

## How does innovation differ across sectors and technologies?

### Innovation and differences across sectors and technologies

Some technologies have had impacts on innovation dynamics across a wide variety of sectors and actors. These “general purpose technologies” include information and communication technologies (ICTs), biotechnology, and nanotechnology. Given their potentially substantial contributions and their transformative impacts they deserve specific policy attention.

Moreover, innovation has very different characteristics across economic sectors, which should be examined by policy makers because those sectoral characteristics will affect the impact of innovation policies. Differences arise notably in the following ways:

- **Type of innovations.** Some sectors are dominated by product innovations while others by process, organizational or marketing innovations. The prevailing type of innovations may be partly due to the nature of technological progress in the industry and industry life cycles, with early industry expansion associated with strong product innovation and more mature industries seeking higher productivity more often through process innovations (Tether et al., 2005).
- **Pace of technological change and degree of novelty.** Some sectors are characterised by rapid change and radical innovations, others by smaller, incremental changes. In some sectors, such as pharmaceuticals, substantial upfront investments in R&D are required and long product development cycles lead to a long product innovation process. In high-technology sectors R&D plays a central role in innovation activities, while other sectors rely to a greater degree on other types of innovation investments.
- **Innovation processes.** Some manufacturing firms tend to undertake more in-house innovation than service-sector firms do, at least if traditional measures of innovation are used. However, there are wide variations in service industries and countries. For example, knowledge-intensive business services (KIBS), which include telecommunication services, finance, computer and R&D services, have in-house R&D and innovation rates similar to those in high-technology manufacturing (OECD, 2010). Similarly, the extent to which different sectors rely on adapting technologies developed by others is different.
- **Actors involved in the innovation processes.** The number, variety, and type of actors involved in the innovation processes differ across sectors: innovations in some sectors may be dominated by large established firms (e.g. the pharmaceutical industry) while others are driven by the entry of smaller, specialised firms; the role of universities and public research institutes varies substantially as well. For instance, the process of innovation in creative industries generally necessitates, more than in many other sectors, the interaction of a multitude of heterogeneous economic actors. For example, the production of a videogame may involve thousands of different contributors, including programmers, engineers, scriptwriters, musicians, and game designers. In addition, the process of innovation in some creative industries is characterized by the important role of end-users and informal communities (e.g. as source of new ideas).
- **Relevance of regulatory environments, including IPR.** Certain types of regulation are a very important driver in some sectors, such as health, compared to other activities. Moreover, certain types of factors such as IP systems are more significant in some sectors compared to others (see [Fields of IP use](#) [1]).

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## Policy Relevance and Implications

Differences in innovation activities across sectors place different demands on the organisational structure of firms, and institutional factors such as regulations and intellectual property rights can vary greatly in their role and importance. The diversity of innovation actors, learning processes, linkages, knowledge bases, institutions and organisation needs to be carefully considered when formulating policy (Malerba, 2005). Because innovations differ from sector to sector, occur in many different ways, and have varying effects, they call for different policy responses.

- As to differences in effects, for instance, innovation in agriculture is particularly relevant for addressing socio-economic challenges in emerging countries: evidence shows that research-led technological change in agriculture has a much greater impact on poverty reduction than productivity growth in industry and services has (Thirtle et al., 2003).
- Sectoral differences might also be relevant for selecting specific policies. For instance, sectoral differences in IP use and value calls for differences in policy. For instance, it might be relevant for specific IP policies for innovation to target sectors with the highest rewards to IP while other types of innovation policies may be used in the remainder of sectors where IP is less efficient.

## References

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