

A scientometric examination of the performance of water research in South Africa

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ABSTRACT

Regular assessment of the state of water research and development (R&D) in South Africa is a necessary component of science policy and successful R&D implementation. Among others, effective R&D has a direct impact on water resource management and promotes training and capacity building initiatives. Much of the country's water research is carried out under the auspices of the Water Research Commission (WRC), a national public entity established by the Water Research Act (Act No. 34 of 1971). Water R&D is carried out by universities, public research institutions and science councils as well as the private sector. A scientometric examination of South Africa's research and development performance indicates that while the water research and development community is small, it is highly productive. The analysis indicates that the South African contribution to the global share of water-related papers in journals indexed by the ISI (now Thomson Reuters Web of Science) is more than 3 times the average for all disciplines in the country, and that South Africa ranks 19th in the world in the domain of 'Water Resources'. A study of the patent data further indicates a much higher than average conversion of knowledge to products as indicated by the water-related patent/total patent ratios.

Keywords: scientometrics, water sector, research, R&D, South Africa, Water Research Commission (WRC), publication, patent

INTRODUCTION

The need for a national water research agenda has been articulated by academics and policy-makers alike as the evidence-based solution to inform water policy and ultimately address the complex water challenges we are faced with today. However, in order to facilitate the production of relevant water research that speaks to the needs of a country we first have to take stock of its research inputs (budget expenditure for example), outputs (publications and patents for example) and areas of focus, in order to determine critical gaps in R&D and capacity. Effectively, we need a comprehensive assessment of the state of water R&D.

The Organisation for Economic Cooperation and Development (OECD) provides a useful definition of research and development (R&D), which will be adopted in this paper. 'Research and experimental development comprise creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications' (OECD, 2002 p. 28).

Scientometrics is used internationally for monitoring and assessment purposes. Despite its limitations, the field of scientometrics tells us much about the health of a country's national innovation system. Monitoring and evaluating the various facets of the scientific enterprise is a necessary and integral part of science policy. Rising costs of research and development and competing disciplinary claims for financial resources

require intelligent allocation of resources, which presupposes knowledge of the activities and performance of the innovation system. Through this approach, we can measure the availability of research with the necessity and impact thereof.

One of the most efficient and objective methods of assessing research and innovation performance is through indicators. Disciplinary and national assessments (Rojo et al., 2005; Dastidar et al., 2005; Pouris, 2005; Jeenah et al., 2008) based on quantitative indicators are used internationally in support of policy development. There is a growing awareness of the advantages of basing opinions and subsequent policy choices on quantitative criteria. Science policy reviews would seem inconceivable today without recourse to existing indicators. Disciplinary assessments are used as benchmarks for the identification of effectiveness of policy instruments, for the support and justification of funding to political authorities, for identification of international collaborators, centres of excellence, and so on.

Probably the most often used indicators for disciplinary assessments are those accruing from bibliometrics and patent analyses. In bibliometrics the number of publications in a field is considered as an indicator of research activity. The philosophy underlying the use of bibliometric indicators as performance measures has been summarised in De Solla Price's statement that publication is not just an indicator but, in a very strong sense, the end product of creative effort for those who are working at the research front (De Solla Price, 1975). In the same way in which scientific articles are accepted as a legitimate reflection of scientific research, patents are accepted as a reflection of technological achievements. Griliches (1990) has pointed out that patent statistics are a unique source to analyse the process of technical change. It is arguably the most comprehensive indicator measuring the quantity of available

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