

Nutrition and Technology Transfer Policies

John H. Barton*

The most important policy issues in the context of nutrition and technology transfer are related to intellectual property rights; competition issues in the seed, food processing and marketing sectors; biosafety questions; and trade and macroeconomic considerations.

Humans obtain food through two fundamentally different ways. One is relatively self-sufficient subsistence farming in which a small economic unit, typically a family, produces its own food. The other is production of food for a market and the consumption of purchased goods.

The task for technology transfer in a smallholder economy is to improve the subsistence farmer's standard of nutrition. In a market economy, technology transfer has a double objective: first, to enable the production of larger quantities of marketable products; and second, to improve the movement of food from the farm to the consumer. Reflecting the increasing degree of urbanisation worldwide, subsistence farming is steadily losing ground to the market economy. This trend poses serious challenges for nutrition and technology transfer policies. Recent World Bank figures show that current food production levels are clearly too low to satisfy the Millennium Development Goal of halving the proportion of people suffering from hunger by 2015.

Technology Transfer Processes in Nutrition and Agriculture

There are two economic mechanisms of supporting the development and transfer of agricultural technology, one based on the public sector and the other on the private sector.

With respect to public sector agricultural research, the lead institutions in breeding new varieties during much of the last three decades were those of the Consultative Group on International Agricultural Research (CGIAR), which co-ordinates a series of research centres throughout the world to meet developing world agricultural research needs. Middle-income developing countries have also established their own national agricultural research institutes.

With public sector budgets shrinking, private sector agricultural research is becoming increasingly important in developed and middle-income developing countries. Only a small part of this research is currently spent on developing country needs, although huge markets such as Brazil, China and India might receive increasing attention in the future. As yet, the poorest nations have not been able to benefit from private sector research and related technology transfer.

Key Policy Issues

The market/small-holder production patterns, and the private/public technology transfer patterns define a two-by-two matrix, as shown below.

		Form of Technology Transfer	
		Private	Public
Form of agriculture	Market	Private sector, market agriculture quadrant	Public sector, market agriculture quadrant
	Small-holder	Private sector, small-holder quadrant	Public sector, small-holder quadrant

The private sector and market agriculture quadrant

Policy issues may arise in particular in the contexts of intellectual property (IP), competition, biosafety and trade and macroeconomics.

With respect to IP, the primary challenges exist in the seed sector. The main question is whether the UPOV Conventions provide sufficient incentives for private sector research for field crop varieties, or whether such research is better accommodated through the regular patent system.

Under UPOV, plants into which a gene has been introduced through genetic engineering may be used by third parties for breeding purposes. This possibility may be denied under patent law. Depending on national implementation, it would be a patent infringement to insert a patented gene into another plant or to use such a transgenic plant for breeding purposes. This stronger form of monopoly right arguably enables private sector researchers to better recoup the costs of their investment, as illustrated by the significant increase of private sector research in the developed world after the introduction of patents to the biotech sector in the late 20th century. Therefore:

- Based on factors such as market size and research capability, a developing nation should decide whether to adopt a UPOV style system in minimal compliance with TRIPs or instead to adopt a stronger biotechnology-oriented patent system.
- Depending on their attitudes toward biotechnology, poor nations should consider ways to make themselves more appealing to private biotechnology research, for instance through integrating the seed markets of several nations followed by adoption of appropriate intellectual property rights.
- Research is needed on how major a role will be played by intellectual property rights in the global agricultural export sector and in the supermarket revolution, and on what might be the reasonable response for the developing world.

With respect to *competition issues*, the main challenge arises from the possible concentration of multinational biotech companies in developing countries and consequent negative price effects. On the other hand, such companies are likely to provide considerable technology transfer to the host country. Therefore:

- Nations with limited private sector competition in the seed industry should ensure that public sector varieties are available in competition with private sector ones.

Continued on page 22

- Middle income developing nations should develop appropriate competition law principles and bureaucratic structures for reviewing multinational acquisitions of local firms.
- These nations should also seek to participate effectively in international competition law negotiations in order to ensure that they are not harmed by global-level declines in competition.

In the area of *biosafety*, developing countries are concerned about losing European export markets if they engage in research and production of genetically modified food. Therefore:

- Developing nations should seek a way in which the biosafety uncertainties of genetically modified agriculture can be resolved, so that these nations can make appropriate decisions to encourage or regulate the private sector's interests in using these technologies.

As to *trade and macroeconomics*, developing countries should ensure that at the national level, tax regimes and investment policies are conducive to the transfer of agricultural technology from abroad. In the international context, developed countries' agricultural subsidy schemes pose a considerable challenge to exporting developing countries. Therefore:

- Developing nations should carefully consider their positions vis-à-vis international negotiations on agricultural trade and agricultural product standards, with the goal of ensuring that their agricultural sectors face competition conditions that encourage the adoption of economically-desirable new technologies.

The public sector and market agriculture quadrant

Generally, there is only a limited need for public means of technology transfer in an efficient market-based agricultural sector. Nevertheless, the public sector should remain available as a counter-balance to anti-competitive moves in the private sector. In addition, certain broad societal needs are not addressed by the private sector and thus require basic public sector research. Therefore:

- Public sector research institutions should seek ways to carry out and support basic research of value to both people and the

environment in developing countries and to co-operate with the private sector in a way that encourages the application of this research as new requirements affect world agriculture.

The private sector and small-holder agriculture quadrant

Private sector research is almost irrelevant for subsistence farmers, because the latter are unlikely to have the financial means to purchase private research products. One major challenge subsistence farmers are exposed to in the area of private sector research is plant breeders' rights. Under the 1991 UPOV Convention, seed saving may be permitted, but seed exchange is prohibited (Article 15). However, such prohibition is not mandated by the TRIPs Agreement. Therefore:

- In the developing world, seed law and plant breeders' rights law should be tailored to take into account the needs of small-holder farmers.

On the other hand, the private sector does offer important opportunities to small-holder farmers. It could, for instance, make advanced seed varieties at low cost available to subsistence farmers, while recouping its expenses through sales to market-economy farmers at market prices. Therefore:

- The public and private sector should co-operate to develop public-private licensing arrangements and partnerships designed (a) to bring new technologies to subsistence farmers under terms that allow them to reap benefits from research while permitting the private sector to obtain appropriate economic compensation in the market sector, and (b) to help small farmers enter the agro-industrial sector.

The public sector and small-holder agriculture quadrant

In this quadrant, it is important to define the appropriate tasks for public sector research:

- How should public sector agricultural research be refocused to deal effectively with the now highly diverse areas of rural poverty? What should be its relation to the private sector? Should the public sector commit itself to biotechnology research?

Another challenge for public research consists of the increasing patenting of "research tools", possibly causing researchers to be held liable for patent infringements. This leads to the following questions:

- How serious is the research tool patent problem in agriculture and can it be resolved? Are the various proposed collaborations likely to be successful? How might their likelihood of success be improved?

Finally, with respect to contextual and macroeconomic conditions needed for farmers to use new technologies, the following issues will have to be addressed:

- How much does the adoption of new agricultural technology depend on the broader matrix of rural economic policy? Should those policies, including subsidy policy and support for agricultural extension services, be modified to contribute to adoption of new technologies? If they should, then how? And lastly, how should the agricultural policy analysis/decision-making and the broader economic development policy-oriented analysis and decision-making be brought into dialogue with each other?

General implications for developing nations

Many of the issues highlighted above arise not only in the particular context of one of the four quadrants, but also in a more general sense. In particular, more expertise and research is needed in the areas of

- agricultural technologies and IP issues;
- competition law;
- biosafety and biotechnology;
- trade law; and
- the future design of public sector activity and research policy.

* Christoph Spennemann, Research Associate of the ICTSD-UNCTAD Project on IPRs and Sustainable Development, wrote this executive summary of a study on 'Nutrition and Technology Transfer Policies' authored for the project by Professor John Barton of Stanford Law School. The complete study is available at <http://www.iprsonline.org/unctadictsd/projectoutputs.htm#casesstudies>.