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Introduction

by

Jean BERLAMONT*

SUMMARY. — Evaluation of Research should be more about quality than about quantity. The number of publications and the impact factor of the journals show only part of the picture. The problems that academics encounter with these evaluation methods are basically the same in the North and the South. Evaluation of development research should take into account the impact of the work on society, dissemination of results and valuation of the research efforts for the individual researcher and his personal development.

Introduction

Since 2003, more precisely after a discussion during its 75th anniversary celebration, the Belgian Academy for Overseas Sciences has been concerned with the questions raised by "the evaluation of development research". A Task Force composed of members of the three Sections of the Academy has been set up, led by Ivan Beghin and Georges Stoops. The Task Force has prepared the Working Paper that will be the basis of today's discussions.

1. Evaluation of Research

Before discussing "the evaluation of development research", we should look at the evaluation of research in general. In universities, national science foundations and price awarding academies, it is common practice to "measure" the quality of a researcher or a research group by counting the number of publications in so called A1 or (THOMSON -) SCI journals (GARFIELD, E. & SHER, I. H. 1963). Other aspects may be taken into account e.g. competitively obtained research budgets, scientific awards, invited lectures, but the main indicator very often is the number of journal publications. As long as publications were meant to share research results with interested readers (publication is dissemination of results), the number of publications in esteemed journals with peer review, indeed was a measure of the quantity and quality of some-ones research efforts, but, every "measuring system" eventually becomes a "controlling system". It is not uncommon today that a research group first selects the journals in which they would like to publish, choose a subject within the scope of the journal, apply for the funding and carry out the research! More and more, editors see a doubling or tripling of the number of submitted manuscripts, which makes it hard to find enough good reviewers willing to do the job! The system is threatened to collapse due to its success.

* President of the Royal Academy of Overseas Sciences; Prof. KULeuven, dept. of Civil Engineering, Kasteelpark Arenberg, 40, B-3001 Leuven (Belgium).

In my opinion SCI journal papers should be a measure of the **quality** of somebody's research work, not its **quantity**. In many disciplines, especially in the rapidly evolving ones, it might be more appropriate to publish at international conferences to disseminate research results. Some conferences are highly selective indeed. Whilst the time between submission and publication in a journal may take 1 to 2 years, a conference paper is published within a few months. Of course, there are also purely "commercial" conferences that aim at maximizing the number of attendants and profit, and are rather social gatherings than scientific events.

Today, not only the number of journal publications counts but also the "quality" or status of the journal in which they are published. Therefore, the "impact factor" IF of the journal is used. It is the average number of times that an article from the journal has been cited during the two first years after its publication. Obviously, the IF does not say anything about the quality of an individual paper; it is also not a measure for the quality of the journal, but rather a measure of the size of the scientific community in a particular discipline and the popularity of the journal. In 2004, ninety percent of the IF of "Nature" was based on only twenty five percent of its articles!

One should consider the useful lifetime of knowledge, which differentiates between scientific fields and which will be relevant talking about development research. The "half-life of knowledge is the amount of time that has to elapse before half of the knowledge in a particular area is superseded or shown to be untrue (Machlup, 1962). The half-life of psychology has been estimated to be 5 years (Hebb, 1975). Tassios (1974) used the citations of scientific articles in journals as an indicator of the wear out of knowledge. He noticed that in civil engineering fifty percent of the cited articles were older than seven years. He concluded that he half-time of knowledge in civil engineering was about seven years. In nuclear engineering it was two and a half years. Eighty percent of knowledge has become obsolete after fifteen years in civil engineering and after only seven years in nuclear engineering. Knowledge in "traditional fields" lasts long, knowledge in newer fields develops fast and is quickly outdated. My most cited paper dates back to 1993. One third of the citations were in the last four years. The largest number of citations occurred when the paper was ten, eleven and thirteen years old! Using two years as a window for determining the IF of a journal is clearly not applicable in all fields… Since 2009 the Journal Citation Reports (JCR) also include a five-year impact factor, which is clearly more suitable for more "traditional" fields.

Therefore IF can not be compared between scientific areas. Some examples:

CA – Cancer Journal for Clinicians	IF = 69
Nature	IF = 29
Science	IF = 26
Estuarine, Coastal and Shelf Science	IF = 1.8
ASCE, Journal of hydraulic engineering	IF = 1

Some editors advise potential authors to cite from the journal in which they want to publish to manipulate the IF!

2. Evaluation of Development Research

"*Excellence is relevant, wherever it occurs*"
(Dr. C. Bode, Deutscher Academischer Austausch Dienst (DAAD), Beijing, 2006)

What is development research? It is one of the questions to be answered today. It is research that is, or could somehow be relevant for development.

When evaluating development research, one has to distinguish between the **process of doing research** and the proper outcomes of the research. Developing countries need good, creative and innovative researchers to solve their immense problems. One should realize that it is probably more difficult to find solutions in a complex environment with limited resources than to do so in a rich, "northern" environment. (*e.g.* health care and adequate food supplies). Training of future researchers in a good and stimulating environment is therefore very important. The project on which they work, and which very often provides the material resources for the research is not so important as such. They have to be trained by doing research and for this purpose it does not matter very much what type of research is carried out or which subject is treated. Students from developing countries should be trained in research methodology: how to ask the right research questions, how to design the right experiments, how to carry out the right measurements, how to develop the proper models. These are generic skills which can be used later for doing focused research once they are back in their own country, disregarding the process through which they have been acquainted.

As far as the **research outcomes** are concerned the question is more difficult to answer. It is sometimes said that developing countries need "appropriate technology", meaning simple, non sophisticated technology. But there is no such a thing like "appropriate technology". There is only good and bad science and good and bad technology. All good technology is appropriate.

It is also untrue that high-tech cannot be used in developing countries as can be shown in two examples from an Interuniversity Cooperation (IUC) project with Escuela Superior Politécnica del Litoral (ESPOL, Guayaquil, Ecuador). In one of them, resistant banana varieties are cultivated with up-to-date gene technology (SANTOS 2009). Bananas are a basic crop for the Ecuadorian population. In a second one, one manages, using up-to-date GIS technology to localize the coastal areas where the shrimp population is affected by the White Spot Syndrome Virus (WSSV), which allows an efficient and timely control of that disease (SONNENHOLZNER *et al.* 2004). Shrimps are a basic food commodity and an important export product. "We don't help developing countries by compromising on high standards".

In developing countries science is relevant if it helps to solve problems on the short or intermediate term. Developing countries face immense problems which partly can be solved by knowledge and technology which is already **available elsewhere**, but which has to be adapted to the local context and boundary conditions, *e.g.* by using local materials and local labour. This is exactly what an engineer should do anytime and anywhere: solve problems using scientific knowledge under external constraints. (*e.g.* drinking water production and distribution, sanitation, better crop productivity, irrigation, …). Here there is a need for knowledge transfer and trained researchers to adapt the knowledge to site specific conditions. "Sharing the fruits of scientific and technological progress is one of the most important ways that rich countries can help poor countries fight poverty" (UNDP, 2003).

The problem however very often is not the lack of knowledge or lack of access to knowledge but is sociological. There is a lack of interest at the level of the local policy makers and local authorities. They do not ask for engineering or scientific advice because they are not used to. It is simply not part of the process. There is an unwillingness of changing wrong habits or deficient techniques by sheer conservatism, religious rules or simply ignorance … It's bad not to know what you don't know… Change is always difficult (not only in developing countries!). Change management is urgently needed.

"If the development community continues to ignore the explosion of technological innovation in food, medicine and information, it risks marginalizing itself and denying developing countries opportunities that, if harnessed effectively, could transform the lives of

poor people and offer breakthrough development opportunities to poor countries" (UNDP, 2001)

There might be a lot of scientific developments and research going on in the North which may be **potentially useful** also in the South and provide answers to questions that have not been asked yet, or offer tools that lead to innovative applications. Only, the researchers in their Northern labs don't realize that. They do get a bonus for making their innovative findings industrially exploitable (this is the main issue of the EU policy today through the EIT (European Institute of Innovation & Technology), with its KIC's (Knowledge and Innovation Communities)) but they do not get a bonus for finding applications in a development context. In 2005, the "Vlaamse Raad voor Wetenschapsbeleid" (VRWB) has carried out a review of "Science sharing" in Flanders (TEMMERMAN 2005). The result was that it would be an enormous effort to find and list all potentially useful research but, a random sample of 1000 research projects and 60 research groups showed an unexpected large number of research projects relevant for development, either directly or indirectly, and in or without cooperation with a research group in the South. One of the recommendations of the VRWB study was that mentioning applicability of the proposed research in the South should be an advantage when applying for funding *e.g.* by the Belgian Science Foundation (FWO and FNRS, resp. in Flanders and the French speaking Community).

On the other hand, there is little research on **specific issues** which are not relevant for northern countries *e.g.* malaria. Pharmaceutical industry worldwide provides 93 % of the resources for health research. The pharmaceutical industry is not interested in research that does not lead to a product that can yield benefits. Therefore, typical issues for the developing countries do not figure on the (international) research agenda. Only ten percent of medical and health research worldwide is spent on problems of ninety percent of the world population.

Developing countries cannot set up the research themselves because they do not have access to appropriate funding. "Bridging the knowledge gap will require considerable investments in science and technology in the south, yet the current levels of investments are on average less than 0.5 % of the Gross Domestic Product (GDP), compared with 4 to 5 % in the north. Because the former lack the resources to invest in science and technology, the north can play a vital role in building and strengthening such capacities within the framework of north - south research partnerships"' (RETOUT 1998)

3. How to Measure Quality

Good research projects in the north or in the south should result in publications in international scientific journals. Researchers in the South manage to do that more and more, often in collaboration and with the help of a partner from the North because researchers in the south don't have the tradition of publishing in international journals. They even don't have access to the (increasingly expensive) international journals! Researchers from the north working with a partner in the south can have their work rewarded by good publications. Since the half-life time of development research is often long, they will probably not be awarded by high impact factors!

But, as much as for our researchers, publications in international journals should show the quality of the research, but certainly not the quantity, nor, more importantly, its impact. To have impact on society in the south, one should not be cited from international journals, but one should be read or heard by those who could possibly use the knowledge and apply it. As mentioned above: this should be the very reason why we publish! Researchers from the North working on subjects useful for the south, or researchers from the south should therefore find appropriate communication channels. The Academy wonders how to measure the impact on

society including of course the scientific society. Some time ago, the Academy has launched the idea of bibliometrical project to find relevant research. The result was: it is hardly feasible.

The discussion today will be on how to measure "impact" of research work. In doing so, one should remind that "numbers are not inherently superior to sound judgment" (Science Daily, 2008).

4. Valuation of Development Research

"Evaluation" of development research ideally also should be used for the "valuation" of development research for our own researchers who do research relevant for the South or who co-operate with institutions in the South.

Colleagues who are active in developing countries often complain that their work overseas is not enough appreciated when it comes to nomination for tenure positions or promotion. In particular young academics are hard to motivate for work in a development context because they prefer to focus on what really matters for their academic career, *i.e.* A1 journal publications! At least that is what they think. A1 publications measure only the quality as a scientific researcher, but many other qualities and skills make a good professor and a successful academic.

I am personally convinced that involvement in development research, not only can produce good research, but offers to the actors plenty of opportunities: reconsider one's research domain in a different context, look at it from a different angle; define precisely the research/project goals, the means and ways to reach them (*e.g.* log-frame matrix) and define indicators of success; work in a complex atypical environment and a complex organization; be confronted with different views; get in contact with a different culture; develop leadership. In brief: develop skills that will be of use later when lecturing, designing innovative research projects, applying for research funding back home, or leading a research team.

Anyhow, it is clear that development research, in order to be sustainable should **also** be beneficial to the partner from the north. If not, bright young colleagues will not engage in development research. The benefit however can be of quite different nature: access to data, to information, availability of lab or field work facilities, labour force for experimental work, good master or doctoral students; opportunities for the students from our universities to spend a training period abroad to get a multi-cultural experience or to do experimental work for the master thesis, etc.

When evaluating individual researchers for promotion, one basically faces the same problems as when evaluating a research group for the allocation of research grants or project money or for the evaluation of universities for rankings!

Whereas up to now it very often comes down to one figure: the number of publications or the rank. It becomes increasingly clear that one has to switch to a multi-dimensional evaluation system (DG EAC, 2008). For a university it could be performance in education and research, innovation, community outreach and internationalization; for an individual researcher it should be research output, regional and international prestige shown by the number of invited lectures or participation in foreign projects, invitations for doctoral committees, reviews, impact on society, collaboration with industry, international dimension. Besides, just as it is the case for university rankings or accreditation, the performance of an individual, should be measured against his own "mission statement". If work in a development context is part of it, it should be evaluated and properly acknowledged.

The Task Force has identified four basic questions and expects today's meeting to provide the answers to:

— How do we define development research?
— What is good development research?
— How can we recognize a good researcher potentially contributing to development? Who are the researchers who deserve to be supported?
— What should we do so that countries in the south themselves produce the best possible research useful for their development?

You will deliberate about these questions during the day but remember that although context may be different and relative proportions may differ, the problems that academics encounter are basically the same in the north and the south. It is about quantity and quality, impact of research work on society and dissemination of results and valuation of research efforts for the individual researcher and his personal development.

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