Symposium on the Comparative Analysis of National Research Systems

Regional Report on Sub-Saharan Africa

compiled by Johann Mouton

comments

by

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17 Country Reports

- **Botswana, Burkina Faso, Cameroon, Cote d'Ivoire, Ethiopia, Ghana, Kenya, Lesotho, Malawi, Mali, Namibia, Rwanda, Senegal, Tanzania, Uganda, Zambia and Zimbabwe (460 Pages)**

- **Benin, the Gambia and Nigeria not compiled**

The compilation benefited from two other major initiatives

- **African Science & Technology Profile** funded by the South African Department of Science & Technology: 22 country profiles completed in August 2007 by CREST and High Impact Innovation (14 country studies were used for the meta review)

- **Science in Africa at the dawn of the 21st century** completed in 2001, coordinated by IRD: 14 country profiles (three in particular were used for the meta review)

Outline of the Report

1. **Introduction**
2. **Summary Indicators and Descriptors**
3. **Summary Findings from the Country Profiles**
    1. **Recent trends in governance and policy development in S&T**
    2. **The institutional landscape: institution-building or de-institutionalization?**
    3. **Current state of human and infrastructural resources**
    4. **Informal S&T structures and scientific communities**
    5. **Knowledge production and output**
4. **Concluding Assessment**

My comments

- **I am impressed …**
- **Bravo!**

My comments

1. **Meta review in Africa and Africa in the rest of the world (research outputs): recent trends?**

2. **Science is as much (more?) concentrated in Africa as in the rest of the world: consequences?**

3. **Science policy in the context of scarce R&D indicators**

4. **De-institutionalisation, de-professionalisation and generation gap?**

5. **Brain drain and the limits of S&T Diaspora.**

6. **International collaboration/cooperation and the limits of national science.**

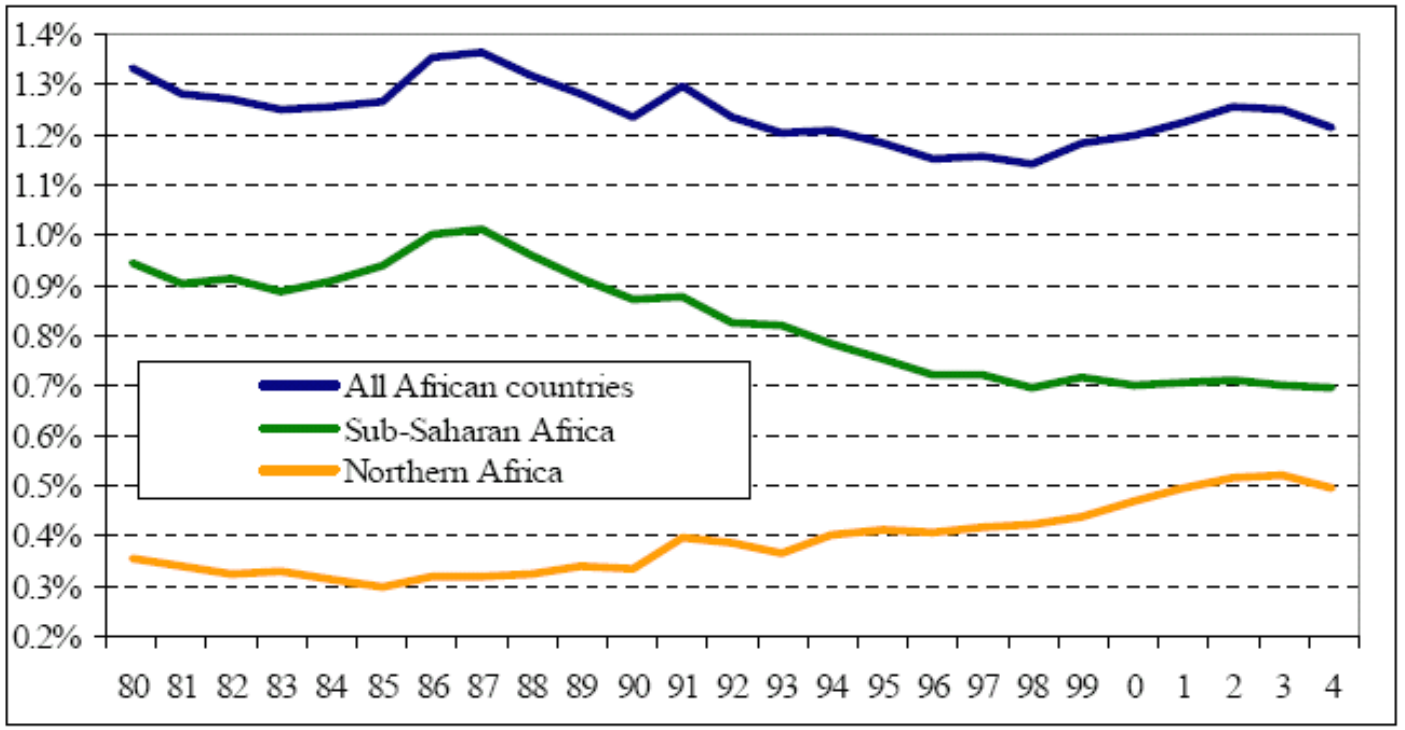
7. **Going beyond macro-indicators and monographs: the need for further studies.**

1. Meta review in Africa and Africa in the world

Research outputs: recent trends

Trends in Africa (1980-2004)

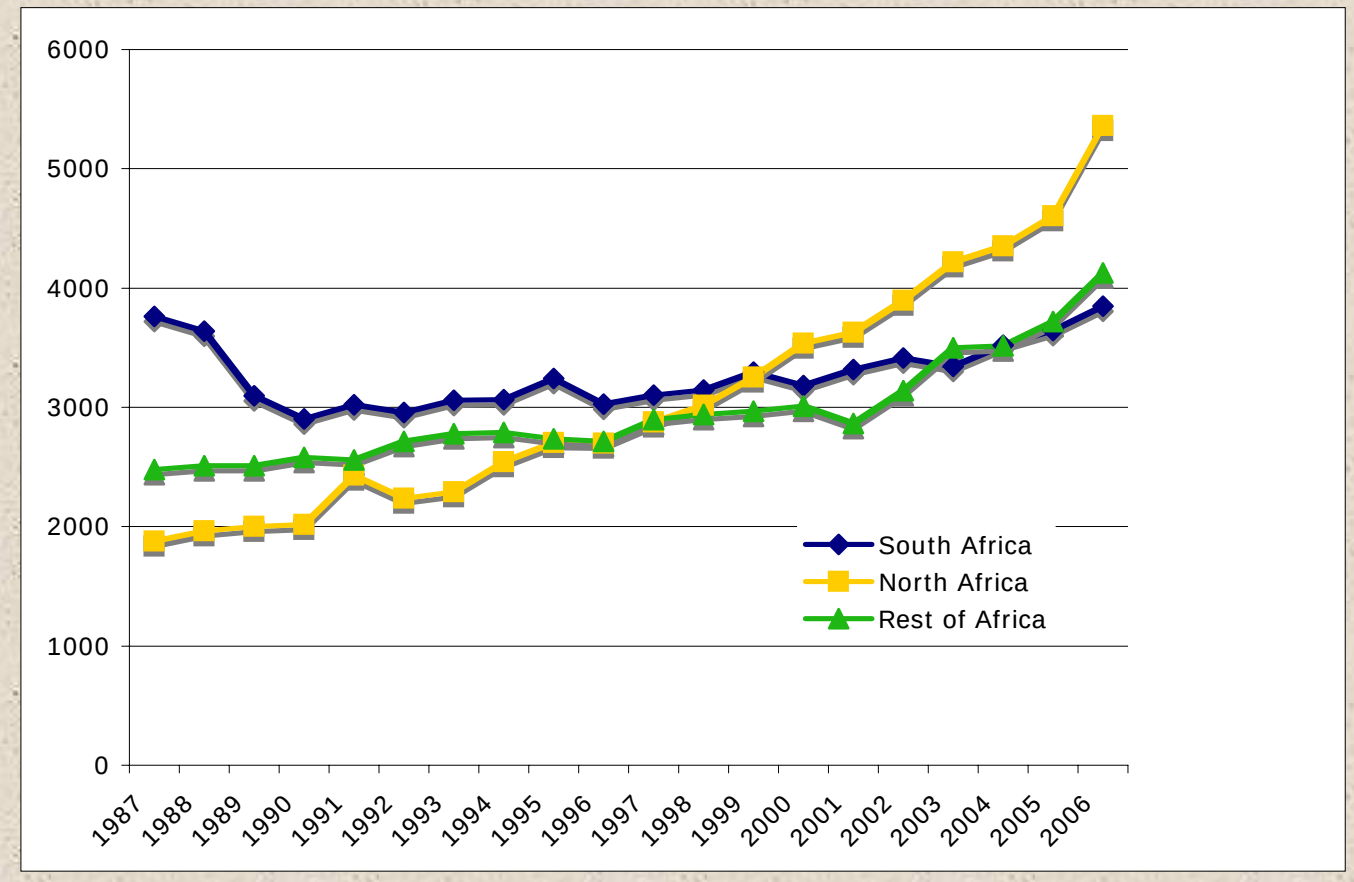
(world share of scientific publications)



Source: CWTS/Thomson Science Citation Index database (excluding the Arts and Humanities Citation Index).

Trends in Africa (1987-2006)

(number of scientific publications)



Source: Thomson Scientific data, IRD/P.L. Rossi computing

Trends in Africa (1987-2006)

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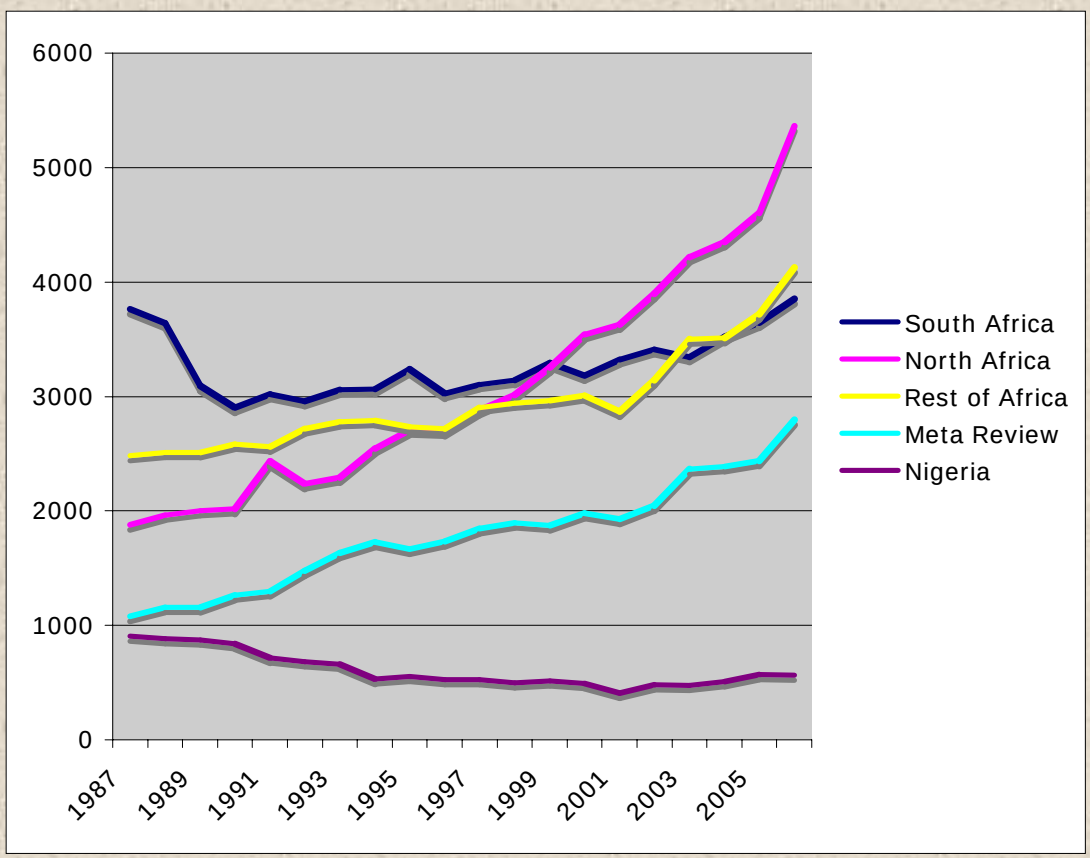


A growing share of Developing Countries except Africa (1999-2004)

Table 2
Scientific production (world share of scientific publications) in Developing Countries

Areas / Countries	World share (%) of scientific publications		
	1999	2004	Evolution 2004/1999
Asia (excluding Japan and Israel)	8.0	12.1	+80
China	2.7	5.2	+89
India	2.1	2.3	+10
South Korea	1.3	2.2	+73
Taiwan	1.1	1.4	+29
Singapour	0.3	0.5	+59
Latin America	2.3	2.9	+27
Brazil	1.0	1.4	+43
Africa	0.9	0.9	-4
South Africa	0.4	0.3	-15
Near & Middle East (excluding Israel)	0.8	1.0	+28
Total Developing Countries	12.0	16.9	n/a

Source : Thomson Scientific data (OST, 2006)

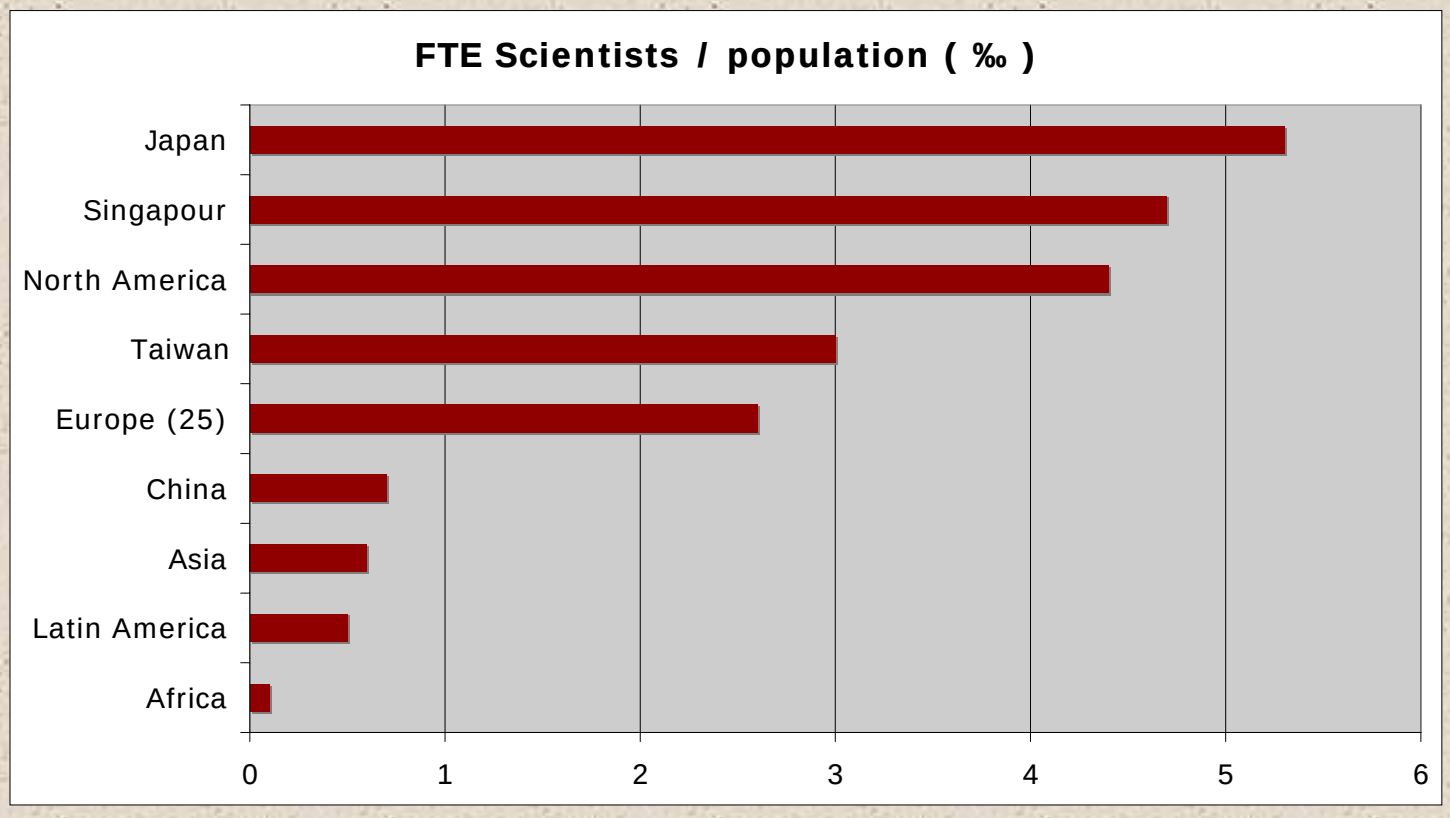
A diminishing world share in the triad countries (1999-2004)

Table 1
Scientific production (world share of scientific publications) in the triad countries

Areas / Countries	World share (%) of scientific publications		
	1999	2004	Evolution 2004/1999
Europe	42.7	40.6	-5
North America	32.9	30.4	-7
Japan	8.8	8.5	-4
Total	84.4	79.5	-6

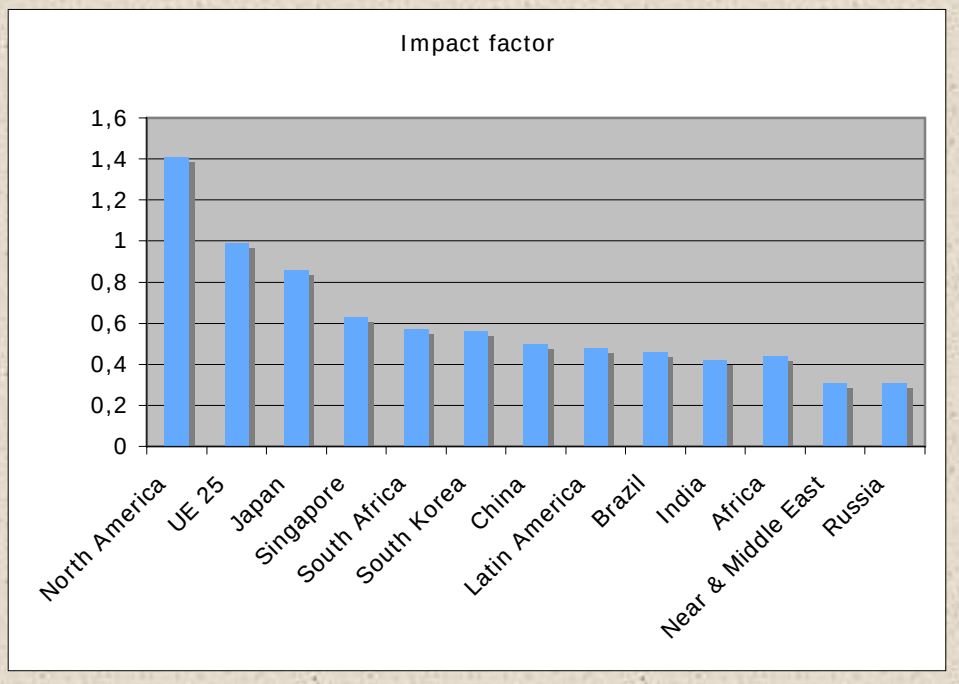
Source: Thomson scientific data (OST, 2006)

Very low scientific density / population (2003)



Source: OST, 2006

A lower international impact



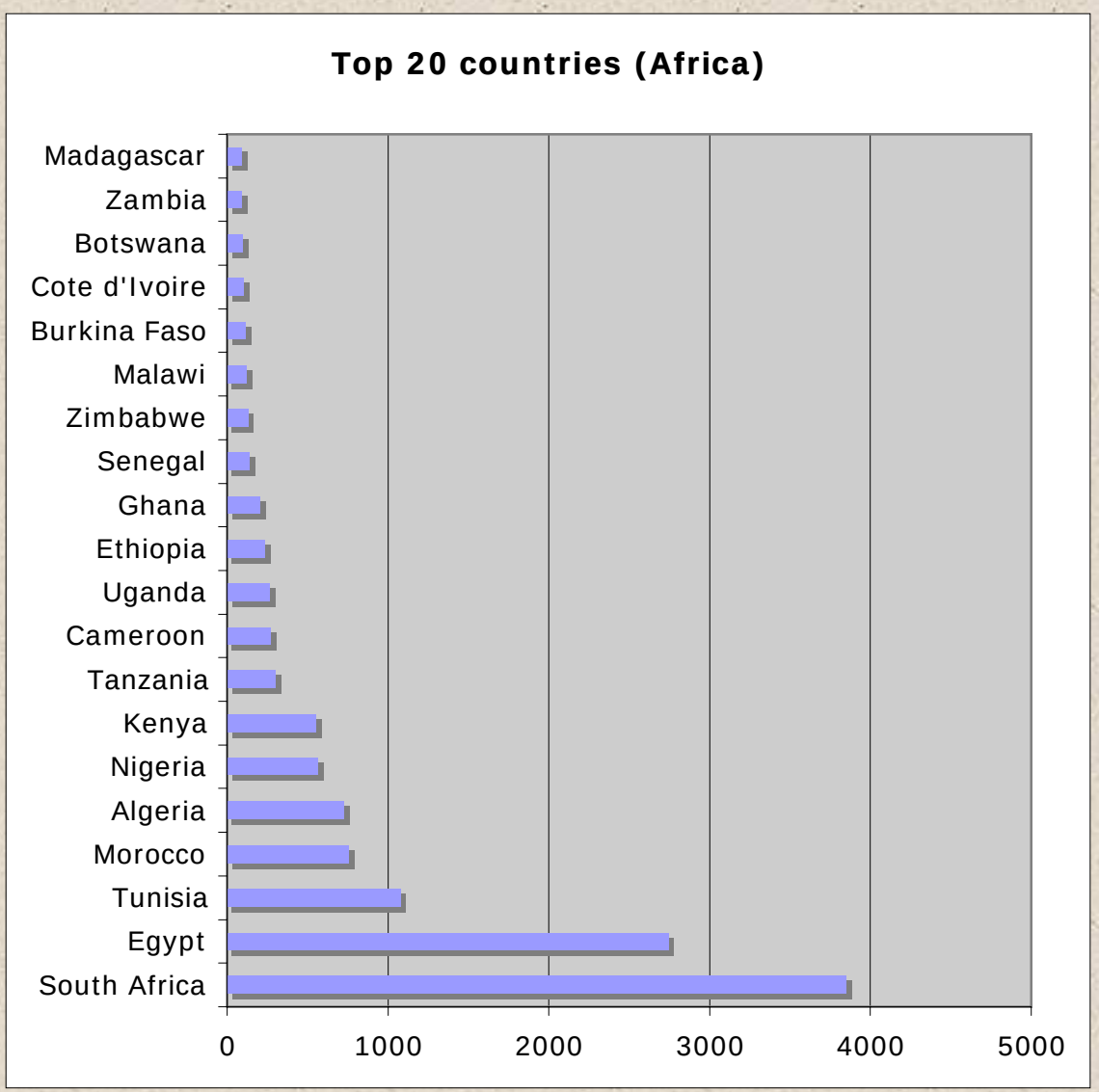
2. Science is as much concentrated in Africa as in the rest of the world

Consequences?

Science is as much concentrated in Africa as in the rest of the world (2006)

- Group 1: South Africa and Egypt (49.4%)
- Group 2: Tunisia, Morocco, Algeria, Nigeria and Kenya (27.6% - 1000-500)
- Group 3: Tanzania, Cameroon, Uganda, Ethiopia, Ghana, Senegal, Zimbabwe, Malawi, Burkina Faso, and Cote d'Ivoire (14% - 300-100 per year)
- Group 4: Botswana, Zambia, Madagascar, Gambia, Sudan, Mali, Gabon, *Benin*, Namibia, Lybia, Mozambique, RDC, Niger, Mauritius, Congo, Guinea, Rwanda, and Togo (8% - 100-25 per year)
- Group 5: 18 countries with erratic production (1%)

Top 20 publishing countries (2006)



Source: Thomson Scientific data, IRD/P.L. Rossi computing

Institutional concentration

- In the medium-size and smaller developing countries and in Africa in particular, the bulk of research activities is most often highly concentrated in one or in very few institutions.

- Extreme cases are to be found in African countries with the smallest research capacities, e.g. Swaziland with a very small and concentrated research capacity at the University of Swaziland.

Individual concentration

- In most Sub-Saharan African countries with the smallest and weakest research capacities (Groups 4 and 5 and partly 3), research outputs (publications) are centered around a few individuals.

3. Science policy in the context of scarce R&D indicators

Science policy development in the context of scarce R&D indicators

- **Three different trajectories**
- **Tendency to imitate STI policy approaches and paradigms from elsewhere (e.g. NSI concept)**
- **Large degree of similarity in the content and Emphasis in national science policy documents.**
- **Whenever available, the application of S&T policy framework is haphazard and rarely evidence-based (among others given the dearth of up to date S&T indicators)**

4.De-institutionalisation, de-professionalisation and generation gap?

Historical context

- **Different continuing colonial legacies?**
- **Weak home-based scientific potential in 1960**
- **1970-1980**
  - **intensive development of institutions**
  - **Intensive recruitment of national staff**
  - **student population explosion**
  - **steady growth in the number of scientists**

This development was supported by “aid” and the set-up of national research systems

Late 80s and 90s: globalisation, privatisation and crisis

- **Public budget cuts**
- **Mushrooming of private universities; proliferation of NGOs and strengthening of their role.**
- **Nearly no recruitment took place through the 1990s in many countries leading to ageing of scientists and the risk of a generation gap.**
- **Poor salaries in Sub-Saharan countries - staff too oftengo unpaid.**
- **Brain Drain increased leading to a further weakening of national scientific capacities.**
- **Changing nature of scientific work and profession**

National Science (1965-1985)

National Science can be defined as follows:

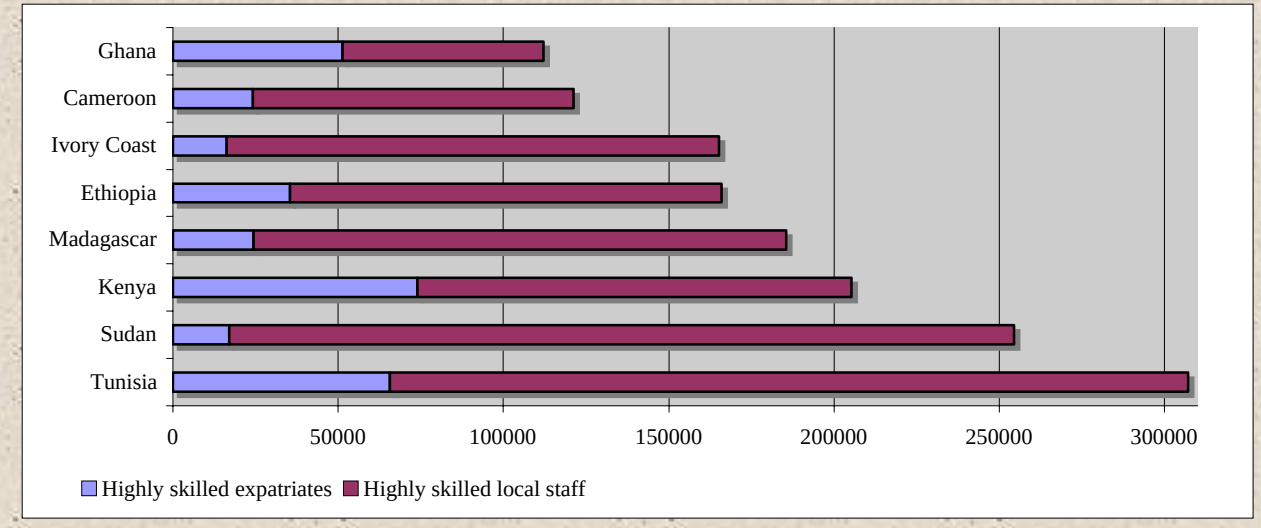
- **Science is a public good**
- **The main funding provider is the State**
- **Scientists have a nationalistic ethos**
- **Scientists are employed as civil servants**
- **Besides the peer community, the end-users consist principally of public authorities**

Changing nature of scientific work & profession: de-professionalisation?

- **The profession is increasingly practised within a contract-based and time-bound system (not in the context of a career)**
- **International (not national) demand shapes programmes and objectives**
- **Benefits and profit (rather than knowledge) define the axioms of action**
- **The system is increasingly regulated by the market, not peer assessment**

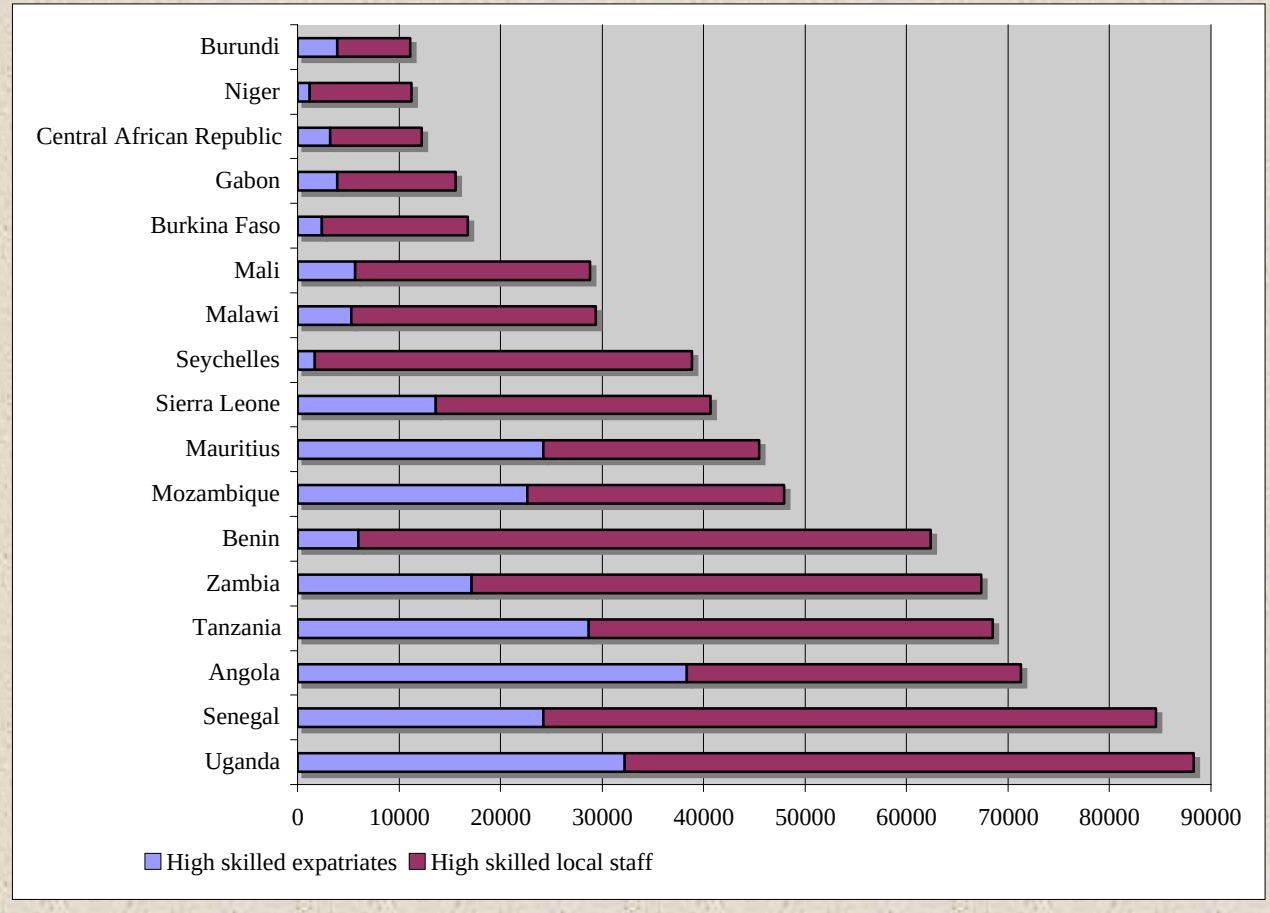
5. Brain drain and the limits of S&T Diaspora

A sizeable share of HQEs abroad (1) medium size African countries



Source: OECD, CIA & others adapted by Gaillard & Gaillard

A sizeable share of HQEs abroad (2) smaller African countries



Source: OECD, CIA & others adapted by Gaillard & Gaillard

Can S&T (diaspora) networking mitigate the brain drain?

S&T diasporas are not a magical response to science capacity building in weakest countries. While they may work in NICs (e.g. South Korea, Singapore, China), the fate of SANSA (South Africa) and Caldas (Colombia) provide evidence of difficulties. Evaluation?

Conditions to be fulfilled

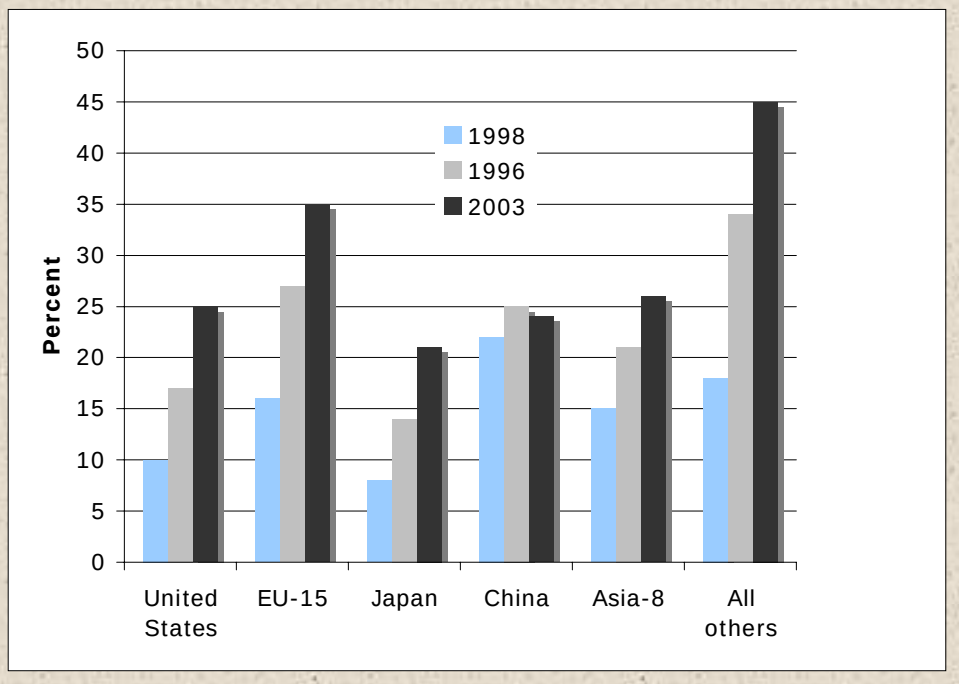
- **Long term political will**
- **Sustained will and engagement from both sides**
- **Sustained administrative capacity**
- **A dynamic and responsive scientific community with a minimum critical mass at home**

Nothing will compensate/replace home-based S&T capacities

6. International collaboration/cooperation

The limits of national science

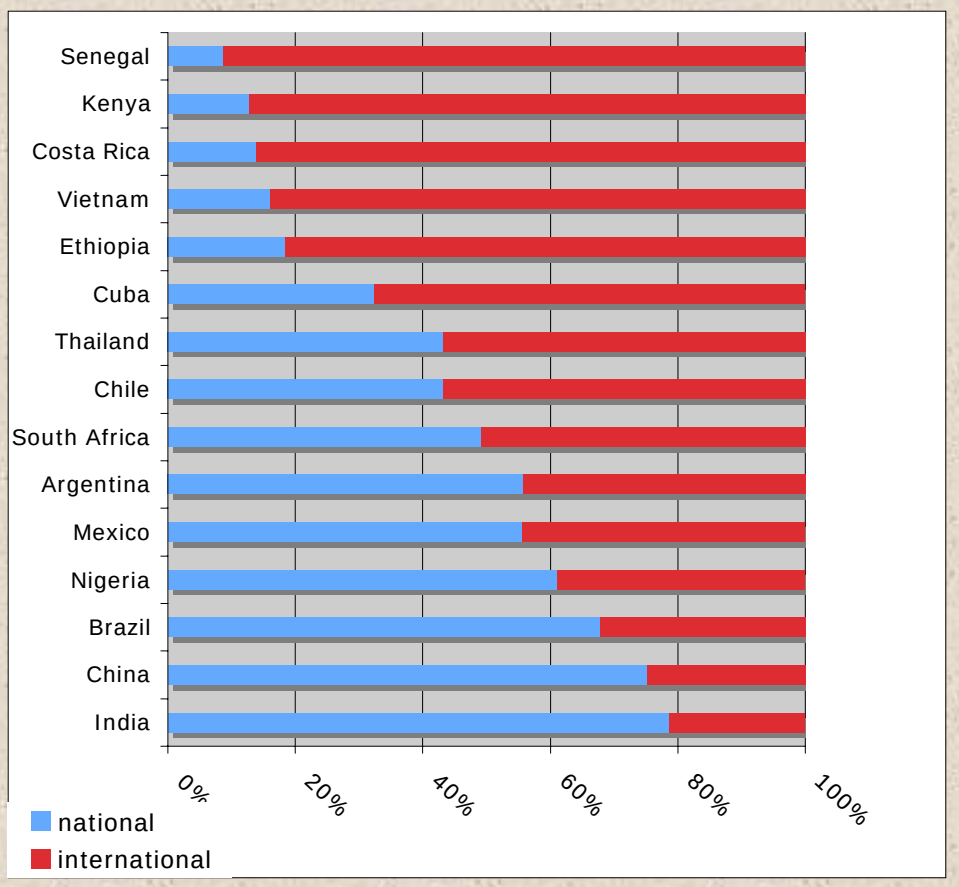
A higher level of international collaboration (coauthorship)



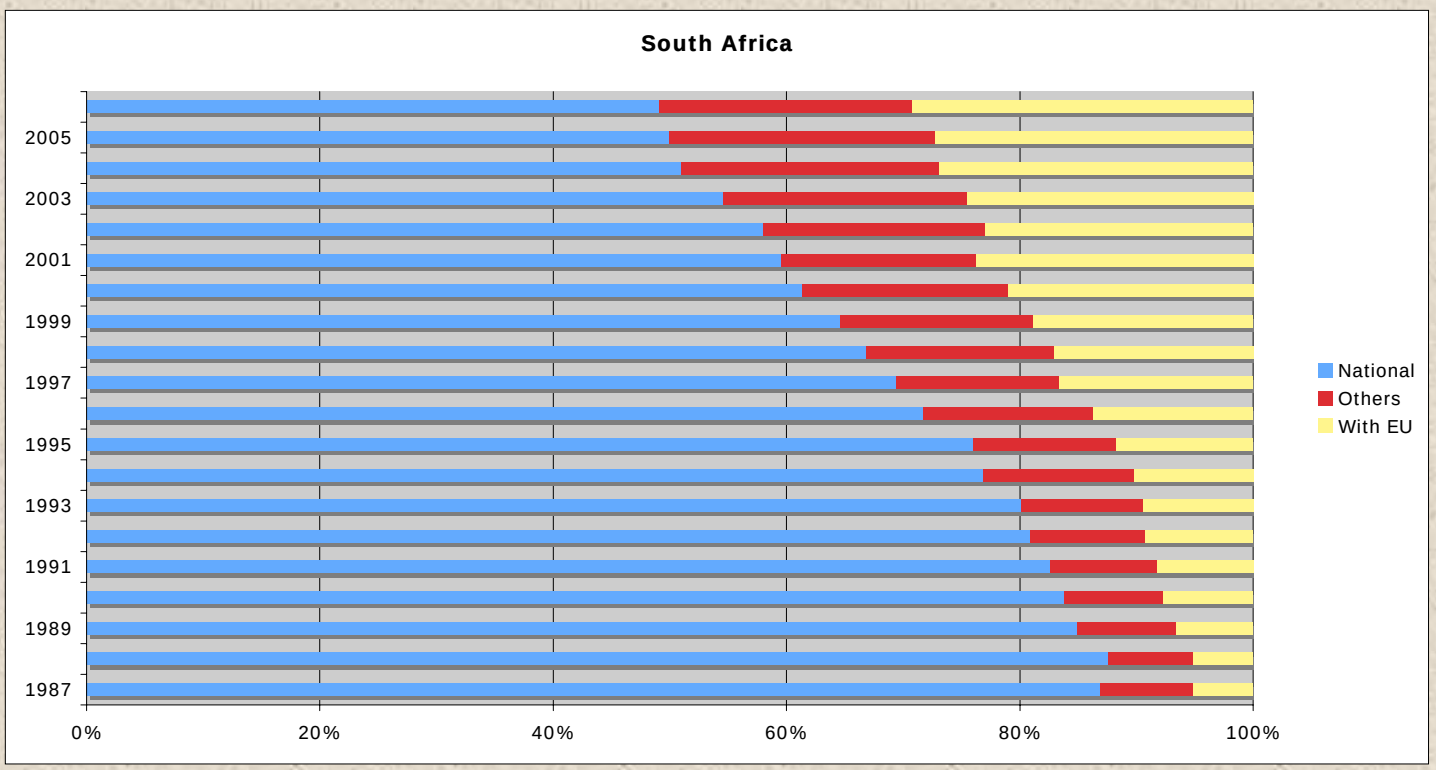
Source: OST, 2006

International collaboration (2006)

(publications co-signed with foreign authors vs. national only)



National science / International collaboration 1987-2006



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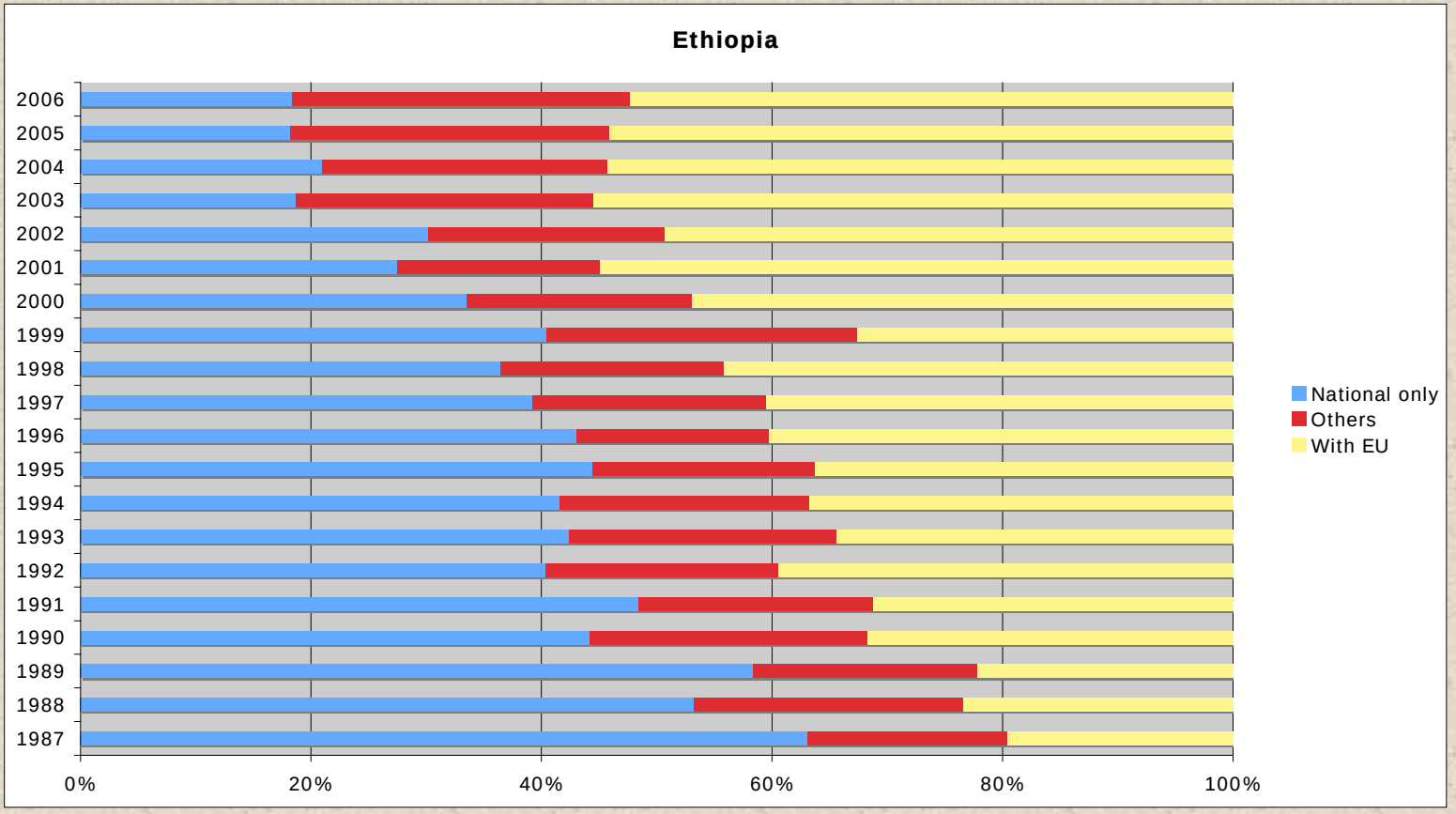

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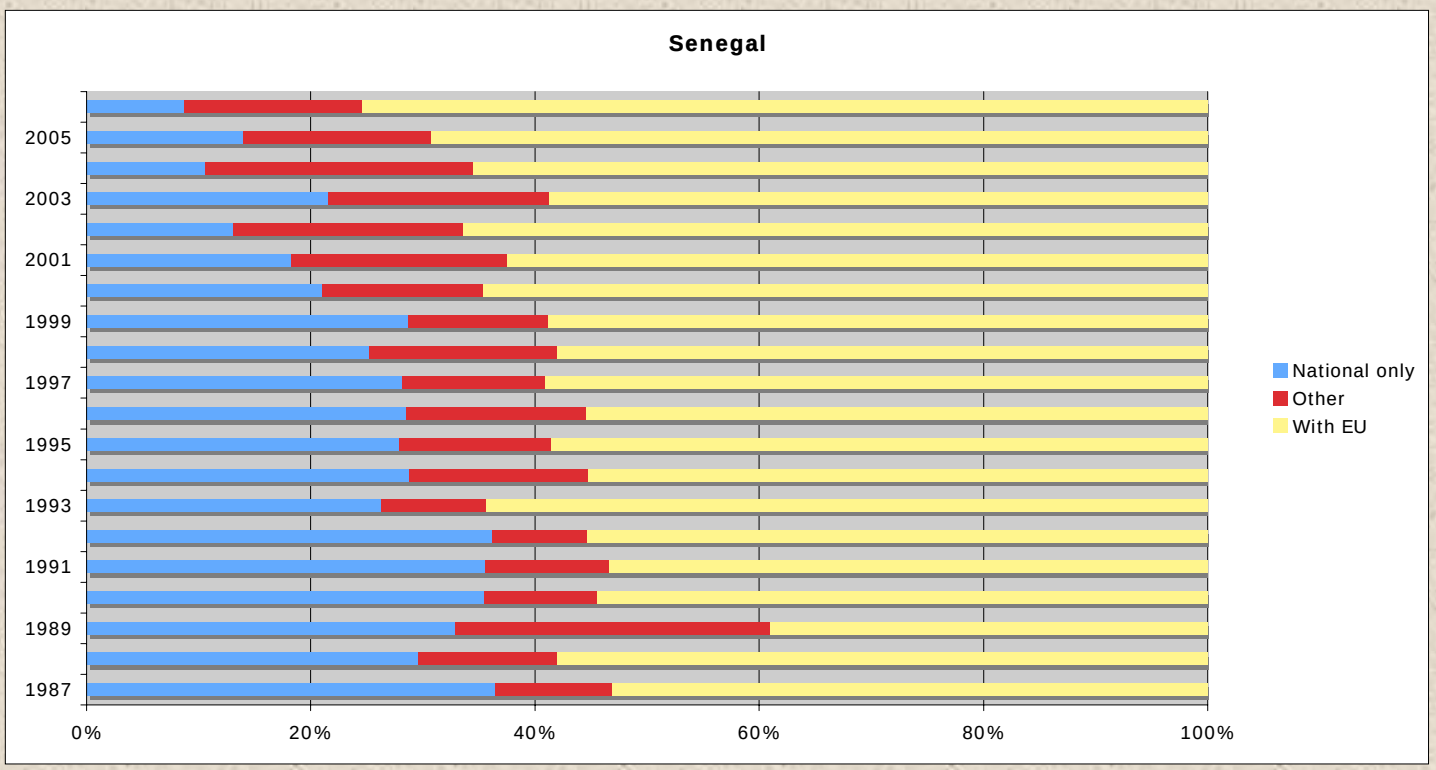

7. Conclusion

Going beyond the meta review: the need for further studies

Conclusion

- **Available information and documentation on science in Africa is not comprehensive and up-to-date.**
- **As a first step, there is a need to fill the gaps in many African countries and ensure the regular availability of R&D indicators.**
- **Beyond macro-indicators, there is the need to collect more qualitative data and to conduct sociological surveys (e.g. on scientific communities, profession and status of scientists, social inscription of science … innovation surveys … etc).**
- **Robust R&D indicators and the results of the above surveys are needed to ensure evidence-based science policy frameworks; Strategic Evaluations; S&T Observatories.**
- **To what extent globalisation and internationalisation make the notion of national system irrelevant?**

Thanks for your attention

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