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Research trends and collaborations by applied science researchers in South African universities of technology: 2007–2017

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ABSTRACT

This paper analyses the publication patterns of researchers in the field of applied sciences at Universities of Technology in South Africa. Aspects investigated include publications in SCOPUS-listed journals; number of citations and countries of publication. Collaborative research patterns at national and international levels were also investigated. A bibliometric analysis approach was followed using SCOPUS as the main source of data and analysing the articles published in selected applied science disciplines. Results show that researchers in the field of applied sciences in universities of technology have increased their number of publications over the past 10 years and are also working in conjunction with other researchers both nationally and internationally. The analysis is an important addition to the field in South Africa which helps in measuring how institutions are positively responding to government incentives in research. The results are also important to information professionals who are increasingly playing an important role in research impact assessments.

Introduction

African universities are said to be the sole sites of knowledge production when compared to OECD countries where knowledge is produced in both public and private sites (Cloete, Maassen and Bailey, 2015). There are calls for African universities to invest more in knowledge production if they are to play a more meaningful role in the socio-economic development of the continent. Sooryamoorthy (2018: 317) points out that "the importance of science has been gaining interest of scholar and policymakers alike who find that the relationship between science and development is getting stronger than ever". On the global scale Africa's contribution to knowledge production is only 1.6% of the total global output and the knowledge production in African universities has not been impressive (Cloete, Maassen and Bailey, 2015).

In South Africa knowledge production is slightly different from the rest of the continent. Research outputs in South African universities have been growing over the last twenty years - due to government incentives that reward outputs published in peer-reviewed journals and are listed in the Department of Higher Education and Training (DHET) "accredited lists". Research has also been increasing due to the growing investment in research infrastructures in these universities. Research has also grown due to funding provided by the National Research Foundation (NRF), which is the South African government's main research funding agency for postgraduates, postdoctorals and established researchers (Fig. 1).

The newly established universities of technology from 2005 onwards have been refocusing their mandates from predominately teaching entities to include research activities. Research in applied sciences is one of the main focus areas of the UoTs in South Africa with all of them having established faculties of Science or Applied Sciences and various research units to support applied sciences research. Applied sciences research is seen as one of the areas that will contribute to South Africa's economic development through the National System of Innovation (NSI). Chiware and Skelly (2016) report on the growing research and collaborative patterns in engineering and applied sciences in universities of technology and the move to multi-disciplinary research activities (Fig. 2).

This paper aims to present the publishing patterns of researchers in the applied science discipline at Universities of Technology (UoTs) in South Africa. In total there are six UoTs in South Africa, namely:

- Cape Peninsula University of Technology (CPUT);
- Central University of Technology (CUT);
- Durban University of Technology (DUT);
- Mangosuthu University of Technology (MUT);
- Tshwane University of Technology (TUT); and
- Vaal University of Technology (VUT).

These universities came into being as a result of the rationalization

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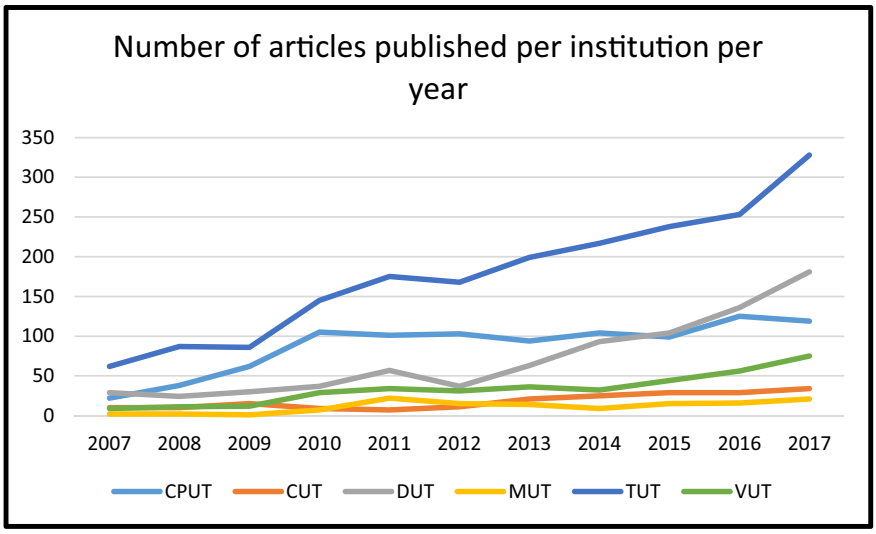

Fig. 1. Number of articles published per Institution per year.

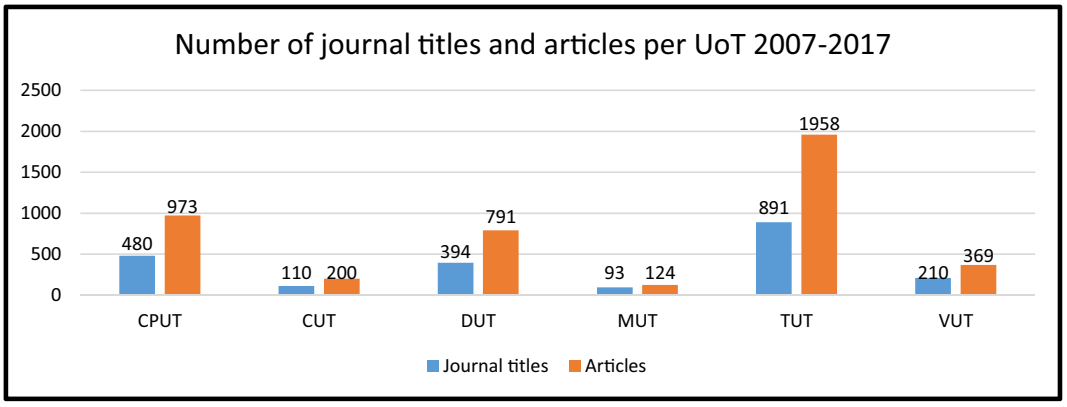

Fig. 2. Number of journal titles and articles per UoT 2007–2017.

of higher education following South Africa's independence in 1994 and the major reconfiguration of the higher education landscape, which took place from 2004 onwards. Through a process of mergers and.

re-designations, South Africa's 36 higher education institutions 21 “traditional” universities and 15 technikons (or technical colleges) were trimmed down to 23 - comprising 11 “traditional” universities (some of which were merged with others), 6 “comprehensive” universities (arising out of mergers between a traditional university and a technikon), and 6 universities of technology (created from 11 merged and unmerged technikons).

Universities of technology have as their foundation the former technikons which built a solid reputation in providing career-oriented programmes. The term Technikon was a South African term that was used to refer to institutions offering technical and vocational education at a tertiary level. These institutions prepared graduates for the world of work. Their research was of an applied nature and their links with industry ensured that the Technikon programmes remained relevant, up-to-date, and that their graduates were familiar, through work-integrated learning, with the way industry functioned.

Throughout the world, universities of technology have made a major impact on the development of their countries and regional economies by preparing graduates for the world of work, and applying their research skills to identifying the problems and needs of society and industry, and together finding solutions to those problems. In the present higher education landscape, all universities in South Africa are equal – they only differ in their focus (SACHE, 2010). Applied science research remains an important area of both teaching and research in UoTs in South Africa and the focus of this paper is on an analysis of how this important research area has grown in these institutions.

In 2003, DHET produced a Research Output Policy titled: Policy and Procedures for the Measurement of Research Output of Public Higher Education Institutions; with the purpose of using rewards to encourage universities to increase their research output. The reward system identifies development targets for institutions and encourages publication through the provision of funding to staff who publish, interalia articles in peer-reviewed scholarly journals thereby exposing the research done within South African academic institutions to the global audience (DHET, 2016).

The South African government's focus on science and technology development supported by research, technology and innovation policies, strong research governance systems and increased research funding has enabled UoTs to develop their research landscape through recruitment of highly skilled staff and the development of research infrastructures through funding of laboratories, equipment, intensive and high computational regional and national facilities at some of the country's leading research institutions like Council for Scientific and Industrial Research (CSIR), Human Sciences Research Council (HSRC), and the Medical Research Council (MRC). The institutions' rapidly growing research outputs are thus due partially to their increased support to researchers and partially to their strategic planning supported by institutional research policies, identification of research focus areas, development needs and strategies for reaching development