Chapter 4

Agricultural policies and innovation

This chapter discusses how agricultural domestic policies, trade policies and agriculture-related policies affect the adoption of innovation in this sector and facilitate the acceptance of agricultural innovation by consumers and society.

In addition to the general and business policy framework, which influences the creation and diffusion of innovation in private firms, including farms and agri-food firms, agricultural and rural policies affect more specifically farmers' willingness and capacity to invest and introduce innovation in production systems and the marketing of agricultural products. Some measures may also influence farmers' choice of product and input mix. Improving the innovative capacity of the farm sector would involve identifying obstacles to innovation, revisiting policies that hamper innovation, structural change and the functioning of output and input markets, and implementing measures to foster innovation and competitiveness.

Agricultural policy has various objectives, such as supporting or stabilising income, raising productivity and competitiveness, ensuring adequate supply of safe and healthy food, and improving the environmental and social sustainability of agriculture. Policy objectives and priorities vary by commodity, country and over time. Countries apply a diversity of trade and domestic policy measures and regulations to pursue their agriculture-related objectives. Policy measures include price support, maintained though domestic and trade measures, and direct payments to farmers based on input use, area or income, as well as investments in public services to the sector, including agricultural R&D, education, extension, and agricultural and rural infrastructure development. There is a wide diversity in the level and composition of support to agriculture across countries and over time and the extent to which different measures affect innovation at farm level (OECD, 2012a).

Among framework conditions, ensuring the agricultural trade and market environment is conducive to investment in agricultural innovation would imply reducing substantially trade and production distorting measures, improving market access, and disciplining export measures (G20, 2012). Policies and regulations that affect inputs markets are particularly important to foster farmers' access to innovative technologies. The market of land, capital or labour will influence the choice of technology. Innovation would be facilitated by the removal of impediments to the functioning of those markets and the implementation of appropriate competition, labour and investment policy to lower input costs, facilitate structural change, and strengthen investment in the agri-food sector.

4.1. Agricultural domestic policies

Domestic policies that support commodity **prices** and offer output-based payments, often encourage producers to invest in intensive commodity production,[1] but create market distortions (OECD, 2012b) and may prevent farmers from diversifying into other commodities or investing in added-value. **Commodity-specific area and headage payments** also focus investments into supported commodities. With **broader area payments**, market signals play a greater role in guiding farmers' choice of production, but the factor land is subsidised and this affects the choice of production system. Higher farm receipts facilitate investment, including for the development of more risky and innovative activities, but do not provide specific incentives to introduce changes.

More generally, the provision of any **income or investment support** is likely to positively affect farmers' capacity to invest. General income support, however, prevents competition and slows structural adjustment. To avoid crowding out market solutions and the slowing of structural adjustment, it should be targeted to specific market failures, such as under-provision of innovations to address problems related to the global commons. Targeted income support might help farmers overcome credit constraints and invest in technology, but it may also slow structural adjustment (see for example OECD, 2008a; 2011b).[2] Policies that facilitate structural adjustment could be envisaged to facilitate economies of scale, attract new entrants and thus foster innovation. Specific efforts could also help facilitate innovation and diversification of activities in small, pluriactive farms. Targeted assistance to investment on

small-scale farms may also be warranted to overcome lack of market access to resources to innovate.

Farm input subsidies affects production practices, and thus innovation choice. For example, support to a specific input may encourage an input mix that will not necessarily be economically or environmentally sustainable. It would be more technology neutral to facilitate access to credit for the purchase of variable inputs. Similarly, credit support may be useful for farmers to invest in innovation in case of identified failure in credit markets. In any case, input subsidies should be temporary and regularly assessed not to impede the development of private markets (OECD, 2012c).

Innovation has a crucial role to play in ensuring the long-run **sustainability** of agriculture and the maintenance and enhancement of the underlying natural resource base – land, water and biodiversity (OECD, 2011b, 2013). A range of policy instruments should be employed that clearly target both the positive and negative environmental impacts of agriculture. Education, training and information initiatives, tailored to the specificities of local situations, can be helpful in many cases. Regulations and taxes should be employed, when possible, to preclude, or strongly discourage, negative environmental impacts (the "polluter pays principle"). Markets, such as the widely discussed carbon emissions and sequestration schemes, should be created where it is practical to do so. Government payments should be introduced where there is a clear demand for a good or service that is not remunerated by the market and where market creation is not feasible. In designing such payments, it is important to target explicitly the desired outcome to the extent feasible, so as to allow farmers to develop solutions best adapted to their circumstances. Policy measures should also help the sector adapt to climate change impacts, to mitigate greenhouse gases from agriculture, or to enhance carbon sequestration. This is, in particular, the case of many agri-environmental policies, such as those encouraging improved manure management to reduce run-off into water courses, adoption of anaerobic digesters, improved grazing land and livestock management, protection of fragile lands and restoration of degraded land, low or no-till systems that reduce soil erosion, afforestation of land for soil protection, flood/drought control or conserving biodiversity, and which can also have benefits in reducing GHG emissions. In addition, R&D on improved crop breeding and animal genetics and feeding systems can help to mitigate emissions and to facilitate adaptation to the impacts of climate changes. Innovation can also enable improved water management in agriculture (OECD, 2011f, 2012d).

Innovation involves some risk and there is a role for government in providing farmers with appropriate tools for managing risks. An effective policy framework for producer **risk management** should give due consideration to the full range of policies that affect farm risk and to the distinction between risks that a farm household can efficiently manage and those that require public support. Effective tools for risk management will be all the more important to ensure investments are made and innovations adopted as agricultural markets are expected to be more volatile in the future.[3] Government policies should take a holistic approach to risk management, assessing all risks and their relationship to each other, avoiding focussing on a single source of risk such as prices, and should not provide support to deal with "normal" risk. Governments can help farmers to assess and manage risks by providing information and training. Facilitating good "start up" conditions – information, regulation and training – should be the primary role of the government in the development of market-based risk management tools such as futures, insurance and marketing contracts. Agricultural risk management policies should focus on catastrophic risks that are rare but cause significant damage to many farmers at the same time. Contingency plans should define in advance the procedures, responsibilities and limits of the policy response. Subsidised insurance is one way of providing disaster assistance, but it tends to crowd out the development of private

insurance markets and has not been successful in preventing additional *ad hoc* assistance being granted after the event (OECD, 2011c, 2011d).

Rather than supporting income, commodity production or input use, it would be more effective to develop specific measures to foster innovation, such as investment in R&D, agricultural education, training, technical advice, information systems covering market developments and most effective technologies adapted to demand, and transport, irrigation and marketing infrastructure.

Possible questions on agricultural domestic policies

- What are the main policy instruments in place? What are the resulting levels and composition of support to producers?
- What are the main obstacles to innovation in the agriculture and agri-food sector?
- What are the objectives of agricultural policy regarding innovation?
- Is impact on innovation at farm and industry level included in the evaluation of agricultural policy measures?
- Are there specific measures to improve adoption of innovation, e.g. credit for investment in farm-level innovation, incentives to adopt specific technologies, support to diversification of activities?
- Do some policy measures introduce disincentives to innovation (e.g. too tightly defined conditions, conditions based on processes, market distortions slowing structural adjustment)? What could be done to reduce policy-related obstacles to innovation?

4.2. Agricultural trade policies

Agricultural trade policy includes import restrictions (e.g. tariffs and tariff rate quotas), and export measures (e.g. export subsidies, export credit, export restrictions). Non-tariff measures, such as product and process regulations, and administrative border procedures, can also restrict market access and trade. Most trade measures maintain domestic prices at a higher level than border prices, and thus are an essential component of price support. Agricultural trade restrictions narrow markets for innovators and consumers. Reducing trade distortions would foster innovation by broadening market opportunities, and by increasing competition, which pushes farmers and agri-food industries to innovate to remain competitive. Trade also facilitates the spread of technologies and practices via imports of goods and services. Improving trade in farm inputs would also facilitate the adoption of new technology by lowering the price of variable inputs or farming equipment for example. Foreign investment in agriculture can help introduce new technologies.

Possible questions on agricultural trade policy

- What recent efforts has the government undertaken to facilitate cross-border agricultural trade, including within regional trade agreements, and by reducing regulatory and administrative border procedures and increasing consistency, simplicity and transparency? What steps has it taken to increase trade policy predictability?
- To what extent do inter-regional obstacles to trade affect the agri-food sector? How costly are these barriers? Do existing tariff and non-tariff barriers to trade contribute to hindering access to agricultural inputs and services or raising their costs?
- Are there specific restrictions on, or incentives for, foreign investment in agriculture?

4.3. Agriculture-related regulation

A number of regulatory issues are of particular importance for agricultural innovation, including IPR protection (discussed in Chapter 5), health and food safety regulations, and bio-safety regulations. For example, pesticides require government authorisation to be marketed, maximum levels of residues are set for the marketing of agricultural products, and regulations increasingly aim to improve animal welfare. But there are also safety rules regarding farm buildings and machineries. In some countries, labour and land regulations (and taxation) include specific provisions for agriculture (OECD, 2005). For example, relaxing restrictions regarding construction on farmland for farm buildings and agricultural related activities would facilitate investment in new activities. Another example is legal arrangements for farm enterprises, which can reduce risk for the farm family, and thus encourage innovation. In many countries, specific regulation applying to producer groups and co-operatives can reduce competition. Those institutions can influence positively or negatively adoption of innovation, depending on their behaviour.

In developing an appropriate sanitary and phytosanitary (SPS) regulatory environment, including implementation provisions, experience has shown that technology neutral, science-based approaches are most effective in diffusing innovation and least market distorting provided that care is taken to ensure agricultural specificities and societal choices are taken into account. Examples of regulatory practices in the European Union and the United States are given in Box 4.1 and Box 4.2. A variety of innovative approaches can help reduce the regulatory cost burden for governments. These include use of public private partnerships based on "best practices" in the way the SPS regulatory framework is managed, including the interface between private voluntary standards and compulsory compliance regulation. In general, the achievement of regulatory objectives mainly relies on adequate national practices supported by on-going harmonization towards best international practices, with the contribution, if necessary, of well-targeted capacity building in developing countries, including through mechanisms like the Standards and Trade Development Facility (STDF).

In this regard, the "three sisters", OIE (animal health), IPPC (plant health) and CAC (food safety), that are referenced in the WTO SPS agreement play an important role as standard setting organisations and early warning and response mechanisms. In complementing international harmonisation, regional co-operation can be a fruitful way to share practices.

Possible questions on policies and regulations affecting agricultural innovation

- To what extent are internationally harmonised standards used with respect to sanitary and phyto-sanitary requirements?
- How are regulations and standards affecting processes and products being established? Who provides scientific evidence? Who evaluates it? Who decides? How transparent is the system? How often are standards and norms being reviewed?
- Which mechanisms are used for approval of new inputs and products? (Same follow-up questions as above)
- What is being done to promote education and awareness (information) of innovation?
- Are there regulations specific to farm enterprises, land and labour, which provide obstacles to adoption of new technologies and production practices, investment in new machineries and equipment, changes in organisational or marketing practices?
- Is there an efficient system to register land property? How are property rights, and right of access to natural resources such as water, enforced?
- How is compliance to regulations enforced?

Box 4.1. EU regulatory practices

Smarter regulation in the European Union

Smarter regulations aim to simplify existing EU legislation in order to spur innovation and reduce the administrative burden for operators. Independent evaluations have been commissioned on several legislative areas including Genetically Modified Organisms (GMO), animal health, plant health and seeds. Impact assessment is now required for any regulatory proposal to improve the quality of proposals, ensure consistency between Community policies, and contribute to sustainable development. In terms of innovation, impact assessment takes the following questions into consideration:

- Does the option stimulate or hinder R&D?
- Does it facilitate the introduction or dissemination of new production methods?
- Does it affect IPRs, including patents, trademarks, copyrights and other "know-how" rights?
- Does it promote or limit academic or industrial research?
- Does it promote greater productivity or resource efficiency?

Source: Gerlitz (2012).

EU legislative framework for ensuring GM food and feed safety

The European Food Safety Authority (EFSA) is the agency responsible for the risk assessment regarding food and feed safety. In close collaboration with national authorities and in open consultation with its stakeholders, EFSA provides independent scientific advice and clear communication on existing and emerging risks. EFSA risk assessment procedures are based on international standards and are often defined in the scientific arena as the most comprehensive risk assessment procedures in the world. The three typical steps of the EFSA GM food/feed risk assessment process are: 1) Molecular characterisation; 2) Compositional analysis; 3) Food and feed safety analysis and risk evaluation; 4) environmental impact analysis.

The risk management phase is managed by the European Commission and member states. In order to obtain an authorisation for the production of GM food products, the interested parties have to submit an application to the competent national authorities, which has to acknowledge the receipt of the application and inform the EFSA without delay. Applications are sent to the European Commission and to the member states, who are consulted on the application over a three month period. EFSA must provide its opinion within six months of receiving the application. However, if additional data is requested during the scientific assessment the time limit is extended. The services of the Commission have to take due account of the comments of the public (within one month after the EFSA opinion) and submit a proposal agreed by the different depart of the Commission (inter-services consultation) to a committee composed of representatives of the member states and go through an examination procedure. When a qualified majority occurs in the Committee, the decision is adopted, published in the Official Journal of the European Union and included in the above-referred GMO register. Otherwise, the Commission must refer the issue to the Appeal Committee, which will have a two months timeframe to adopt a decision. Adoption is possible in the absence of a decision.

Authorisations, when granted, are valid for ten years and are renewable, for ten years each time. However, the decision can be reviewed and even withdrawn at any time if new elements occur that would justify such an intervention. In other words, the Commission with the fundamental scientific advice of EFSA maintains a substantial supervision power. Finally, all authorised products are entered in the EU register, which contains all relevant details and information.

Source: Updated from Valletta (2010).

Box 4.2. The regulation of genetically engineered (GE) products in the United States

Three agencies are involved in this regulation: the USDA's Animal and Plant Health Inspection Service (APHIS), the Environmental Protection Agency (EPA) and the Food and Drug Administration (FDA). APHIS is responsible for protecting agriculture against pests and diseases, the EPA is charged with ensuring the safe use of pesticides, and the FDA is responsible for food and drug safety. In several areas, the regulatory domains of each agency overlap. Indeed, products are frequently regulated by more than one agency.

Extensive coordination and collaboration among regulatory officials and agencies are crucial to this process. Within the United States, regulations have been updated numerous times to keep pace with scientific advancement. All product decisions are based on scientific evidence.

The USDA conducts oversight of nearly all field trials concerning GE plants. All field trials must receive USDA approval, and must be designed in a manner that guarantees biological confinement. When an applicant has enough information to demonstrate that a given organism will not pose danger to agricultural and human environments, and that it will not pose any plant-pest risks, he or she can petition the agency for "deregulated status." The agency will then conduct an environmental analysis process based on the supplied data, though it may request additional information, if needed. The public also has the opportunity to provide input during this process. Depending upon the conclusions drawn from this initial analysis, more complex and elaborate analyses may be required, as outlined under federal law.

This process demands information on a broad range of topics. Applicants must supply all relevant experimental data, including any data that may be unfavourable, as mandated by law. These data must also include comparisons to conventional crops. If a petition is approved and a product is deregulated, that product can be grown and marketed without further GE-specific oversight from APHIS. Deregulation, however, does not guarantee that the product will not undergo concurrent EPA or FDA review.

The EPA is responsible for the regulation of pesticidal microorganisms and any plant-produced pesticidal substances. If a plant were to produce the insecticidal toxin BT, for example, the EPA would regulate that substance as a pesticide. The agency also sets tolerance levels for the safe use of various conventional pesticides. If any herbicide is used in coordination with an herbicide-tolerant plant, the EPA will regulate the use of the herbicide in conjunction with that plant.

Regardless of whether a pesticidal substance is applied to, or produced by a plant, there is a wide range of information that must first be examined. Each product needs to be characterised, and its effects on human health, ecological impacts and environmental consequences must be evaluated. For certain insecticidal substances produce by a plant (e.g. BT proteins), the EPA also requires plans for resistance management, in the event that insects develop resistance to that insecticide. In addition, the EPA's responsibility with respect to these substances covers not only environmental effects, but impacts on food and feed safety, as well.

The FDA is responsible for ensuring that foods produced through GE are as safe as conventional foods. The types of issues addressed for GE products are the same as those addressed for conventional foods, including toxicity and allergens, food composition, nutritional value, and intended use. The FDA also conducts consultations with product developers. Formally, these consultations are considered voluntary, though it is very unlikely that a company would bring a product to market without first consulting the FDA. These consultations typically include significant dialogue between regulators and developers.

In short, all foods must meet same safety standard under the Food, Drug and Cosmetic Act, regardless of whether or not they are derived from GE organisms.

Source: Schechtman (2012).

Notes

1. As land supply has often a lower price elasticity than other inputs, output support provides an incentive to intensify production.

2. Kimura (2013) finds that low performers, in terms of the partial indicators used, are more dependent on support than the average of all farms, i.e. it accounts for a larger share of their farm receipts, and contributes to maintaining them in the sector.

3. The Policy Report on Price Volatility in Food and Agricultural Markets prepared by International organisations for the 2011 G20 suggests policy responses to tackle this issue. www.oecd.org/document/20/0,3746,en_2649_37401_48152724_1_1_1_37401,00.html

From:

Agricultural Innovation Systems

A Framework for Analysing the Role of the Government

Access the complete publication at:

https://doi.org/10.1787/9789264200593-en

Please cite this chapter as:

OECD (2013), "Agricultural policies and innovation", in *Agricultural Innovation Systems: A Framework for Analysing the Role of the Government*, OECD Publishing, Paris.

DOI: https://doi.org/10.1787/9789264200593-6-en

This work is published under the responsibility of the Secretary-General of the OECD. The opinions expressed and arguments employed herein do not necessarily reflect the official views of OECD member countries.

This document and any map included herein are without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

You can copy, download or print OECD content for your own use, and you can include excerpts from OECD publications, databases and multimedia products in your own documents, presentations, blogs, websites and teaching materials, provided that suitable acknowledgment of OECD as source and copyright owner is given. All requests for public or commercial use and translation rights should be submitted to rights@oecd.org. Requests for permission to photocopy portions of this material for public or commercial use shall be addressed directly to the Copyright Clearance Center (CCC) at info@copyright.com or the Centre français d'exploitation du droit de copie (CFC) at contact@cfcopies.com.