

Managing Intellectual Property to Foster Agricultural Development

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SYNOPSIS

Over the past decades, consideration of IPRs has become increasingly important in many areas of agricultural development, including foreign direct investment, technology transfer, trade, investment in innovation, access to genetic resources, and the protection of traditional knowledge. The widening role of IPRs in governing the ownership of—and access to—innovation, information, and knowledge makes them particularly critical in ensuring that developing countries benefit from the introduction of new technologies that could radically alter the welfare of the poor. Failing to improve IPR policies and practices to support the needs of developing countries will eliminate significant development opportunities. The discussion in this note moves away from policy prescriptions to focus on investments to improve how IPRs are used in practice in agricultural development. These investments must be seen as complementary to other investments in agricultural development. IPRs are woven into the context of innovation and R&D. They can enable entrepreneurship and allow the leveraging of private resources for resolving the problems of poverty. Conversely, IPRs issues can delay important scientific advancements, deter investment in products for the poor, and impose crippling transaction costs on organizations if the wrong tools are used or tools are badly applied. The central benefit of pursuing the investments outlined in this note is to build into the system a more robust capacity for strategic and flexible use of IPRs tailored to development goals.

BACKGROUND AND CONTEXT FOR ACTION AND INVESTMENT

As public funding for agricultural research has fallen relative to private sector investments, for many countries the era in

which agricultural development often depended on public goods and the unchecked sharing of research results has come to an end. Countries have entered a new era in which innovation, R&D, and the sharing of knowledge occur at the same time that global IPRs are on the rise. The current IPR climate demands a nuanced and strategic use of IPRs to enable innovation and support agricultural development, but the shift toward this scenario is proving challenging, and many donors, governments, institutions, and individuals are struggling to respond.

There are good reasons for the hesitant progress in understanding the use of IPRs in agricultural development. First, other priorities upstage IPR issues in environments where limited resources must be allocated across formidable needs. Second, expertise in IPR issues often cuts across many fields, including law, business, science and technology, as well as development policy. Even the range of IPR instruments in agriculture is diverse. In addition to patents, other forms of protection, such as trademarks and geographical indications, can create value in agricultural value chains in developing countries; copyright laws can limit access to agricultural research journals, databases, and software code; PVP certificates, utility models, and sometimes even trade secrets are also relevant to agricultural development (World Bank 2006).¹ Third, the international landscape for IPRs is changing rapidly. Policy makers in developing countries now operate within a system of bilateral, regional, and multilateral treaties that govern a wide range of IPR issues (box 6.15); protection of genetic resources and traditional knowledge (box 6.16); and, in debates about food security and developing countries' capacity to respond to climate change, the increasing importance of the role of IPRs in technology transfer. This note argues, however, that IPR-related investments are

Box 6.15 Beyond TRIPS

The Agreement on Trade-Related Intellectual Property Rights (TRIPS) came into effect in 1995, stipulating that all signatories to the agreement should introduce a minimum amount of legislation to protect IPRs. This international obligation triggered a widespread introduction of IPR legislation in developing countries in recent years, as it became a requirement for entry into the World Trade Organization. More recently, in addition to TRIPS, developing countries operate in a landscape increasingly dominated by preferential trade agreements (PTAs). These agreements

often contain obligations relating to domestic intellectual property policies that exceed the minimum standards set forth in TRIPS. Collectively, agreements with intellectual property obligations comprise a landscape referred to as “TRIPS-plus.” A recent report estimated that close to 400 PTAs were in force by 2010, governing more than half of global trade. Not only is the number of agreements growing, but IPR provisions are also occurring in increasingly diverse types of agreements, from customs standards to anticounterfeiting agreements.

Source: Heydon and Woolcock 2009; Frankel 2009.

Box 6.16 IPR Issues in Genetic Resources

Ownership of genetic resources and traditional knowledge is an area where IPRs are increasingly considered a serious issue. R&D in crop improvement, for example, depends on the wealth of genetic material held in farmers’ fields and national and international gene banks. Both the conservation of genetic resources and access to them are critical for our future capacity to address global food security issues, including drought tolerance, yield improvements, and resistance to diseases and pests.

Maintaining a balance between the preservation of genetic resources and ensuring widespread access depends on finding solutions that can work within a complicated cross-section of national, international, and institutional policies. For example, in 2006 the research centers of the Consultative Group on International Agricultural Research (CGIAR) that maintained *ex situ* collections of plant genetic resources signed agreements with the Governing Body of the International Treaty on Plant Genetic Resources for Food and Agriculture (“the Treaty”), which placed the collections they hold under the Treaty, and adopted a “Standard Material Transfer Agreement.” Exchanges of genetic resources involving the CGIAR centers are now governed by this agreement, which includes IPR obligations.

Further questions over rights to genetic resources are raised by the increased capacity for large-scale DNA sequencing. Currently, many projects to sequence plant genomes promise benefits to agricultural development. The data and associated knowledge hold the potential to assist in breeding for improved yields, disease resistance, and countless other traits. There has been continuing concern, however, in genome sequencing about the optimal use of IPRs that does not impede innovation based on the new data. Some argue that without the ability to patent, the investment in further R&D is not warranted; others argue that allowing proprietary ownership allows for blocking patents that can slow or halt innovation. While it is becoming increasingly difficult to patent DNA sequences in the United States, a large number of patent *applications* still contain claims to sequences in bulk. For example, CAMBIA’s analysis indicates that approximately 74 percent of the rice genome is claimed in United States patent applications.

As this brief discussion indicates, future investments in policies and programs involving genetic resources must include considerations of IPRs to support the donors’ intended impacts on agricultural development.

Source: CAMBIA (“Mapping of Rice Patents and Patent Applications onto the Rice Genome”); Pollack 2010.

Note: The Standard Material Transfer Agreement can be accessed at this link: http://www.planttreaty.org/smta_en.htm.

critical if developing countries are to benefit sufficiently from advances in STI over the next decades.

MAJOR IPR-RELATED DRIVERS OF DEVELOPMENT

Three main interrelated paths characterize mechanisms through which IPRs impact global poverty: (1) trade and foreign direct investment; (2) national capacity for innovation and development of local commerce; and (3) technology transfer. These paths are discussed in the sections that follow with full recognition of the oversimplification of this framework.² Nonetheless, it serves as a useful compass for the analysis that follows.

Trade and foreign direct investment

Box 6.15 showed how trade issues often drive IPR legislation, with varied impacts. Studies of the relationship between IPRs, trade, and foreign direct investment in developing economies have covered a wide range of potential paths of interaction in an attempt to determine whether stronger IPR policies in developing countries are likely to produce benefits for the world's poor. While a significant literature illustrates positive implications of stronger IPR policies on trade and foreign direct investment, there are caveats. Strict enforcement of IPR, for instance, may drive up the costs of imitating or copying inventions, which may reduce growth in very low income countries that rely on these approaches and do not yet have the infrastructure to accept foreign direct investment. Other work has shown that stronger IPR policies can exacerbate income inequalities in developing countries and that the flows from trade and foreign direct investment do not sufficiently impact the very poor (Adams 2008). In short, the empirical work on IPR policies, foreign direct investment, and trade in developing countries leaves unresolved questions about how the poor are affected over time, and debates will continue with further exploration of the issues.³

National innovation climate

IPR legislation is one component of the climate for innovation in a country, but legal instruments are not enough on their own to encourage investment in innovation. Without the active involvement of national researchers, there will be little appreciation of the role of IPRs, and thus other investments will do little to encourage innovation. Interventions that focus on protecting inventions in public institutions

can be a way to jump-start a cycle in which increased protection of IP increases awareness of the value of innovation. Box 6.17 shows an approach to increasing locally focused R&D in Botswana, coupled with measures to raise public awareness of new inventions and designs.

Types of IPRs differ in their influence on the innovation climate within low-income countries. Patents can be important IPR instruments for discrete inventions, as seen in box 6.18, which shows how a machine to prevent frost damage in fruit orchards was exported from Chile to important overseas markets. Other forms of IPRs offer greater opportunities to influence the domestic innovation and business development climate, however. Trademarks, geographical indicators, plant breeders' rights, and seed registration laws may garner comparatively less attention than patents in the international press, but as noted, they often have more practical potential to affect agricultural development in low-income countries. Box 6.19 describes how a trademark was initially used to build a brand around Colombian coffee and how geographical indicators have been employed more recently to maintain this brand. The success of this approach led other countries to similarly distinguish their local produce in an international market, such as Pinggu peaches from China. In this case, the agreement between China and the EU on geographical indicators for peaches from this region of China opened an export market for high-quality fruit previously recognized only within China.⁴

Technology transfer

The transfer of technology and knowledge remains perhaps the most influential of the three drivers listed here in terms of IPR investments contributing to poverty reduction. Most well-capitalized engines of innovation are in developed countries, but increasing numbers are found in emerging economies. There is a real need to improve international capacity for agricultural R&D targeted at poverty reduction as well as the flow of knowledge and technologies to benefit developing countries. Whether the "technology" that is transferred refers to a novel plant variety, the tacit knowledge of how to improve a food-processing practice, or an innovative business model for giving smallholder farmers access to microirrigation, making technology and knowledge available to improve the lives of the poor has both direct impacts (for example, by improving health, food security, or access to water and sanitation) and indirect impacts (such as economic development). IPRs are an important factor in public-private partnerships transferring technologies, in the formalization of the knowledge and

Box 6.17 BOTECH Harnesses Innovation in Botswana

Botswana Technology Centre (BOTECH) in Gaborone is a research and technology organization established by the Botswana government in 1979. Operating under the Ministry of Communications, Science, and Technology, BOTECH has pursued the government's policy objective of technology promotion and innovation as a tool for developing the economy and improving the quality of life in Botswana. To strengthen research and development capacity, BOTECH has a longstanding involvement and active participation with a number of local organizations, including the University of Botswana, Botswana Institution of Engineers, Botswana Export Development and Investment Authority, Botswana Innovation Hub, and some nongovernmental organizations.

Botswana's Industrial Property Rights Act (1996) provides a legal framework for the country's innovators to seek intellectual property protection for their intellectual property. BOTECH has worked to improve intellectual property awareness in Botswana to assist inventors to be more creative and benefit from their innovations. BOTECH's intellectual property policy seeks to address a number of issues, including Botswana's increased participation in international treaties related to intellectual property, access to information on inventions related to BOTECH activities, and dealing with new technology that has been transferred to companies. BOTECH initiated the

National Design for Development Awards in 1999 to recognize inventions and innovations that can offer solutions to some of the problems faced by Botswana. As of 2010, three award ceremonies have been hosted. The World Intellectual Property Organization and African Intellectual Property Organization supported the award ceremonies by sponsoring special awards for outstanding innovations in Botswana. BOTECH is contributing to efforts to protect Botswana's traditional knowledge by chairing an Indigenous Knowledge Task Force, which is drafting the indigenous knowledge section for the Industrial Property Rights Act.

BOTECH's solar-powered hearing device was developed through a collaborative scheme with Motse Wa Badiri Camphill, a nongovernmental organization that conducted field tests, raised funds for design improvements, branded the device with the SolarAid name, and took it to market. SolarAid generated considerable interest and was used in many developing countries. BOTECH assisted Motse Wa Badiri Camphill to set up a separate organization, the Godisa Technologies Trust, to develop the promising pilot project into a genuinely successful product. The recharger, now successfully marketed under the SolarAid brand, requires only 6–8 hours of sunlight to maintain a full charge for a week.

Source: Quoted with slight adaptations from WIPO, <http://www.wipo.int/ipadvantage/en/details.jsp?id=2623>.

innovation that lies in the public sector, and in the creation of specific technology transfer offices (TTOs) in such institutions (see module 5, TN 5 for examples of TTOs for individual institutions or a network of institutions). TTOs are one example of policies promoting technology transfer, but they are not the only such policy.

Understanding where to make strategic IPR-related investments, given the diverse pathways of potential impact listed above, requires a closer look at the current context of international IPRs and agricultural development. Investments in this space must take into account (1) the international obligations related to IPR and the rapidly expanding use of IPRs in agriculture and (2) the continuing disparity in capacity between the public sector and the private sector in the strategic use of IPRs. Although biotechnology is playing an increasing role in agricultural development and is one area where the private sector has made large invest-

ments, IPR policies should not be driven by individual technologies. Similarly, the desire to encourage public-private partnerships should not—by itself—drive IPR policies, although clearer understanding of IPRs at both the national and institutional level will help these partnerships flourish.

Disparity in the capacity to manage IP in public and private R&D

Despite increasing opportunities to engage the private sector, the public sector continues to be the primary driver in agricultural R&D for most developing countries. Globally, agricultural investment in the public sector is double that of the private sector, and one-third of the worldwide agricultural R&D budget is spent in developing countries.⁵ The lack of capacity for IPR management in public research organizations, and the disparity in IPR management

Box 6.18 Patenting a Chilean Invention to Protect Crops from Frost

In 1991, severe frost decimated Florencio Lazo Barra's fruit orchards. He lost all of his table grape production and 80 percent of his plums. He also incurred high fuel costs for oil burners, which he used in the failed attempt to protect his orchards from frost. After years of experimentation, in 1996 a working prototype of the Lazo Frost Control Machine ("Lazo FCM") was tested successfully. The Lazo FCM is a powerful centrifugal fan with a heater, which is trailed across the field by a tractor. The insertion of a layer of hot air in the cold air mass surrounding the plants protects fruits and vegetables from frost.

Following successful tests with the prototype, Mr. Lazo applied for assistance from Innova Chile, a government agency tasked with promoting innovation. He obtained funding to convert his business idea into reality and produce more machines. Orders from Chilean farmers soon followed, and in 1997, with assistance from an intellectual property expert, he began obtaining a patent abroad. The United States was the first country to grant his invention a patent in 1999. In Chile, patent No. 41776 was granted in 2002 by the

Industrial Property Department. The invention is also protected by patents in Argentina, Australia, China, and the European Union.

In 1998 the Lazo FCM technology was exported to the United States by granting a manufacturing license to Agtec Crop Sprayers (now "Superb Horticulture"), who sold the product under the name "Lazo Frost Dragon." In the first three years, over 500 machines were sold in South America and the United States. In 2000, sales and distribution started in Europe through Agrofrost N.V., a company based in Belgium selling and distributing the machines throughout Europe under the "Lazo Frostbuster" name. More recently, the technology was exported to New Zealand and Australia.

Without the support of Innova Chile, which enabled the inventor to file for patent protection, little of this development would have taken place. Government agencies charged with supporting innovation are often criticized for supporting projects that do not come to fruition, so it is important to recognize cases where they have been successful to balance this impression.

Source: Quoted with slight adaptations from WIPO, <http://www.wipo.int/ipadvantage/en/details.jsp?id=2448>.

capacity between the public and private sectors, are therefore important considerations for investments in agricultural development.

ACTION AND INVESTMENT NEEDED

This section describes a set of investments related to IPR and agricultural development that can improve activity in this sector. Opportunities exist to improve policies at the institutional level and to develop institutional capacity, as well as to increase knowledge sharing between the public and private sectors and, through these advances, increase capacity for technology transfer.

It is not possible to provide a template for particular laws or IPR regimes that will benefit all countries; *IPR legislation must be tailored to the national context*. This issue is discussed extensively in World Bank (2006), which recommends a dialogue with conscious consideration of needs and priorities prior to enacting IPR legislation for plant breeding. For example, staple crops may be treated differently from crops grown for export. Where a particular

species is considered to be of national importance, exemptions from PVP have been incorporated in some national legislation. Furthermore, as countries develop, needs for protection may change, particularly as they move from industries that exist by copying products produced elsewhere to innovating to develop their own products. IPR regimes continue to evolve even in developed economies and must be flexible enough to cope with changes in national requirements.

Promote the establishment of specific IP policies in public organizations

Establishing institutional policies on the ownership, protection, and dissemination of inventions will have a big impact on enabling technology transfer among public organizations. Institutional IPR policies are critical to the impact of public research, can open an institution to new partners, and create incentives for changing the innovation climate. One of the biggest improvements in technology transfer between public and private organizations in the United

Box 6.19 Colombian Coffee: Trademarks and Geographical Indicators Protect a Valued Brand

Coffee from Colombia has retained a significant price premium over coffee from Brazil (the world's largest producer of Arabica coffee) for many decades, largely owing to a branding strategy that emphasizes the high quality of Colombia's product. The National Federation of Coffee Growers of Colombia (FNC, *Federación Nacional de Cafeteros de Colombia*) was created in 1927 by Colombian farmers. Today, it represents over half a million coffee growers, the majority of whom are smallholders. The Juan Valdez® brand strategy is an excellent example of continuing creativity in IPR management to promote agricultural development.

Television commercials shown in North America in the 1960s featured Juan Valdez® in the coffee fields with his faithful mule, painstakingly selecting and hand-picking the ripest beans. Consumers began to respond to the message that Colombian beans are grown and harvested with great care, with little help from machines, in ideal climatic conditions with plenty of rain, sun, and fertile volcanic soil. Demand grew. Many coffee roasters began marketing their products as Colombian coffee. A number launched high-end products consisting exclusively of Colombian coffee.

The Juan Valdez® logo was licensed to coffee roasters that used only high-quality Colombian coffee. Not

all coffee roasters responded to this initiative, however, and another IPR instrument was included in the strategy: certification. "Colombian" was registered in relation to coffee as a certification mark in North America in the 1980s. The formal standards attached to this certification mark provide a guarantee that the actors in the marketplace are meeting minimum quality standards when selling "Colombian" coffee, thereby protecting its hard-earned reputation. Enforcing and protecting this certification turned out to be expensive but worthwhile, given the premium that Colombian coffee now demands in the market. The continuing expansion of the Juan Valdez® brand also included opening branded coffee shops, which have had varying degrees of success, as well as a partnership with Coca-Cola FoodService to offer a branded liquid coffee system.

"Café de Colombia" was registered as a geographical indicator in Colombia in 2004 and the European Union in 2006. Unlike trademarks and certification marks, geographical indicators are intrinsically linked to attributes and quality standards related to origin. They need to be recognized by governments, so delays can arise in establishing such a system, but the value of these treaties in promoting quality brands is now recognized.

Source: Fridell 2007; March 2007a, 2007b.

States was legislation mandating IPR policies for institutions that receive federal funds. By clarifying ownership of inventions and the responsibility of the institutions to protect them, IPR policies became an integral part of research activities. Without necessarily mandating the use of IPRs through legislative means, in individual organizations the establishment of policies related to ownership and responsibilities for protecting and disseminating inventions will have a big impact on enabling technology transfer.

Create a global corps of trained IPR practitioners

The impact of new IPR legislation in the wake of TRIPS cannot lead to positive cultural shifts in the use of IPRs without sufficient numbers of trained, in-country practitioners. The success of continuing investments in creating patent offices, improving judicial systems, and opening TTOs depends on the quality of the professionals engaged.

Well-trained IP practitioners are critical for a country to represent national interests and negotiate IPR provisions in multiple international forums and for a country to develop national IPR policies that promote development within complex international obligations. Likewise, managers, engineers, and scientists in public and private institutions must be able to understand IP and how to use it if countries are to play an increasingly competitive role in global agricultural development.

Support the creation of TTOs

An effective way to achieve institutional understanding of the value of IPRs may be through the creation of specific TTOs with a mandate to identify and protect innovation use and to use IPRs to promote greater impact of the research and innovations arising within the institution (for example, through licensing technology with other partners). Such

offices provide direct opportunities for the professionals targeted in training activities to gain experience and also demonstrate to researchers the value of IPRs in enabling further development of their innovation (for additional information, see module 5, TN 5).

Revisit the importance of nonpatent frameworks and opportunities for agricultural development

Trademarks, PVP, seed laws, and geographical indications are a few of many IPR-related nonpatent instruments that may have an impact on agricultural development.⁶ In low-income countries where patenting is limited and mechanisms for enforcing patents are not well developed, these alternative forms of IPRs can be critical instruments in AISs. The PVP system, for instance, granting plant breeders exclusive rights to market new varieties, is implemented in a number of industrialized and developing countries (World

Bank 2006). UPOV remains active in promoting harmonization as traditional approaches to PVP are challenged by advances in plant breeding and genetics (Janis and Smith 2007). Trademarks and related brand equity strategies are considered by some scholars to be underutilized as a form of creating value for developing countries' agricultural products. A wide variety of opportunities exist for improving nonpatent, IPR-related instruments at both the policy and practitioner level; for examples, see boxes 6.19 and 6.20.

Encourage donors to require strategic IPR management in development investments

Private foundations, governments, aid agencies, and other donors can influence the outcomes of investments across many fields by instituting internal grant-making requirements that demand a higher level of strategic IPR management. As one example, requiring grantees to provide a plan

Box 6.20 Hagar Soya Co., Cambodia: Multiple Benefits from an Innovative Social Business Model

Hagar Soya Co. Limited (HSL) is a small enterprise in Phnom Penh created in 1998 by Hagar, a nongovernmental charity based in Switzerland. In the mid-1990s, Hagar began an income-generation, training, and employment project for abused and abandoned women in postconflict Cambodia. The project led to the incorporation of HSL as one of Hagar's small businesses. HSL's first commercially successful product was a soya milk drink sold under the brand name "So! Soya." The product is nutritious, affordable, and tastes good—all important qualities in helping local children increase their protein intake in a country with very high malnutrition. Following the success of the soya milk drink, the company added more soya-based items to its product line.

Initially, the commercialization of Hagar's soya milk was done in a rather informal way; women from Hagar's programs produced 300 liters of fresh soya milk per day and sold it on the streets of Phnom Penh from push carts. By 2003, HSL was ready for larger-scale production and the "So! Soya" trademark was registered with the intellectual property Department of the Ministry of Commerce of Cambodia. Subsequent HSL products such as "So! Soya kids," "So! Soya Gold," "So! Yo," "So! Yumme," "So! Milk," and

"So! Choco" have also been protected by registered trademarks.

The company's intellectual property strategy focuses almost entirely on trademarks and aims at increasing the competitiveness of HSL's products. The company considers trademarks to be effective for preventing unauthorized use of HSL's marks and guarding against counterfeiting. The competitive edge also arises from registering a trademark to protect and increase its value, then publicizing it through a good marketing and business strategy to enlarge the company's market share and stimulate the development of new products. The success of HSL's trademark strategy is reflected in the company's achievements, first, in marketing its brand name through brand development of both the company and its products, and second, in ensuring lasting brand impact through quality products.

The company benefited from Hagar's initial ability to identify the right path to incorporate income-generating activities within a development project, taking into consideration the social needs of Cambodia. HSL is an example of an efficient social enterprise model, which, according to the International Finance Corporation, can be replicated by nongovernmental organizations worldwide.

Source: Quoted with adaptations from WIPO, <http://www.wipo.int/ipadvantage/en/details.jsp?id=2563>.

demonstrating that IPR has been considered in all aspects of the proposed activities will drive demand for building capacity in IPR management, highlight the impact of specific IPR-related policy needs, set important standards, and ultimately benefit donors by reducing the risks of their investments. Furthermore, requiring a consideration of product development beyond the research stage has the advantage of identifying other technologies that may need to be licensed and other partners who will need to be involved to deliver the products to the target population.

IPR-related investments must be made, however, with the recognition that IPR is only one of many factors that can foster or impede technology transfer. While there are key opportunities to address IPR issues in technology transfer, practitioners often find that *risks unrelated to IPR* are more challenging. These risks concern stewardship, products flowing back into commercial markets, and liability issues. It should also be noted that, particularly for technology directed toward rural populations, some form of extension services will be critical for disseminating the technology to the target population (World Bank 2006).

POTENTIAL BENEFITS

Investments in IPRs play a facilitating role, influencing the potential impacts of many other investments in agricultural development. The impacts of improved handling of IPR issues, therefore, are unlikely to be directly measurable. Benefits to R&D activities in the public and private sectors should include improved transfer of technology from public organizations, improved linkages between industry and academic or public research institutions, and improved access to private sector technologies. For example, Unicamp created productive linkages between the university's own R&D and industry once it established a specific TTO (module 5, TN 5).

In individual cases, benefits can often be attributed directly to the particular steps taken to protect the IP within a particular project, such as the patenting of the frost control machine (box 6.18), which allowed the inventor to enter licensing agreements with overseas developers. This connection can also be seen in commercial enterprises, where success is determined by the creation of a particular brand associated with a certain quality of product. Box 6.20 described how a small NGO in Cambodia became a successful enterprise by trademarking its products. Although the success of this enterprise depended on a wide range of factors, trademark protection was an enabling part of the business strategy.

POLICY ISSUES

The World Intellectual Property Organization (WIPO) recognizes a number of policy issues related to IPRs for developing countries and has adopted 45 related recommendations under the WIPO Development Agenda.⁷ The recommendations are grouped in the following clusters and cover a number of issues relevant to this discussion, including: Technical Assistance and Capacity Building; Norm-setting, Flexibilities, Public Policy, and Public Domain; Technology Transfer, Information and Communications Technologies (ICTs), and Access to Knowledge; Assessment, Evaluation, and Impact Studies; Institutional Matters, including Mandate and Governance.

Coordination of IPR policies with other innovation policies

Policies seeking to encourage innovation for development are inherently dependent on many other areas of policy and law. Sound policies on education, trade, agricultural input subsidies, farmers' extension services, functioning court systems, and many other elements are integral to the impact of IPR policy on agricultural development (World Bank 2006). Given the interconnectedness of IPR policies with other national policies, and given the wide variety of IPRs affecting agriculture, it is difficult to provide specific policy recommendations. Countries have considerable flexibility (even within TRIPS) to adopt IPR policies that support their own specific needs, and resources exist for them to engage advice on policy changes.

While the appropriate policies will be as diverse as the range of developing countries adopting them, there are common goals for IPR policy supporting agricultural development. These goals support benefits for the poor in access to technology as well as economic development, and they include creating incentives for local innovation, encouraging foreign direct investment, increasing connections between industry and universities or research institutes, facilitating better public-private partnerships, and improving the impact of public agricultural research for the poor.

A functional legal system and extension service

The major precondition for any development of IPRs is a functional legal system under which IPRs and other legally binding agreements, especially contracts, can be enforced. IPRs are a property right, and developing respect for property rights further contributes to social justice and the rule

of law in a country (Cavicchi and Kowalski 2007). As noted, extension services are another precondition; introducing technology and innovation into research is pointless if the outcomes are not transferred to farmers and have no impact on poverty (World Bank 2006). Access to improved products is a major equity issue that must be addressed within individual projects, but for products that have a direct commercial value and will be marketed through the private sector, high royalties may have detrimental effects on access. In this case, IPR legislation can include compulsory licensing mechanisms to increase access and/or reduce the market price.

Environmental issues

Given the wide-ranging impact of IPRs on rural development, it is difficult to provide specific policy recommendations with respect to environmental issues. In most cases, access to improved technologies is expected to improve rural productivity. Productivity improvements may have both positive and negative environmental implications, but the major factor in environmental damage is often the lack of better alternatives. If farmers have better alternatives to current practices, they may be able to take better care of their land, use other resources more efficiently, and contribute to greater environmental sustainability.

Roles of public and private sectors

Since the major rationale for a society to develop IPRs is to provide an incentive for individuals and organizations to invest in innovation by increasing the likelihood of a return, IPRs will directly affect the private sector's involvement in agricultural development. IPRs help connect countries to the global innovation marketplace, which includes both private and public actors. At the same time, giving public institutions responsibility to protect their inventions (as well as license them) increases technology transfer. For this reason, there is a major role for the public as well as the private sector in developing an IPR system that is relevant to national needs.

LESSONS LEARNED

As discussed, a wide range of actions and investments can support the management of IPRs to promote agricultural development. The following sections summarize lessons learned over the years as new strategies in IPR management were used to achieve specific socioeconomic goals.

Legislation has to be passed and enforced but is not sufficient on its own

For low-income countries, the impact of IPR policies is often dwarfed by other factors that have a far more direct effect on innovation, including lagging investment in education, institutional and infrastructural challenges, limited access to financing, and the effects of a range of other business development policies. In response to TRIPS, most countries have passed IPR legislation, but few have gone on to create a culture of innovation. To take this next step, the value of protecting and using innovation must be understood within a society. Government support for innovation (box 6.18) that leads to the development of specific products is one way to demonstrate the value of IPRs to a wide cross-section of society.

Investments related to IPRs are focusing on legal systems of developing countries, based on the understanding that the ultimate impact of any IPR depends on how it is enforced. IPR legislation must be supported by well-functioning institutions (courts, patent offices, and the like) if IPRs are to provide any incentive for innovation, but these critical investments in institutional capacity will have more impact if they are designed to support the interactions of institutions and staff with a rapidly changing IPR environment. Examples include investments in improved capacity to negotiate international treaties, increased support for connections to international networks of professionals, and improved access to research and expertise specifically targeted at IPR issues in developing countries.

Managing property rights in public institutions is critical

In agricultural development, public institutions are central to the development and adoption of innovations that will benefit the world's poor. The role of the public sector in agricultural development has shifted considerably over recent decades: grants are for shorter terms and focus more tightly on projects; engagement with the private sector is increasingly a necessity; and organizations operate in a complex web of IP and regulatory law frameworks. The public sector has lagged considerably in understanding how IPR policies and practices affect its role in development goals.

In public organizations, capacity for IPR management is often a low priority due to resource constraints, limitations on available expertise, and a lack of receptivity among some managers to embrace IPRs as an important component of their development work. This lack of capacity can lead to mistakes and missed opportunities in licensing,

partnership agreements, and strategic management of innovations. From the donors' perspective, lack of IPR management can lead to delays, potentially reduced impact, or sometimes the halting of a project altogether. Conversely, good capacity for IPR management reduces the risk for donors' R&D investments.

Humanitarian licensing models need more work

Licensing language that supports “humanitarian uses” of proprietary technologies permits them to be used for applications important to international development while preserving the technology owner’s commercial market, yet such language is not widely used. Much work remains to be done to move from “model language” to language integrated into working licenses. In addition to IPR provisions, humanitarian use licensing has not yet adequately addressed key issues that repeatedly arise in public-private partnerships, such as liability.

Emerging markets represent a further licensing challenge. So far, many models of humanitarian licenses depend on territorial distinctions. This strategy can leave countries like Brazil, India, and China out of a geographically defined region for humanitarian use, despite the large populations of very poor people in these countries. Legal strategies must be improved to allow the poor in these countries to benefit from technologies that are accessed under humanitarian use licenses.

Flexibility is crucial for future success

One-size-fits-all solutions to IPR management work in limited situations to reduce transaction costs, but over the years it has become clear that most IPR management at the institutional level requires project-specific consideration of the partners, technologies, countries, and many other details. Patent pools, patent commons, clearinghouses,⁸ and model licenses do have great value, but the standardized approach must be complemented with (1) the flexibility to modify the IPR strategy and (2) access to resources to support good strategic management. At the policy level, similarly, the complex differences among countries necessitate careful assessment of tailored IPR policy solutions. As noted, the level of development of a particular industry may warrant some kind of special exemption, particularly if the industry is considered of strategic importance. Such exemptions have most often been seen in the pharmaceutical industry, where exemptions from patent protection for certain drugs or even whole classes of drugs have been used

to promote a local industry. Often these are temporary measures used to assist in strategic development, because they may be considered to be in breach of trade rules, but where a case can be made for a special need, exemptions are an important option to consider.

RECOMMENDATIONS FOR PRACTITIONERS

The recommendations that follow are intended for policy makers as well as practitioners (researchers, managers, and experts who encounter IP issues at the institutional or project level). The recommendations complement the earlier section on “Actions Needed,” which identifies key areas for investment, and should be kept in mind by practitioners as aspects of IPR arise in projects.

Create diverse opportunities for IPR training

Policy makers as well as those at the institutional level can articulate the need to raise awareness of IPR issues across many fields of science and technology. Scientists, engineers, IP managers, government officials, administrators, and many others can benefit from improved understanding of the role of IPRs in agricultural development. The roles that IPRs play, however, and the levels at which they may be encountered are highly diverse, which suggests that a broad range of training options should be considered. For example, box 6.21 details the development of a small enterprise from an NGO-led project to generate income. In this case, IPR awareness training was incorporated into the business planning for the project so that participants would understand the options for protecting any IP. Where a producer organization is involved, such as the Colombia Coffee Federation (box 6.19), the organization’s needs may best be served by identifying specific individuals to receive more specialized training in legal aspects of managing IPRs.

In addition, practitioners can work to ensure that training for particular professionals continues—for example, through engagement with an international community. Training within a South–South context can be particularly valuable for professionals to compare the challenges and solutions related to IPRs in developing countries. Where the establishment of technology transfer offices is being considered, exchange programs with existing offices can be highly beneficial and help to forge long-term links between institutions. Box 6.21 includes examples of investments in training IP professionals with funding from national agencies and donors.

In-depth training. Since its founding in 1998, the World Intellectual Property Organization (WIPO) Academy (<http://www.wipo.int/academy/en/>) has offered a wide range of courses on intellectual property and intellectual property management. In addition to short workshops, the academy provides key support for degree and certificate programs in many developing countries. For example, in 2010 Zimbabwe's African University (in collaboration with WIPO and the African Intellectual Property Organization) graduated the first class of students with a master's degree in intellectual property.

South–South training. The International Intellectual Property Training Institute (IIPTI, <http://iipti.org/>), part of the Korean Intellectual Property Office, trains professionals from Malaysia, Vietnam, and other developing countries within the region. India, South Africa, and Brazil play key roles as regional leaders with the capacity to share IPR knowledge specific to the challenges faced by developing countries.

Targeting diverse professionals. Singapore's Mentorship Funding Scheme brings in qualified patent agents from overseas to mentor and train professionals

at locally based organizations. The Intellectual Property Office of Singapore (IPOS, www.ipos.gov.sg) funds the costs of the program jointly with local organizations. India's National Institute of Intellectual Property Management (NIIPM, www.ipindia.nic.in), in the Ministry of Commerce and Industry, provides training to R&D managers, scientists, legal professionals, patent agents, researchers, doctors, engineers, and others.

Practical knowledge. As part of its bilateral development assistance, the Swedish International Development Cooperation Agency (SIDA, www.sida.se) offers around 100 Advanced International Training Programmes every year targeted at practitioners in the field. These programs frequently cover various IPR issues, including topics such as genetic resources and IPRs, industrial property in the global economy, and intellectual property for least developed countries. The Public Intellectual Property Resource for Agriculture (PIPRA, www.pipra.org) provides training and educational materials (see the *ipHandbook*, www.iphandbook.org) to developing-country scientists, intellectual property managers, and policy makers, with a focus on providing tools for practicing intellectual property.

Source: Authors.

When developing training programs, it is essential to consider that the trained professionals will need some form of employment in a setting where they can use the skills they have learned. Significant resources have been wasted by training people who have no opportunities to apply their knowledge; these misdirected efforts further erode the impression that IPRs should be taken into account. TTOs provide a focus for training individuals and can also employ them in a role that enables them to maintain their involvement in this field.

Promote collaboration among public and private partners

Practitioners working at the institutional level should seek to ensure that institutional IP policies support partnerships between public and private organizations. Such policies might include, for example, a clear set of principles to govern legal relationships with partners, processes to assess risk in partnerships, transparency mechanisms to enable good governance,

clarity around confidentiality issues, and the flexibility for management to implement a strategic IPR management plan. EMBRAPA⁹ in Brazil has created such policies, which enabled it to make licensing deals with a number of multinational companies as well as local seed producers and assume a significant role in soybean variety development (Fuck and Banacelli 2009). Policy makers should continue to explore IP policy options through the lens of creating incentives for public and private collaboration in agricultural development.

Balance in-house capacity with prudent use of external services

The IPR management capacity needed to meet the challenges of coming decades does not exist in sufficient depth, even in industrialized countries. In the private sector, due diligence,¹⁰ the negotiation and drafting of agreements, and strategic IPR management are all regular practices (see IAP 2). Universities, nonprofits, governments, international aid agencies, and philanthropic foundations have excellent expertise in IPRs.

Yet the capacity for both strategic management of IPRs and the day-to-day work of IPR practitioners is not as common as it needs to be. In such cases, external sources are commonly employed for a number of specialized tasks, such as legal opinions on freedom to operate and drafting of patent submissions. Practitioners should consider this option when dealing with specific investments that may have detailed requirements for IPRs. The use of external services may be a much more cost-effective option for certain tasks.

One investment discussed earlier was the creation of a TTO in an institution to serve as a focal point for protecting

IP as well as for licensing. In module 5, TN 5 addresses the role of TTOs in agricultural development, where the creation of a TTO represents an opportunity to foster an enabling environment for innovation and provide opportunities for training (including raising awareness of IPR among scientists and administrators). For some institutions, the costs of creating and managing a technology transfer office, investing in a portfolio of IPRs, and (importantly) having the resources to enforce those IPRs, may not be feasible, and they will need to explore other options for developing capacity in IPR management and training.