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# A case study on obstacles to the growth of biotechnology

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**Abstract**

Why has a biotechnology industry developed much faster in some countries than in others? Studies indicate that public funding for research is not sufficient for the establishment of a strong biotech industry. What should countries and regions do then, in order to become globally competitive in the area? In this paper I concentrate on the upstream section of biotech growth – the creation of new biotechnology companies – and take a closer look at the case of Portugal, a country where the industry has long been at an embryonic stage. It becomes apparent from the analysis that generalist, top-down measures to stimulate general technological development may not be appropriate to foster a sector composed of many unique characteristics. Evidence from several countries suggests that there is a group of specific factors which all have to be in place simultaneously to allow the emergence of a biotech industry. A careful analysis of the Portuguese example – when set against the background of European and Global biotech – may help regions such as southeast Asia and southern Europe define their paths to bio-competitiveness.


## 1. Introduction

Biotechnology has been increasingly recognized as a crucial element for the economic growth of countries and regions, regardless of their stage of development [1]. The horizontal character of biotech allows it to bring innovative solutions to numerous industries, including the pharmaceutical and health

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Table 1
Number of NBFs in several industrialized countries and its relation to population size[a] and gross domestic product (GDP)[a]

| Country | Population ($\times 10^6$) | Companies | GDP ($) ($\times 10^9$) | Companies/Population ($\times 10^6$) | Companies/GDP ($) ($\times 10^{11}$) |
|---|---|---|---|---|---|
| Australia | 19.5 | 190 | 528 | 9.74 | 35.98 |
| Belgium | 10.3 | 69 | 297.6 | 6.70 | 23.19 |
| Canada | 31.9 | 417 | 923 | 13.07 | 45.18 |
| Denmark | 5.4 | 75 | 155.5 | 13.89 | 48.23 |
| Finland | 5.2 | 76 | 136.2 | 14.62 | 55.80 |
| France | 59.8 | 239 | 1054 | 4.00 | 22.68 |
| Germany | 83.3 | 360 | 2184 | 4.32 | 16.48 |
| Ireland | 3.9 | 35 | 111.3 | 8.97 | 31.45 |
| Israel | 6.0 | 149 | 122 | 24.83 | 122.13 |
| Italy | 57.7 | 51 | 1438 | 0.88 | 3.55 |
| Japan | 127.0 | 60[b] | 3550 | 0.47[b] | 1.69[b] |
| Netherlands | 16.1 | 85 | 434 | 5.28 | 19.59 |
| Norway | 4.5 | 21 | 143 | 4.67 | 14.69 |
| Portugal | 10.1 | 14 | 182 | 1.39 | 7.69 |
| Spain | 40.1 | 28 | 828 | 0.70 | 3.38 |
| Sweden | 8.9 | 199 | 227.4 | 22.36 | 83.55 |
| Switzerland | 7.3 | 129 | 231 | 17.67 | 55.84 |
| UK | 59.8 | 331 | 1520 | 5.54 | 21.78 |
| US | 280.6 | 1457 | 10,082 | 5.19 | 14.45 |

Data is from years 2001 to 2003, depending on the country, and is only meant to provide a general indication. As mentioned in the text, the definition of NBF may vary from country to country.
[a] According to the CIA World Factbook 2003. www.cia.gov/cia/publications/factbook.
[b] Not counting biotech subsidiaries of larger companies.

sectors, agriculture, protection of the environment, and many other areas. However, the emergence of biotechnology as a major economic force has been deeply asymmetric across the globe, and even among the most industrialized nations [2–4]. In the United States, for instance, the availability of private investors and the entrepreneurial capacity of scientists and engineers, along with a strong *push* from established industries – namely the Pharmaceutical industry – have been pointed out as key factors that have taken biotech to a point where it has become a major economic force, employing about half a million people, directly or indirectly.[2] In most of Europe and Asia, on the other hand, the absence of quite such a favorable set of conditions has kept biotechnology at a somewhat less advanced stage of development [5–10], a fact which has prompted most governments to take measures with the intent of fostering the growth of the sector. In the process, the development of biotechnology in these regions has become largely policy-dependent, and it is becoming increasingly crucial for national and regional governments to understand exactly what measures to take in order to make their biotech industries competitive.

Dependence on policy measures may account, at least partially, for significant differences in the size of the biotech industries – at least as far as the number of New Biotechnology Firms (NBFs) is concerned – of countries with comparable economies (Table 1). NBFs are usually seen as the basis of a

[2] According to BIO – the Biotechnology Industry Association.