Intellectual Property in the 21st Century Series

Technology Transfer and Intellectual Property Issues

Braden A. Everett
Nigel L. Trijillo
Editors

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PREFACE

Technology licensing is an important element of conduct in many industries and has attracted a fair amount of attention in recent years. While vertical industrial structure is quite common, the literature on technology licensing has not paid much attention to this aspect. Considering fixed-fee licensing, the authors show that upstream and downstream markets play important roles for a profitable licensing. The authors of this book also analyze the Technology Transfer (TT) challenges within the new climate regime, in terms of the process of innovation into an existing energy system, the related barriers and the supporting diffusion mechanisms, with the emphasis laid on the emerging opportunities within the new climate regime. Successful practices are also presented and discussed by both the developed and the developing countries in this respect. Also investigated in this book is the potential of transferring and implementing sustainable energy technologies through the Clean Development Mechanism of the Kyoto Protocol in Chile, China, Israel, Kenya and Thailand. Moreover, the available literature Geographical Indications (GIs) are surveyed and related geographical origin systems with particular emphasis on international markets. The authors also examine the matter of intellectual property (IP) and how it bears on the two economic sectors. Consideration is given to the role of patents, trade secrets, trademarks and copyrights and their relative value as strategic tools in the current competitive environment.

Chapter 1 - Climate Change mitigation is considered as a high priority internationally and is placed in the top of the agenda for most politicians and decision makers. The key challenge is that low-carbon sustainable technologies need to be adopted both by developed as well as developing countries, in an effort to avoid past unsustainable practices and being locked

into old, less sustainable technologies. Technology Transfer (TT), as an important feature of both the United Nations Framework Convention on Climate Change (UNFCCC) and its Kyoto Protocol can play a key role. TT can allow countries to move quickly to environmentally sound and sustainable practices, institutions and technologies. Indeed, the transfer or innovation process must be fast enough, to reduce global vulnerability to climate change. The aim of this chapter is to analyse the TT challenges within the new climate regime, in terms of the process of innovation into an existing energy system, the related barriers and the supporting diffusion mechanisms, with the emphasis laid on the emerging opportunities within the new climate regime. Successful practices will be also presented and discussed by both the developed and the developing countries in this respect.

Chapter 2 - This paper presents the results of intensive efforts by extension agents to introduce two new peanut varieties to "beneficiaries" (recipients of direct contact and help by extension workers) in two farming communities in the Philippines. Both communities ("commercialization" communities) were the focus of highly concentrated adoption efforts by extension agents. A nearby "non-commercialization" peanut growing community is included in the analysis as a comparison group. We examine various individual and community-level factors which affect the adoption and sustainability of two new peanut varieties.

This study specifically examines individual farmer characteristics and social network ties, along with social structural influences (group patterns) on the long-term sustainable adoption of new farming technology. We test hypotheses that identify characteristics of individual social network involvement and characteristics of communities which are suspected to influence sustainable adoption of new technology. These social factors are pitted (in empirical and estimated statistical models) against traditional predictors, such as characteristics of farms and farmers and communications channels (e.g. contact with extension agents) to determine those variables that are most influential in sustainable technology transfer.

Logistic regression analysis is applied in two models that consider the adoption of new peanut varieties (UPL Pn10 and BPI Pn9 as dependent variables), which were introduced to the farmers at the same time and proved to be higher yielding than traditional native varieties. The results of the two regression models indicate that influences on the sustainability of the two varieties (analyzed separately) after initial adoption can differ substantially, even between two significantly higher yielding new peanut varieties, depending upon the conditions. With the sustained adoption of BPI Pn9 as the

dependent variable, being an extension program "beneficiary" or even just living in a commercialization program community (or not) are extremely important variables for the probability of long-term sustainable adoption of this higher yielding variety. However, being a "beneficiary," having higher household income, and a larger number of friends who also grow peanut, are found to be very important predictors of long-term adoption of UPL Pn10.

This evidence suggests that, in communities without intensive efforts by extension workers (the vast majority of communities), qualities other than high-yield are sometimes thought to be important by the farmers and these factors have a much greater influence on sustainable adoption. This stresses the importance of improving collaboration between farmers and researchers in research and development to better incorporate farmers' perspectives in the development of new varieties and other types of agricultural technology innovations.

Chapter 3 - Plant Intellectual Property (IP) has evolved only since the 1930s accelerating among developing countries only since the 1990s under a trade agreement. Today only a few developing countries have Plant Variety Protection (PVP), the most common form. The incentive theory is quite clear that plant IP ought to enhance private sector investment and support public breeding, but documentation remains partial. Among developed countries PVP has expanded investment and breeder numbers. Impacts on productivity remain ambiguous, in part due to methodological issues. Few developing countries have sufficient longevity and depth of analysis to allow firm conclusions. In general, private investment and breeder numbers have risen. Access to foreign varieties (especially for fruits and flowers) has improved. But the opportunity for the public sector to generate funds is unclear. Small farmers using traditional methods are little affected. Overall, there have been no major impacts but on a crop/location specific basis PVP system appear to function according to theory providing modest benefits in a time of reduced public breeding investment.

Chapter 4 - We examined the perceptions of a diverse group of managers from 53 companies regarding the counterfeiting problem in China. The results indicate mixed opinions about whether a Chinese consumer knowingly purchases a fake good; the supply of the product outweighs its demand as the main driver for the growth in product counterfeiting; the profit incentive will continue to motivate the supplier; and, desirable counterfeit product attributes (e.g., low price or prestigious image) will continue to entice consumer demand. Many managers' believed that most anti-counterfeiting strategies have little effect on reducing counterfeit trade in China.

Chapter 5 - The Clean Development Mechanism (CDM) is a project-based emissions trading mechanism that the Kyoto Protocol has established and which enables project co-operation between industrialised and developing countries. Under the CDM, sustainable development is considered a country context-specific aspect which differs across countries. Actual CDM practice has shown that projects are largely initiated by the demand for relatively low-cost certified emission reductions, leading to a series of ad-hoc projects, rather than serving the overall host countries' sustainable development needs and priorities. This chapter investigates the potential of transferring and implementing sustainable energy technologies through the Clean Development Mechanism of the Kyoto Protocol in Chile, China, Israel, Kenya and Thailand. Specifically, the adopted approach targets at supporting the particular host countries' Designated National Authorities (DNA) in building the capacity to explore which CDM projects would contribute to the countries' sustainable development needs and priorities, in terms of pre-assessing the most suitable energy technologies in a relative relatively straightforward and transparent way.

Chapter 6 - While vertical industrial structure is quite common, the literature on technology licensing did not pay much attention to this aspect. We show that licensing through fixed-fee in the downstream market is profitable *only if* licensing increases competition in the upstream market. Licensing is *always* profitable in the upstream market if it increases competition in the downstream market. If licensing in the upstream market does not change the downstream market structure, licensing is profitable if the initial technology of the upstream firms is sufficiently close. A monopolist, either in the downstream market or in the upstream market, may have the incentive for licensing its technology.

Chapter 7 - Policy makers in both developed and developing countries have identified Geographical Indications (GIs) as a potential mechanism to assist primarily the agriculture sector in developing countries by reducing supply competition for traditional products while raising/standardizing the quality of those products. The perception seems to be that benefits will flow primarily to smallholders in local communities, but the correctness of that assumption, which is to say the projection of the distribution of benefits from the use of GIs, has to date not been analyzed empirically. Studies investigating the economic impact of well functioning GIs from developed countries are limited. Most of the very few studies available on the impact of GIs for developing countries are semi-analytical in nature or are the works of legal scholars. In this chapter we survey the available literature on GIs and related

geographical origin systems with particular emphasis on international markets. Findings from this study will provide better insights for policy makers in developing countries while negotiating with developed country counterparts at international settings, and also while implementing Trade Related Aspects of Intellectual Property System (TRIPs) mandated GI protection. Further, such a review will help us to identify the issues that need to be addressed in future studies.

Chapter 8 - Issues regarding intellectual property and development are crucial to delineate the basic features of tomorrow's society.

The beginning of this century has been marked by dramatic events that have shaped the choices made in these years. New problems have come up due to cultural differences among countries and to the difficulty in sharing lifestyles in a global environment.

Many of these problems have arisen from poor communication caused by a lack of appropriate communication tools. In addition, the recent consequences of stock exchange speculations have made us reflect on the real value of money and on the need for resource investments that guarantee the rights of individuals and minimize social disparities. Science and technology can play a basic role in this scenario, by contributing to increase equality among countries.

In recent years, the Internet has shown how information that earlier was difficult to obtain can now be accessed easily, and also how the availability of open standards can favor scientific and technical advancement. As queries for obtaining new results are now more and more complex, the possibility of exchanging data and accessing databases quickly and easily has become increasingly important.

The issue of intellectual property needs to be treated very carefully, because it is among the most significant with regard to the diffusion of scientific discoveries. Research is certainly encouraged by the financial return deriving from the legal rights that derive from a discovery. On the other hand, scientific progress is hampered if financial aspects limit the spread of the actual details of a discovery. For this reason, strategies are needed that can provide common objectives for those who make a discovery and for those who use it, thus facilitating the diffusion of science and of its humanitarian applications. In fact, scientific discoveries can derive from a variety of purposes, such as military advancement and medical progress. Access to information about medical discoveries should have no constraints, to ensure that all over the world people can actually exert their rights to health and life. A general diffusion of knowledge would not only help to save human lives,

but would also clearly highlight rationale behind the choices made by each country.

Chapter 9 - This chapter reviews a number of trends related to trade secrets as well as some data concerning how firms use the mechanism in the current competitive environment. The growth of knowledge management applications has led a number of firms to more broadly identify what they consider to be a valuable proprietary knowledge asset. Firms are also sharing vast amounts of data, information, and knowledge throughout e-networks connecting them with collaborators. At the same time, competitive intelligence activity, designed to uncover and take away such assets, has also grown apace. Given both trends, there is increasing interest in using trade secrets to try to keep these knowledge assets safe.

The enactment of the Economic Espionage Act has further accelerated these trends by better defining trade secrets at the federal level and laying out specifics as to how to better manage them. We look at evidence of EEA prosecutions to establish the validity of these trends and other insights that might be drawn. Based on the data, it appears that firms are indeed looking to protect different types of knowledge such as databases, particularly related to customers, and strategic plans. And, of course, it also appears that competitors are interested in relieving them of such knowledge.

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Chapter 1

TECHNOLOGY TRANSFER CHALLENGES WITHIN THE NEW CLIMATE REGIME

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ABSTRACT

Climate Change mitigation is considered as a high priority internationally and is placed in the top of the agenda for most politicians and decision makers. The key challenge is that low-carbon sustainable technologies need to be adopted both by developed as well as developing countries, in an effort to avoid past unsustainable practices and being locked into old, less sustainable technologies. Technology Transfer (TT), as an important feature of both the United Nations Framework Convention on Climate Change (UNFCCC) and its Kyoto Protocol can play a key role. TT can allow countries to move quickly to environmentally sound and sustainable practices, institutions and technologies. Indeed, the transfer or innovation process must be fast enough, to reduce global vulnerability to climate change. The aim of this chapter is to analyse the TT challenges within the new climate regime, in

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terms of the process of innovation into an existing energy system, the related barriers and the supporting diffusion mechanisms, with the emphasis laid on the emerging opportunities within the new climate regime. Successful practices will be also presented and discussed by both the developed and the developing countries in this respect.

Keywords: Technology Transfer; Sustainable Energy; Diffusion Mechanisms; Climate Change; Clean Development Mechanism.

1. INTRODUCTION

The origin of transferring sustainable energy technologies in the context of the international climate co-operation and in particular from industrialised countries to developing countries lies in Article 4.5 of the UNFCCC:

> "The developed country Parties and other developed Parties included in Annex II shall take all practicable steps to promote, facilitate and finance, as appropriate, the transfer of, or access to, environmentally sound technologies and know-how to other Parties, particularly developing country Parties, to enable them to implement the provisions of the Convention. In this process, the developed country Parties shall support the development and enhancement of endogenous capacities and technologies of developing country Parties. Other Parties and organizations in a position to do so may also assist in facilitating the transfer of such technologies." (United Nations, 1992).

The key challenge in this respect is that low-carbon sustainable technologies need to be adopted both by developed as well as developing countries, which requires that developing countries avoid past unsustainable practices and being locked into old, less sustainable technologies. Instead, Technology Transfer (TT) should allow them to move quickly to environmentally sound and sustainable practices, institutions and technologies. The transfer or innovation process must be fast enough to reduce global vulnerability to climate change. In this process the Clean Development Mechanism (CDM) could play a key role as it is focussed on low(er) carbon technology transfers to developing countries.

Schnepp *et al.* (1990, p. 3) define technology transfer as "... a process by which expertise or knowledge related to some aspect of technology is passed from one user to another for the purpose of economic gain." In the case of the

transfer of low carbon technology, the economic benefits that Schnepp *et al.* highlight include the mitigation of the future costs associated with climate change (Ockwell and Lovett, 2005) as well as any financial benefits to the companies involved in the transfer process.

The Intergovernmental Panel on Climate Change (IPCC) report on Methodological and Technological Issues in Technology Transfer (IPCC, 2000, p. 3) contains a broad definition of technology transfer. They define technology transfer in terms of a set of processes "covering the flows of know-how, experience and equipment, for mitigating and adapting to climate change amongst different stakeholders such as governments, private sector entities, financial institutions, NGOs and research/education institutions". Transfer includes diffusion of technologies and technological co-operation across and within countries. The term is usually applied to transfers from North to South, but as Brewer (2007) points out, it neglects the fact that some developing countries have climate friendly technologies which could be transferred from South to North and also from South to South.

According to the IPCC (2000), technology transfer involves the process of "learning to understand, utilise and replicate the technology including the ability to decide which technology to transfer and adapt it to local conditions and integrate it with indigenous technologies".

The term technology transfer refers to both the transfer of knowledge and of the hardware. Knowledge can be comprised of explicit technical scientific knowledge about the principles of how a technology might work. Such transfers also need to involve knowledge about the practicality of the technology to make it work under a range of circumstances. Then, when a technology is being transferred through an organisation, such as a manufacturer, there is tacit knowledge associated with the procedures associated with the organisation. For the host developing country, there are similar knowledge requirements with additional need for people who can interface with the host country organisations and people who can understand and have knowledge about the systems into which the technology is being transferred with its supply and support chains.

Of course, knowledge is not enough for a complete transfer of the technology. There also needs to be consideration of the host country social capital for the skills and expertise needed and host country technology base in terms of manufacturing capacity, supply chain capacity, end-of-life/waste disposal, institutional capacity and sustainability of the whole process and the social networks between them. For the technology innovation to deliver benefits to the communities within the host developing country, it is also

imperative that local organisations buy themselves in the investment and that communities are involved in the technology implementation process.

IPCC (2000) considers only North-South transfers and breaks down some of the elements of the processes involved. It recognises a diversity of stakeholders in the process and identifies the following key actors: project developers; technology owners; technology suppliers; product buyers; recipients; users of the technology; financiers and donors; governments; international organisations; NGOs; and Community Groups. They do not mention research organisations, trade organisations and educational institutions, though these are also important in supporting the transfer process.

IPCC (2000) points out that technology transfer can take place in a number of ways and lists the following: directly between government agencies; within vertically integrated firms; and partnerships across a network of information service providers, business consultants and financial firms.

The IPCC (2000) report also recognises that the pathways for transfer will depend on the country context, sector and type of technology. However, they explicitly mention pathways for interaction, such as government assistance programmes; direct purchases; licensing; Foreign Direct Investment (FDI); joint ventures; co-operative research arrangements; co-production agreements; education and training; and government direct investment.

Moreover, in addition to the ways in which technology transfer can take place and the pathways for transfers, the IPCC report also identifies stages within the processes involved in technology transfer: identification of needs; choice of technology; assessment of conditions of transfer; agreement; implementation; evaluation; adjustment to local conditions; and replication.

It is emphasised that the processes are complex and not necessarily sequential. The first stages, identification of needs and choice of technology as well as the final stages, from agreement to replication, which represent the transfer to the local energy market, are also essential when aiming at technology transfer via the CDM.

The IPCC quite rightly emphasises that there is no fixed prescription for enabling technology transfer and that activities have to be grounded in the stakeholder and country context, as well as the technology scale and type. However, they focus on three main activities, which are considered to make a significant contribution to overcoming barriers, namely capacity building; enabling environment; and mechanisms for transfer.

The process of technology transfer is informed by a range of literature on technology transfer, innovation, development, behavioural change and economic development. This chapter draws on some of this literature and