ITDG
PRACTICAL ANSWERS TO POVERTY

# How to make technology transfer work for human development

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## Summary

Technological innovation is vital for growth and poverty reduction in developing countries. Many of the technologies most important for the needs of poor women and men do exist, but they are not accessible to them.

International technology transfer through Foreign Direct Investment (FDI) or trade does not necessarily have a poverty reduction impact. Indeed, in many cases this form of technology transfer has little bearing on the technology needs of poor women and men in developing countries and may even undermine their production systems.

For sustainable, long-term development the focus of attention of policy makers and development agencies should be on the development of local capabilities to develop, adapt and use technologies.

To enable the development of technological capabilities that will meet the needs and priorities of the poor and marginalized, public support for pro-poor R&D and the regulation of investment and trade will be essential.

WSSD should take action to ensure that

- financial and technical support is provided for the development of dynamic national systems of innovation in developing countries;
- support is provided for technological R&D that is relevant to people living in poverty and builds R&D capacity in developing countries;
- international and national regulatory frameworks, including the regulation of trade and investment and intellectual property rights regimes, enable the development of technological capabilities and skills in developing countries at the national and local level.

## Introduction: the global ‘technology divide’

The great disparities in levels of human development between the northern and southern countries of our world are mirrored by a ‘technology divide’. The lack of access by poor women and men to the most basic technologies and knowledge needed to create sustainable livelihoods has condemned billions of people to an existence of recurrent poverty, disease and hunger. With admirable hope – or perhaps blind ignorance – the concept of “technology transfer” has been presented by the international community as a means to address this great divide.

Technology is widely recognised as one of the major determinants of economic growth, and the idea that the ‘simple’ transfer of technology from rich countries to poor countries will result in growth and thereby reduce poverty is appealing. One of the benefits of globalization, argue its proponents, is that it will make technological developments accessible to people in developing countries. Globalization will close the technology divide, and level the playing field between countries. One writer went so far as to suggest that “globalization can ignite a virtuous circle of technological upgrading and skill accumulation in technological latecomers.” (Meyer, 2000)

Similarly, the transfer of environmentally sound technologies (EST) has been promoted as a means to address global environmental problems. Chapter 34 of Agenda 21, for example, states that "Governments and international organisations should promote the formulation of policies and programmes for the effective transfer of environmentally sound technologies that are publicly owned or in the public domain". This is echoed in Article 10c of the Kyoto Protocol.

Yet, the evidence is inconclusive at best on whether technology transfer contributes to growth and poverty reduction. While Southern governments see it as a means to acquire modern, up-to-date technologies and Northern governments see it as a vehicle for exports – grinding poverty continues to be the daily experience of billions of women and men who are excluded from access to old and new technologies alike. 2 billion people still do not have access to modern, safe forms of energy supply; 1.5 billion people still live in inadequate shelter; 1 billion people still have no access to safe water, and 2.4 billion have no sanitation; and 800 million remain chronically undernourished.

The technologies to meet these needs do exist in developing countries, but they are not accessible to the people who need them most. At the community and household level, however, technology change can make a positive difference to the lives of women and men living in poverty.

## Foreign Direct Investment and international trade

Though there are there are many vehicles for technology transfer, the main ones are foreign direct investment (FDI) and trade. FDI and trade can inject new knowledge and technology into developing countries, which then have the potential to diffuse widely throughout the local population. Technology transfer in the form of FDI increases the capital stock within a recipient country and, so the argument goes, produces spillover effects such as the spread of new technical knowledge to other firms. It is these dynamic spillover effects, and with them the local appropriation or utilisation of technology, that receive most attention in debates about poverty reduction.

Though there has been a massive increase in the levels of FDI and expansion in international trade in recent years, the evidence that as a form of technology transfer they have beneficial effects for local firms and poverty reduction is far from conclusive. For example, to take royalty payments as an indicator of technology transfer, UNCTAD noted that over 80% of global royalty payments for international transfers of technology were made from subsidiaries to their parent firms (UNCTAD, 1997). This high incidence of intra-firm technology transfers suggests that spillover effects are not diffused to local firms within the recipient country. Further evidence suggests that when they do occur, the beneficiaries are not competitor firms but other actors within the same value chain. FDI is also limited to select regions of the world –only ten countries (mainly concentrated in Asia and Latin America), accounted for three-quarters of inward investment in 2000 (World Bank, 2001). For the majority of developing countries therefore the potential spillover effects from technology transfer through FDI and global trade would appear remote.

A recognized constraint on access to new technologies is the willingness of technology owners to transfer their intellectual property (IPCC, 2001). Various aspects of the current international Intellectual Property Rights (IPRs) regime can also be seen to restrict the knowledge spillovers supposedly generated by FDI and trade. For example, in countries where the regulatory regime (policies and institutions) is weak and/or unenforceable, and where technological capacity is limited, companies are often reluctant to invest for fear of security for their proprietary technology. IPRs also potentially restrict the development of local technological capabilities in developing countries. In the past, imitative and adaptive research, along with reverse engineering, has proven to be a significant form of knowledge generation in developing countries. IPRs make the absorption of spillovers of foreign technologies extremely unlikely – removing an advantage that was previously available to countries that have already developed.

**ITDG Case Study: technology for renewable energy**

ITDG has worked on the development and diffusion of micro-hydro technology for many years, notably in Nepal, Sri Lanka and Peru. The approach has been, first, to adapt known technology to better suit the circumstances of poor communities in developing countries (e.g. simplified and lower cost technical designs), and to establish local capability to design micro-hydro schemes, to manufacture the equipment, and then install it. This has involved working with, and training, small-to-medium scale enterprises.
It has entailed transferring knowledge and skills about metal fabrication and casting, and electrical and civil engineering.

While the thrust of ITDG's efforts to develop local capabilities in micro-hydro have been concerned with the technological elements, it has also been essential to address questions of policy (e.g. for power generation), finance for investment in micro-hydro schemes (working with existing credit programmes or, as in Peru, establishing new ones), and the capacity to manage and maintain micro-hydro installations of communities and enterprises.

As a direct result of these efforts, there are now dozens of locally-owned and managed schemes supplying electricity to poor comm-unities. These schemes provide an immediate, significant improvement in the quality of people's lives, and enable longer term human development by facilitating education and improved health. Indirectly, because micro-hydro capability is now established within the country, ITDG's efforts have contributed to many more schemes.

Proponents of the IPRs system argue that they actually encourage technology transfer and innovation. While there is little evidence to suggest that the level of technology R&D is determined by IPRs, the further strengthening and harmonisation of IPR regimes worldwide, as required through the Trade Related Aspects of Intellectual Property Rights (TRIPs) agreement of the World Trade Organisation (WTO), is only likely to reinforce the inequitable access and control of technological knowledge.

## Technology transfer and poverty reduction: building local capacity and access

To understand why international technology transfer in terms of FDI and trade has no direct link with poverty reduction in developing countries, it is useful to look at the technologies that do make a difference to people living in poverty. For this we need to gain a wider appreciation of the systems in which the livelihoods of women and men are located (value chains, production systems, markets, competing stakeholders, etc.). In the era of globalization we also need to recognise that these systems have a global dimension to them.

The livelihoods of the great majority of poor women and men in developing countries depend on micro- and small-scale enterprises of one sort or another. They must forge their livelihoods working in their fields, homes and small workshops, and by making vital decisions about the best use of their limited assets in order to survive on the tightest of margins. These women and men do not depend on employment in the formal sector, where FDI is directed. Indeed, the formal sector accounts for a minority of the economically active population in most developing countries.

The effective transfer of technological knowledge that meets the needs of people living in poverty has two critical dimensions:

- the development of people's capabilities to acquire new knowledge and make their own choices about technology change;
- the establishment of a supporting institutional and policy environment.

(The two ITDG case studies included in this paper illustrate these two aspects of technology transfer at the local level.)

An understanding of the relationship between capability and human development is critical to making technology transfers applicable to poverty reduction. A certain capability to select, absorb and adapt technologies into local settings and to develop new technologies through local innovation must be present for effective technology transfer, whether at household/enterprise level or national level. At

**ITDG Case Study 2: technology for smallholder farmers**

ITDG has been involved for over two decades in supporting the development of technologies used by small-scale farmers. The approach in this case has been to work with farmers, enabling them to acquire new knowledge about alternative agricultural techniques, such as soil and water conservation, or pest management. New ideas and knowledge are generated amongst farmers through, for example, exchange visits with other farmers and on-site demonstrations, and then by enabling them to try and test these new ideas farmers develop their own technologies. Participatory technology development (PTD), has been shown to be an effective approach to farmers' gaining more productive, and sustainable, technologies.

Public support for the extension of technical advice to small-scale farmers, as well as for agricultural research, has fallen substantially in recent years. ITDG's work in Zimbabwe, Kenya, Peru and elsewhere, has demonstrated alternative systems of technical assistance to small-scale farmers, that do not rely on the decreasing budgets of Ministries of Agriculture, nor on the conventional (T&V) technology transfer model of agricultural extension. Community extension workers, paid by farmers, now provide technical advice and services to farmers in many communities where ITDG has worked. Training programmes for community extension workers require public (or donor) support, but the overall system of training and extension provides a cost effective alternative.

the household level this entails local knowledge and information systems, integral to social networks. At the national level, this means a framework for a system of innovation involving a range of institutions and policies.

The regulation of international trade and investment must recognise the importance of developing technological capabilities within developing countries (which cannot, for instance, be imported wholesale via new machinery or through turnkey projects). National policies are required that redress market failures in the diffusion of technologies appropriate to the needs of the poor and enable the development of technological capabilities. These national technology policies and innovation systems need to be integrated with poverty reduction strategies.

Enabling access to new technologies therefore is partly about making more productive technologies available (e.g. through technology transfer), and partly providing an environment (institutional, financial, social etc. – providing information, micro-credit, skills, etc.) that supports access by marginalised people. Building poor people's capacity to make these choice means not just 'bringing' new technologies to their doorstep, but addressing their organisational, management and the marketing skills' opening new channels of information and knowledge' and making credit and markets more accessible.

## Action needed at WSSD

The Draft Implementation Plan for WSSD (paras. 89 and 90) echoes Agenda 21's call for the transfer of 'environmentally sound' technologies and corresponding 'know how' to developing countries. The urgent action called for should also:

- Ensure that financial and technical support is provided for the development of dynamic national systems of innovation in developing countries, with technology policies geared towards poverty reduction and environmentally sustainable development, integrated with poverty reduction strategies.
- Provide support for technological R&D relevant to the poor, focused upon creating R&D capacity in developing countries, and support for investment in R&D and innovation by low-income producers themselves to develop their own technologies that are most suitable to local needs.
- Ensure international and national regulatory frameworks that support the development of technological capabilities in developing countries, including the regulation of trade and investment by national governments, and intellectual property rights regimes that enable access to new technological knowledge and recognise existing knowledge.

## Further reading

IPCC, 2001, *Methodological and Technological Issues in Technology Transfer: A Special Report of Working Group III of the Intergovernmental Panel on Climate Change,* IPCC.

ITDG, 2001, *Enabling people to make technologies work for them,* ITDG's response to the Human Development Report 2001.

Jörg Meyer, 2000, *Globalization, technology transfer and skill accumulation in low-income countries,* UNCTAD.

RIIA, 2002, High-level workshop on strategies for addressing linkages between technology and sustainable development at the World Summit for Sustainable Development, Workshop Report, RIIA.

Kamal Saggi, 2000, *Trade, Foreign Direct Investment, and International Technology Transfer: A Survey,* Working Paper 2349, World Bank.

UNDP, 2001, *Human Development Report 2001: Making new technologies work for human development,* UNDP.

## About ITDG

ITDG – the Intermediate Technology Development Group – helps people to use technology in the fight against poverty. We work in partnership with communities to develop practical answers to their problems, based on local knowledge and skills and putting people's needs first.

ITDG is a charity registered in the United Kingdom which works directly in four regions of the developing world – Latin America, East Africa, Southern Africa and South Asia, with particular concentration on Peru, Kenya, Sudan, Zimbabwe, Sri Lanka, Bangladesh and Nepal.

ITDG has a unique approach to development – we don't start with technology, but with people. The tools may be simple or sophisticated – but to provide long-term, appropriate and practical answers, they must be firmly in the hands of local people: people who shape technology and control it for themselves.

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