

*SCIENCE, TECHNOLOGY AND  
INNOVATION* Policy  
Madagascar

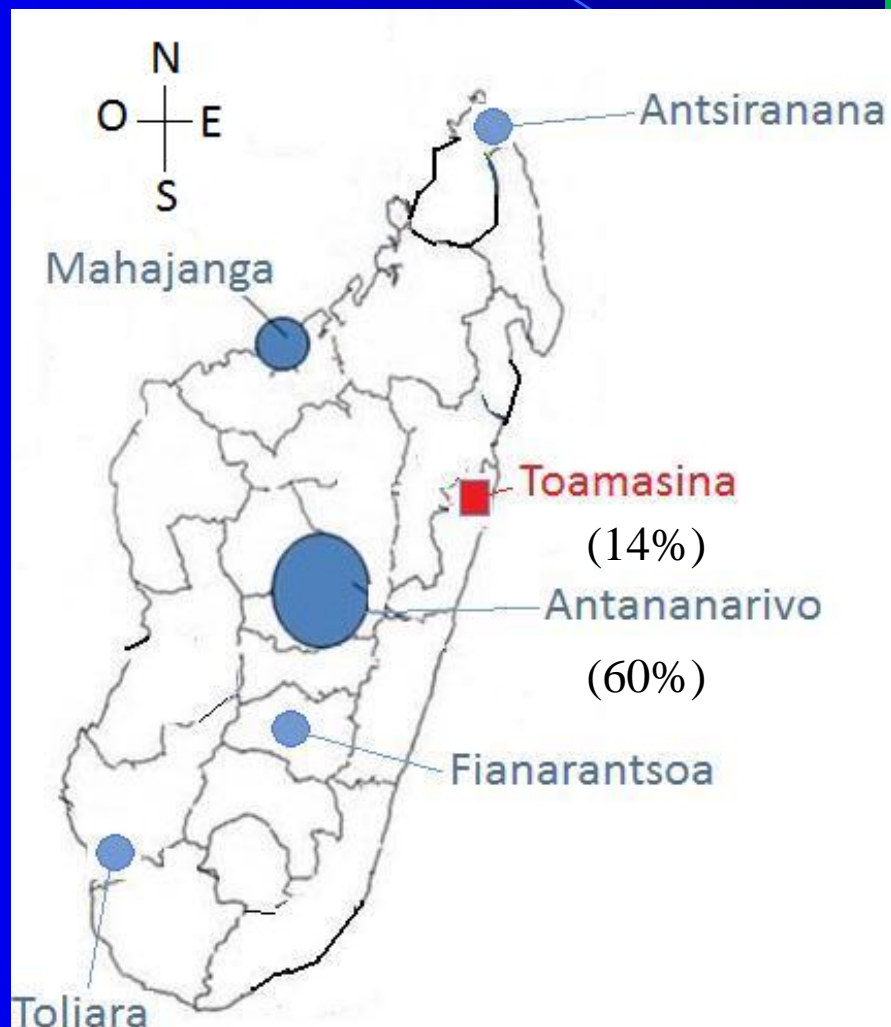
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*Ministry of National Education*

*Mombasa, Kenya, 30 March-3 April 2009*

# Current status: Tertiary education

- 6 public universities
- 2 non-university institutes offering 2-year technological courses
- 1 distance education organization in public sector
- 20 non-university in the private sector

- 58000 students (2007)
- 4/5 in public universities



## Structure and Curriculum

First cycle

DEUG

Second cycle

Licence

Maîtrise

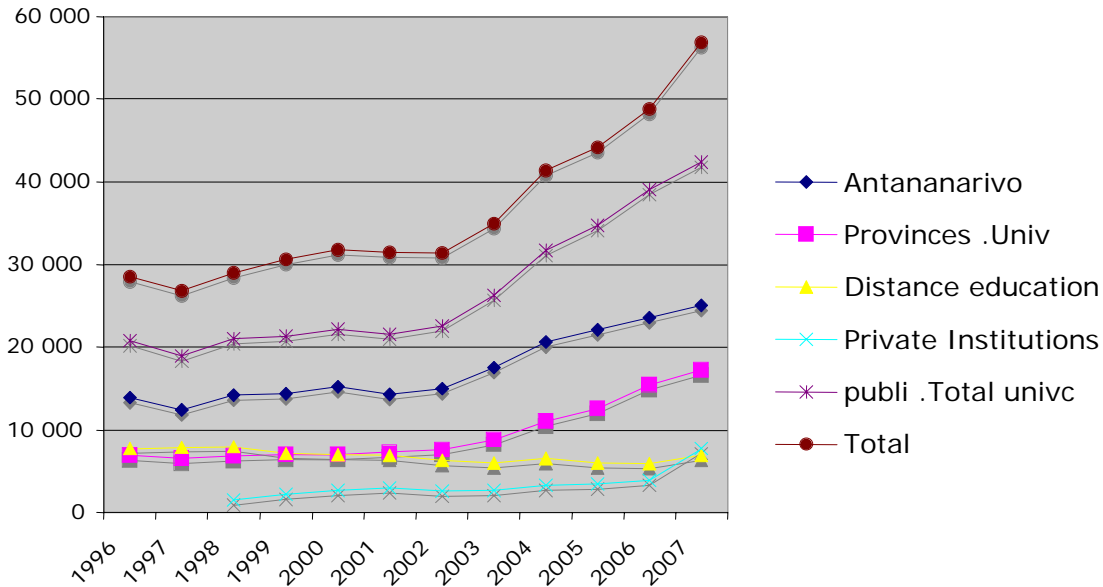
Third cycle

DEA, DESS

Doctorat

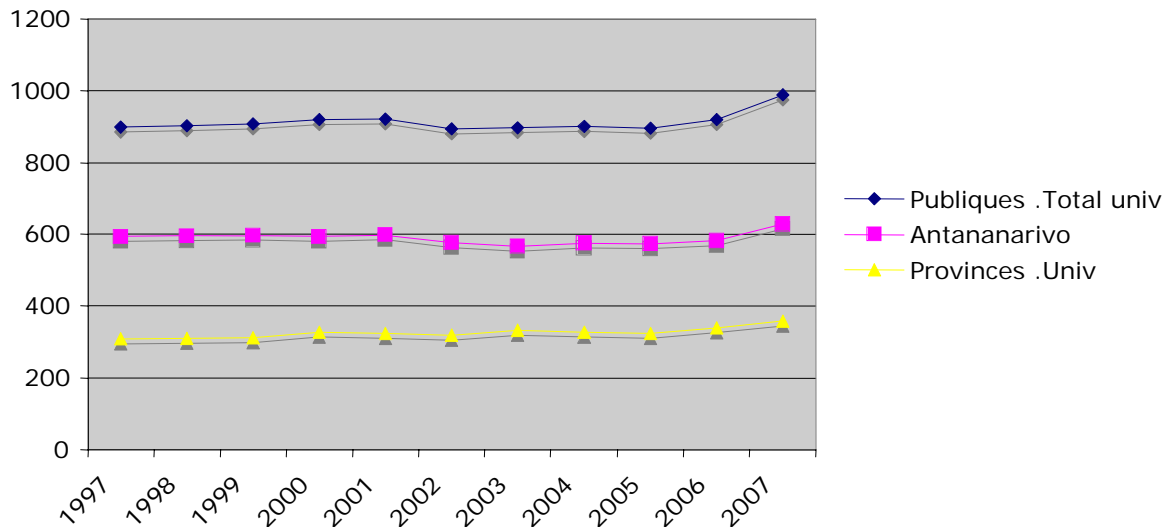
(J. Gaillard, 2008)

## Student enrollment trends



- 54% Bac → TE (2006)
- 40% of students dropped out after the first year
- 4200 graduates in 2006
- 2351 had bachelor's degrees, 1000 master's degrees, 380 beyond that level

## Teaching staff enrollment in public universities



- 1 teacher for 58 students
- Average age is 55 years
- Legal obligation: 125 hours a year
- The quality of laboratories is poor for doing research

# Current status: Tertiary education

Madagascar's GCI rankings for HE&T pillar, 2007 (World Bank, 2008)

<b>Pillar/Sub-indicator</b>	<b>Rank (1 = high, 131 = low)</b>
<i>Higher education and training pillar</i>	
Secondary enrollment (hard data)	126
Tertiary enrollment (hard data)	121
Internet access in schools	116
Local availability of specialized research and training services	108
Extent of staff training	107
Quality of the educational system	101
Quality of math and science education	83
Quality of management schools	74

- Low ranking for the six first sub indicators
- Higher ranking for the two last one

# Current status: Research Centers

Institutions	Researchers	Technicians	Others	Total
FOFIFA	83	54	101	238
CNARP	12	32	48	92
CNRO	5	2	34	41
CNRE	48	7	32	87
CNRIT	44	19	42	105
CIDST	12	10	39	61
IMVAVET	6	12	50	68
PBZT	14	1	167	182
INSTN	17	3	18	38
DR	21	-	42	63
Total	262	140	573	975

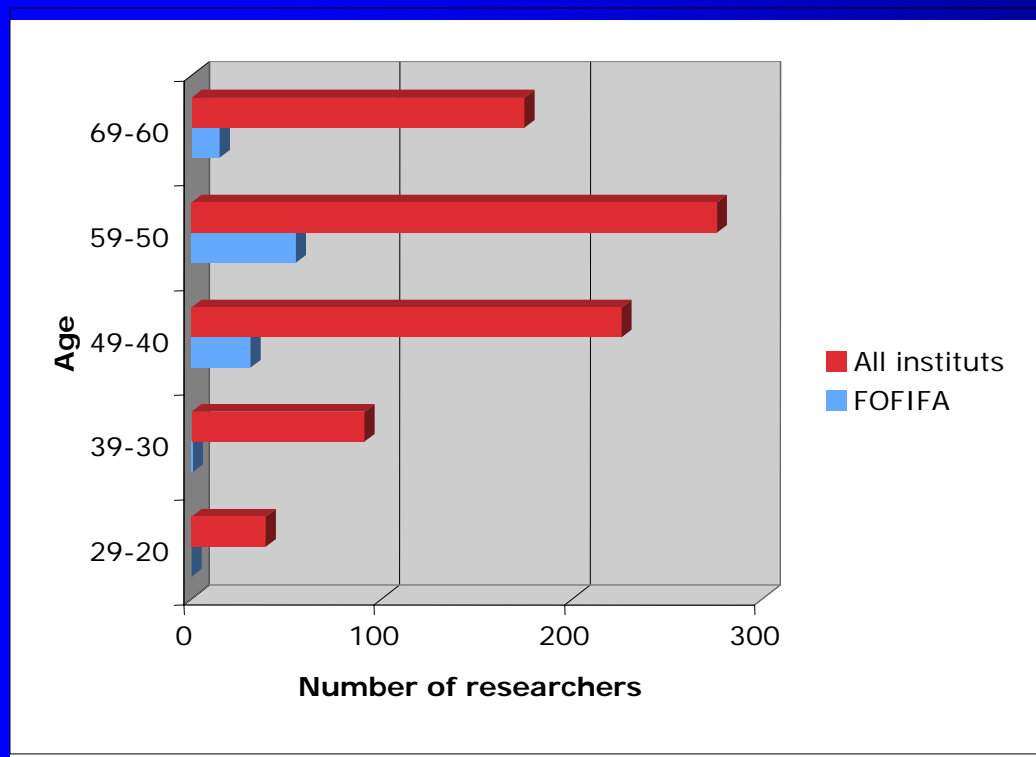
Staff enrollment in public research institutes (2007) (J. Gaillard, 2008)

So many other persons in all public research institutes

# Current status: Research Centers

## Age group of the researchers

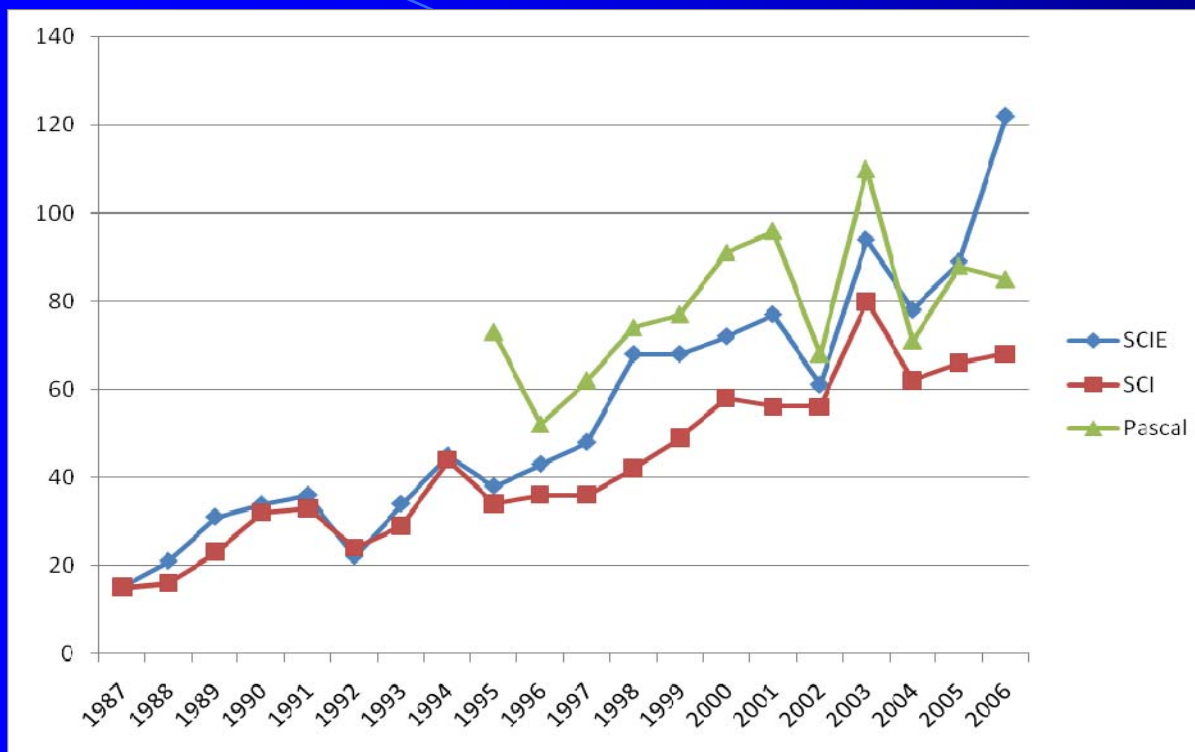
(J. Gaillard, 2008)



- The majority of the contingent is located between 50 and 59 years (54%)
- Non negligible proportion (15%) is over 60 years old

# Current status: Research Centers

Scientific publication trends (J. Gaillard, 2008)

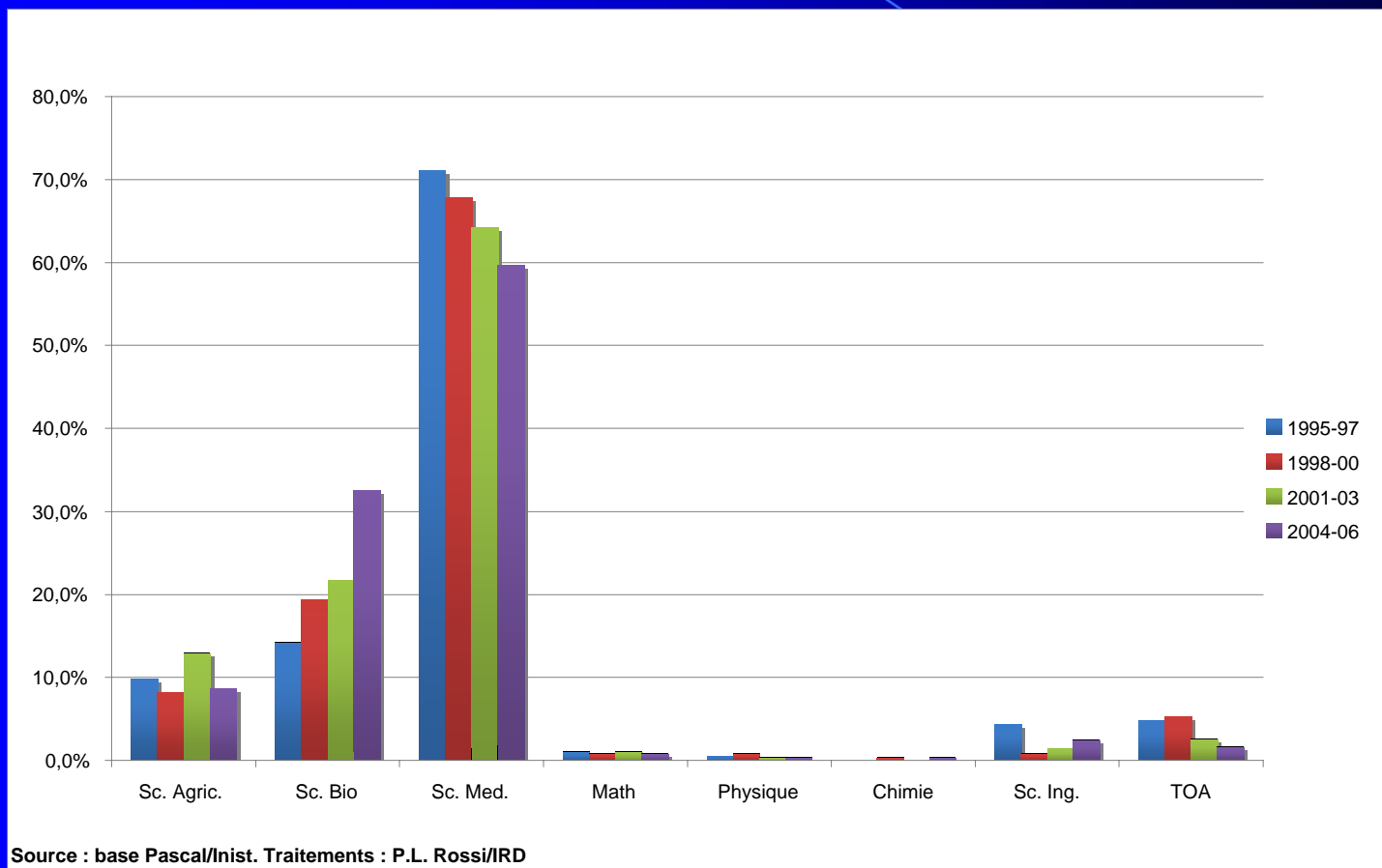


Starting from less than 20 references in 1987, the total scientific publications indexed become about 80 in 2006

# Current status: Research Centers

Relative importance of main research domains

(J. Gaillard, 2008)



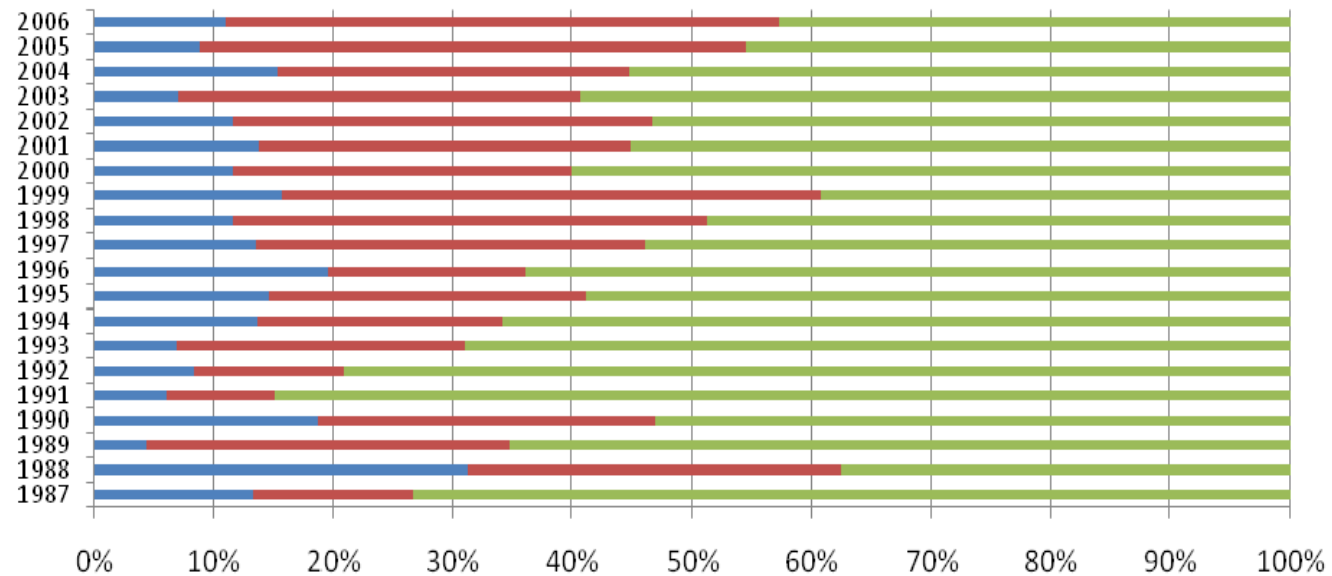
Extreme dominance of the medical sciences (of 60 to 70%) and relative weakness of the agricultural sciences (about 10%)



# Current status: Research Centers

## International publications and co-publications

(J. Gaillard, 2008)



	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
■ Pays seul	2	5	1	6	2	2	2	6	5	7	5	5	8	7	8	7	6	10	7	9
■ Sans UE	2	5	7	9	3	3	7	9	9	6	12	17	23	17	18	21	29	19	36	38
■ Avec UE	11	6	15	17	28	19	20	29	20	23	20	21	20	36	32	32	51	36	36	35

Source ISI-SCI, traitements P.L. Rossi/IRD

The level of the international collaborations measured by the international co-publications (signed with foreign authors) is important

# Current status: Research Centers

The countries partners (J. Gaillard, 2008)

1987-2006		2002-2006	
Country	Co-signatures	Country	Co-signatures
France	320	USA	121
USA	242	France	108
Royaume-Uni	89	Royaume-Uni	43
Allemagne	78	Allemagne	33
Italie	39	Afrique du Sud	21
Afrique du Sud	36	Japon	15
Suisse	31	Pays-Bas	13
Sénégal	29	Italie	12
Japon	26	Malaisie	12
Pays-Bas	18	Canada	11
Malaisie	17	Sénégal	11
Belgique	15	Suisse	10
Canada	14	Belgique	8

The main partners are the European countries (mainly France) and USA.

# Current status: Research Centers

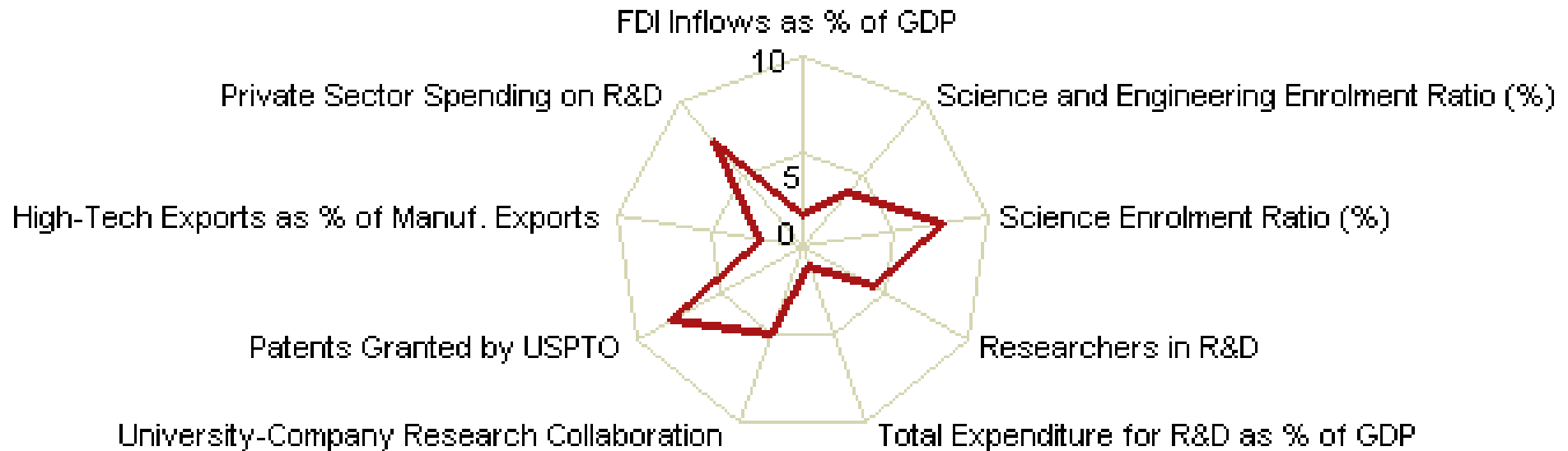
Madagascar's GCI rankings for Innovation pillars, 2007 (World Bank, 2008)

<i>Innovation pillar/sub-indicator</i>	<b>Rank</b> (1 = high, 131 = low)
Quality of scientific research institutions	106
University-industry research collaboration	96
Capacity for innovation	91
Utility patents (hard data)	89
Company spending on R&D	86
Availability of scientists and engineers	62
Government procurement of advanced technology products	53

Madagascar's innovation ranking is better compared to HE. These rankings suggest that Madagascar has some innovation strengths

# Current status: Innovation

Madagascar knowledge indicators – innovation systems (World Bank, 2008)



Comparison Group: **Africa** Type: **weighted** Year: **most recent** (KAM 2007)

- FDI inflows and high-tech exports as percentage of manufacturing exports are low
- Science enrollment ratio, patents granted by the United States Patents and Trademarks Office private sector spending on R&D are relatively high

# Current status: Finance

Allocation of public capital expenditures in education  
by sub-sector, 2002-2007 (World Bank, 2008)

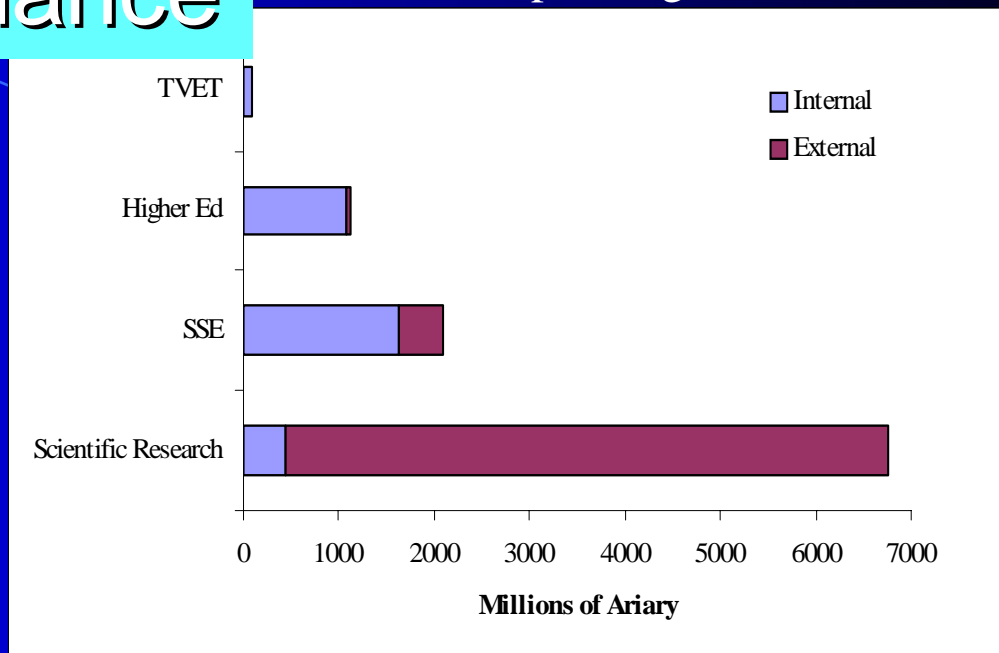
	Share of capital expenditure					
	2002	2003	2004	2005	2006	2007
<b>Total Capital Exp (US \$ mill.)</b>	<b>19.7</b>	<b>40.0</b>	<b>37.0</b>	<b>61.6</b>	<b>51.0</b>	<b>65.5</b>
Higher Education	22%	5%	5%	7%	1%	0.9%
Scientific Research	9%	24%	3%	5%	6%	4%

Scientific research receives a higher share of total capital expenditures than higher education because these are largely financed by external sources

# Current status: Finance

Investment spending , 2006 (World Bank, 2008)

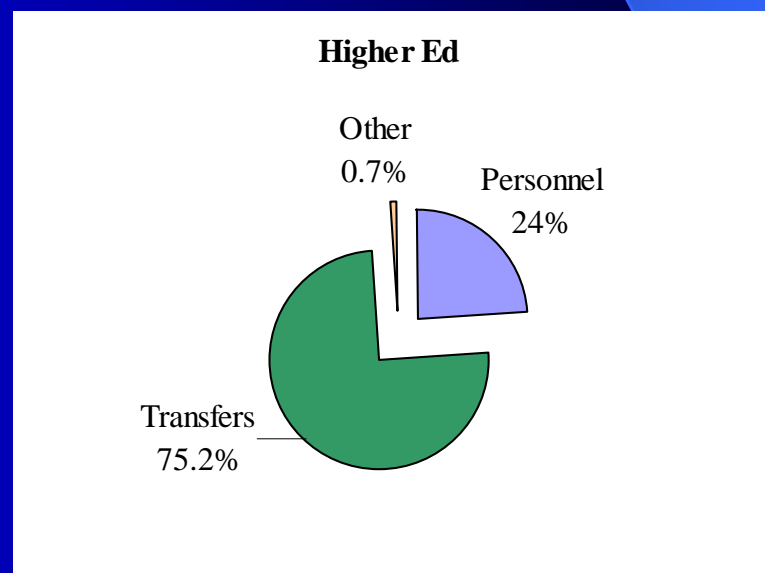
- High level of dependence on donor funding.
- Domestic investment budget is too small to make a significant impact on changing sub-sectoral priorities.



## Composition of recurrent public expenditure

(World Bank, 2008)

- Salaries of permanent teaching staff are included in the Ministry of Education's budget
- Three-quarter of the expenditures consists of transfers to public institutions, which are managed by them

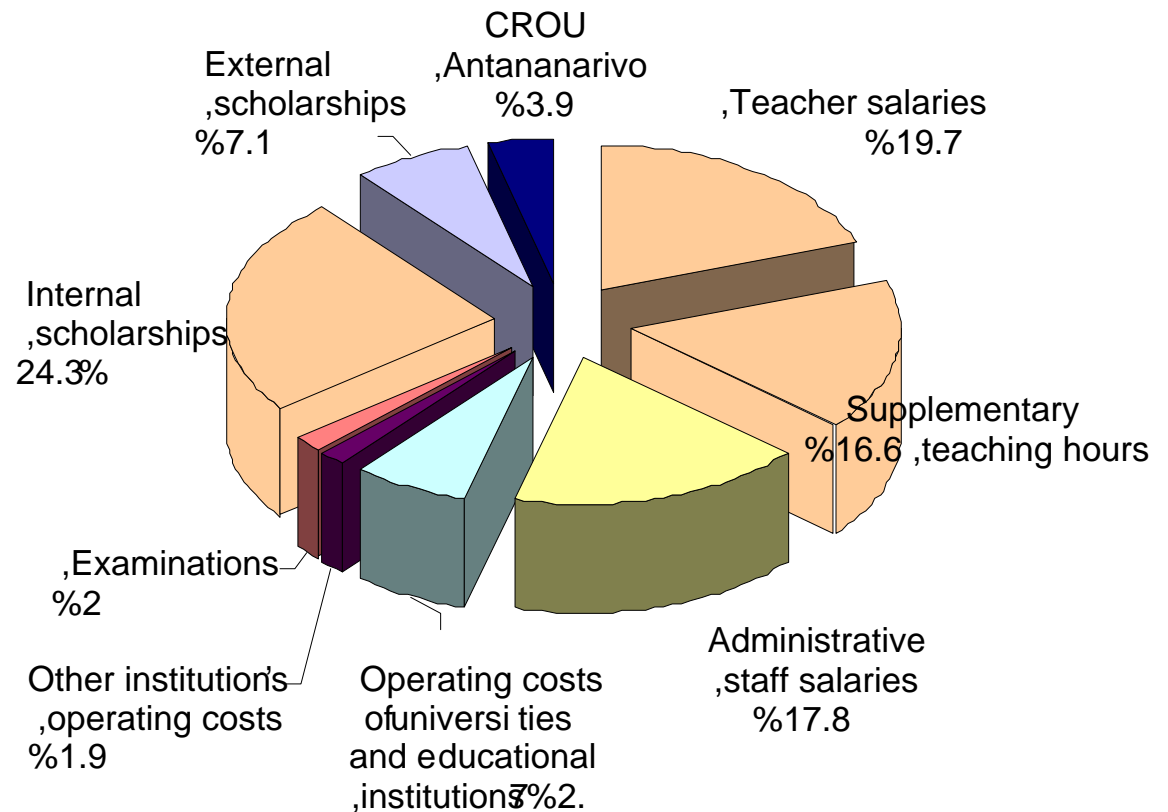


# Current status: Finance

## Composition of recurrent expenditure in higher education, 2006

(World Bank, 2008)

- 54 % of current spending comprised remuneration of staff
- 30 percent of total recurrent spending was allocated to scholarships
- only 10 percent for administrative and pedagogical expenses of universities



# Higher Education Reform

## Project milestones

Dates	Activities	Status
March 2008	Constitution of Team Working Group under the authority of Director of Higher Education and Research Reform	done
Septembre 2008	Elaboration of the Higher Education Reform Document (HERD) draft	done
October 2008- January 2009	National consultations	10/22 regions are finished
February 2009	Review of the HERD	done
March 2009	Validation of the HERD	done
April 2009	Submission of the HERD to the parliaments	The parliaments have been dissolved recently



# 7 Recommended Reforms

## Quality

1. Choose undergraduate courses and disciplines that are important to Madagascar's economic development
2. Expand short courses for training higher level technicians
3. Accelerate introduction of the shift towards a progressive *bachelor's-master's-PhD* system
4. Partner with foreign universities to build local institutional capacity and to leverage international experience

## R&D

- 
1. Build a cadre of young researchers in priority fields
  2. Fund research competitively and selectively, to solve problems that are important to national and regional economic development
  3. Encourage contract research, particularly for foreign firms operating in Madagascar

# OBJECTIVE : CREATE A HIGH QUALITY TERTIARY EDUCATION SYSTEM (Short term 1-2 years)

Components	Indicators
<p>Conduct assessment of labor market needs with employers and other government agencies and enrollment/cost projections</p>	
<p>Undertake feasibility study of expansion of ISTs in different regions and begin investment</p>	
<p>Undertake feasibility study of expanding/specializing regional universities and provide additional funding</p>	<ul style="list-style-type: none"><li>▪ Number of students in tertiary education per 100 000 habitants</li></ul>
<p>Prepare plan for introducing LMD reform and start introduction</p>	<ul style="list-style-type: none"><li>▪ National program on research</li></ul>
<p>Undertake study of private sector, external partnerships and open/distance learning</p>	

# OBJECTIVE : CREATE A HIGH QUALITY TERTIARY EDUCATION SYSTEM (Medium term 3-5 years)

Components	Indicators
<p>Reform university governance structures</p> <p>Expand number of ISTs, based on need and available funding</p> <p>Roll out LMD implementation in more disciplines using competitive funds or other financing mechanisms</p> <p>Expand Ph.D training and faculty development programs</p>	<ul style="list-style-type: none"><li>• Numbers of research outcome applied</li><li>▪ Number of graduates from tertiary education per year</li></ul>

# OBJECTIVE : CREATE A HIGH QUALITY TERTIARY EDUCATION SYSTEM (Medium term 3-5 years)

Components	Indicators
Establish accreditation and quality assurance mechanism for public and private sector	■ Numbers of centres of excellency
Introduce new open/distance learning delivery systems to expand access	
Design and start implementation of competitive fund in selected institutions/disciplines	
Design and start implementation of revised scholarship scheme	

# OBJECTIVE : CREATE A HIGH QUALITY TERTIARY EDUCATION SYSTEM (Long term 5+ years)

Components	Indicators
<p>Increase tertiary enrollments through diversified system of public universities, ISTs, private sector, foreign partnerships and ODL</p>	
<p>Continue upgrading of curricula in different fields</p>	
<p>Introduce benchmarking of institutions against international standards</p>	
<p>Design mechanisms for university-industry partnerships, and provide matching funding to encourage applied research partnerships in selected priority fields</p>	<ul style="list-style-type: none"><li>▪ Share of budget allocated to scientific research</li></ul>

# Research Reform

## Project milestones

Dates	Activities	Status
Mey 2008	UNESCO Team Mission (J. Gaillard and April Tash )	done
July – August 2008	Constitution of Research Team Working Group	done
September 2008	Submission of the Research current status report by J. Gaillard	done
October 2008	Second mission of UNESCO Team	done
December 2008	Submission of the Research current status report updated	Not finished

## Elaboration of the Research Reform Document (one year)

- Update and complete the inventory of the set of the public and private, national and international institutions of research and Higher education contributory to the activities of research in Madagascar
- Complete the panorama of the institutions and check the DIRD in percentage of the GDP
- Inventory as exhaustive as possible and analysis of the public or private, national or international sources of financing supportive research in Madagascar and their impact on the national capacity buildings and the development
- International cooperation: Inventory and analysis of the scientific cooperation agreements signed by the present institutions on the territory of Madagascar.
- Investigation / inventory on the laboratories of research in Madagascar and proposal of a structuring plan of the capacities.

# Elaboration of the Research Reform Document (one year)

- Define national research priorities
- Inventory of the scientific publications in Madagascar beyond the publications indexed in the international data bases and strategies of publication of the researchers.
- Investigation on the use of the research results, the innovation and relations research-industry.
- Thoughts on National Research Council: To establish an independent, autonomous national agency to promote research, broadly defined, encourage high quality research in areas of national interest, to advance the welfare of its people and foster national development



# References

**1)** Developing the Workforce, Shaping the Future:  
Transformation of Madagascar's Post-Basic Education  
**May 29, 2008**  
**Document of the World Bank**

**2)** Le système national de recherche scientifique et technique (S&T) à Madagascar  
Contribution au renforcement de la politique S&T nationale

Etat des lieux  
(rapport préliminaire)  
par  
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Institut de Recherche pour le Développement (IRD), Paris, France  
Rapport préparé pour l'UNESCO, Secteur des sciences exactes et naturelles,  
Division de l'analyse et des politiques scientifiques  
25 septembre 2008

**Thank you for your attention!**