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The WRC operates in terms of the Water Research Act (Act 34 of 1971) and its mandate is to support water research and development as well as the building of a sustainable water research capacity in South Africa.

Tracer study of water PhDs in South Africa

Doctoral graduates are considered the best qualified for creating, implementing and disseminating new knowledge and innovation. Consequently, information about the socio-economic impact of their training is essential in knowledge-based and complex economies. In a first for South Africa, the Water Research Commission, through its research partners, undertook a survey of water and sanitation-related PhD degrees awarded between 2013 and 2017. The study sets an important baseline to benchmark and monitor against, both within the water sector and across sectors and disciplines.

Introduction



The training of doctoral, or PhD, students is a long and costly endeavour. The question of the return on investment in producing PhD graduates is a policy concern for the public funders of education. Although the number of PhDs produced by South African universities has more than doubled over the past ten years, National Research and Experimental Development Surveys have not detected a corresponding increase in the research and development workforce. Similarly, there is a weak understanding of sectoral capacity to absorb these graduates into the workplace.

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and innovation. Consequently, information about the socio-economic impact of their training is essential in knowledge-based and complex economies. Tracer surveys, also known as graduate destination surveys or alumni surveys, are employed by many countries to generate such policy-relevant information on the characteristics and opinions of PhD graduates.

This project undertook such a survey of water and sanitation related PhD degrees awarded during the period 2013-2017 by South African universities. This is the first investigation of this nature in the fields of water and sanitation in South Africa and probably internationally. The project set out to examine the work experience of water-related PhD graduates, the demand vs. supply for water-related PhDs, the mobility of PhD-holders between sectors, when PhD-holders leave research for careers in management, and whether they remain in the country.

Approach and results

For this investigation, PhD theses in the field of water and sanitation were identified. The National Electronic Theses and Dissertations (NETD) and NEXUS databases were utilised to identify PhD graduates whose theses' titles and/or abstracts contained relevant keywords. After manually checking the relevance of the search results, the project team identified a final list of 112 theses relevant to the thematic scope and five-year timeframe of the investigation.

University websites, databases indexing academic articles

and social media were examined in order to identify the relevant characteristics of the doctoral graduates. This methodology proved successful in generating information on the demographics and employment characteristics for almost all 112 individuals. Of the 112, 107 profiles were traceable and employment details were found for 104 graduates. This is a significant accomplishment within the context of many other tracer studies in South Africa, which have tended to suffer from either small samples or low response rates. A questionnaire was developed and sent to the identified graduates, and 48 responses were received.

The headline findings of the project are the following:

- Of the 107 PhD graduates for whom demographic information was available, 66% were male and 34% were female; 55% were black, 38% white, 4% coloured and 3% Indian/Asian.
- All the 104 graduates for whom employment information was available were employed at the time of the study.
- More than 50% of the graduates occupied positions in the university sector. Of these positions, 23% were short-term postdoctoral contracts.
- Of the 106 graduates for whom relevant information was available, 66% are located in South Africa, and 92% are within Africa.
- Approximately 90% of the respondents were in occupations related to the water and sanitation sector.
- Mobility between sectors was identified to be 16%. Eighteen graduates indicated that they had transitioned between sectors.
- The work experience of 40% of the PhD holders was identified to be between 2 to 5 years.
- Twenty graduates (18%) declared that they had management experience.

Implications and recommendations

The results indicate a high demand for PhDs in water and sanitation, leading to the conclusion that the country can absorb more PhD graduates in this field. Under current market conditions, it appears that PhD graduates can secure employment in the sector relevant to their field of training. This coincides with the results of tracing studies in other countries where low levels of unemployment are generally observed for PhD graduates. While this provides an indication that demand currently matches or exceeds supply, it does not go as far as confirming the estimate by

the Water RDI Roadmap that the sector requires 200 PhDs per year.

It is not clear whether this level of demand exists for PhDs across all sectors and scientific disciplines in South Africa, or is particular to the water sector. A follow-up study, currently underway, is tracing a broader spread of PhD graduates across a range of sectors and disciplines. This will allow benchmarking of the results of the water-related PhDs tracing study against other sectors, enabling identification of any water sector-specific factors that need to be taken into account in planning and decision-making for high-end skills in this sector.

The number of graduates produced is significantly less than the number that go on to work in the water sector or academia in South Africa. At least 34% of the graduates are no longer within South Africa. Many graduates from other African countries have since returned to their countries of origin. This is flagged as an issue for further investigation.

The study makes a number of recommendations that have already been taken up in the abovementioned follow-up multi-sectoral study. Additionally, the following recommendations are made:

This type of investigation should be repeated every two years, in line with international good practice, and the relevant results included in the South African Water Research Indicators of the WRC. The development of a system for tracking PhD graduates across all sectors and disciplines is further recommended, in order to enable the generation of policy-relevant information across the breadth of the economy.

Policy options should be explored for potential retention of foreign students graduating at South African universities with skills that are in demand locally. There are both costs and benefits to the South African economy in training and exporting PhD graduates. Attention also needs to be given to identifying administrative and regulatory obstacles (e.g. visas) to such retention.

Conclusion

This first-ever tracer study of PhD graduates in water-related fields has provided insight into the attributes, employability and mobility of these individuals. The finding that all the

traced graduates are currently employed is an indication that supply is not exceeding demand for these skills in the water sector and water-related academic disciplines. It remains to be seen whether the number of graduates is adequate for the needs of the sector. A baseline has now been set for future studies to benchmark and monitor against, both within the water sector and across sectors and disciplines. The completion of the broader cross-sectoral tracer study will generate valuable results against which to compare the water-specific findings generated by this study.

For more information,
the related report, *Trace study of water PhDs in South Africa (WRC Report no. 2851/1/20)* can be accessed at www.wrc.org.za or contact WRC Research Manager, Mr John Dini at Email: johnd@wrc.org.za