Reviewing national research systems

Dr. Johann Mouton, CREST, Stellenbosch
Dr. Roland Waast, IRD, Paris

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The brief

The brief (Original idea)

At its workshop held on the 6th of 7th of April 2006 at UNESCO the objectives of a proposed study on national research systems were formulated as follows:

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

The brief
(Elaboration on purpose)

- Mapping and stock-taking exercise
- A meta-review of studies published between 1990 and 2005
- Three scenario's anticipated
  - A reasonably complete country study is available
  - Elements of a country study are available
  - No information on the country's research system available

The brief
(Elaboration on scope)

The review should focus on countries that meet the following criteria:

- Developing and poor countries of the world
- Non-OECD countries and also not including the newly industrialized countries
- Countries that have not already been well researched even if they fall into the two categories above
- Countries with at least some minimal R&D capacity

Project fact sheet

Project fact sheet
(The network - all 23+)

- *The African team*: Johann Mouton - Nelius Boshoff, Simone Esau-Bailey, Jacques Gaillard, Hocine Khelfaoui, Mziwandile Madikizela, Mluleki Nkwelo, Nomahlubi Shezi and Frank Teng-Zeng
- *The Arab team*: Roland Waast - Jacques Gaillard, Sari Hanafi, A. H al Huzban,Hocine Khelfaoui, Mina Kleiche & Pénélope Larzillière and Mr Estime (R. Arvanitis)
- *The Asian team*: VV Krishna - Usha Krishna, S.T.K. Naim and Seetha Wickremasinghe
- *The Latin American team*: Daniel Villavicencio - LLuvia Ponce, Antonio Chiapa and Martin Zamalvide

- + the support staff at CREST and IRD + UNESCO HE Forum staff

Project fact sheet
(The deliverables)

This study produced a wealth of reports and nearly 1400 pages of text:

- Four regional compilations on country reviews:
  - Africa compilation (22 countries; 447pp)
  - Arab compilation (11 countries; 238 pp)
  - Latin American compilation (14 countries; 245 pp)
  - Asia compilation (13 countries, 134pp)
- Four regional reports
  - African regional report (42pp)
  - Arab regional report (38pp)
  - Latin American regional report (26pp)
  - Asia regional report (30pp)
- A consolidated bibliography (46pp)
- A final synthesis report and template (149pp)

Project fact sheet (Explanation on country reviews)

- Some country reviews: available country studies re-structured according to the template
- Some country reviews: updated versions of previous versions (usually completed for similar exercises, e.g. IRD study on Science in Africa)
- Some country reviews: compiled from disparate and (scattered) sources that resulted in a review that is still incomplete
- Complete new country studies constructed (possible because of Estime and DST projects)

Therefore: The 52 country reviews differ from each other in terms of recency, level of completeness and "authority"

Project fact sheet
(The scope)

Africa (17): BOTSWANA, BURKINA FASO, CAMEROON, ETHIOPIA, GHANA, IVORY COAST, KENYA, LESOTHO, MALAWI, MALI, NAMIBIA, RWANDA, SENEGAL, TANZANIA, UGANDA, ZAMBIA, ZIMBABWE

Latin America and Caribbean (13): ARGENTINA, BOLIVIA, CHILE, COLOMBIA, COSTA RICA, CUBA, ECUADOR, JAMAICA, MEXICO, PANAMA, PERU, TRINIDAD & TOBAGO, VENEZUELA

Asia (10): BANGLADESH, INDONESIA, MALAYSIA, NEPAL, PAKISTAN, PHILIPPINES, SINGAPORE, SRI LANKA, THAILAND, VIETNAM

Arab Region (12): ALGERIA, BAHRAIN, JORDAN, KUWAIT, LEBANON, MOROCCO, OMAN, QATAR, SUDAN, SYRIA, TUNISIA, U ARAB EMIRATES

Project framework

The project framework (1)

Given the large number of countries to be covered as well as potential diversity of studies to be reviewed the study was conducted along the following lines:

- Phase 1: Utilizing the knowledge and resources of a an international team of research experts to collect relevant material and completing a first round of study mapping (the collection and mapping phase).
- Phase 2: Finalising the template (based on knowledge gained from the 52 reviews) and proposed a methodology to be employed in future country studies
- Phase 3: Conducting a comparative and integrative review of the country reviews (the integrative review phase) to result in regional and a global synthesis report

The project framework in practice (2)

Phase 1: Desktop research to identify available and known collections of country studies

Phase 2: Developed a first version of the country study template to be used for mapping exercise

Phase 3: Commissioning regional experts (Krishna/ Villavicencio) to construct country maps for Latin America, Asia and Middle East.

Phase 4: Conducting own country studies (cross-funded through other IRD and CREST studies) in Africa and Middle East

Phase 5: Conducting a comprehensive search for available information on statistical indicators pertinent to the project

Phase 6: Compiling country studies by region

Phase 7: Writing 4 regional reports

Phase 8: Writing of synthesis report which includes high-level findings, template and proposed methodology for future country studies

Project methodology - caveats

Caveats

- Research is often a trade-off between breadth and depth/ standardization and interpretation/ the outsider ("etic" and "emic" perspectives)
- The non-existence of certain data and information
- The unreliability of statistical data

Proposed methodology for country studies

Proposed methodology
(General issues)

- The purpose (clarifying the kind of country studies to be conducted?)
- The unit of analysis (what have we learnt about the nature of science and research in the countries reviewed?
- Data types (what kinds of data should be gathered in such country studies)
- The analytical framework (the template to be employed in such studies)

Methodology
(Purpose)

Purpose	Elaboration	Research aim	Methodology
Epistemic	Generate reliable and robust knowledge	Descriptive + Explanatory+ Interpretive	Qualitative + quantitative methods/ Emic + etic
Managerial (monitoring)	Produce regular information	Descriptive Comparative	Standardized data (indicators/ trend data/ scoreboards)
Managerial (review/ audits)	Benchmark (rank) performance of country	Evaluative (summative) Comparative	Standardized data (bibliometrics + survey data) + Peer review/ expert panels)
Formative (develop-mental)	Identify strengths and weaknesses of a country system	Advisory and prognostic	Foresight and scenario-building methods/ Experts/ SWOT-analyses/ Delphi-techniques/ Modelling

Methodology
(Units of analysis)

S&T Arrangement = Degree of structure / articulation

System	Assemblage [Bricolage?)

S&T Arrangement = Density of institutions

High density	Low density

S&T Arrangement = Locus of power

Internal steering	External steering

Methodology
(Units of analysis - RSTI)

- Inclusive of ALL fields of science (incl. SSH)
- Inclusive of all modes of knowledge production
- Inclusive of both formal and informal research
- Inclusive of both intra- and extra-national agencies

Proposed methodology
(Data types)

- Existing standard S&T indicators (including bibliometric indicators which are not always included) are in general terms insufficient to provide a truthful picture of the science system of the country.
- It is therefore important to think creatively (across domains) about new indicators which can help shed light on key features of S&T systems; and
- In the final analysis – and this is a key feature of the methodology produced here – the best statistical indicators have to be complemented by additional descriptive and qualitative information.

Proposed methodology
(Data types)

- Research and knowledge indicators
- Descriptors
  - Chronological descriptors (establishment of institutions, societies and journals, release of policies and plans)
  - Listing descriptors (lists of institutions, journals, societies, associations)
  - Visual descriptors (organogram of governance of science, flow of knowledge products)
- Bibliometrics: Macro- and micro-level bibliometrics to be included
- Narratives

The proposed methodology (Summary)

Unit of analysis	Theoretical model	Purpose	Methodology
Inclusive definition of research and science "systems" incl. informal research structures and socio-political ecology of research	Social studies of science approach + focus on socio-cognitive structures (incl. historical path-dependencies, variety of modes of knowledge production, social inscription of science and the role and status of epistemic communities	Continuum of applications ranging from basic research concerns to more evaluative and even normative interests	Mixed-methodology approach that combines statistical indicators (current and new) with more descriptive-narrative (incl. historical) analyses + surveys + field visits

Main findings

Main findings: Observations and propositions

- What function for Science ?
- Trust in science
- Policies
- Institutions
- The role of universities
- Human and Social Sciences
- Human resources and brain drain
- Co-operations

What function for Science?

- A subordinate Function
  - At Universities
  - Within « Research » Centres

- Research: a Function of its own ?
  - Simply adapting, borrowing, subcontracting…
  - Or maintaining an autonomous capability (with which potential, within which fields, with which purpose) to develop anticipating niches ?

- Some good reasons for supporting science

Trust in science

- 3 Crises
  - Funding
  - Profession
  - Institutions
- Trust
- From National sciences to New modes of knowledge production

Policies

- Formal similarities
  - Organisation, Declarations of intent
- 2 modes of governance
  - Centralised, Decentralised
- 3 Main policies
  - Innovation/ Laissez faire /Hesitation/undecided
- Room for Policies
  - Choice of « niches »
  - « Good practices » (Examples: Action plans, agreements between State and performers, Various funding mechanisms, Assessment and selection devices, Organisation: Labs & Poles, Regionalisation, Cooperation policies…)

Institutions

- A trend to de-institutionnalization
- The need for institutions (Establishments, Legal environment, Evaluation…)
- The challenge to old institutions
  - Changes in the environment, missions, clients, financial plans, management
- The Challenge to Centres and mission oriented Agencies
  - Local and Global Competition for routine tasks, provision of services and technological watch
  - 3 strategies

The specific Role of Universities

- Training
  - Not only Professors and researchers to-be but also training long lasting technical managers and upgrading their knowledge (Examples: Water, Medicine)
- Sanctuary for research
  - Fair share of basic research
  - Needs critical masses in relevant niches
- Develop strategic research
  - Watch of recent advances in the global knowledge
  - Liaise to relevant applications
- Take research seriously
  - Initiate new topics, fields and research postures
  - Label for the establishment

Human & Social Sciences

- Scientists like all others
  - Mostly academics, in great number, overloaded; research production: a subordinate function
  - Same status & careers than S&T colleagues, same working conditions
- Sciences different from others ?
  - Social inscription (close relation with public life; influence of / by ambient values)
  - Local & Universal (« Local » sciences, relativism & universalism)
  - Style of science (individualism)
- Sciences in great demand
  - Arenas and Scenes,
  - Changing Values : 3 ways of accumulation (academic, activist, consultant)
  - New mode of knowledge production (on the fringe of institutions, individual contracts & private Centres, Social Engineering & Action research. Atomization, Desinstitutionalization, « Globalized Elite »
  - Tensions & initiatives

Human Resources

- Size
  - Regular Army (Universities, Centres). Reserve (stand-in, doctoral students)
  - Theoretical numbers, FTE. Active potential (measure through publications)
- Quality
  - Diplomas; Updating.
  - Critical masses
  - Research posture, Style of science
- Profession
  - Status. Remuneration. Careers. Evaluation
  - Working conditions
  - Brain drain
- Norms and Values
  - Values. Hierarchy and controls. Scientific Community
  - Social inscription. Relevance (Scientific, socio economic)
- Structuration
  - Formal (institutions) and informal (Scientific Community)
- Initiatives

Co operations

- Figures
- Goals
  - Emergent, Intermediary, Small
- Functions and forms
- Amount ?
- Opportunities and Risks
  - Updating; Survival.
  - Subcontracting and Autonomy
- Good practices
  - Long standing Institution building
  - Big international Programmes
  - Centres of excellence…

Thank you

jm6@sun.ac.za

waast@bondy.ird.fr

The « System » and its components

- Is there a « System » (= a Function) ?
- Human Resources
- Institutions
- Co operations

What the status of science owes to its environment
(The need for descriptors and narratives)

- **Economy**

  (Wealth, type of economy, development models and past strategies…)

- **Politics**

  (Political regime, Socio cognitive blocs, Government support…)

- **Social environment**

  (Hierarchy of values and trades, Status of knowledge, History)

- **Specific actors**

  (Key figures, Circles of specialists, Rich families, Special communities…)

Same indicators, different status:

The need for descriptors and narratives

- **Economy**: BFA (Weallth), NIGERIA (Oil…), Cuba (Dev model)…
- **Politics**: PAK (Military concerns), Angola (Tribute), SGP, MLY…
- **Society**: Jordan (hierarchy of knowledges), Chile (Values)…
- **Specific Actors**: VEN (immigrants), ARG (Key figures), EGY (Communities), DZ (Professions)
- **History**: LBN (old Univ), NGA (Ibadan)…
- **Same indicators, different strategies** (style of science, domains and niches, incentives and function). **There is room for Policies.**

Regional features

- Africa
  - International market for scientific labour
- Arab Countries
  - Is there a function for science ?

Asia

- Science paths linked to industrialization

Latin America

- Ancient institutionalisation, unsteady support; key figures and circles of specialists.

Arab Countries

- Unity (*Symbolic*: Language, Religion, Old civilisation) and Diversity (Wealth, Political regime, Economic strategy. History of Education & Research institutions; Expectations from Research…)
- 3 Groups : Different approaches to Research
  - The Gulf Countries, Machraq, Maghreb
- Indicators, Descriptors and Narratives
  - National systems ? Profession, Institutions. Demand. Initiative: All State / No State, State support : resolute, ups and downs, expletive, Donors and Patrons.
- Legitimity and Function of Research
  - The question of innovation
  - The status of knowledge

Latin America

- Ancient record of education
- Unsteady support to research
- Key figures and circles of specialists
- 3 clusters:
  - Laissez faire
  - Hesitating
  - Growing intensity and organisation for innovation
- Good practices

  - Among which: Observatories of S&T