Application-oriented university research in the new millennium: bibliometric study of general trends within universities worldwide

Robert J.W. Tijssen*, Jos Winnink**

* tijssen@cwts.leidenuniv.nl
CWTS, Leiden University (The Netherlands);
DST-NRF Center or Excellence in Scientometrics and Science, Technology and Innovation Policy (SciSTIP), Stellenbosch University (South Africa)

** winnikjj@cwts.leidenuniv.nl
CWTS, Leiden University (The Netherlands);
Netherlands Patent Office (The Netherlands)

Research question and methodology

Each research-active university has a unique institutional profile in so far as the kind of research that is done. The multidimensional nature of the research activities runs across several distinctive spectra such as: “basic” to “application oriented” research, theoretical to empirical, observational to experimental, incremental to breakthrough. Previous work suggests a global trend toward more ‘application oriented’ research in world science (Tijssen, 2010). This study further investigates these changes on the basic-applied spectrum, now also at level of world’s 750 largest research-intensive universities. Even though most research-intensive universities are stable organizational entities, with little change in from year to year, we expect to see some noteworthy changes among these universities since the year 2000, an era in which several universities have undergone major restructuring or mergers, and some countries such as China have invested heavily in expanding and upgrading their university research systems. Has ‘application oriented’ research become more prominent in recent years? And which universities are driving this trend?

Our analytical approach fits within a stream of large-scale empirical studies that examine relationships and interactions between university research and associated knowledge application domains (Narin et al., 1976; McMillan et al., 2000; Boyack et al., 2014). Building on the work by Tijssen (2010), who analyzed macro-level trends in world science during the years 1999-2008 as represented in CWTS’s in-house version of Thomson Reuters’ Web of Science database (WoS), we conduct an updated trend analysis across the entire WoS and subsequently zoom in on institutional dynamics of the world’s 750 largest research-intensive universities. The analysis covers the time-period 2000-2013.

Our breakdown of the research literature is based on ‘Research Focus’ classes, identical to the six categories of the ‘Journal Application Domains’ classification system that was introduced by Tijssen (2010):
1. Discovery science – journals with a large share of papers produced by university researchers (including academic hospitals); very few or no contributions from industry
and private sector organizations, or from hospitals and medical centers outside the university system;

2. Industrial relevant science - industry relevant journals with a substantial share of papers (co-)produced by industry R&D staff;

3. Science-based technological development - industry practice journals, with a large relatively share of contributions from industry R&D staff;

4. Clinically relevant science - clinical relevant journals with a substantial share of papers (co-)produced by staff at hospitals and clinics outside the university system;

5. Science-based clinical practice – clinical medicine journals with many contributions from staff at general hospitals and clinics;

6. Industrial-medical development – journals at the intersection with contributions from industry and general hospitals (notably related to biotechnology and pharmaceutics).

First results

We find that some universities that have gone through remarkable changes in recent years in shifts towards application-oriented science. Our preliminary results also raise several new questions and further research into relevant organizational determinants and explanatory factors. One factor we need to investigate is the effect of international research cooperation and/or research cooperation with the business enterprises (Tijssen, 2012). Another factor is the possible impact of funding criteria on national university research systems. Managerial practices and (government-imposed) performance indicators are becoming major driving forces for research behavior in an increasingly large number of countries worldwide (Hicks, 2012) where expectations as to practical utilization and commercialization of research findings have become key funding criteria that may significantly affect the choice of research topics within universities.

References


