Models and contributions of innovation in firms

There are two main models of firm innovation: a “technology push” model and a “market pull” model. However, it is now widely accepted that innovation is a complex and interactive process, involving constant feedback loops between the different phases. Moreover, the process of firm innovation depends on multiple factors related to innovation characteristics, as well as firm characteristics, and framework conditions. Innovation output may differ along several dimensions, including the type of innovation and the impact of innovation. Moreover, a wide range of actors may be involved in the innovation process, such as suppliers, customers or universities.

Actors of innovation

A wide range of actors are involved in firms’ innovation processes (see Key actors for innovation in firms [1]). Confronted with increasing global competition, rising costs, the growing integration of different technologies, shorter life cycle, and increased pace of innovation, many companies collaborate with external partners, whether suppliers, customers or universities. These collaborations help them stay abreast of developments, expand their market reach, tap into a larger base of ideas and technology, find complementary expertise, access specific skills and competences, and get new products or services to market before their competitors. Evidence shows that large firms tend to collaborate more on innovation than small- and medium-sized enterprises (SMEs) (OECD, 2011a).

Inputs to firm innovation

Key inputs for innovation include:

- **Finance** (see Financing Innovation [2]). Access to finance is a key driver of the creation, survival and growth of innovative businesses.
- **Skilled labour** (see Firms’ access to labour for innovation [3] and Skills for Innovation [4]). Skilled labour is needed to develop incremental innovations, and identifying relevant new business opportunities.
- **Knowledge** (see Firms’ access to knowledge for innovation [5]). Access to knowledge helps companies recognize the value of new knowledge, assimilate it and apply it to commercial ends.

Innovation process

Models of innovation processes

There are two main models of innovation processes:

- The **“technology push”** model refers to a model in which the innovation process starts with scientific discovery, then moves to manufacturing, and ends with commercialisation and diffusion in the marketplace. Development in firms, then followed by development, manufacturing, and commercialisation.
- The **“market pull”** model refers a model in which the innovation process starts with identification of a market opportunity, and commercialisation.

Although both models are linear, innovation processes are often non-linear. Loops typically occur between the different phases of the process in order to overcome shortcomings.

Variations in innovation process

The "technology push" model is particularly relevant for some industries, such as pharmaceuticals and chemicals. In these industries, the supply of novel or radical innovations is crucial. These science-based industries (Pavitt, 1984) typically run large in-house R&D programmes, or sponsor R&D activities in universities or at small firms (Malerba, 2005). For other industries, particularly platform or standards-based industries, such as computer operating systems, automobiles, machine tools or telecommunications, responding to changing demand through incremental innovations is more frequent. For this group of industries, incremental innovation around dominant designs and locked-in systems, with a greater focus on integrating new innovations into existing products and services, is more important than producing revolutionary innovations to replace the existing standards along which competition and innovation have evolved (Utterback and Suarez, 1993; Malerba, 2005).

Overall, the process of innovation may take multiple forms: firms may rely solely on internal [illegible] innovation process (e.g. co-development of an entire product) or only a part of it (e.g. co-development of a particular component).

The process of innovation depends on multiple factors related to innovation characteristics, [illegible] see Models and contributions for innovative entrepreneurship [6].

Innovation output

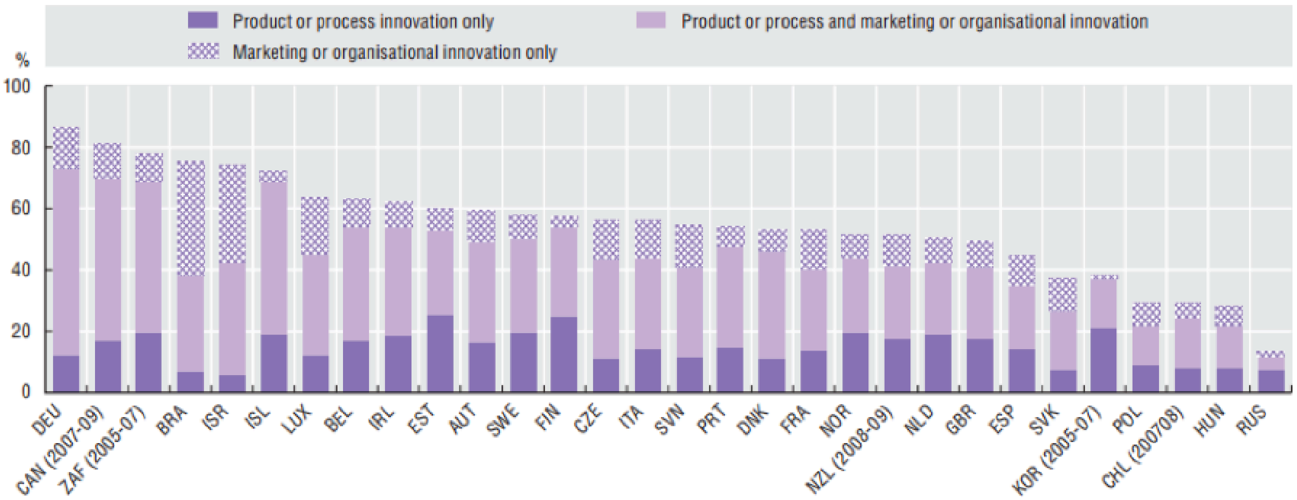
Innovation output may differ along the several dimensions (see What is innovation? [7]), including the following:

- **The type of innovation** (see Product and process innovation [8]). The Oslo Manual defines four types of innovation: product innovations, process innovations, organisational innovations and marketing innovations (OECD/Eurostat, 2005). However, many firm innovations may have characteristics that span more than one type of innovation.

- **The impact of innovation** (see Radical and incremental innovation [9]). A radical or disruptive innovation can be defined as an innovation that has a significant impact on markets and on the economic activity of firms in that market; while incremental innovation concerns an existing product, service, process, organization or method whose performance has been significantly enhanced or upgraded.

Evidence from firm innovation surveys suggests that the share of types of innovation varies significantly across countries and depends on firm size and economic sector (Figures 1, 2 and 3) (OECD, 2011b).

Figure 4. Types of innovation in the manufacturing sector, 2006–08
(% of all manufacturing firms)



OECD (2011). "Mixed modes of innovation", in OECD Science, Technology and Industry Scoreboard 2011, OECD Publishing.
Source: OECD, based on Eurostat (CIS-2008) and national data sources, June 2011. See chapter notes.
StatLink:http://dx.doi.org/10.1787/888932487077 [10]

Figure 1. Product and/or process innovative firms, % of total firms

Figure 2. Organisational innovative firms, % of total firms

Figure 3. Marketing innovative firms, % of total firms

What are the contributions of innovative firms?

Innovative firms play an important role in addressing socio-economic challenges (see Contributions to socio-economic objectives [11]), including notably:

- **Economic growth and employment.** (see Contributions to growth and jobs [12]) ... progress as ... setting up of new enterprises to provide the market with new offerings and create new jobs.
- **Social challenges.** (see Addressing social challenges [13]) Innovation can help alleviate ... opportunities and addressing particular challenges faced by lower income groups.
- **Environmental challenges.** (see Addressing environmental challenges [14]). Innovation is ... like limiting climate change and global greenhouse gas emissions and maintaining biodiversity.

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Related Link: Open innovation
Innovation networks and clusters
Innovation management in firms
Firms' market environment for innovation
Models and contributions for innovative entrepreneurship

Links
[1] https://www.innovationpolicyplatform.org/ipp/filters/result-page?topic-filters=12168
[2] https://www.innovationpolicyplatform.org/content/financing-innovation?topic-filters=11384
[3] https://www.innovationpolicyplatform.org/content/firms-access-labour-innovation?topic-filters=12043
[4] https://www.innovationpolicyplatform.org/content/skills-innovation?topic-filters=11385
[5] https://www.innovationpolicyplatform.org/ipp/filters/result-page?topic-filters=12068
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