



Adapting Innovation Systems to New Challenges

Highlights

- Innovation is a key driver of sustainable productivity growth and increased resilience.
- Nevertheless, many countries spend less on research and development (R&D) relative to value-added in agriculture today than they did in 1990. However, private investment has generally increased.
- Unless the capacity of agricultural innovation systems (AIS) to cost-efficiently deliver demand-driven innovations is substantially improved, farmers may be unable to exploit growing market opportunities and overcome challenges associated with resource pressures and climate change.
- Countries at all stages of development need to strengthen the governance and funding and collaborative mechanisms of AIS through measures such as stronger international co-ordination and information-sharing, and improved technical assistance to farmers.



What's the issue?

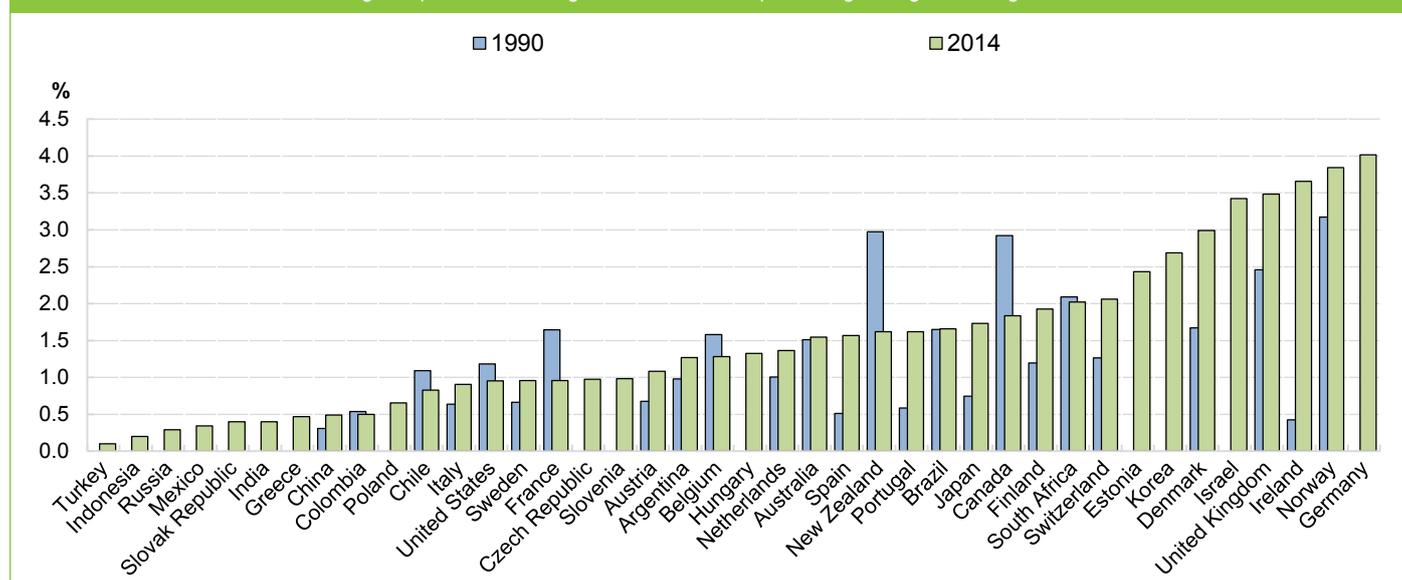
Agricultural innovation systems (AIS) are networks of actors – i.e. farmer representative bodies, research institutions and governments – that contribute to the development, diffusion, and use of new agricultural technologies and institutional innovations that influence agricultural knowledge, learning and change at national level.

Strong AIS are essential for the improvement of the economic, environmental and social performance of agriculture. Innovation is the main driver of productivity growth, as farmers increase efficiency by adopting new technologies and practices and systems innovations. Future sustainable productivity growth in agriculture depends on the capacity of AIS to provide farmers with innovations that

address an increasingly diverse and complex range of needs, including improved farm productivity and environmental performance, in addition to better responses to climate change.

However, new research priorities present a challenge for AIS, particularly those facing budget constraints and in countries with a small domestic research capacity. The public sector is a major funder and performer of agricultural research and development (R&D) in many countries. Nevertheless, expenditure levels and R&D intensity – the ratio of public R&D expenditure to agricultural value-added – vary across countries (See figure).

PUBLIC R&D INTENSITY IN AGRICULTURE IS INCREASING IN MANY DEVELOPED AND EMERGING ECONOMIES
Share of budget expenditures on agriculture R&D as a percentage of agricultural gross value added



The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

Source: OECD Research and Development Statistics, 2015, OECD National Accounts, 2015 and ASTI, IFPRI 2014 for Argentina, Brazil, Chile, the People's Republic of China, Colombia and South Africa.

Public R&D intensity is traditionally higher in developed countries. However, while many developed and emerging countries currently invest more public money in agriculture-related R&D than before, R&D intensity has fallen in a number of agricultural export-oriented countries, such as Canada, New Zealand and the United States.

There have also been changes in the way that public funds are delivered, with competitive project funding growing in importance. Private investment in research and innovation has increased, as well as collaboration between public and private partners along the value chain. Indeed, public-private co-operation at national and international levels has been facilitated by the strengthening of intellectual property rights (IPRs), competitive funding mechanisms, and public support for private R&D.

AIS need to find an appropriate balance between research into new innovations, and training and advisory services that enable farmers to adopt currently available innovations and to develop and share their own solutions. As agricultural systems become more complex, farmers need more advanced innovation skills. The anticipation of future needs – in co-operation with the industry – and the provision of education and lifelong training are both therefore increasingly important. Better provision of information to consumers about new technologies is also needed, in order to facilitate their acceptance by the general public.

To some extent, advisory services can compensate for farmers' lack of skills or training by providing information that supports innovation. However, while the public sector continues to play a major advisory role in some countries, in others, the public sector has reduced direct provision of advice and now focuses on ensuring access.



What should policy makers do?

Improve policy frameworks that facilitate and encourage private investment in agriculture. This includes the reduction of unnecessary regulatory burdens that create disincentives for private investment. Farm innovation can also be enabled by removing agricultural support measures which weaken farmers' incentives to innovate.

Enhance the relevance and efficiency of AIS by:

- **Strengthening the governance of innovation in agriculture.** Governments should improve strategic orientation on long-term issues, strengthen co-ordination between agricultural innovation actors and policies in order to better connect supply and demand, and make systematic evaluation an integral part of public funding mechanisms. AIS governance can also be enhanced through the greater integration of agriculture within the general innovation system and by cross-sectoral collaboration.
- **Clarifying public and private roles in innovation.** This involves the identification of areas for partnerships and the improved governance of public-private partnerships; the focusing of public research efforts on longer-term sustainability; and the facilitation of private investment and collaborative efforts through

the strengthening of IPRs and research infrastructure, and appropriate funding mechanisms.

- **Facilitating access to appropriate training and independent advisory services** to improve technical knowledge and professional skills, including for sustainability improvement.
- **Strengthening co-operation through participation in international, regional and sub-regional research networks** to increase R&D spillovers, technology transfer and the efficiency of national AIS.



Further reading

This document is based on the evidence and analysis found in a number of OECD reports and papers published in recent years:

- **Agricultural Innovation Systems: A Framework for Analysing the Role of the Government**
- **Innovation, Agricultural Productivity and Sustainability in Australia**
- **Innovation, Agricultural Productivity and Sustainability in Brazil**
- **Innovation, Agricultural Productivity and Sustainability in Canada**
- **Innovation, Agricultural Productivity and Sustainability in the Netherlands**

A complete list of relevant books and papers can be found at <http://oe.cd/taking-stock> or on the Agriculture Ministerial website at www.oecd.org/agriculture/ministerial.

