

# Main Institutional Sectors in the Publication Landscape of Spain: The Role of Non-profit Entities

Borja González-Albo<sup>1</sup>, Javier Aparicio<sup>1</sup>, Luz Moreno-Solano<sup>2</sup>, María Bordons<sup>2</sup>

<sup>1</sup> *borja.gonzalezalbo@cchs.csic.es; javier.aparicio@cchs.csic.es*

Transversal Support Research Unit (UTAI), Centre for Humanities and Social Sciences (CCHS),  
Spanish National Research Council (CSIC). Albasanz 26–28, 28037 Madrid (Spain)

<sup>2</sup> *luz.moreno@cchs.csic.es; maria.bordons@cchs.csic.es*

ACUTE Group, IFS, Centre for Humanities and Social Sciences (CCHS),  
Spanish National Research Council (CSIC). Albasanz 26–28, 28037 Madrid (Spain)

## Introduction

The study of national efforts in R&D by institutional sector is a matter of great concern because sectors differ in their main activities, accounting systems, orientation towards research and type of R&D (OECD, 2003). However, bibliometric analyses at the level of institutional sectors are not very common because the assignation of centres to sectors is not free of difficulties and the resulting sectors may entail a certain degree of heterogeneity. The role of institutional sectors in the scientific activity of countries, either for the total country (Godin & Gingras, 2000; Moya et al., 2013) or in a given field (Lander, 2013), has been analysed in the literature, although studies dealing with specific sectors such as universities or companies are much more frequent.

In most countries, main institutional sectors in publications include universities, hospitals and public research centres, while papers from non-profit entities (NPE) are usually scarce. Although this applies in Spain, an impressive increase in papers from NPE has been observed in the last fifteen years. This paper aims to analyse the research performance of non-profit entities in Spain with regard to activity, impact and collaboration; to locate them in the national context; and to identify main types of active organisations.

## Methods

Spanish publications (original articles and reviews), hereafter papers, covered by Web of Science (WoS, 2000–2011), search strategy CU=Spain and PY=2000–2011, are analysed. Six institutional sectors are identified in all addresses through a semi-automatic process (Morillo et al., 2013) followed by a manual revision to assess validity: companies, health sector, non-profit entities, public administration, public research centres and university. A full counting method is used.

The impact of publications is analysed through the percentage of papers in first quartile journals

within each field (%Q1), normalised position (NP) (Bordons & Barrigón, 1992), relative impact factor (RIF), % non-cited papers and citations relative to country average (RC) (three-year citation window). The orientation of sectors towards collaborative research is explored through the number of authors per paper, number of institutions per paper and collaborative pattern (percentage of papers with a single institution, percentage of papers with national collaboration, percentage of papers with international collaboration). An in-depth analysis of NPE is carried out. The NPE's activity index (AI) in ten broad thematic areas is obtained to gain insight into the specialisation profile of these entities as compared to Spain.

## Results

Main institutional sectors in Spanish papers in WoS (2000–2011) include university (66%), public research organisations (22%) and the health sector (18%). Non-profit entities amount to 10% of the papers, and show the highest increase during the period (3% of the country output in 2000 vs. 18% in 2011). This sector shows high specialization in Biomedicine (AI=1.59) and Clinical Medicine (AI=1.67). Collaboration in NPE is above the country average in terms of team size (11 vs. 8), number of institutions per paper (5 vs. 3) and share of collaborative papers (91% vs. 68%). NPE show also the highest shares of both nationally and internationally co-authored papers (75% vs. 41% and 45% vs. 40%, respectively). NPE display the highest percentage of papers in high-quality journals and the highest impact through relative citations (Table 1).

From the inspection and categorization of the NPE, the following organisational types emerge: foundations (50.3%), research networks (24.6%), consortia (16.0%), research management entities (12.2%), associations (6.5%), and scientific parks (1.0%). The highest increase during the period corresponds to research management entities and research

networks. Research management entities stand out because of their high figures in both the percentage papers in high impact factor journals and relative citations (Table 2).

Research management entities show the lowest proportion of papers with a single institution (2%), a high share of papers with national (89%) and international collaboration (68%), and the highest average team size. The highest share of papers in Q1 journals is observed for co-authored activity between national and foreign partners for all sectors except associations and research networks.

The specialization of NPE varies according to the organisational type: Biomedicine and Clinical Medicine for networks, consortia and foundations; Physics for research management entities; Biomedicine and Chemistry for scientific parks; and Engineering for associations.

### Conclusions

The in-depth analysis of the NPE in Spain shows the rising trend of different organisational types which differ according to the field and respond to specific strategic procedures to manage research (creation of foundations in the context of medicine, networks for clinical research, scientific parks to link basic and applied research in the university context, etc.). Interestingly, some of these organisational types (research networks, consortia, parks) include cross-sector and cross-discipline collaboration which is supposed to lead to major discoveries in science and even to radical innovation. Collaboration in the context of the structured and stable framework provided

by these organisational forms is more effectively enhanced than through occasional collaborative projects. Our data indicate the success of these emerging organisations in supporting/conducting high impact research.

### Acknowledgements

The financial support of the Spanish Ministry of Science and Innovation (CSO2011-25102) is acknowledged.

### References

- Bordons, M. & Barrigón, S. (1992). Bibliometric analysis of publications of Spanish pharmacologists in the SCI (1984-89). Part II. Contribution to subfields other than "Pharmacology and Pharmacy", *Scientometrics*, 25 (3): 425-446.
- Godin, B., & Gingras, Y. (2000). The place of universities in the system of knowledge production. *Research Policy*, 29 (2), 273-278.
- Lander, B. (2013). Sectoral collaboration in biomedical research and development. *Scientometrics*, 94 (1), 343-357.
- Morillo, F., Aparicio, J. González-Albo, & B., Moreno, L. (2013). Towards the automation of address identification. *Scientometrics*, 94 (1), 207-224.
- Moya-Anegón, F., Chinchilla-Rodríguez, Z., Corera-Álvarez, E., González-Molina, A., López-Illescas, C., & Vargas-Quesada, B. (2013). *Indicadores bibliométricos de la actividad científica española 2010*. Madrid: FECYT.
- OECD (2002). *Frascati Manual*. Paris: OECD.

**Table 1. Number of papers and impact indicators by institutional sector in Spain (WoS 2000-2011)**

	No. Papers	NP	%Q1	%Non cited papers	RC	RIF
Universities	271399	0.66	47.93	23.45	0.85	0.89
Public Research Centres	91095	0.74	62.41	12.94	1.31	1.24
Health sector	74337	0.59	39.66	21.32	1.20	1.16
NPE	41605	0.74	62.59	10.56	1.75	1.57
Public Administration	17238	0.66	49.04	20.65	1.01	0.96
Companies	15682	0.63	43.72	22.15	0.81	0.84

**Table 2. Number of papers and impact indicators of the NPE by organisational type (WoS 2000-2011)**

	No. Papers	NP	%Q1	%Non cited papers	RC	RIF
Foundations	20934	0.76	65.50	9.71	1.82	1.67
Research Networks	10249	0.75	63.16	7.18	1.83	1.74
Consortia	6651	0.73	60.83	9.88	1.69	1.55
Research Management Entities	5074	0.81	76.47	6.42	2.71	1.96
Associations	2692	0.66	47.73	20.84	0.90	0.94
Scientific Parks	310	0.76	66.11	8.71	1.21	1.55
Other NPE	1204	0.60	35.35	27.99	0.75	0.76