



ASSESSING RISK
IN EVALUATION OF «RETURN ON INVESTMENT»
OF RESEARCH FUNDING ORGANISATIONS

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A follow up from last year's workshop:

A « micro case study » to illustrate the limitations and difficulties of an evaluation of «return on investment » in research...

... while concluding on the possibility and necessity to deal with it.



HFSP in a nutshell

History

1987: First mention of the Human Frontier Science Program by Mr Y. Nakasone at G7 Economic summit Venice
1989: Creation of HFSP, based in Strasbourg France
1992, 1997, 2002, 2004: HFSP Intergovernmental Conferences decide the Program's continuation– next in 2007

Statutory aim of the Program:

" to promote, through international cooperation basic research focused on the elucidation of the sophisticated and complex mechanisms of living organisms and to make the fullest possible utilization of the research results for the benefit of all humankind ..."

Members :

Australia (2005), Canada, France, Germany, India (2006), Italy, Japan, New Zealand (2006), Korea (2005), UK, USA, EU

Budget: ~ 60 mio USD in FY 2007

Program activities

Research Grants: teams of 2 to 4 scientists for 3 years: 750 – 1350 kUSD per award depending on team size.

Young Investigators: within their first 5 years after independent lab position

Program Grants: at any stage of their career

Career Development Awards: support to establish an independent position in home country: 3 years, 300 kUSD

Long Term Fellowships: Postdoc scientists training in different field/continent: 3 years ~ 150 kUSD.

Annual Awardees meeting: Scientific meeting for scientific interaction among HFSP constituency.



Assessment of HFSP

- Annual audit by external auditors appointed by HFSP Board (one from Europe, America and Asia) on procedures and organisation
- Annual audit of accounts by statutory auditors
- In depth review on effectiveness and uniqueness every 5 years (1996, 2001, 2006) by independent organizations (ARA, PREST, NIFU STEP) and by high level scientific panels.

Combination of methods: bibliometrics, interviews, review of processes and implementation, feed back from awardees.

Conclusions from these reviews used by the IGC in making its decision to extent its support to HFSP.



Evaluation of return on investment in research is bound to take place as one component of accountability.

Reluctance to change or genuine concern ?

THE TIMES
HIGHER
EDUCATION SUPPLEMENT

The Times Higher Education Supplement
04 June 2007

[Current Edition](#)

Research wrecked by 'bean counters'

Phil Baty
Published: 01 June 2007



“institutional ranking have huge influence”

Academics strike back at spurious rankings

A call by a group of US colleges earlier this month to boycott the most influential university ranking in the United States has shone the spotlight on the problem of institutional rankings. Experts argue that these are based on dubious methodology and spurious data, yet they have huge influence. But help is at hand: European academics are putting some rigour into rankings by tackling the problem themselves.

On 5 May, Douglas Bennett, president of Earlham College in Richmond, Indiana, and 11 other college presidents asked colleagues to refuse to fill out surveys for the *U.S. News & World Report*. That

survey of institutions, they argued, “implies a false precision and authority that is not warranted by the data they use”. Another 17 colleges have since signed up.

“All current university rankings are flawed to some extent; most, fundamentally,” says Alan Gilbert, president and vice-chancellor of the University of Manchester in Britain. “But rankings are here to stay, and it is therefore worth the time and effort to get them right.”

The rankings in the *U.S. News & World Report* and those published by the *British Times Higher Education Supplement (THES)* depend heavily on surveys of

thousands of experts — a system that some contest. A third popular ranking, by Jiao Tong University in Shanghai, China, is based on more quantitative measures, such as citations, numbers of Nobel prizewinners and publications in *Nature* and *Science*. But even these measures are not straightforward.

Thomson Scientific’s ISI citation data are notoriously poor for use in rankings; names of institutions are spelled differently from one article to the next, and university affiliations are sometimes omitted altogether. After cleaning up ISI data on all UK papers for such effects, the Leeds-based

consultancy Evidence Ltd, found the true number of papers from the University of Oxford, for example, to be 40% higher than listed by ISI, says director Jonathan Adams.

Researchers at Leiden University in the Netherlands have similarly recompiled the ISI database for 400 universities: half a million papers per year. Their system produces various rankings based on different indicators. One, for example, weights citations on the basis of their scientific field, so that a university that does well in a heavily cited field doesn’t get an artificial extra boost (see table).

The German Center for Higher

514

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News

Nature 447, 514-515 (31 May 2007) |



Quote from Director Ove Poulsen –

Danish Ministry of Research and Information Technology

...We have used the evaluation tool very reluctantly because we do not find it to be a very good tool in understanding the dynamical behaviour of an institutional system....

(one) extremely important issue ...is the availability of high quality indicators; indicators which not so much look at the performance of individual institutions as trying to define our knowledge system.

The universities and the research institutions represent a system which produce knowledge, but knowledge in itself is not of any interest if it is not moved...

We ought to be concerned about (how we transmit knowledge from one person to another, and from one institution to another) because it is in that process that we generate added values of our knowledge system. It is in that way we can formulate new innovation policies....

Society invests a lot of money in research, not to keep the individual scientist happy but because it is good for the society. Research produces students and knowledge, and this knowledge is to be used in society.

Assessing Assessments - European experiences p.93

Published by The Danish Institute for Studies in
Research and Research Policy

“How good is a research funding organisation at generating and moving knowledge, and participate to the “system” ?”



Evaluate generation and movement of knowledge

A “micro test case”

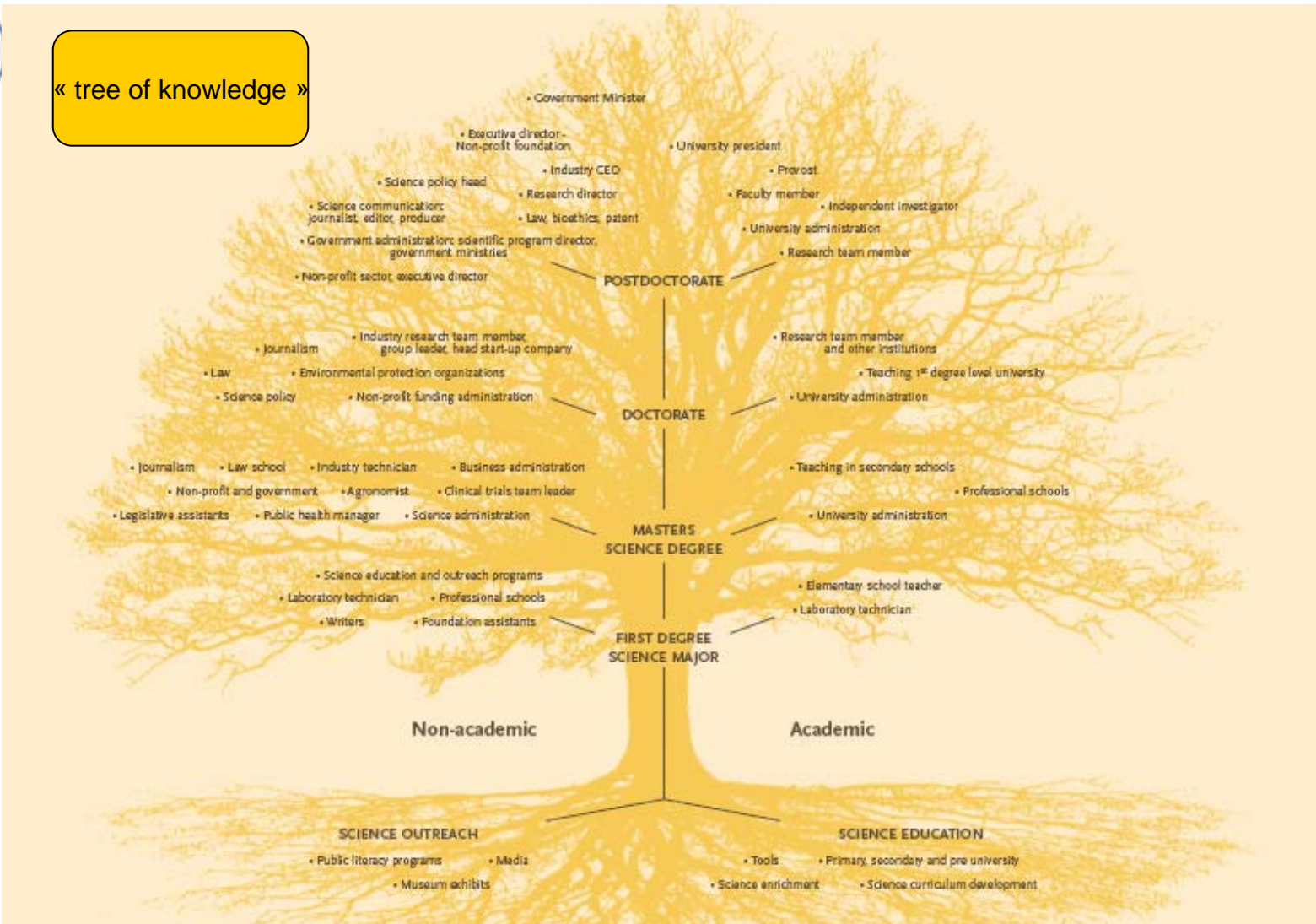
- Perimeter:
 - HFSP Fellowship program - 1990-2007 : 2200 awardees – subset of awardees before 2000 – only a handful of cases for illustration.
- Indicators
 - Quantitative (generation):
 - publications, patents before and after award
 - With and without host
 - Qualitative (Movement)
 - significance of work: cross reference of publications or patent
 - Networking/knowledge sharing: referee activity, conferences
 - Own career profile: location and position (“tree of knowledge”)

Data sources



Thomson “ISI Web of Knowledge”
World Intellectual property Organization (WIPO) database
Internet search engines (Google)



« tree of knowledge »



10/08/2007

Report on a Meeting held in Strasbourg, France, November 29-30, 2001 on International Training and Support of Young Investigators in the Natural Sciences



Individual summary

knowledge creation and movement

Articles
(Thomson Web of knowledge)
<i>(hfsp cited)</i> with host without host
name

Creation - communication

Other scientific communication
reviews
books
conferences

Diffusion - networking

Awards
<i>hfsp cited</i>

Recognition - influence

Patents
<i>hfsp cited</i> (co) inventor
publications/ patent

value capture - application

career path

Role - « tree of knowledge »

Issues/comments



Creation - communication

Articles		1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
<i>(hfsp cited)</i>	with host	1																		
Be	without host	16						1	1		fellowship starts	1	1/2	2	3	2	1		2	1
<i>(hfsp cited)</i>	with host	0																		
Sp	without host	17						2	1	4		3	2					2	2	1
<i>(hfsp cited)</i>	with host	17						1	1	2	1	1		4	2	3		1	1	
Pe	without host	1		1																
<i>(hfsp cited)</i>	with host	3							1		1				1					
Ha	without host	5			2		1	1										1		
<i>(hfsp cited)</i>	with host	7												2	4			1		
Pr	without host	10										1	0	1		1	1	2	4	
<i>(hfsp cited)</i>	with host	0																		
Xx	without host	0																		

Citations

Be	Citations/art: 27.82 h-index : 11
Sp	Citations/art: 7.65 h-index : 10
Pe	Citations/art: 35.84 h-index : 15
Ha	Citations/art: 34.20 h-index : 4
Pr	Citations/art: 13.52 h-index : 10
Xx	Citations/art: 13.52 h-index : 10

Comparisons and statistical analysis possible within and between organisations.
 Interaction host/fellow .
 Need to add information on field.
 Reference to HFSP very rare, not retrievable from ISI data.



Sample results Patents

value capture - application

Patents		1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
<i>(hfsp cited)</i>	(co) inventor	0																		
Be	publications/ patenti	0																		
<i>(hfsp cited)</i>	(co) inventor	1																		1
Sp	publications/ patenti	3											1			1	1			
<i>(hfsp cited)</i>	(co) inventor	1																		1
Pe	publications/ patenti	19						1			1			1	6	2	2	5	1	
<i>(hfsp cited)</i>	(co) inventor	0																		
Ha	publications/ patenti	1												1						
<i>(hfsp cited)</i>	(co) inventor	0																		
Pr	publications/ patenti	0																		
<i>(hfsp cited)</i>	(co) inventor	0																		
Xx	publications/ patenti	0																		

Patents where cited as inventor

Patents where articles or patents are cited

Comparisons and statistical analysis possible

very heterogeneous – case of Pe: research on prion

Few patents filed as «inventor», and ...

...apparent relationship with position (see next slide)

lag time

Reference to HFSP rare and buried in the description

No links between bibliographic and patent databases (incl. in Thomson group)



Sample results

Career path

Role - « tree of knowledge »

Career path	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	
Be							Univ Fribourg			Univ Canberra			Univ Geneva							
Sp							Univ Basel Dept of botany CH								NESTEC research center CH					
Pe							Department of Biology, Technion, Israel Inst. of Technology													Chiron Corp, Emeryville, C
Ha			Univ of Tokyo																	Fordham Universi
Pr							Univ Bath, Dept Biol & Biochem England													Lewis-Sigler Inst. for Integrative Genomics, P
Xx																				ASU

Descriptive – comparaison more complex

HFSP link with mobility obvious but impact on career only by interview...

Mobility academic > industry

Need to add information on position

No database available - time consuming



Immediate issues

Ineffective Identifiers... if any

Homonyms (ex. of Hamaguchi Masaaki (Genetic analysis of human cancer)):

375 records found for "Hamaguchi M" in 21 subject categories (ISI data)

76 records in "oncology" only with Hamaguchi M/otohiro, M/ichinari, M/asaaki

But ... "first names are not searchable" in Thomson ISI database ...

Change of Institutional denomination and perimeter > combined with above : career path hard to capture

Search engines give anecdotal information and existing databases are not connected (e.g; Derwent and SCI)

No field for funding organizations ...



Risks of “return on investment” evaluation

Risk of not doing it

Unsustainable:

As if not for profit research was not accountable ?

The argument that it is too complex to evaluate does not hold with current digital information storage and retrieval technologies.

Counter-productive:

Ambitious goals such as in the « Lisbon agenda» in Europe are not met. Translation of faith into priorities would be helped by good quality data.

How can «best practices» be identified and leveraged without means to identify them ? .

“Dangerous”:

Tools developed by the industry for applied R&D are inappropriate for fundamental research, humanities, social sciences.

The demand for such evaluation, in particular from politicians, creates a niche market. Commercial information providers might fill this need but with their own agenda (not bad in itself, but risky quality-wise and probably expensive).



Risks of “return on investment” evaluation

Risk of doing it

Could generate an alien “culture of result” that might antagonise the research community.

Counter-productive if too simplistic, with abuse of bibliometrics and impact factors.

The average return on investment in intellectual assets is highly skewed. Many research projects do not succeed but the returns on successful projects more than compensate.

Misappropriation of (good) results. What credit or share of a successful career or project can be claimed by a single organization nowadays ?

Could be (mis)used to serve a hidden agenda (cost cuts, restructuring and concentration...)

Potential for excessive complexity and finally no use.



Risks of “return on investment” evaluation **Misc. considerations**

A great diversity of goals, disciplines and cultural environment makes comparison and benchmarking difficult (and even the very idea of performance evaluation may be alien).

This is about evaluation *a posteriori*, and not *about* research prioritisation

Confusion and ignorance favour a less challenging status quo.

Requires a very important and sustained intellectual, conceptual and material investment. Needs a driving force with recognised global authority.



Other important communities are dealing with this issue

“ The relative lack of recognition of intangibles in accounting coupled with their growing importance in the value creation process, means that the financial statements have lost some of their value for shareholders.”

Policy Brief OECD Feb 2007



Conclusion

Evaluation of return on investment in research is bound to take place as one component of accountability.

The research community would be the first beneficiary of a proactive attitude so as to mitigate the risk of misconception, misuse, or costly monopoly.

There are already interesting approaches and no need to «reinvent the wheel » but an overview and practical step forwards are missing at the international level.

There is an obvious need for universal unambiguous identifiers of researchers, research institutions, funders ...just to make possible adequate referencing.

A global role for an existing or *ad hoc* global organisation (e.g. OECD) ?



Thank you for your attention