



The obsession for competitiveness and its impact on statistics: the construction of high-technology indicators

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Abstract

High technology is a concept much in vogue in OECD countries, for it is a symbol of an “advanced” economy. This paper looks at why and how the concept and its indicator acquired such fame. It explains that the reason has to do with the fact that the indicator emerged in the context of debates on the competitiveness of countries and their efforts to maintain or improve their positions in world trade. The first part looks at the early statistics behind the indicator (R&D/sales), statistics developed in official analyses of industrial R&D surveys before the 1950s. The second part traces the evolution of the R&D/sales ratio in the 1960s through its use as an indicator of research or technological intensity. The third part discusses the internationalization of the indicator via the OECD.

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Early official economic statistics dealt with national income, industrial production, and productivity. Following World War II, international trade was increasingly added to statistical series (Tomlinson, 1996). In fact, international relations between countries, growing trading exchanges and competitiveness came to dominate the political agendas of several governments.

It was in this context that two of the main science and technology indicators that are currently in vogue came to be developed: the technological balance of payments (TBP) and high technology. This paper deals with the

emergence of the latter. High technology (or technology intensity) is an indicator much in vogue in OECD countries, for it is a symbol of an “advanced” economy. The indicator is in fact the analog to industry of the GERD/GDP indicator for countries: a ratio of R&D divided by production. Industries are classified according to whether they are above or below the average ratio. An industry that invests above the average in R&D is considered to be a high-technology industry.

The indicator remains a controversial one for conceptual and for methodological reasons. Nevertheless, governments use it continually as part of their economic and innovation policy. As the US National

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Science Foundation (NSF) summarized the situation, high-technology industries are important to nations for several reasons (NSF, 2002, pp. 6–5):

1. High-technology firms innovate, and firms that innovate tend to gain market share, create new products/markets, and/or use resources more productively.
2. Industrial R&D performed by high-technology industries benefits other commercial sectors by generating new products and processes that increase productivity, expand business and create high-wage jobs.
3. High-technology firms develop high-valued-added products and are successful in foreign markets, which results in increased competition.

What is characteristic about the indicator on high technology is its linkage to competitiveness issues. This paper explains that the reason has to do with the fact that the indicator emerged in the context of debates on the competitiveness of countries and their efforts to maintain or improve their positions in world trade. High technology rapidly came to be viewed as the solution to the issue, and statistics were developed to document the case.

Some authors have qualified the debates on competitiveness as obsessive. For P. Krugman, for example, countries do not compete economically with each other as corporations do (Krugman, 1994). But the metaphor “derives much of its attractiveness from its seeming comprehensibility” (p. 39). First, the competitive image is exciting, and thrills sell tickets. Second, the metaphor makes difficulties easier to solve (subsidize high technology or be tough on competitors). Third, it is a political device that assists in justifying choices. This article shows how statistics contributed to the rhetoric on competitiveness, looking at the efforts of official statisticians to rhetorically transform early statistics on R&D into indicators on high technology.

Where does the indicator come from? Who was behind its construction? What discourses did governments conduct using the indicator? This paper intends to answer these questions. It is divided into three parts. The first looks at the basic statistics behind the indicator, statistics developed in early official analyses of industrial R&D surveys. The second part traces the evolution of the statistic through its use as an indicator of research or technological intensity. The third part dis-

cusses the internationalization of the indicator via the OECD.

1. A very basic ratio

The simplest indicator on high technology is constructed by dividing R&D expenditures by production (i.e. value-added, turn-over or sales) and then classifying industries according to this ratio. As R.N. Anthony, author of an influential survey on industrial R&D, once wrote: “Use of this ratio implies that there is some relationship between research spending and sales; to the extent that sales is a measure of the size of the company, this implication is in general warranted” (Anthony and Day, 1952, p. 295).

The indicator has precursors that go back to the 1930s: analyses of industrial R&D have always calculated ratios of R&D to sales. The US National Research Council (NRC) conducted the first such analysis among the industrialized countries. In 1933, its Division of Engineering and Industrial Research tried to assess the effect of the Great Depression on industrial laboratories (Holland and Spraragen, 1933). The report classified companies according to whether they spent over 10% of sales revenue on R&D, 5–10, 1–5 or under 1%. With the data in hand, the authors concluded: “it appears that those companies the products of which more nearly approach the classification of raw materials spent a smaller percentage of their sales income for research than the companies in which products are of a *highly* manufactured character” (p. 3).

The following industrial surveys in the United States were conducted by or with the National Association of Manufacturers (NAM). In 1941, NAM participated in an industrial survey conducted by the National Resources Planning Board (NRPB). The report measured that: “the median expenditure of the companies for industrial research was (...) 2 percent of gross sales income” (US NRPB, 1941, p. 124). This was the only number on R&D expenditures in the report, because the questionnaire had concentrated on personnel data (man-years), which were easier to obtain from companies. Eight years later, NAM published the results of a survey of industrial R&D in which these statistics appeared again (NAM, 1949). NAM reported that in 1947, companies displayed an average ratio of research expenditures to estimated sales of 1.6% (pp. 3, 77–79). A

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