



INNOVATION TO IMPROVE PRODUCTIVITY AND SUSTAINABILITY IN FOOD AND AGRICULTURE: POLICY INSIGHTS FROM COUNTRY REVIEWS

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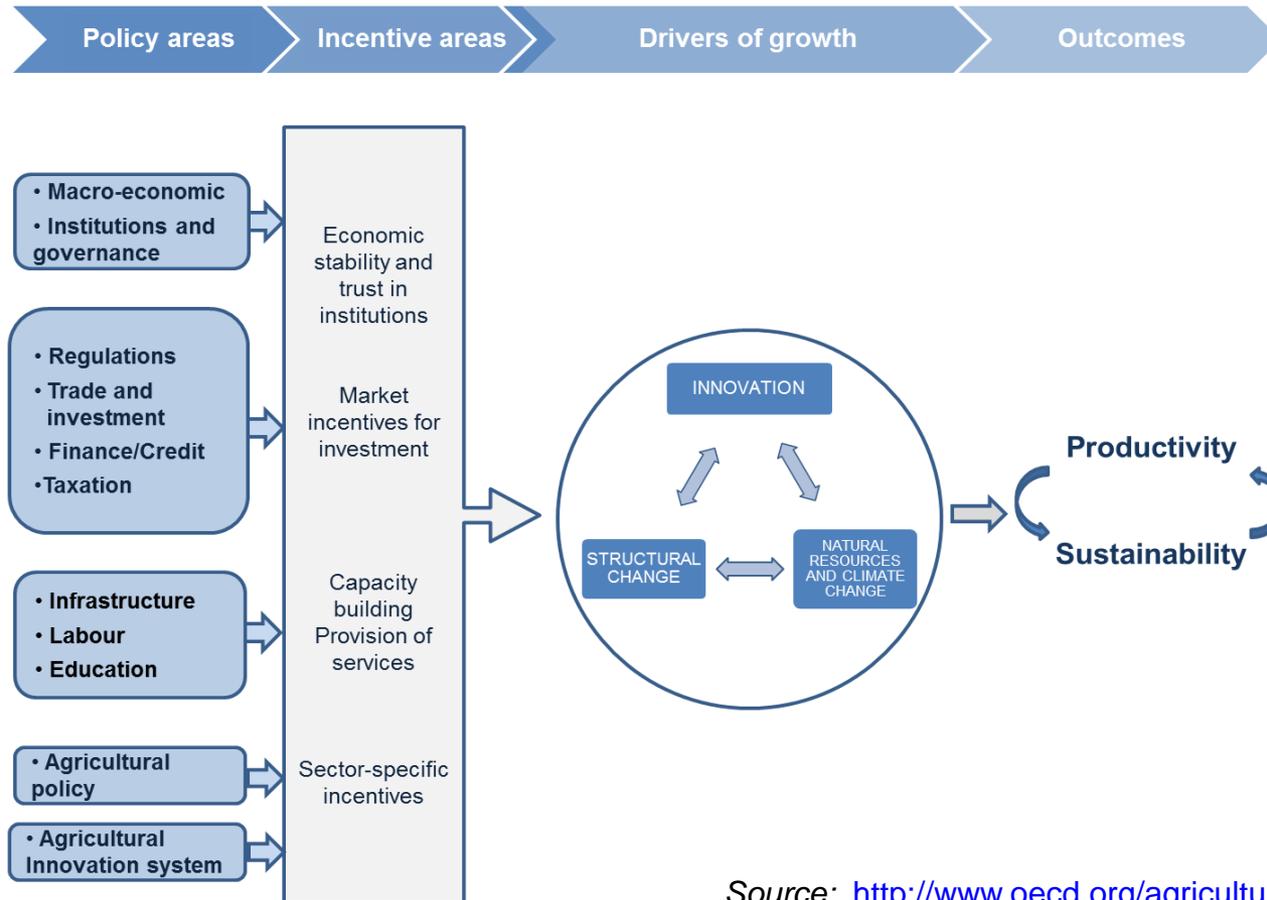
Outline

- Background: Framework and country reviews
- What did we learn about:
 - The productivity-sustainability challenge
 - Innovation, structural change, natural resource use and climate as drivers of productivity and sustainability in food and agriculture
- Key policy messages
 - It is important to consider the whole agri-food chain
 - The wider enabling environment matters
 - Policy coherence needs to improve
 - Agricultural policy could better target drivers and invest in long-term improvements
 - Agricultural innovation systems need to be more responsive to needs, forward-looking and cost-effective



The Food and Ag Productivity-Sustainability Framework

General and sector-specific policies affect innovation, structural change, natural resource use and climate change, which drive productivity and sustainability in food and agriculture.



Source: <http://www.oecd.org/agriculture/policies/innovation>



12+ country reviews since 2015

Countries	Implementation	Publication
Australia, Brazil, Canada	Pilot countries to test the framework started mid-2013	Mid-2015
Netherlands	Stronger focus on sustainability issues	Nov. 2015
Turkey, United States	Climate change added, started mid-2015	Late 2016
China	Focus on specific issues	2018
Estonia	Launch mid-2016	February 2018
Sweden	Launched in October 2016	June 2018
Korea	Launched in February 2017	December 2018
Latvia	Launched mid 2017	February 2019
Japan	Launched March 2018	May 2019
Argentina, Colombia	Innovation part used in agricultural policy reviews	2015, 2019
Switzerland	Self-applied	2017
Synthesis	Draft report in March 2019	2019



What did we learn?

- Productivity-sustainability challenges and opportunities
 - Opportunities related to growing and more diverse demand: value chain approach.
 - Productivity growth needs to improve as it is main source of production growth (in recent decades).
 - This needs to be achieved sustainably, while coping with climate change.
 - Business as usual is not an option, innovation is needed.
- Drivers of productivity and sustainability in food and agriculture
 - **Innovation** is a main driver of productivity growth and can improve sustainability (next slide). Innovation in food and agriculture depends on progress in other areas.
 - **Structural change**: size matters for productivity (innovation capacity; scale), more evidence needed for sustainability.
 - **Natural resource use and climate**: increasing constraints requiring innovative approaches, institutional changes, faster responses.



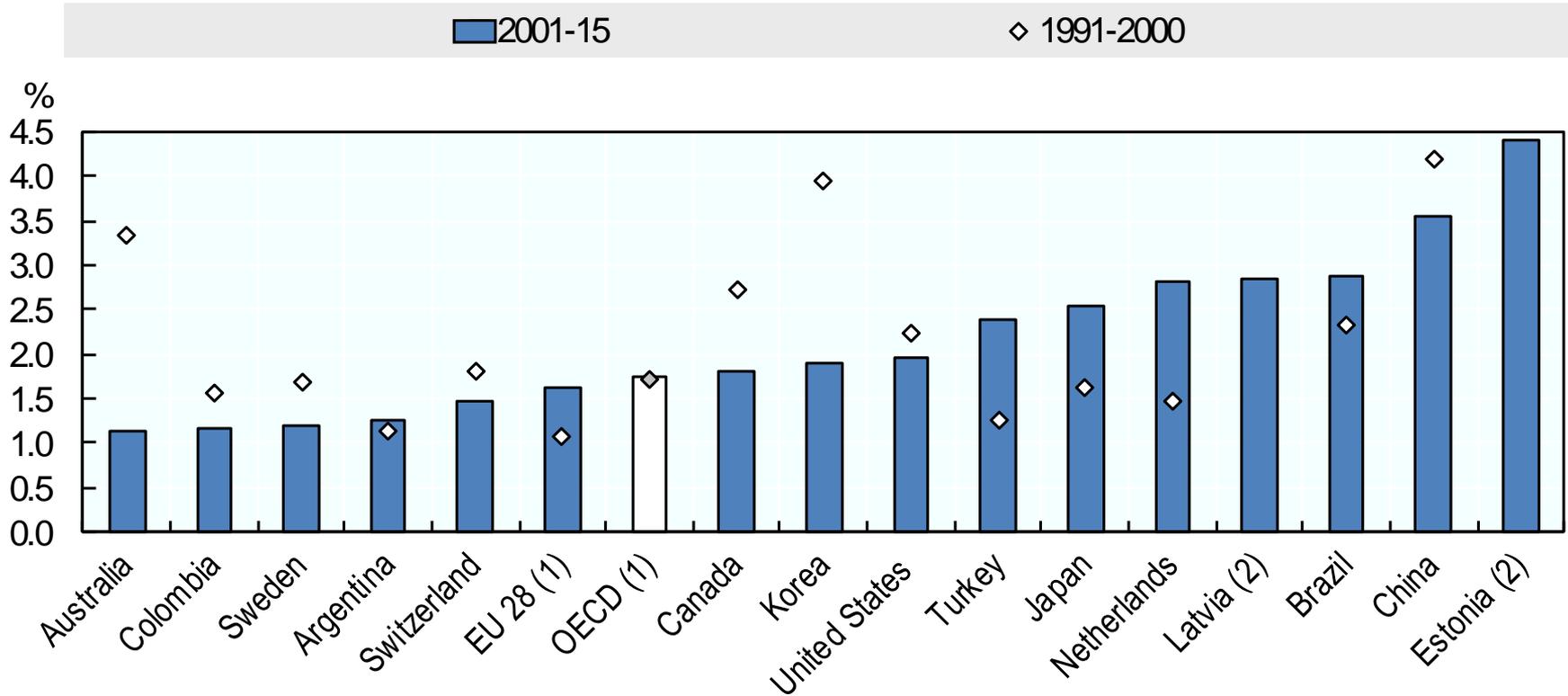
Innovation as a driver of productivity and sustainability?

- The link between innovation and total factor productivity (TFP) is well established theoretically and empirically.
- TFP growth largely reflects higher labour productivity, linked to larger farm size and adoption of labour-saving technologies, including information and communication technologies (ICT).
- Better management, production and marketing strategies, and genetic improvement.
- Innovation also led to more sustainability, with appropriate incentives, and increased traceability
 - Innovation in buildings and machineries allowed energy saving, better risk management, lower waste.
 - More sustainable practices (lower input, land and water management) were developed and adopted,



Developments in agricultural productivity growth

Annual percentage TFP growth by decade



Source: United States Department of Agriculture, Economic Research Service, Agricultural Productivity Database, 2019, www.ers.usda.gov/data-products/international-agricultural-productivity.aspx.



Agri-environmental performance generally improves in OECD countries

Based on average annual change between 1998-2000 and 2010-12

	Resource	Environment
Absolute decoupling	<p>Water use: Australia, Estonia, Korea, Netherlands</p> <p>Land use: Korea, Netherlands</p>	<p>N and P balance: Estonia, Sweden, Turkey, United States</p> <p>Ammonia: Netherlands, Sweden, United States</p> <p>GHG emissions: Netherlands, Turkey</p> <p>Pesticide sales: Netherlands, Korea, United States;</p> <p>Pesticide risk: Sweden</p>
Relative decoupling	<p>Water use: China, Turkey, United States</p> <p>Energy use: Estonia, United States</p>	<p>GHG emissions: Estonia, United States</p>
Deterioration	<p>Energy use: Turkey</p>	<p>Pesticide sales: Turkey</p> <p>GHG emissions: Korea</p>

Relative decoupling refers to a decline in the ecological intensity per unit of economic output. Resource-absolute decoupling refers to a situation in which resource impacts decline in absolute terms. Time periods are not identical for each country, more recent data on agri-environmental indicators might alter this assessment

Source: Based on OECD AEI indicators.



Key general policy messages

- The wider **enabling environment** matters
- Improving **policy coherence** and transparency is crucial to building trust and increasing policy effectiveness and efficiency.
- Policy strategies should cover the whole **supply chain**, as productivity and sustainability need improvement along the chain, with stakeholders working together.
- There must be a **business case** to innovate and to improve productivity and environmental performance in the system. Well-functioning markets and a sound regulatory and policy environment are key to harnessing the market opportunities.
- The first step is to **remove policy distortions**,
- Then adapt the domain and level of intervention (target) to the issue at stake



Policy coherence needs to improve

- Align innovation and growth strategies.
- Investigate the extent to which food and agriculture benefit from general policies (rural development, innovation, support to companies, tax credit). Size and lack of capacity may limit access.
- In some cases, agricultural policy compensates for deficiencies in other policy areas, such as competition, access to loans.
- But evidence of market or policy failure not revisited (investment support, input subsidies).
- Better understanding of trade-offs and synergies, e.g. between general and targeted agricultural policies; between agricultural policy objectives, and between agri-environmental and climatic policy targets.
- Mechanisms to define priorities need to be developed.



Agricultural policy could better target drivers and invest in long-term improvements

- Facing budget constraints, governments need to invest in areas that yield longer-term benefits, such as infrastructure, education, research and extension, exploiting synergies with the private sector.
- Remove impediments to investment (structural adjustment).
- Remove distortions in input and output markets to allow farmers to exercise choice of input mix, production systems and output.
- Provide tools for better risk management.
- Provide more targeted incentives to innovation, sustainable practices.



Key innovation policy messages

- Agricultural innovation systems need to be more responsive to needs, forward-looking and cost-effective
 - no one size fits all
 - governance is key
 - clarify public-private roles
 - foster cooperation at national and international levels
 - pay attention to adoption (innovation support, advisory systems).
- Better information and analysis is needed to support decision-making and improve policies. It can also contribute to improving communication to foster acceptance of reform and of innovation.



Strengthen AIS governance mechanisms

- Establish a longer-term strategy, involving stakeholders, developing more coherent and longer-term strategies for research and innovation.
- Improve policy coherence.
- strengthen dialogue with stakeholders.
- Clarify the role of different organisations, improving the co-ordination between research organisations, public –private roles.
- Simplify research programming.
- Develop comprehensive and coherent evaluation procedures, including: set up measurable targets, develop evaluation procedures ensuring independence, relevance to research level, and inclusion of various aspects
- Better information needed to improve evaluation of system and research impact and priority setting



Guide public research investment according to agreed priorities

- Public funding of agricultural R&D is crucial for the whole system, but research intensity depends on ambition and needs: no magic number.
- Public funds should focus on areas with public good aspects to improve complementarity with other efforts
 - provide stable funds for knowledge infrastructure to maintain capacity and attract partners
 - strengthen private contributions to R&D and innovation for food and agriculture and foster public-private partnerships to increase the impact of public funding, e.g. by enforcing intellectual property rights
 - Target support to private research and innovation in areas and companies, where there is under-investment (SMEs, specific topics, dedicating some funding for policy-relevant research).
- Provide clear information on programmes, regulations, market conditions, available technology, etc.
- Guide research using project-based, competitive mechanisms, but without excessive instability, and explore demand-driven funding.



Facilitate collaboration and knowledge flow

- Strengthen linkages:
 - within the agricultural innovation system between research and development (R&D) and with technical assistance.
 - with R&D in other sectors, as agricultural innovation is increasingly dependent on innovation in other sectors.
 - Across countries.
- Facilitate **collaborative approaches** (public-private, across sectors, multidisciplinary), e.g. funding mechanisms (PPP, projects), networks, competence centres, sharing infrastructure and information etc.
- Strengthen **cross-country cooperation** for cross-border issues and sharing costs: enhance knowledge flow, facilitate staff exchange, attract foreign students, participate in international efforts (GRA on GHG emissions, G20 initiatives, EU programmes, etc.)



Pay attention to adoption

- Main driver of innovation is the market and motivation to increase profit, save on costs (labour): Improve the “enabling environment”
- Non-adoption often linked to capacity and incentives (knowledge, viability, size, regulatory constraints, high support): Focus public efforts on those who do not have access
- Facilitate adoption through:
 - education, training, and extension: different systems and actors
 - facilitating knowledge flows
 - fostering an innovation culture and society’s acceptance
 - Targeted incentives
- Government role in extension systems: Governance, public goods aspects



Matching and adapting skills is a common challenge

- improve attractiveness of agriculture-related education, interest in science.
- attract labour with relevant skills in the sector.
- Anticipate skills demand, discuss with industry, market better agricultural education.
- Life-long training. Include management and fund-raising skills.



Further reading

- OECD (2019), Innovation, Productivity and Sustainability in Food and Agriculture, https://issuu.com/oecd.publishing/docs/innovation__productivity_and_sustai
- Policy Brief: https://issuu.com/oecd.publishing/docs/agricultural_productivity_and_innov
- OECD Food and Agricultural Reviews, <https://doi.org/10.1787/24114278>



For more information

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