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Exploring imaginative geographies of nanotechnologies in news media images of Italian nanoscientists

Simone Arnaldi

Centre for Environmental, Ethical, Legal, and Social Decisions on Emerging Technologies (CIGA) University of Padua, Viale Porta Adige 45, Rovigo, Italy

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ABSTRACT

News stories about three prominent Italian nanoscientists are examined to explore how Italy and other countries involved in nanotechnology development are represented in the Italian media. The paper discusses the importance of these "geographical imaginaries" as symbolic and rhetorical resources for the journalists and the scientists that are pictured in the news to discursively shape what nanotechnology, its international development, and its relevance for Italy is all about.

1. Introduction

Nanotechnology is acknowledged as a key enabling technology for a wide range of technological sectors, including electronics, optical sciences and engineering, manufacturing, chemistry, materials, and biotechnology, with prospected applications in medicine, environmental remediation, energy, communications, inter alia. Nanotechnology has been rapidly established as a top priority in research practice and science and technology policy. Several indicators confirm the increasing dedication and commitment of the scientific community, the relevance for policy makers and companies, and the attention of the media and the public.

The burgeoning rise of nanotechnology in scientific and political agendas has led to escalating efforts to map and chart its international development. Under the notion of "international development of nanotechnology", existing literature includes variously the monitoring and analysis of trends in funding [1], the comparative analysis of national policies [2,3], as well as the mapping of research literature [4–6] and patents [7], thus consistently outlining a "geography of knowledge production in nanotechnologies" [8]. Also, concerns about the impact of nanotechnology on international development and equality have propelled a rich research tradition in this field [9–11].

Italy is fully part of this international effort to develop nanotechnology and the field has been listed among the official national research priorities since 2002 ([12], p. 19). Existing research shows that Italy has achieved significant results in terms of publication outputs and citations. For instance, Wang and Notten compared the publication records and citation ratios in nano-research related to five industrial sectors (Chemistry & materials; Health, medicine & bionano; ICT; Energy; Aeronautics & automotive) over the period 1998–2008 [13]. This work listed Italy among the top 10 countries for both publications and citation ratios. Although data available are not up-to-date, the

E-mail address: simone.arnaldi@unipd.it.

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OECD similarly ranks Italy eleventh for share of nanotechnology patent applications to the European Patent Office (EPO) in the years 1995–1997 and 2000–2002 [14]. Two longitudinal studies for the 1976–2002 period of the patents assigned by the United States Patent and Trademark Office (USPTO) [15] and for the 1976–2004 period by the USPTO, the European Patent Office (EPO), and the Japan Patent Office (JPO) [16] showed similar results. These results for nanotechnology appear partially in contrast with the narrative of the crisis of the Italian science system that seemingly dominates the public discourse. The level of funding below the EU average (1.26% of GDP in 2010 compared to the average 2.00% of EU27), the low amount of private investment in research and development (44.7% of the total expenditure in 2010 compared to the average 53.9% of EU27), and the performance worse than the EU average according to a broad set of innovation indicators (see, respectively [17–19],) are recurrent complaints about the performance of the system and warnings for its impact on the future development of the country (for recent examples of this point of view in the media, see Refs. [20,21]). A widespread unease towards both academic bureaucracy in a system that favours longevity of tenure over merit in promotions and funding allocation, and towards the current recruiting mechanisms completes the picture (an example of a pugnacious pressure group on these issues is ROARS [22]). All these aspects converge in affirming a powerful narrative on brain drain in the public debate. While reliable estimates are nearly absent, the few existing analyses calculate that the dimension of the outflows is actually limited, although affects strategic sectors like S&T and is not counterbalanced by the capacity of the country to attract scientists and, more in general, a high- skilled workforce from abroad [23]. Nonetheless, the fear of an impoverishment of the country's human capital due to sustained emigration of early career scientists and established researchers is high and stirs media debates and political controversies in Italy and abroad [24–26].

The broader context of the international development of nanotechnology and the place Italy has in it is the subject of this paper. However, this work deals with this topic from an unusual point of view. It does not focus on funding, collaborations, patents, etc., but on representations; it does not aim to map "real world" dynamics of nanotechnology development, but to examine its picture as it appears in the Italian media (elite daily newspapers and newswires). While the news coverage necessarily reflects what goes on in the real world of science and policy, the tradition of studies on science in the media has long demonstrated that media actively re-elaborate, mediate and frame stories and events. Therefore, the research question here is not to check whether the Italian media "got it right" in picturing the current international trends of the nanotechnology field or in correctly placing Italy in this broader context. The goal of the paper is instead to explore geographical imaginaries of nanotechnology. The notion of geographical imaginaries refers here to the representations of Italy and other countries that are involved in nanotechnology development as they appear in the media (here, elite daily newspapers and newswires). The interest in studying these geographical imaginaries is that they are not the result of the mere localization of places, people and events. On the contrary, they are filled with meanings: they are symbolic and rhetorical resources for the journalists and the social actors that are pictured in the media coverage to discursively shape what nanotechnology, its international development and its relevance for Italy is all about. Thanks to these imaginaries, the coverage is able to demarcate the domestic and international dimensions of nanotechnology development, their boundaries, and their relations. It is able to compare, assess, rank positions and activities, and define problems, solutions, and prospects.

This article complements this perspective with a second, equally unusual point of view. Such imaginaries and their symbolic and rhetorical value are not pre-defined, fixed once for all. Instead, they are reiterated, mediated, negotiated and re-elaborated by the actors that populate the coverage. Accordingly, the paper looks at imaginaries as far as they are enacted by such actors. This paper focuses on scientists, and how geographical imaginaries are used by scientists and in stories about scientists to build scientific and political authority, define models and good practices, criticize actors and policies, through marking the boundaries and the relations between the domestic and international dimensions of nanotechnology development. The choice of scientists is not surprising at all, as scientific experts are traditionally the most prominent social actor in the news coverage of science. From this point of view, nanotechnology, and Italy, are not an exception.

The theoretical underpinnings of this work are introduced in Section 2. On the one hand, research on science in the media is recalled to ground our claim about the relevance of scientists and experts in the coverage and thus in setting the interpretation of technoscientific issues. On the other hand, the notion of imaginative geographies is introduced to clarify the link between spatial representations and discourse that is established in this work. Section 3 describes briefly the research approach that was adopted, the procedure used for selecting the news stories to be analysed, the scientists who are depicted in them (Mauro Ferrari, President and CEO of The Methodist Hospital Research Institute in Houston; Roberto Cingolani, Scientific Director of the Italian Institute of Technology – IIT; Fabio Beltram, Director of the National Enterprise for nanoScience and nanoTechnology and Director of the *Scuola Normale Superiore*), the research questions to be answered. Section 4 examines the geographical imaginaries, the multiple functions that they performs in the coverage, and the links between the international and domestic dimensions of nanotechnology that they establish, thus constructing the position of Italy in the broader, international context of nanotechnology development. A closing Section summarizes the empirical findings of the research and suggests the importance of the centre-periphery opposition as the organizing principle of the geographical imaginaries, as well as the relevance of two distinct narratives focusing respectively on the crisis of the Italian science system and on the prospected benefits from nanotechnology. Finally, some limitations of the study and prospects for future research are discussed.