

## OECD Report on Biotechnology Statistics\*

Biotechnology is used for producing existing products in new ways, identifying new product opportunities (as in drug discovery), and for producing new products that could not be commercially produced before (as with many large molecule therapeutics and some GM plant varieties). The wide range of uses for biotechnology means that it is a generic technology with applications in many different economic sectors. Biotechnology is also better described as a group of related biotechnologies.

The diverse types of biotechnologies and the range of possible applications create two main challenges for developing comparable biotechnology statistics: how to defined biotechnology and how to define a biotechnology firm.

### Definition of Biotechnology

The OECD has developed both a single definition of biotechnology and a list-based definition of different types of biotechnology. The single definition defines biotechnology as *“the applicatin of science and technology to living organisms, as well as parts, products and models thereof, to alter living or non-living materials for the productin of knowledge, goods and services.”*

The OECD list-based definition, or close variants, were used in surveys in 15 countries, but different definitions of biotechnology were used in the other 11 countries: seven studies limit biotechnology to ‘modern’ or third-generation biotechnologies that are similar to the OECD list-based definition in practice, two studies use mixed definitions that include second generation biotechnologies (Japan and South

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\* Beuzekom, Brigitte van and Anthony Arundel (2006). *OECD Biotechnology Statistics 2006*. OECD.

Africa), and two do not define biotechnology, but leave it to the survey respondent to decide if their firm is active in biotechnology. As the latter two studies cover Denmark and Sweden, a large majority of the respondents are likely to interpret biotechnology as modern biotechnology.

### **Definition of a Biotechnology Firm**

The definition of a biotechnology firm is partly linked to the method used in each country to sample firms. Three definitions are in common use. Two different methods are used in separate studies in Finland, Korea, New Zealand, Spain, Sweden and the United States.

Data are only available for 'core' biotechnology firms for seven countries. The definition of a core biotechnology firm varies, but in most countries a core biotechnology firm must perform R&D in biotechnology and biotechnology must be its principal activity. The latter requirement often limits core biotechnology firms to those with less than 500 employees.

At least some of the data for the remaining 19 countries cover all firms with some biotechnology activities, even if biotechnology is only a small part of its total activity. In 13 countries biotechnology firms are identified through a positive response to a question on conducting biotechnology-related R&D in the national R&D survey. In nine countries all biotechnology firms were surveyed (core firms plus other firms with some biotechnology activities). No information on the definition of a biotechnology firm is available for Poland.

In 20 countries at least one survey is limited to firms that develop biotechnology innovations. For four countries, the only available survey includes firms that use biotechnology but do not necessarily perform biotechnology R&D. No data are available for Belgium and China on this issue.

Two main methods are used for identifying biotechnology firms. Eighteen surveys use secondary sources to identify biotechnology firms. These include industry association membership lists, participants in government programmes to support biotechnology, stock market listings, patent records, information provided by venture capital firms, and any other possible source for identifying a biotechnology firm. Thirteen surveys use the national R&D sampling frame. The survey in Korea is based on activity in specific sectors, with no information is available for Poland.

In general, the results in this document (for all countries combine) for the number of biotechnology firms, employment, R&D and sales are more likely to underestimate the true values than to overestimate them. This is primarily caused by the reliance for several countries on studies limited to core biotechnology firms and the low response rates in several studies.