. This was evidenced by the presence of Assistant Directors-General from each of the Education, Natural Sciences and Social and Human Sciences Sectors within UNESCO, as well as the presence of OECD and NEPAD representatives. This point was also made by the Director of SAREC/Sida as being an important part of moving forward in this important work, which is, by nature, multi-faceted and intersectoral.

Other positive aspects noted during the meeting were the cooperation that was of benefit to Professors Mouton and Waast during their compilation of data, the originality of some of the country reports, the continuing development of the template and the possibility for scientific policies, even in smaller countries.

The presentations from Ghang Zhang of the OECD, Professors Philippe Mawoko and Claes Brundenius of NEPAD indicated similarities and scope for cooperation between the three research review systems. The themes of benchmarking, a global context and competitiveness (especially in finding niches) are common in both OECD and UNESCO as central issues. NEPAD and the Global Synthesis Report of Professors Mouton and Waast both call for surveys. Professor Brundenius noted the missing link between Research and Industry, an element s, which has also been a focus of the UNESCO tool.

- **Aspects for Further Consideration**

The main aspects considered were the trade off between breadth and depth for the template and the consideration of utility and visibility as fundamental tenets of science systems. Practically, there were questions of consistency, under representation of poorer countries and indigenous populations, foreign data collection and other data troubles.

Regarding cooperation questions, Professor Mouton outlined that bibliometric studies have shown a lack of cooperation between a country and its immediate neighbours, instead preferring to enter into joint projects with Northern countries.

- **Moving Forward**

The OECD formula has been used in some way or another for forty years. It would offer something of a goal for the UNESCO formula. The OECD formula suggests much more flexibility and autonomy; it is more recommendation than the UNESCO formula and does not have the same problems of a non-integrated government/science community. Finally there was a question wondering about the lack of a "client" for the UNESCO review: methodology will be influenced by the client. This question was not fully dealt with but there were further statements made suggesting that OECD and UNESCO should have a close working relationship.

**17 January 2008 (Morning Session)**

## AFRICA REPORT

- **Positive Aspects**

There were several positive remarks from the audience in response to the Professor Gaillard's presentation on African research systems. These focussed on the amount of information collected in a short time and the quality of the data. Specific to the region there were positive remarks for the increase in the number of publications and the creation of SANSA (South Africa Network of Skills Abroad).

- **Aspects for Further Consideration**

The remarks made were focussed on the need to standardise data, the low numbers in scientific communities, researchers and institutions, scarce R&D indicators linked to science policies and a need for more qualitative information about scientific activities in some countries. Professor Teng Zeng noted that most of the countries in the study do not fall in the group of Africa's ten largest economies, leading him to wonder how research can be supported. He also differentiated between three levels of brain drain: external, internal and regional, noting that regional brain drain is not as bad a problem and that mobility programmes could be set up for scientists on a regional basis.

Many comments made by the observers added further suggestions. There were problems related to the structure and content of the template. The choice of research topics and priorities, the recruitment process for researchers, explanations behind the facts and figures in the reports and the actual use of the reports now that they have been established were all questioned. There were

other questions related to the country situations such as the definition of a scientific community, the necessary creation of a critical mass, the lack of interest in some countries for developing S&T policy and the lack of South-South cooperation.

- **Moving Forward**

Highly qualified expatriates are needed in many of the African countries as well as a need for international cooperation. As concerns the template there will need to be more complete collection of data for certain countries and an increased emphasis on national systems rather than regional concerns.

On major challenge for the UNESCO Forum is how it can continue to grow the Research Community, above all because of the difficulties to obtain   relevant documents in some countries even when data are available?

## ARAB REPORT

- **Positive Aspects**

The report on Arab states was praised for the amount of data collected. Specific to the region, Professor Benjelloun stated that there is a relatively better situation in Morocco, Tunisia and Mauritania (participants in the Bologna process). In Morocco, some initiatives have been taken against brain drain such as the creation of a website for the exchange of expertise and the creation of a Council of Universities Presidents based on the European model with much more freedom, and decentralised authority.

- **Aspects for Further Consideration**

According to Professor Hanafi, the main problems in the Arab world were mainly to do with the broader question: "Is there a research system with a specific function in the Arab world? "   He noted the difficulties in finding data on R&D and S&T especially in the decentralised universities of Egypt, Sudan and Syria, the fact that many private universities do not engage in research, the restrictions Gulf Countries have on foreign students and the problems of brain drain where national scientists abroad can be 4 or 5 times higher than at home.

Professor Benjelloun noted a disconnection between the results of research and their use in the community. He believes that universities should be considered as an agent for social mobility and improvement of the quality of Education and Research but there is a danger in parachuting models that do not necessarily interact with the local university environment.   Professor

Benjelloun also noted that even if there is free access to most universities, only 35% of students attend them.

Comments from the observers raised three main problems: a democracy deficit, lack of women's empowerment, knowledge deficit. This has led to mistrust in national research, a lack of legal structures/ connection between research and policy and a problematic average level of private institutes.

The observers' remarks on the report itself noted an inaccuracy of data, a lack of interpretation, a lack of distinction between social and technical sciences, the non-existence of indicators surrounding women's participation and a lack of feedback from the countries themselves.

- **Moving Forward**

Any question on moving forward pertaining to the Arab region must address the issue of "what is the return on investment of research productivity?" The Arab world was shown to have undertaken research as a means of development; this is the area which must be addressed.

**January 17 (Afternoon Session)**

**ASIA REPORT**

- **Positive Aspects**

Several positive aspects were mentioned. Professor Clemena Salazar suggested that the report was rich in indicators and that there was a diversity of information. There was also positive feedback on the advances that have been made by many of the countries.

- **Aspects for Further Consideration**

Professor Clemena Salazar did however note that it would have been better to have had a more uniform scope in the report, specifically with regard to the context and historical background of each country. Some things were left unclear from the Asian meeting, as evidenced by Professor Arvanitis' questions. These related to  the innovations from the region,  intellectual property and how it was developed,  the involvement of multinationals

and where this collaborative work was being done and, finally, public research institutes and their current situation in smaller countries.

- **Moving Forward**

Dr Ikramov, Secretary -General of the UNESCO National Commission for Uzbekistan, suggested that there should be a promotion of school experiences through didactics and wondered to what extent science education is involved in developing research institutes. Finally he suggested that it would be important to include central Asia in the report. Professor Jacob's questions were largely concerned with the quality of data, specifically in relation to transferring research results into policy. She noted there would be a need for a definition of issues and quality as well as creating a reference model.

Professor Kaur Gill noted that there should be another plan for Malaysia. She noted a need to update data, focus on education (primarily moves from social to natural sciences) and references to the cooperation between universities and industries in Malaysia.

Professor Olsson (Sida/Sweden) noted several important issues for the Asian region. She suggested a funding framework, specification of sectors (do they go beyond agriculture?), a balance between funding and cooperation for institutions involved in research and more focus on the poorer countries.

## Latin American /Caribbean Report

- **Positive Aspects**

The breadth of the data collected and the attempts to define trends in this diverse region were noted with satisfaction.

- **Aspects for Further Consideration**

There were several issues raised with the LAC country reports. There was call for greater focus on native groups and their institutions (as has been done in the Andean regions), as well as a need for a pilot/model report for each of the country studies; there was need for more discussion about the autonomy of the countries. There was suggestion that Venezuela should be better studied and there was a call for more research into the Caribbean. There were also problems surrounding the methodology: the need to know how to report knowledge, which terms are acceptable and what presuppositions will come out of the use of implicit standards set by the template.

It was further suggested that other indicators could be created especially in the region of measuring outcomes as well as outputs. Indeed several problems were identified concerning the indicators. There are gaps in the indicators, the methodology would need to be extended, the use of indicators and the search for them needs to be highlighted and the indicators should point towards options and realistic goals.

- **Moving Forward**

Finally there were calls to consider science as a political/business issue. There were calls for investment from private sectors as well as perhaps a second template to deal with scientific investment. . It was also suggested that the legitimacy and autonomy of science/research should be taken into account in these country reviews

**18 January 2008   (Final Sessions)**

**Session:   Mapping Research on Health Systems**

- **Main Points**

The research mapping for health systems was presented as another template/methodology for comparison with the UNESCO template. Though specific to health it had many similarities with the Forum website as well as some strength as a model. As noted by Dr Burke (Global Forum on Health Research), it is very important to compare investments in health in high-income countries. As such there is a multi-level approach, as outlined by Dr Kennedy of the Council on Health Research for Development (COHRED), mapping, profiling, analysis, intervention and evaluation. And as with any other of these mapping systems the main challenge is to quickly move from analysis to action.

Dr Sadana (WHO) presented a mapping and benchmarking toolkit for low and middle income countries, then Dr Gardner (WHO) gave the discussion further context noting that there is a need to evaluate the difference between S&T and Health research communities and eventually a need for unified methodologies. He also outlined a need for a joint push across sectors (agricultural, engineering etc.) to promote research. Further, Sida notes the creation of knowledge networks, evaluation of links and the patterns and outcomes between social indicators. The point was also made that the meetings of experts aren't necessarily always contextual and that the upcoming health meeting in Bamako is a step in the right direction.

- **Aspect for Further Consideration**

According to several observers, there were several areas to develop in the Health Mapping System. Data about Africa, on diasporas, the brain drain and national health policies could be usefully explored.

- **Moving Forward**

It was noted that the priority of health research remained with gathering data now, but by the time of the Global Ministerial Forum on Research for Health (Bamako November 2008) , all the material of WHO will be available.


**Session:   The Global Met-Review and the Template of Indicators**

- **Positive Remarks**

Professor Mouton suggested that this session would allow him to offer clarifications upon the template as well as dispel misconceptions about it. He suggested there would be three categories of responses:

1.  Requiring immediate attention
2.  Requiring follow-up in the medium term
3.  Not requiring any follow-up

He noted the strengths of this review were that it was *wide-ranging* and *novel,* and that the UNESCO template was to be used as an heuristic device to be used critically. He also reaffirmed the need for descriptors and narratives to complement the indicators.  Professor Mouton also noted the questions of context such as commissioned/self-initiated reports, diagnostic v. prognostic, descriptive v. analytical etc.

Professor Olsson (Sida/Sweden) made comments to the effect that she was happy with the template, happier still with the discussions and ideas come up with. She also responded to certain concerns over possible fragmentation, emphasizing that the roles of the Forum were diverse.

- **Aspects for Further Consideration**

There were questions raised over several issues from the symposium. They included the countries excluded from the studies, lack of interest in science from many of the countries

included and the special circumstances surrounding social science which warrant a separate approach.

Concerning the template there was criticism for the poor coordination across narrative reports done on the same country with Burkina Faso given as an example of receiving three histories of science reports, each having significant differences. There was also suggestion that the word narrative might not be accurate in describing all non-quantitative data and that the template outline similarly suffered from inaccuracy in its guiding structure. There were further questions over fragmentation in the Forum, the possibility for the misapplication of critical mass (leading to application of out of context philosophies to LDC countries), whether science really does help the poor and the absence of Millennium Development Goals as a reference for the study.

- **Moving Forward**

In response to one of the comments made during the symposium about the need to study systems despite the enormous difficulties in collecting relatable data, Professor Mouton suggested that the concept of "good enough" held merit as a response to the question of minimum data quality standards.

Several suggestions for improving the template were made. Professor Mouton considered that the report would benefit from the use of 'emergent' countries as a reference for the others in the same region. He proposed that South Africa be the reference for sub-Saharan Africa, and Brazil for in Latin America. Gender would be incorporated, by adding it to more of the indicators and input/output student mobility indicators also ought to be included. A tenth section labelled *Tensions, Dynamics and Challenges*, was also proposed for the template. It is to consider social inscription of science, ethos of science, state and science relations and legitimacy.

Professor Mouton devoted a section of his remarks to consider 'what next?' He considered three stages: taking comments on existing materials, finalizing the report (sources and referencing) and further cooperation with the UNESCO institute of statistics in Montreal. The next option was to consult with statistical agencies. The third was to further purvey the template especially working with NEPAD.

Professor Kjellqvist (Sida/Sweden) offered an "S" graph was offered putting research and development on the axes of a graph suggesting the concurrent but S shaped increase in both. He further suggested the use of specialist mathematicians to enhance this aspect of mapping. There was a question raised by Professor Choucri concerning the possibility for leap-

frogging parts of the S curve. She further noted that critical knowledge reminds us,  that "one size does not fit all".

The knowledge bank referred to by Professors Mouton, Olsson and Arvanitis has been largely termed in being an electronic repository, which compiles all data on an interactive framework. There was further suggestion for the template being put on the Internet. Such works are the intentions of a tool for policy advice currently begin developed as part of UNESCO's MOST Programme in the Social and Human Sciences Sector.

# Section 4

**Conclusion**

Following this meeting, Professor Mouton and Waast will finalize the country studies and the Global Meta-Review taking into account comments and suggestions of participants.

The Country Template will also be finalized for eventual applications.

This finalization exercise should be completed by July 2008.


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