

**RESEARCH AND DEVELOPMENT IN INFORMATION SCIENCE AND TECHNOLOGY  
IN THE MAJOR INDUSTRIAL COUNTRIES  
STATISTICAL ANALYSIS OF INVESTMENT**

**INTRODUCTORY NOTE**

Canada, South Korea, the United States, Japan, the European Union  
(including Germany, Finland, France, United Kingdom, and Sweden)  
and Non-OECD Countries

**1. PURPOSE OF THE STUDY**

This study is:

- One, an update of the studies conducted in 2003 and 2005 for the Strategic Advisory Board on Information Technologies (CSTI) and the Ministry Delegate for Higher Education and Research. The purpose is still to consolidate the statistical foundations on which the CSTI recommendations are based, by providing an accurate estimate of public and private ICT R&D investment volumes and trends in the major industrial countries. The study examines Canada, South Korea, the United States, Japan, and the European Union, including Germany, Finland, France, the United Kingdom, and Sweden.

For lack of any other possible method, the figures have been constructed from an existing statistical base developed by the OECD, which defines the ICT sector according to 5 activity codes.<sup>1</sup> These codes do not perfectly encompass ICT as a whole. Some sectors are excluded from the scope of the OECD definition, especially everything relating to embedded digital control applications. Software R&D that is not carried out by software and computing services companies and software package publishers' R&D (except in the US) are also excluded.

- Two, the new component in the 2006 study is a chapter on 'emerging countries' that includes Brazil, China, India, Israel, Russia, Singapore and Taiwan. For these countries that are not within the OECD field, the statistical base is far from being as well documented and consolidated as for the countries in the first part of the study. The statistical base draws mainly from the data published by the Battelle Institute (<http://www.battelle.org>) and from some OECD data.

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<sup>1</sup> The industries which make up the ICT sector as defined by the OECD are: Division 30 – Manufacture of office, accounting and computing machinery; Division 32 – Manufacture of radio, television and communication equipment and apparatus; Division 33 – Manufacture of medical, precision and optical instruments, watches and clocks; Division 72 – Computer and related activities; Division 64 – Post and telecommunications, group 642 - Telecommunications. The first three divisions are part of the manufacturing industries; the last two are part of the service industries.

## 1. FINDINGS

The following conclusions may be drawn from consolidating the 2003 and 2004 figures and from extending the series using more reliable estimates for 2005 and 2006.

### 2.1. Confirmed trends

- ⇒ In absolute values, the total amount invested in the ICT R&D performed on US soil (\$67bn in 2000, **\$71bn in 2006**) is consistently more than **twice the amount in EU-25** (PPP\$32bn in 1999, **PPP\$32bn in 2006**).<sup>2</sup>
- ⇒ **In Europe, the intensity of ICT R&D as a % of GDP is twice as low as it is in Japan and the United States**, i.e., 0.56% in the United States and 0.25% in EU-25, of which 0.41% for France
- ⇒ **ICT R&D is the only field where there is such a gap between Europe and the United States**, even though ICTs are ‘empowering technologies’ that determine performance in all sectors of activity.

### 2.2. New trends since the previous studies

- ⇒ **South Korea, Finland, and Sweden are consistently pursuing highly proactive policies.** The trend in **France and the United Kingdom** seems to have **picked up**, reaching the mean trend as of 2003. **However, the increase is primarily due to budget appropriations** while weak private ICT R&D intensity persists. An **upswing** of the trend has begun in **Germany**, due to the build-up of R&D of ‘**embedded**’ ICTs (automobiles, aviation, machine tools, and so on).
- ⇒ However, the key aspect of the period under consideration is a very **clear trend reversal in US firms' funding** of intramural **ICT R&D. Business funding has been declining by 2% per year, in real terms, for three years.** Unlike US public expenditure on ICT R&D where military appropriations account for the largest share (85%) and continue to soar.
- ⇒ **The new decoupling of the public funding trend rate from the private funding trend rate** has triggered a significant shift in the funding structure of gross domestic expenditure on ICT R&D in the US, where the share of budget appropriations has jumped from 12.3% to 19.3%. The US is the only country in the study where such a development has occurred.
- ⇒ From 2000 to 2006, budget appropriations for ICT R&D allocated to US business rose 104%. The figures underscore a **twofold trend of the ICT R&D budgets of US firms, i.e., ‘current’ non-strategic R&D that can easily be outsourced and/or relocated and strategic long-term R&D (massively parallel architectures, signal processing, bioinformatics, optronics, and so on) that is chiefly funded by public procurement and military contracts.**
- ⇒ However, **based on data from the OECD and the other sources used, there are no grounds for stating that the R&D build-up in non-OECD countries (see below) entails a direct ‘loss of substance’ of the R&D potential of the developed economies, on the contrary.**
- ⇒ **Rather than relocation we are seeing the internationalisation of R&D activities in general, and ICT R&D activities in particular, with the goal**

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<sup>2</sup> \$PPP: dollar at parity of purchasing power

of getting a foothold on markets with strong growth potential and **of harnessing the strong skills, expertise and resources of the scientific personnel in countries such as India or China.**

⇒ An attempt to estimate **business ICT R&D in the main non-OECD countries** has produced the following findings (2005 data):

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- **The ICT R&D of the seven non-OECD countries in the study account for more than half of the intramural ICT R&D that is financed in the nine studied countries,** which account for more than 90% of the R&D of developed countries.
- **China's ICT R&D is already higher than Japan's,** ranking China **second worldwide.**
- **India, with an ICT R&D amounting to about \$10bn, accounts for half of Europe's overall ICT R&D effort.**
- **Taiwan weighs as much as Canada and Israel as much as Finland,** and yet the Finnish ICT R&D effort is exceptional.