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OF CLUSTERS AND ASSUMPTIONS: INNOVATION AS PART OF A FULL TRIPS IMPLEMENTATION

*Daniel Gervais**

INTRODUCTION

Studying the Agreement on Trade-Related Intellectual Property Rights (TRIPS)¹ is fascinating for several reasons. Let me mention just two.

First, because TRIPS introduced a high(er) level of intellectual property protection in a number of developing countries around the world, including detailed rules on the enforcement of intellectual property before national courts and customs authorities, it provided an opportunity to examine the impact of the introduction of (property) rights on a variety of intangibles in legal systems from which those rights were absent. This opened a multilevel inquiry. Because the rules contained in TRIPS evolved mostly in the West over two centuries,² an interesting question is whether, and if so how, eighteenth-century European rules, updated in concert with other Western nations until 1989,³ can be successfully integrated into the social, cultural, economic, and legal fabric of dozens of developing nations, and how success is measured in that context. A specific branch of this analysis focuses on the impact of the introduction of enforcement-related notions, such as *quia timet* injunctions⁴ or destruction of potentially useful counterfeit goods in judicial systems where such notions did not exist or

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1. Agreement on Trade-Related Aspects of Intellectual Property Rights, Apr. 15, 1994, Marrakesh Agreement Establishing the World Trade Organization, Annex 1C, Legal Instruments—Results of the Uruguay Round, 33 I.L.M. 1125, 1197 [hereinafter TRIPS].

2. Both the Paris Convention for the Protection of Industrial Property, Mar. 20, 1883, as last revised at the Stockholm Revision Conference, July 14, 1967, 828 U.N.T.S. 305 [hereinafter Paris Convention], and the Berne Convention for the Protection of Literary and Artistic Works, Sept. 9, 1886, as revised at Paris July 24, 1971, 1161 U.N.T.S. 3 [hereinafter Berne Convention], were first drafted, negotiated, and revised in Western Europe, except, in the case of the Paris Convention, for which the revision conference was held in Washington, D.C., in 1911.

3. See DANIEL J. GERVAIS, THE TRIPS AGREEMENT: DRAFTING HISTORY AND ANALYSIS 11–19 (3d ed. 2008). For the most part, TRIPS encapsulates the norms that the demander countries (the European Communities, Japan, and the United States) could agree on among themselves as of late 1989.

4. A court order to prevent an action that has been threatened but has not yet violated the plaintiff's rights. BLACK'S LAW DICTIONARY 800 (8th ed. 2004).

were even frowned upon.⁵ At the normative level, are critiques that emphasize the fact that parallelism—namely the possibility of gradually increasing intellectual property levels as the economy developed, an approach used by most industrialized nations—was not an option for the developing world well-founded?⁶

A second reason is that TRIPS allows us to consider the impact of high(er) levels of intellectual property protection on economic activity. The welfare costs associated with the introduction of higher intellectual property protection are well-known. For example, introducing patent rights in an area in which they previously did not apply (e.g., pharmaceuticals) may lead to steep price increases compared to products whose pricing does not include any monopoly rent. This is what led to the adoption of two important measures by the World Trade Organization (WTO), namely the extension of the transitional period for least-developed nations⁷ to implement pharmaceutical patent provisions of TRIPS until 2016,⁸ and the adoption of a Declaration on TRIPS and Public Health,⁹ and later a formal amendment to the agreement,¹⁰ to allow developing countries to import certain pharmaceuticals¹¹ produced under an export compulsory license.¹²

5. For example, TRIPS Article 46 provides that, [i]n order to create an effective deterrent to infringement, the judicial authorities shall have the authority to order that goods that they have found to be infringing be, without compensation of any sort, disposed of outside the channels of commerce in such a manner as to avoid any harm caused to the right holder, or, *unless this would be contrary to existing constitutional requirements*, destroyed.

TRIPS, *supra* note 1, art. 46 (emphasis added). The italicized exception was introduced to reflect a rule in countries such as Brazil where destruction of otherwise useful goods is allegedly unconstitutional. Indeed, the mandatory destruction of counterfeit goods, even after infringing trademarks have been removed, is a value judgment that all may not share. Such destruction prioritizes the possibility that the goods might be rebranded or otherwise reenter the channels of commerce over the fact that they may have some use for these goods, e.g., charitable organizations.

6. See Daniel J. Gervais, *TRIPS & Development*, in *INTELLECTUAL PROPERTY, TRADE AND DEVELOPMENT* 16 (Daniel J. Gervais ed., 2007).

7. TRIPS distinguishes developing and least-developed nations. The latter group is based on the United Nations list. See United Nations, List of Least Developed Countries, <http://www.un.org/special-rep/ohrls/ldc/list.htm> (last visited Feb. 1, 2009).

8. Council for TRIPS, *Extension of the Transition Period Under Article 66.1 of the Trips Agreement for Least-Developed Country Members for Certain Obligations with Respect to Pharmaceutical Products*, IP/C/25 (June 27, 2002). In another decision, the Council also decided that, “Least-developed country Members shall not be required to apply the provisions of the Agreement, other than Articles 3, 4 and 5, until 1 July 2013, or until such a date on which they cease to be a least-developed country Member, whichever date is earlier.” Council for TRIPS, *Extension of the Transition Period Under Article 66.1 for Least-Developed Country Members*, IP/C/40 (Nov. 30, 2005).

9. World Trade Organization [WTO] Ministerial Declaration on TRIPS and Public Health, Nov. 20, 2001, WT/MIN(01)/DEC/2.

10. WTO General Council, *Amendment of the TRIPS Agreement*, WT/L/641 (Dec. 8, 2005).

11. See GERVAIS, *supra* note 3, at 65–69.

12. This is a derogation to Article 31(f) of TRIPS, which provides that products manufactured under a compulsory license must be “predominantly for the supply of the domestic market of the Member authorizing such use.” TRIPS, *supra* note 1, art. 31(f).

This impact analysis has now moved a few steps forward. Instead of focusing only on the welfare costs (or “IP negatives”),¹³ the question now is, if one assumes that the “Western” level of intellectual property protection enshrined in TRIPS is part of the cause of the successful innovation produced in the West, then *what else* is required if a country is to become a successful innovator (i.e., how to generate “IP positives”)? Put differently, how can opportunities for welfare be created? The focus here is on an element that is essentially absent from the TRIPS text, namely, how a developing country can implement not just an intellectual property policy seen as protecting mostly foreign rights and designed to comply with TRIPS as if this were an end in itself, but rather a comprehensive *innovation strategy*. That is, if intellectual property is an ingredient of the innovation recipe, what are the other ingredients and how should they be used?

Initial analytical efforts¹⁴ emphasized the importance of technology transfer and Foreign Direct Investment (FDI). They also underscored the fact that most of the work on this issue had been done in and for advanced economies. This naturally begged the question of whether such work could be exported to different parts of the world and countries at various stages of development (and, if the answer is negative in at least certain cases, why).

In this essay, I try to make a contribution to the two areas of study outlined above, and especially the second one, by asking how developing countries can optimize their innovation potential. I attempt to show that mechanical implementations of TRIPS are unlikely to generate positives measured in terms of domestic innovation and may generate significant administrative and welfare costs. It will become evident that much more interdisciplinary work is required.

In Part I, I first go back to my earlier work on the “phases” of the TRIPS Agreement to illustrate how the perceived need for analyses of innovation strategies and policies emerged in the TRIPS context and how developing an innovation strategy is now part and parcel of a complete TRIPS implementation or, in some cases, reimplementation.¹⁵ In Part II, I continue

13. Welfare costs may be considered in aggregate and distributed forms. There may be aggregate welfare costs that a given society can bear, but, if those costs disproportionately impact the poor, issues of distributive justice emerge as well.

14. See, e.g., Sir Hugh Laddie, *Foreword* to COMM’N ON INTELLECTUAL PROP. RIGHTS, INTEGRATING INTELLECTUAL PROPERTY RIGHTS AND DEVELOPMENT POLICY (2002), available at http://www.iprcommission.org/papers/pdfs/final_report/CIPRfullfinal.pdf; INTELLECTUAL PROPERTY AND DEVELOPMENT: LESSONS FROM RECENT ECONOMIC RESEARCH (Carsten Fink & Keith E. Maskus eds., 2005); WORLD BANK, THE URUGUAY ROUND AND THE DEVELOPING ECONOMIES (Will Martin & L. Alan Winters eds., 1995); Suzanne Scotchmer, *The Political Economy of Intellectual Property Treaties*, 20 J.L. ECON. & ORG. 415, 435–36 (2004).

15. According to Article 65.(2) of TRIPS, developing countries other than least-developed ones, had until January 1, 2000, to comply with most substantive provisions of the agreement. Almost all of them rushed to “paper comply” with TRIPS, often by adopting model laws. Countries in which intellectual property was mostly new had relatively few experts on hand, and their lawyers, judges, and customs authorities needed significant training. However, there was little time to ask broader questions about how intellectual

along the path traced in an earlier piece¹⁶ in which I considered the work of development economics and its study of the IP/investment/intellectual property nexus, and I consider insights from other social scientists on innovation and creativity and how those might inform our conclusions and recommendations to developing nations and our understanding of the success of some of them at the global innovation game. In this case, I look at work done on National Systems of Innovation (NSIs) and, indirectly, the contribution of systems theory to our understanding of how intellectual property and innovation interrelate.

In Part III, I offer a few thoughts on how intellectual property rules can be implemented as part of a broader innovation strategy.

I. THE PHASES OF THE TRIPS AGREEMENT

A. *The Emergence of TRIPS and the Addition Narrative*

As I have argued elsewhere,¹⁷ TRIPS is now entering its third phase. The first phase (TRIPS 1.0) began with a well-documented¹⁸ push by the U.S. government, supported by the European Commission and the Japanese government, to link intellectual property and trade rules in the World Trade Organization (WTO) as part of the Uruguay Round of Multilateral Trade Negotiations, which ended in Marrakesh in April 1994 with the signing of the Agreement Establishing the WTO, Annex 1C of which is the TRIPS Agreement. Arguably, Phase I did not end with the Uruguay Round. It continued for a few years after the establishment of the WTO, while a number of developing countries (very few of whom had been active participants in the negotiations¹⁹) began to grasp the detailed scope of their TRIPS commitments. Phase I of TRIPS was informed by *addition narratives* according to which adding high(er) levels of intellectual property protection to the laws of developing and least-developed nations (a) would protect the property of intellectual property holders in both rich and poorer countries (and, by generating additional profits, would in turn lead to more research and development); and (b) was necessary to jump-start economic

property rules would affect their economies and even less time to harness emerging scholarship on innovation policies, which itself was only beginning to turn its attention to the developing world. See *supra* note 3 and accompanying text; *infra* note 40 and accompanying text.

16. See Gervais, *supra* note 6.

17. See *id.* at 4.

18. See PETER DRAHOS AND JOHN BRAITHWAITE, INFORMATION FEUDALISM: WHO OWNS THE KNOWLEDGE ECONOMY? (2003); GERVAIS, *supra* note 3, at 11–12; CHRIS MAY, A GLOBAL POLITICAL ECONOMY OF INTELLECTUAL PROPERTY RIGHTS: THE NEW ENCLOSURES? (2000); SUSAN K. SELL, PRIVATE POWER, PUBLIC LAW: THE GLOBALIZATION OF INTELLECTUAL PROPERTY RIGHTS 96–120 (2003); Andrea Koury Menescal, *Those Behind the TRIPS Agreement: The Influence of the ICC and the AIPPI on International Property Decisions*, 2 INTELL. PROP. Q. 155 (2005).

19. See Gervais, *supra* note 6, at 13.

growth in those countries (intellectual property seen as a necessary ingredient of development).

B. *The Attacks on TRIPS and the Subtraction Narrative*

TRIPS 2.0, the second phase in the life of the agreement, began just before the new millennium. It was characterized initially by highly critical analyses of the TRIPS negotiation process, which were said to have been based on coercion of and/or ignorance by (for many developing countries this was a first complete multilateral trade negotiation, a difficulty compounded by the lack of intellectual property experts²⁰), and/or a very bad bargain for the developing world. The Uruguay Round was the first example (on such a scale at least) of sectoral reciprocity. To sum it up rather crudely: the General Agreement on Trade in Services (GATS)²¹ and TRIPS in exchange for agriculture and textiles. In addition, developing countries accepted as part of the Uruguay Round package practically the full range of preexisting General Agreement on Tariffs and Trade (GATT) law, in the form of the Tokyo Round codes (other than the Government Procurement Agreement²²). From this perspective, the “great bargain” seemed unbalanced. There is little debate but initially at least, the TRIPS Agreement reduced the welfare of developing countries²³ and that the TRIPS undertakings²⁴ turned out to be more costly than anticipated for developing countries.

Some critics emphasize a coercion rationale to explain the bargain point to various threats during the Uruguay Round to isolate developing countries from the global trading system and/or to impose punitive unilateral sanctions if they did not accede to the demands of the West.²⁵ Other critics opine that intellectual property was not proper subject matter for the WTO²⁶. An extension of this critique sees the Uruguay Round as the last major multilateral trade negotiations round or at least the last in which the West is

20. Ruth K. Okediji, *The Limits of Development Struggles at the Intersection of Intellectual Property and Human Rights*, in INTELLECTUAL PROPERTY, TRADE AND DEVELOPMENT, *supra* note 6, at 375.

21. General Agreement on Trade in Services, Apr. 15, 1994, Marrakesh Agreement Establishing the World Trade Organization, Annex 1B, Legal Instruments—Results of the Uruguay Round, 1869 U.N.T.S. 183, 33 I.L.M. 1167 (1994).

22. WTO Agreement on Government Procurement, Apr. 15, 1994, available at http://www.wto.org/english/docs_e/legal_e/gpr-94_01_e.htm.

23. See, e.g., F. M. Scherer, *Global Welfare in Pharmaceutical Patenting*, 27 WORLD ECON. 1127, 1127–42 (2004).

24. J. Michael Finger & Philip Schuler, *Implementation of Uruguay Round Commitments: The Development Challenge*, 23 WORLD ECON. 511, 511–25 (2000).

25. Put differently, TRIPS was perceived by a number of developing nations as a lesser evil than isolation and loss of Most Favored Nation (MFN) status. See Bernard Hoekman, *Services and Intellectual Property Rights*, in THE NEW GATT: IMPLICATIONS FOR THE UNITED STATES 113 (S. M. Collins & Barry P. Bosworth eds., 1994).

26. JAGDISH N. BHAGWATI, IN DEFENCE OF GLOBALIZATION 182–85 (2004). Dr. Jagdish Bhagwati’s criticism seems to insist mostly on the fact that TRIPS is not proper subject matter for the WTO.

able to obtain more than it concedes to the developing world, specifically because of the WTO's foray into the atypical area of intellectual property and the developing world's reaction to it.

However, several critiques underscored the absence of empirical data to justify the additional narratives. They also rejected the transfer of (partly) empirically based justificatory theories²⁷ from industrialized to developing nations. In parallel, many of them tried to demonstrate the inadequacy of Western intellectual property norms to protect certain forms of traditional medicinal knowledge or traditional cultural expressions (sometimes referred to jointly as "traditional knowledge").²⁸ This discourse led to a recommendation that TRIPS should be resisted and new norms developed. Phase II was thus informed by *subtraction narratives*: in short, the lesser the impact of TRIPS, the better the situation of developing countries would be.²⁹ Phase II debates also insisted on coalescing to develop alternative norms in other forums, such as the Convention on Biological Diversity³⁰ or insisted on technology transfers to compensate in part for higher levels of rent extraction. Phase II was crucial for our purposes, because it began to confront a fundamental two-prong query, namely, (a) what is the causal relationship between intellectual property protection and FDI and (b) does increased FDI necessarily lead to growth in the recipient economy's innovation and its overall development? This query is important because it targets the major underpinning of much of the prointellectual property discourse.

Not surprisingly, multilateral norm-making designed to increase protection levels (and reduce some of the flexibilities that remain in the TRIPS Agreement) became increasingly difficult. After the outbreak of the debate between several African and Latin American countries, on the one hand, and pharmaceutical companies, on the other, and the companies' ill-advised attempt to enforce patent rights in the face of thousands of patients

27. For example, they rejected intellectual property as a natural property right in ideational goods or as an essential instrumental tool to achieve growth. See Daniel Attas, *Lockean Justifications for Intellectual Property*, in *INTELLECTUAL PROPERTY AND THEORIES OF JUSTICE* 29–56 (Axel Gosseries et al. eds., 2008). This was also seen as the (unwarranted) export of intellectual notions developed in the West, by Immanuel Kant, Georg Wilhelm Friedrich Hegel, John Locke, and others. See, e.g., Madhavi Sunder, *IP*³, 59 *STAN. L. REV.* 257, 283–85, 312–31 (2006). Madhavi Sunder notes, "[i]ntellectual property originalists looking backwards miss the revolutionary social and technological changes afoot in this century. We are witnessing historic changes in our traditional notions of who the creators and innovators of culture are, or ought to be." *Id.* at 331.

28. See generally J. MICHAEL FINGER & PHILIP SCHULER, *POOR PEOPLE'S KNOWLEDGE: PROMOTING INTELLECTUAL PROPERTY IN DEVELOPING COUNTRIES* (2004). On possible solutions within the TRIPS framework, see Daniel Gervais, *Traditional Knowledge & Intellectual Property: A TRIPS-Compatible Approach*, 2005 *MICH. ST. L. REV.* 137, 166.

29. For a detailed discussion of how Egypt's pharmaceutical industry and access to medicines was done more harm than good by TRIPS, see BASMA I. ABDELGAFAR, *THE ILLUSIVE TRADE-OFF: INTELLECTUAL PROPERTY RIGHTS, INNOVATIONS SYSTEMS AND EGYPT'S PHARMACEUTICAL INDUSTRY* 15–23 (2006) (discussing the emergence of TRIPS).

30. Convention on Biological Diversity, <http://www.cbd.int/convention/convention.shtml> (last visited Mar. 15, 2009).

unable to afford antiretroviral therapies, increasing multilateral levels of patent protection became practically impossible, at least for the predictable future.³¹ Initial suggestions in the Doha Round to strengthen the enforcement section of TRIPS and incorporate two treaties negotiated in 1996 under the auspices of the World Intellectual Property Organization (WIPO)³² dealing with copyright on the Internet were all but abandoned. Efforts in WIPO to negotiate new treaties (e.g., on database protection, harmonization of substantive patent law, rights of broadcasters and webcasters) have confronted strong opposition, in particular from developing countries. As an additional sign of the shift brought about by Phase II, while the WTO attempted to address some of the concerns raised by the developing world (e.g., by allowing the TRIPS Council to work on the relationship between TRIPS and the CBD and insisting on documenting compliance with the industrialized countries' technology transfer obligations), WIPO started work on a development agenda³³ designed to align the organization's work with the interests of the developing world. As of this writing,³⁴ work on the agenda was continuing, but its fate and the measurable substantive outcome of the discussions remained uncertain. It is equally important to note, however, that during the second phase, the TRIPS demanders did not abandon their efforts to continue to increase the international intellectual property baseline. Rather, they began using their political ammunition in *bilateral* negotiations to negotiate trade and investment treaties. Recent bilateral agreements signed by the European Union and the United States³⁵ almost always contain "TRIPS Plus" norms, including undertakings by developing countries not to use specific TRIPS

31. Recent measures announced by the governments of Thailand and Brazil tend to demonstrate that the issue is far from resolved. For example, Brazil granted a compulsory licence to import a cheaper generic version of a patented drug to treat AIDS. See Brazil Breaks HIV-Drug Patent After Failed Negotiations with Pharmaceutical Giant Merck, NOTISUR—S. AM. POL. & ECON. AFF., June 8, 2007, available at http://www.accessmylibrary.com/coms2/summary_0286-31364472_ITM.

32. World Intellectual Property Organization [WIPO], Diplomatic Conference on Certain Copyright and Neighboring Rights, Dec. 20, 1996, 35 I.L.M. 65; WIPO, Performances and Phonograms Treaty, Dec. 20, 1996, 36 I.L.M. 65.

33. WIPO General Assembly, *Proposal by Argentina and Brazil for the Establishment of a Development Agenda for WIPO*, WO/GA/31/11 (Aug. 27, 2004); see also WIPO General Assembly, *Report on the Thirty-First (15th Extraordinary) Session*, 33–37, WO/GA/31/15 (Oct. 5, 2004). This proposal was joined by twelve other member states (Bolivia, Cuba, Dominican Republic, Ecuador, Egypt, Iran, Kenya, Peru, Sierra Leone, South Africa, Tanzania, and Venezuela). See WIPO, *Report of the First Session of the Provisional Committee on Proposals Related to a WIPO Development Agenda*, Provision 2 & Annex, PCDA/1/6 (Feb. 20–24, 2006).

34. This essay went to press in March of 2009.

35. See Office of the U.S. Trade Representative, Bilateral Trade Agreements, http://www.ustr.gov/Trade_Agreements/Bilateral/Section_Index.html (last visited Jan. 28, 2009); Peter K. Yu, *The International Enclosure Movement*, 82 IND. L.J. 827, 867–68 (2007).

flexibilities.³⁶ The measures to “rebalance” TRIPS multilaterally do not seem very effective in bilateral discussions.

C. Ongoing Implementations and Reimplementations: The Calibration Narrative

TRIPS has now entered a third phase (TRIPS 3.0), one that is informed by *calibration narratives*. TRIPS is no longer seen rather simplistically as a huge negative, and the prospect that TRIPS might be somehow “repealed”³⁷ is widely seen as unrealistic. The components of this calibration process are many: (a) the recognition that developing countries are very different and consequently may need different implementations of TRIPS, instead of “cookie cutter” norm implants; (b) the recognition that below certain developmental thresholds, the introduction of high levels of intellectual property protection will not generate positive impacts (as was evidenced by the extension of transitional periods available for least-developed WTO members); (c) the recognition that intellectual property protection is necessary to develop innovation and foreign direct investment (including technology transfers) but in itself is insufficient to achieve developmental objectives; (d) consequently, the recognition that any complete TRIPS implementation must form part of a broader strategic initiative; and finally (e) the recognition that the sudden introduction of high levels of protection and enforcement may induce significant welfare impacts, which must also be managed.

This multifaceted calibration effort is a reflection of the fact that the negotiation of the TRIPS Agreement incorporated intellectual property in

36. See SISULE F. MUSUNGU & CECILIA OH, THE USE OF FLEXIBILITIES IN TRIPS BY DEVELOPING COUNTRIES: CAN THEY PROMOTE ACCESS TO MEDICINES? 8 (2005), available at <http://www.who.int/intellectualproperty/studies/TRIPSFLEXI.pdf>.

37. See, e.g., Martin Kohr, *The WTO, the Post Doha Agenda and the Future of the Trade System: A Development Perspective*, THIRD WORLD NETWORK (2002), <http://www.twinside.org.sg/title/mkadb.htm>. However, most strong critiques of the agreement, generally on public health grounds, recognize that it is here to stay. See, e.g., Junaid Subhan, *Scrutinized: The TRIPS Agreement and Public Health*, MCGILL J. MED. 152, 152–59, available at <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2323529#n8-mjm0902p152>. As Junaid Subhan notes,

Criticism of the TRIPS agreement arises on a number of levels. There are those who criticize the implementation of its provisions in sovereign countries, there others that criticize the provisions of the TRIPS agreement and there are still others who criticize its very existence. The subsequent critique of the TRIPS agreement will be made through the lens of the following neutral principles in order to make the recommendations as relevant and applicable to the current situation as possible:

- Access to essential medications is a fundamental human right.
- Intellectual property legislation has been a driving force behind innovation for commercial purposes.
- The world’s primary source of novel and generic drugs has been and will continue to be the commercial pharmaceutical industry.
- *The TRIPS agreement will not be repealed in the near future and will continue to shape international intellectual property law.*

Id. (emphasis added) (footnotes omitted).

the trade realm, as one of many areas of trade negotiations. In the trade world, what matters more is not the protection of private property interests, but rather the protection of income and investment.³⁸ Property protection becomes, as it were, a means to an end. As a result, intellectual property now has to “square off” against other trade-related rights. At the same time, all trade-related rights, including intellectual property, must fight normative battles with non-trade-related rights, such as the right to health and other human rights. These non-trade-related rights and their intersection with intellectual property are recognized in Articles 7 and 8 of TRIPS, both of which were also specifically mentioned in the Doha Declaration of 2001. Incorporating the constraints considered until recently exogenous to trade, such as human rights,³⁹ arguably will be one of the main challenges of the WTO dispute-settlement system in enforcing TRIPS and other trade-related norms and standards.⁴⁰

II. INTELLECTUAL PROPERTY, INNOVATION, AND KNOWLEDGE

The title of this part indicates the breadth of the analytical challenges (of which I can only offer a *tour d’horizon*). In a nutshell, they boil down to this: how does intellectual property affect the flows of knowledge, and how does knowledge correlate with innovation? Related questions involve finding (and using) appropriate metrics and parsing exogenous constraints. In terms of output, figuring out how to adjust or calibrate an intellectual property regime to foster innovation (the whole project could be termed developing a national innovation strategy) may be the hardest part. Most WTO members likely will endeavor to cabin any such calibration within the parameters of TRIPS.⁴¹

The backdrop for any calibration effort is likely to be the need to grow an economy increasingly based on knowledge rather than physical, capital, or natural resources. Decreasing returns on physical capital in the most industrialized countries and the outsourcing of manufacturing and, to a certain degree, product development, mean that the only real engine of growth will be technological.⁴²

38. In other words, as the three-step test filter for national exceptions to copyright, design, and patent rights—and to a certain extent, trademark rights—makes plain, what matters most is not whether an infringement has taken place but whether actual or potential revenue was lost as a result. The protection of rights is therefore, indirectly at least, tied to a new harm to the market test.

39. See Daniel J. Gervais, *Intellectual Property and Human Rights: Learning to Live Together*, in *INTELLECTUAL PROPERTY AND HUMAN RIGHTS 3* (Paul L. L. Torremans ed., 2d ed. 2008).

40. See GERVAIS, *supra* note 3, at 142–44.

41. See Daniel J. Gervais, *Epilogue: A TRIPS Implementation Toolbox*, in *INTELLECTUAL PROPERTY, TRADE AND DEVELOPMENT*, *supra* note 6, at 527–45.

42. This is a point made as far back as 1957 by Robert M. Solow. In his 1987 Nobel Prize Lecture, he noted,

[T]he main result of that 1957 exercise was startling. Gross output per hour of work in the U.S. economy doubled between 1909 and 1949; and some seven-eighths of that increase could be attributed to ‘technical change in the broadest

A. National Systems of Innovation

Work on NSIs, the systematic analysis of the factor that allows a country or region to be globally innovative, considered as a discrete field of study, emerged in the 1980s, pioneered by Bengt-Åke Lundvall,⁴³ a professor at the Department of Business Studies at Aalborg University of Denmark and at Sciences-Po in Paris, France. One of its first foci was naturally education: innovators in a number of fields generally need the intellectual tools to understand the existing state of technology in a given field to be able to innovate.⁴⁴

1. Knowledge, Innovation, and Education

The emphasis on education in NSI analyses seems solidly anchored in the Humboldtian tradition of integrating research and education.⁴⁵ In modern terms, this translates as education aimed at generating innovators (and innovation). Indeed, at the root of any innovation system is a broader knowledge system, which “enhances the overall performance of a society by producing and distributing knowledge resources, which then are used by the other systems of a society to support their processes and performances.”⁴⁶

Countries developing or revising an NSI should thus devise both long-term plans to ameliorate education/research linkages and short-term plans to ensure that “human capital” is available to fuel innovation. This includes

sense’ and only the remaining eight could be attributed to conventional increase in capital intensity.

Robert M. Solow, 1987 Nobel Prize Lecture: Growth Theory and After (Dec. 8, 1987), available at http://nobelprize.org/nobel_prizes/economics/laureates/1987/solow-lecture.html (referencing Robert Solow, *Technical Change and the Aggregate Production Function*, 39 REV. ECON. & STATS. 312, 312–20 (1957)).

43. See generally BENGT-ÅKE LUNDVALL ET AL., NATIONAL SYSTEMS OF PRODUCTION, INNOVATION AND COMPETENCE BUILDING (2002).

44. See generally *id.*

45. See generally M. István & M. Fehér, *The Humboldtian Idea of a University: The Bond Between Philosophy and the Humanities in the Making of the Modern University*, 28 NEOHELICON 33 (2001). For a more policy-oriented take, see ORG. FOR ECON. CO-OPERATION AND DEV., EDUCATION POLICY ANALYSIS (2004) [hereinafter OECD REFORM]. Interestingly, Alexander von Humboldt also wrestled with creativity and “came up with the concept of internalized form—fundamentally the concept of free creation within a system of rule—in an effort to come to grips with some of the same difficulties and problems that Cartesians faced in their terms.” NOAM CHOMSKY & MICHEL FOUCAULT, THE CHOMSKY-FOUCAULT DEBATE ON HUMAN NATURE 12 (The New Press 2006) (1971) (quoting Noam Chomsky). René Descartes attributed to the “mind” a range of phenomena, including creativity, that he could not explain according to the mechanical or physical principle. See René Descartes, *Discourse on the Method*, in SELECTED PHILOSOPHICAL WRITINGS 44 (John Cottingham et al. trans., 1988).

46. Elias G. Carayannis & David F. J. Campbell, “Mode 3”: *Meaning and Implications from a Knowledge Systems Perspective*, in KNOWLEDGE CREATION, DIFFUSION, AND USE IN INNOVATION NETWORKS AND KNOWLEDGE CLUSTERS: A COMPARATIVE SYSTEMS APPROACH ACROSS THE UNITED STATES, EUROPE, AND ASIA 1, 11 (Elias G. Carayannis & David F. J. Campbell eds., 2006) [hereinafter KNOWLEDGE CREATION].

using foreign educational resources.⁴⁷ It is not overstating the point to say that, to compete in a knowledge- and technology-intensive economy, ideally everyone should have a basic understanding of science, even in high school. While the aim is not to turn every citizen into a scientist or innovator, everyone should be reasonably conversant in science to comprehend an increasingly technology-dependent environment and thus to participate effectively in debates about major social issues, many and probably most of which have a scientific component.⁴⁸ For the same reason, it may be desirable to make university education the rule, rather than the exception for an elite.⁴⁹

2. Clusterization and Global Networking

If education is a central consideration, it quickly became evident in NSI-related research that much more was required to optimize the innovation output of a country or region.⁵⁰ One of the key findings was the need for government to assist in the formation of clusters⁵¹ or networks of innovation, including universities, private laboratories, and access to venture capital and other incubation tools.⁵² This allows products to move more quickly from basic research to prototyping, but also, and perhaps more importantly, creates spillover effects and a dissipation of knowledge, allowing knowledge that a university, company, or other entity is unable or unwilling to use at a given point in time to be used by others.⁵³ Publicly funded research may also be used locally more effectively in this way.⁵⁴

47. See OECD REPORT, *supra* note 45, at 89–115.

48. Climate change, energy production, and medical research (on ethical and other levels) come to mind as current examples.

49. This debate is going well past the boundaries of this essay. If education is the intellectual foundation for much innovation, it is not a true *sine qua non*, because innovators without formal education are common. Others have emphasized that education might in fact limit creativity by imposing strict intellectual self-discipline. As Jean Piaget noted, the “principle goal of education is to create men who are capable of doing new things, not simply of repeating what other generations have done—men who are creative, inventive and discoverers.” JEROME S. ARCARO, *QUALITY IN EDUCATION: AN IMPLEMENTATION HANDBOOK* 51 (2006) (quoting Jean Piaget).

50. See GERVAIS, *supra* note 6, at 52–59, 545–46.

51. Clusters are defined here as “concentrations of interconnected companies, specialized suppliers, service providers, firms in related industries, and associated institutions.” Max von Zedtwitz & Philip Heimann, *Innovation in Clusters and the Liability of Foreignness of International R&D*, in *KNOWLEDGE CREATION*, *supra* note 46.

52. See DANIEL ROUACH & JEFF SAPERSTEIN, *CREATING REGIONAL WEALTH IN THE INNOVATION ECONOMY: MODELS, PERSPECTIVES, AND BEST PRACTICES* 331–42 (2002).

53. See EVERETT M. ROGERS, *DIFFUSION OF INNOVATIONS* 333 (5th ed. 2003).

54. The Bayh-Dole Act, Pub. L. No. 96-517, 94 Stat. 3015, 3015–28 (1980) (codified as amended at 35 U.S.C. §§ 200–212 (2000 & Supp. II 2002); see Gary Pulsinelli, *Share and Share Alike: Increasing Access to Government-Funded Inventions Under the Bayh-Dole Act*, 7 *MINN. J. L. SCI. & TECH.* 393 (2006). Gary Pulsinelli notes that prior to the Bayh-Dole Act, “[t]he general aim of the agencies was to achieve widespread dissemination of the results obtained in laboratories operating with federal money and to encourage wide development and usage through dedication to the public domain and nonexclusive licenses.” Pulsinelli, *supra*, at 401. He then notes that “[t]he Act encourages small businesses and

The state-academia-industry triple helix⁵⁵ is widely seen as the key to a successful NSI. Such a model insists on human capital, which loops back to the central role of education and training.

Government-industry arrangements typically cut across industrial sectors and link multiple clusters (to optimize knowledge spillover and reuse), and for the same reasons, little attention is usually paid to a priori synchronisation of the interaction between the three helices because the system is designed to be dynamic.⁵⁶ Whether in Beijing or Bangalore, Silicon Valley or Sophia-Antipolis, knowledge clusters consisting of universities, research centers, industry, and government support create a technology pull and increase production and, as noted above, spillovers of knowledge, thereby increasing its usage.⁵⁷ They are also better at absorbing external knowledge and attracting funding.⁵⁸ This is related to what Professor Andrew Hargadon termed “idea management strategies” designed to “link people, ideas, and objects together in ways that form effective and lasting communities and technologies.”⁵⁹

An NSI thus aims to enhance the global competitiveness of each country or region,⁶⁰ and, in economic turns, ensures that the country or region is an engine of growth of what has become largely a knowledge-based economy.⁶¹ In fact, studies tend to correlate higher levels of general

nonprofit funding recipients to patent the results of government-sponsored research by allowing them to retain title to the inventions if they diligently file patent applications and promote commercial development of the inventions.” *Id.* at 403.

55. See generally Henry Etzkowitz & Loet Leydesdorff, *The Dynamics of Innovation: From National Systems and “Mode 2” to a Triple Helix of University-Industry-Government Relations*, 29 RES. POL’Y 109 (2000).

56. See David F. J. Campbell, *The University/Business Research Networks in Science and Technology: Knowledge Production Trends in the United States, European Union, and Japan*, in KNOWLEDGE CREATION, *supra* note 46, at 67, 73.

57. Zedtwitz & Heimann, *supra* note 51, at 102.

58. See *id.*

59. ANDREW HARGADON, *HOW BREAKTHROUGHS HAPPEN: THE SURPRISING TRUTH ABOUT HOW COMPANIES INNOVATE* 6 (2003). Another commentator suggests that “a network-based idea management tool can be understood as a mechanism for transforming tacit, intangible human capital into explicit, tangible structural capital. Intellectual capital in explicit form can be managed, manipulated, and exposed to and combined with other tangible and intangible resources and objects—people, funds and other ideas, for example. This is the intended function of idea management.” John C. Stratton, *Idea Work Style—A Hypothetical Web-Based Approach to Monitoring the Innovative Health of Organizations*, in WSS 2003: WI/IAT 2003 WORKSHOP ON APPLICATIONS, PRODUCTS AND SERVICES OF WEB-BASED SUPPORT SYSTEMS 69, 70 (J. T. Yao & Pawan J. Lingras eds., 2003).

60. See Stefan Kuhlmann, *Future Governance of Innovation Policy in Europe—Three Scenarios*, 30 RES. POL’Y 953, 954 (2001).

61. LUNDVALL ET AL., *supra* note 43, at 221–28; see also Helga Nowotny et al., *Rethinking Science*, in KNOWLEDGE CREATION, *supra* note 46, at 39, 43 (“Not only has knowledge, in the form of world brands and massive (and instantaneous) data flows, become the key resource in the global economy, but scientific knowledge, more narrowly defined, has also been both more highly integrated than ever before and also more widely distributed.”).

knowledge with a high-quality, dynamic democracy.⁶² This is nothing new, but the scale of changes may induce more than strictly quantitative effects and certainly brought new players to the table:

Research communities have always been virtual communities that cross national and cultural boundaries. But their dynamics have been transformed. Once interaction within these communities was limited by constraints both physical (the ability to meet) and technical (letters and telephones); now, as a result of advances in information and communication technologies, interaction is unconstrained—and instantaneous. . . . This shift has been intensified by . . . new kinds of knowledge organization—such as thinktanks, management consultants, and activist groups.⁶³

Indeed, the research on the clusterization of innovation has factored in a new reality, namely, globalization. Companies often have or work with labs in several countries, and knowledge-production teams need not (any longer) be collocated. While this allows us to consider clusters and innovation functionally rather than geographically, it poses new challenges to domestic policymakers, whose views are almost necessarily territorial, reflecting the nation-state structure.⁶⁴ The ability of research and development to move is both a challenge and an opportunity, however, allowing new entrants to become players much more rapidly.⁶⁵

At this juncture, however, as Maz von Zedtwitz and Philip Heimann rightly note, “innovation is not internationalized uniformly.”⁶⁶ Basic research is highly concentrated, which indirectly supports the clusterization approach to research.⁶⁷ Data from 2002 showed that 87.4% of basic scientific research was concentrated in Europe, Japan, and the United States.⁶⁸ The development phase was slightly less concentrated with 73.2% of activity in the triad.⁶⁹ This is changing rapidly as China builds major development centers around Shanghai and research centers around Beijing.⁷⁰

62. See FREEDOM HOUSE, *FREEDOM IN THE WORLD 2004: THE ANNUAL SURVEY OF POLITICAL RIGHTS AND CIVIL LIBERTIES* (2004), available at <http://www.freedomhouse.org/template.cfm?page=130&year=2004> (“[A]mong upper income countries that derive the vast proportion of their wealth from enterprise and knowledge, 38 are Free and only 3 are Partly Free. Societies that are most successful in producing wealth are almost uniformly Free.”).

63. Nowotny et al., *supra* note 61, at 41–42.

64. One could engage in a post-Westphalian analysis of the regulation of innovation and technology, and how a country can take strategic advantage of this tectonic shift, but this is neither the place nor the proper context.

65. LUNDVALL ET AL., *supra* note 43, at 3–4.

66. Zedtwitz & Heimann, *supra* note 51, at 101, 104.

67. See *supra* notes 50–56 and accompanying text.

68. Maximilian von Zedtwitz & Oliver Gassmann, *Market Versus Technology Drive in R&D Internationalization: Four Different Patterns of Managing Research and Development*, 31 RES. POL’Y 569, 573 (2002).

69. Zedtwitz & Heimann, *supra* note 51, at 105.

70. Maximilian von Zedtwitz et al., *Managing Foreign R&D in China*, RES. & TECH. MGMT., May–June 2007, at 19, 19.

The development of local innovation clusters around the world may also change science itself. Innovation is both a race to find new globally competitive innovations and to adapt existing innovation to local palates. Epistemologically, the idea of science as coming from “nowhere,” thus morphs into multiple views of science.⁷¹ There is no longer a purely objective, “reductionist” view of pure science,⁷² as the increasingly multinational and multicultural patterns of research and development bring about a dialogic process that gives science (or, more precisely, the outcomes of research efforts) a subjective view anchored in the values and expectations of each society, country, or region.⁷³ Naturally, social and cognitive barriers may need to be overcome, but this process in itself may be creativity-inducing.⁷⁴ Preexisting endogenous constraints become less significant, and regional autonomy (to determine its own methodology) is increased. Arguably, this will be a positive only if the “right” decisions have been made. How does one know? If the initial policy objective were to increase local innovation, one could argue that innovative output appropriately measures success.

On a different level, but one with a similar causation pattern, science has questioned old taxonomies of scientific disciplines.⁷⁵ New interdisciplinary research can emerge faster owing to the fresh look that a massive input

71. See CHOMSKY & FOUCAULT, *supra* note 45, at 42.

72. Indeed, the de-Westernization of scientific research has several deeper societal impacts. It might challenge, for instance, what Michel Foucault calls the “apparatuses of truth.” “Each society,” he writes, “has its regime of truth . . . centered on the form of scientific discourse and the institutions that produce it.” *Id.* at 168.

73. See *id.*

74. See Mark Lorenzen & Volker Mahnke, *Global Strategy and the Acquisition of Local Knowledge: How MNCs Enter Regional Knowledge Clusters* 5 (DRUID Working Paper No. 02–08, 2002), available at <http://ideas.repec.org/p/aal/abbswp/02-08.html>. (“The costs of exchanging such knowledge are relatively low within clusters, allowing for frequent face-to-face meetings and on-site observations. Horizontal knowledge spillovers in clusters occur between firms that share non-strategic knowledge or, alternatively, engage in strategic R&D alliances. Hence, direct vertical or horizontal relations between firms may yield both transfers of existing knowledge, and joint creation of new knowledge. However, both these types of processes are much more complex than transferring bits of information, and hence necessitate firms to build mutual trust and common cognitive platforms. This may take considerable time and investments.” (citations omitted)).

75. To quote Heinz von Foerster,

I would recommend to drop disciplinarity wherever one can. Disciplines are an outgrowth of academia. In academia you appoint somebody and then in order to give him a name he must be a historian, a physicist, a chemist, a biologist, a biophysicist; he has to have a name. Here is a human being: Joe Smith—he suddenly has a label around the neck: biophysicist. Now he has to live up to that label and push away everything that is not biophysics; otherwise people will doubt that he is a biophysicist. If he’s talking to somebody about astronomy, they will say ‘I don’t know, you are not talking about your area of competence, you’re talking about astronomy, and there is the department of astronomy, those are the people over there,’ and things of that sort. Disciplines are an after effect of the institutional situation.

Interview with Heinz von Foerster, in 4 STAN. ELEC. HUM. REV. (1995), <http://www.stanford.edu/group/SHR/4-2/text/interviewvonf.html>.

from new players, with new cultural and social perspectives, brings to science.⁷⁶ For example, an undeniable net positive of the Internet in that context is that it allows science to flow worldwide instantaneously. Researchers with access to the Internet can access patent applications and both current and past patents from major intellectual property offices, often at no cost.⁷⁷ Many scientific journals are available online, though not always for free.⁷⁸ The Internet also feeds the various social imaginaries and provides new images of what is, and of what is possible. This is crucial because, as Charles Taylor's insightful analyses have shown,⁷⁹ a perception of what is possible widens the array of norms that are realizable. In other words, people do not fight for utopias, but can move into action for something they know they can achieve.

The Internet and, more broadly, digital technology, has induced another innovation-related shift. Scientists and artists used different tools and generally found it difficult to communicate, let alone work together. Parallels were sometimes mentioned (between mathematics and music, for example), and sometimes realized by geniuses (Leonardo da Vinci), but those were rare, mostly theoretical discussions. This has now changed dramatically and suggests that one of the foci of education should be biased toward computer technology,⁸⁰ because code and computers have become a horizontal link between art and science. To take a simple example, both artists and scientists (engineers) use three-dimensional design software. The future of innovation could bring art and science much closer together.

On the negative side of the globalized innovation ledger, however, studies also show that physical proximity of researchers facilitates the exchange of tacit knowledge.⁸¹ It is also harder to regulate decentralized science. National bans on certain types of research are easily circumvented, and companies can use their hydra-like structure to escape various tax,

76. *See id.*

77. *See, e.g.,* U.S. Patent & Trademark Office, <http://patft.uspto.gov> (last visited Jan. 24, 2009).

78. This is a different debate, but, unless voluntary access mechanisms can be put in place though price discrimination or otherwise, a digital version of the appendix to the Berne Convention, which in its current form allows developing countries to issue compulsory reproduction and translation licenses of copyrighted material, might be an interesting option. It is unclear that the appendix would allow countries to use it for material that has been accessed and licensed online. A number of suggestions, some of them helpful, have been made in the Access to Knowledge (A2K) context. *See, e.g.,* Treaty on Access to Knowledge art. 3-12(b)(vi) (Draft May 9, 2005), available at http://www.cptech.org/a2k/a2k_treaty_may9.pdf. The proposal focuses perhaps too narrowly on administrative issues and education in the traditional sense.

79. *See generally* CHARLES TAYLOR, MODERN SOCIAL IMAGINARIES 15 (2004).

80. A good example is the Montreal-based Society for Art and Technology. Using the design of artist Luc Courchesne's "Panoscope," a three-dimensional spherical installation, the Canadian Space Agency was able to solve an issue concerning the robotized arm of the U.S. Space Shuttle (sometimes referred to as the "Canada arm"). *See* Society for Arts and Technology, http://www.sat.qc.ca/article.php?lang=en&id_article=479 (last visited Mar. 23, 2009).

81. *See* Zedtwitz & Heimann, *supra* note 51, at 106.

disclosure, or other regulatory constraints, in what Robert Reich terms the age of “supercapitalism.”⁸²

3. Steering Innovation

An NSI can and should not direct, but rather it should *steer* innovation based on a realistic assessment of a country’s strengths, resources, constraints, and capabilities. This is based on the assumption that the government has the ability and vision to play a pastoral role—to set priorities and, especially in countries where innovation is nascent, to use a top-down approach without endangering worthwhile grassroots or bottom-up initiatives.

Universities have a central role to play. As public funding of research is increasingly inadequate,⁸³ higher education institutions and public research centers have been pushed to look for other sources of funding, including patents.⁸⁴ The delicate balance is how far down a vertical axis of specificity a government or funding agency should direct the research.⁸⁵ While setting areas of priority is almost inevitable and may in fact be desirable, there are costs associated with separating scientific research into discrete, sometimes outdated fields.⁸⁶ From this perspective, an optimal research funding program should be mostly processual in nature and designed to ensure quality research rather than to deliver specific government-directed outputs.

Universities and scientists thus face a well-known dilemma. They need funding, and they know that the intellectual property they produce is increasingly valuable. Yet the question of the universities’ obligations toward the broader community and the potential negative effects of limiting access (via licensing policies or otherwise) to university research are real. The tendency to “title” every research output challenges the idea of science as a public good.⁸⁷ An argument often heard in this context is that, if “intellectual is valuable, it cannot be given away free by open publication in peer-reviewed journals or at scientific conferences”;⁸⁸ however, timing can greatly alleviate this concern by ensuring that the patent application is filed

82. See generally ROBERT B. REICH, *SUPERCAPITALISM: THE TRANSFORMATION OF BUSINESS, DEMOCRACY, AND EVERYDAY LIFE* (2007).

83. In the light of the points made above and the increasing displacement of research and innovation to developing countries, this may be short-sighted policy indeed for industrialized countries. See Gervais, *supra* note 6, at 38–41.

84. For the United States, this is partly mandated by federal law. See generally David C. Mowery et al., *The Growth of Patenting and Licensing by U.S. Universities: An Assessment of the Effects of the Bayh-Dole Act of 1980*, 30 RES. POL’Y 99 (2001).

85. See Nowotny et al., *supra* note 61, at 45 (“[T]he tendency of government to define its role in research funding in quasi-commercial rather than fiduciary terms [is a concern]. This attempt to align public-policy with market priorities in research policy . . . is likely to reduce diversity and creativity.”).

86. See *supra* note 71 and accompanying text.

87. See Nowotny et al., *supra* note 61, at 45–46.

88. *Id.* at 46.

prior to the first public disclosure in order to maintain the invention's novelty.⁸⁹ Even so, there is an unquestionably greater risk of enclosure of scientific knowledge.⁹⁰

Before concluding this section, two additional remarks may be useful. First, on a human level, the emphasis on commercially successful outcomes will steer funds toward more "promising" projects and toward researchers with a desire to pursue those projects, potentially harming the culture of collegiality.⁹¹ Second, any complete policy should include a feedback loop to determine its effectiveness. Innovation-based competitiveness is difficult to measure due to its multifactorial nature.⁹² Among the measurable deltas would be the increase in patent applications and the economic activity (jobs might be a useful indicator) generated in R&D. Patent citations are useful,⁹³ but "we still lack systematic information about the commercial revenues or profits generated by patents."⁹⁴

To be complete, our overview of NSI issues as they relate to intellectual property should at least note two potential negatives or complexities of an NSI. The first is the impact of social norms; the second, the real risk of adopting intrinsically ineffective measures.

89. Under U.S. law, disclosure less than twelve months before the application is filed is acceptable under certain conditions. See 35 U.S.C. § 102 (2000). In most other countries, absolute novelty applies, and any disclosure before the application destroys novelty.

90. See Keith E. Maskus & Jerome H. Reichman, *The Globalization of Private Knowledge Goods and the Privatization of Global Public Goods*, 7 J. INT'L ECON. L. 279, 283 (2004) ("As private interests take precedence over public concerns, moreover, we argue that the proliferation of exclusive rights could raise fundamental roadblocks for the national and global provision of numerous other public goods, including scientific research, education, health care, biodiversity, and environmental protection. The architects of the new system evidently have paid little attention to these issues, believing that a clear specification of strong property rights could establish appropriate incentives for private development of modalities to advance these and other public activities. In our view, the greater likelihood is that the privatization of public-interest technologies could in many cases erect competitive barriers, raise transactions costs and produce significant anti-commons effects, which tend to reduce the supply of public goods related to innovation as such, and also to limit the capacity of single states to perform essential police and welfare functions not otherwise available from a decentralized international system of governance." (footnotes omitted)).

91. Nowotny et al., *supra* note 61, at 45–46.

92. The well-known World Competitiveness Report published by IMD references 331 variables (criteria). See IMD, WCY Online Version, http://www.imd.ch/research/publications/wcy/wcy_online.cfm (last visited Jan. 24, 2009).

93. See generally Francis Narin et al., *The Increasing Linkage Between U.S. Technology and Public Science*, 26 RES. POL'Y 317, 318, 322, 328 (1997); Bronwyn H. Hall et al., *The NBER Patent Citations Data File: Lessons, Insights and Methodological Tools* (Nat'l Bureau of Econ. Research, Working Paper No. 8498m, 2001), available at <http://www.nber.org/papers/w8498.pdf>. For a more critical analysis, see generally ADAM B. JAFFE, INNOVATION AND ITS DISCONTENTS: HOW OUR BROKEN PATENT SYSTEM IS ENDANGERING INNOVATION AND PROGRESS, AND WHAT TO DO ABOUT IT (2004).

94. Campbell, *supra* note 56, at 86.

4. Social Norms and Innovation

Even with good educational and physical resources, innovation may be foreign to the groupthink and memes of a community, society, or country. As Everett Rogers puts it,

Norms are the established behavior patterns for the members of a social system. Norms define a range of tolerable behavior and serve as a guide or standard for the behaviour of members of a social system. The norms of a system tell individuals what behavior they are expected to perform.

. . . The most innovative member of a system is very often perceived as a deviant from the social system and is accorded a status of low credibility by the average members of the system. This individual's role in diffusion (especially in persuading others to adopt the innovation) is therefore very limited.⁹⁵

He adds, however, that “[c]ertain other members of the system function as opinion leaders. They provide information and advice about innovations.”⁹⁶

This is of course difficult to change. It takes time. But, a proactive government may signal the positive value of innovation, at least in less threatening fields.⁹⁷ The aim is to create and/or facilitate the emergence of what Michel Foucault referred to as the “conditions for radical innovation,” namely the “common social and intellectual base for the creations of scientific imagination.”⁹⁸

5. Inefficient Regulation

Regulations and policies may be inefficient for a number of reasons. I mention two that are particularly salient in this context. One is the creation of approval or other reporting and administrative requirements that make using and/or complying inordinately costly or time-consuming—in short, red-taping policies and systems to such an extent that any positive aim or outcome is negated (and use discouraged) by the negatives. The other is multilevel regulation (and policymaking). For example, a European innovation system would normally consider the potential existence of twenty-seven⁹⁹ NSI, and a number of municipal, subregional, and regional initiatives in higher education, research, and development.¹⁰⁰ While the

95. ROGERS, *supra* note 53, at 26.

96. *Id.*

97. In areas where innovation might clash head-on with religious beliefs, for example, it may be more difficult. Technologies such as contraception or the debate concerning stem-cell research in the United States are examples.

98. CHOMSKY & FOUCAULT, *supra* note 45, at 133.

99. I use the European Union (EU) and its twenty-seven member states as a reference.

100. See generally LIESBET HOOGE & GARY MARKS, MULTILEVEL GOVERNANCE AND EUROPEAN INTEGRATION (2001).

European Union no doubt wants to be competitive in innovation,¹⁰¹ parts of the Union (cities, countries, regions, etc.) may also want to compete against other parts. In addition, there is a serious risk that policies will either duplicate efforts (which creates some inefficiencies and represents a useless expenditure of taxpayers' funds)¹⁰² or, in worst case scenarios, be counterproductive by pulling in different directions and likely increasing compliance requirements. Any good policymaking should consider this issue and put in place proper coordination structures and processes.

III. INTELLECTUAL PROPERTY, NSI, AND INNOVATION

A. *Why Develop an Innovation Strategy, Not (Just) an Intellectual Property Policy*

If sufficient and adequate intellectual property protection is but one ingredient in a complex recipe to achieve innovation-based economic development, then intellectual property rights (IPR) protection is essential but, by itself, insufficient to ensure growth. Intellectual property is but one train in a comprehensive knowledge and innovation policy, and that the trains of surrounding norms and policies also make it to the station is the objective to be attained.¹⁰³ By themselves, intellectual property rules arguably benefit mostly major owners of intellectual property, who are largely concentrated in a few highly industrialized countries.¹⁰⁴

As we saw in Part I, most of the narratives that try to explain the emergence of TRIPS¹⁰⁵ focused on the negative context for developing countries. Not surprisingly, they gave birth to implementation narratives I categorize as “subtractive” because of their insistence on minimalist TRIPS implementation. In the meantime, certain lobbies, with the support of key

101. See Kuhlmann, *supra* note 60.

102. Both factors (budgetary constraints and multilevel governance) are often linked. See WILLIAM WALLACE & HELEN WALLACE, *POLICY-MAKING IN THE EUROPEAN UNION* 207 (2005) (“[R]egional expenditure is dominated by strong vested interests, the proposed increases in expenditure in fields such as innovation and technology may well be rejected in order to satisfy the interest of net contributors in an austerity budget.”).

103. The Arab countries’ proposal to WIPO on its development agenda contained the following:

As a first step, Member States should be encouraged to and assisted in setting up national strategies on intellectual property, which identify areas of strength and weakness in dealing with intellectual property systems. Remedies should be found for weak areas and areas of strength should be further enhanced with a view to attaining a successful and efficient functioning of the intellectual property system.

WIPO, *Proposal by the Kingdom of Bahrain on the Importance of Intellectual Property in Social and Economic Development and National Development Programs*, Annex, at 6, WIPO Doc. 11M/2/2 (June 14, 2005).

104. According to the United Nations Industrial Development Organization, 94% of all privately funded research and development was located in those countries during the 1990s. See UNITED NATIONS INDUS. DEV. ORG., *INDUSTRIAL DEVELOPMENT REPORT 2002/2003* (2002), available at http://www.unido.org/fileadmin/import/userfiles/hartmany/12idr_full_report.pdf.

105. See *supra* Part I.A–B.

players, insist on increasing the protection to TRIPS Plus levels in bilateral and regional discussions. Both approaches are flawed if considered from an innovation-enhancing perspective. To exploit successfully intellectual property with a view to maximizing economic growth in areas that are information and intellectual property intensive and to be able to produce goods and services with a higher ideational content (which is what intellectual property rules tend to protect), each country needs a comprehensive knowledge optimization strategy. This may include using to the maximum extent TRIPS flexibilities in certain areas, but not in others. Policymakers, especially those from more advanced developing and emerging economies, may be well-advised to focus more on developing domestic innovation than limiting rent-seeking efforts by foreign multinationals. The latter is a short-term fix in a much more complex, longer-term effort to establish, maintain, or enhance competitiveness in an increasingly intangible world trading system. In other words, the *adequate* (not minimal) protection of commercially or industrially relevant knowledge forms part of an optimal strategy. Developing countries will gain more by integrating TRIPS norms in a broader innovation- and knowledge-optimization strategy. As with market openness, intellectual property rules per se are best viewed as a catalyst.

Because WTO members cannot legislate below the TRIPS levels without incurring the risk of dispute-settlement proceedings under the Dispute-Settlement Understanding,¹⁰⁶ and because it is unlikely that TRIPS norms will be diluted in the Doha Round,¹⁰⁷ it would seem to be pragmatically justified to take TRIPS as a given quantity (or constant) of the equation. The real equation is to determine how the available flexibility in implementing the agreement should be used and why. This should only be done as part of a comprehensive NSI design.

B. *Elements of a National Strategy*

Intellectual property rules per se do not automatically lead to better or more innovation and (commercially exploited) creativity. By themselves,

106. Understanding on Rules and Procedures Governing the Settlement of Disputes, Apr. 15, 1994, Marrakesh Agreement Establishing the World Trade Organization, Annex 2, Legal Instruments—Results of the Uruguay Round, 33 I.L.M. 1125 (1994); *see also* GERVAIS, *supra* note 3, at 505–12. One should note that not all countries are equal when it comes to the Dispute-Settlement Understanding (DSU). The EU and the United States have resisted applying decisions of the DSU that found their legislation incompatible with their WTO obligations. The long-standing dispute between the European Union and the so-called “dollar banana” countries, *see* Lorand Bartels, The Appellate Body Report in European Communities—Conditions for the Granting of Tariff Preferences to Developing Countries, WT/DS246/AB/R and Its Implications for Conditionality in GSP Programs (n.d.) (unpublished manuscript, on file with the Fordham Law Review), is an example, while in the United States a panel report concerning the incompatibility of exceptions contained in § 110(5)(b) of the Copyright Act, issued in 2000, with the DSU remains unimplemented as of this writing, *see* Albena P. Petrova, *The U.S.-Section 110(5) of the Copyright Act Dispute Analysis and Forecasts for Compliance*, CURRENTS: INT’L TRADE L.J., Summer 2006, at 43.

107. *See* GERVAIS, *supra* note 3, at 46–49.

they do not even achieve the limited purpose of increasing inward FDI.¹⁰⁸ This is what has prompted many developing countries to insist on the technology transfer part of the TRIPS bargain, which is enshrined in Article 66.2,¹⁰⁹ as well as capacity-building under TRIPS Article 67. This is linked to the quest for an intrinsic equilibrium, measured country by country (even in the face of uniform multilateral rules), in the way intellectual property protection is implemented.

Granted, the task at hand is not a simple one. Yet, instead of trying to turn back the clock of extant liberalization and intellectual property rules, I suggest that they can be put to good use. There is no room in this essay to cover all aspects of a comprehensive knowledge-optimization strategy, the primary purpose of which would be to strengthen a country's economy and its growth. However, the following paths are probably some of those that could be followed.

1. Priority Setting and Enhancing Domestic Innovative Capabilities

Based on existing industrial infrastructures, education and research programs, available natural and human resources, and potential domestic and regional markets, what are the realistic areas that a country should prioritize? The *primary* target of an NSI should not be to generate new imports, though they may be useful as indirect technology transfer tools, but rather to build domestic intellectual-property-generating activities, in part through foreign investment (which almost always includes a knowledge and technology transfer component) and technology transfer and acquisition.¹¹⁰ Developing WTO members who want to maximize the benefits of TRIPS (while minimizing negative effects and associated welfare costs) should apply outcomes of priority-setting exercises and help provide their domestic enterprises in those areas with idea management tools.¹¹¹

Technology transfers can and should be part of this type of strategy. Technology transfers are subject to appropriation within the boundaries of applicable contracts and intellectual property rights.¹¹² An appropriate

108. See Gervais, *supra* note 6, at 30–32.

109. It reads as follows: “Developed country Members shall provide incentives to enterprises and institutions in their territories for the purpose of promoting and encouraging technology transfer to least-developed country Members in order to enable them to create a sound and viable technological base.” The Council for TRIPS is actively following the implementation of this provision, notably by requiring reports on technology transfer initiatives taken by developed countries. See WORLD TRADE ORG., ANNUAL REPORT 13 (2005), available at http://www.wto.org/english/res_e/booksp_e/anrep_e/anrep05_e.pdf. For a summary of the information provided, see Council for Trade-Related Aspects of Intellectual Property Rights, *Note by Secretariat: Submissions Under Article 66.2 of the TRIPS Agreement*, IP/C/W/431 (Oct. 22, 2000).

110. See Gervais, *supra* note 6, at 30–40.

111. See *supra* note 59 and accompanying text.

112. See generally Chris Dent et al., *Research Use of Patented Knowledge: A Review* (OECD Directorate for Sci., Tech. & Indus. (STI) Working Paper No. 2006/2, 2006), available at <http://www.oecd.org/dataoecd/15/16/36311146.pdf>.

research exemption should also be considered.¹¹³ However, innovation should also be encouraged by providing venture capital and seed investments funneled through innovation incubators. This type of early capital to bring innovation to the marketplace is often the most difficult step for innovators, and appropriate assistance is generally required.

2. Education and Institutional Capacity Building

As I noted at the beginning of Part I, this is probably the most important aspect once priorities have been set. Education, both in the country and abroad, is the cornerstone of a viable, long-term knowledge strategy and economic growth in the information society. Technical education is necessary to understand the state of the art in any technological field. Training is also required to understand how to use patent search and other intellectual-property-related tools.¹¹⁴

Initially, a country should pay to send some of its best students to the top research universities, especially in fields where the knowledge brought back can directly contribute to the strategy in light of priorities set. This could include engineering, biology, chemistry, physics, and all other sciences, but also, in almost all cases, management and law. In science, engineers, scientists, and technicians are equally important.¹¹⁵ Financial mechanisms may be used to ensure that trained graduates will return to their country of origin; if a country does not have patent protection, it will have a hard time attracting technology-oriented employers and will have a hard time retaining nationals that have studied in this area.¹¹⁶ As a second step,

113. See generally Katherine J. Strandburg, *What Does the Public Get? Experimental Use and the Patent Bargain*, 2004 WIS. L. REV. 81. The scope of that exemption in the United States is in doubt, however, after *Madey v. Duke University*, 307 F.3d 1351, 1360–61 (Fed. Cir. 2002).

114. Patent databases are publicly available. By mining recent patents and published applications (which typically implies an eighteen-month delay after the initial filing—unfortunately, in certain industries, much can happen in eighteen months) and providing copies to local companies with product development abilities, a number of upward technological steps may be taken fairly rapidly. Of course the obligation to comply with TRIPS means that if the patent is granted in the developing country in question, the technology cannot be used directly, and even a reasonable license cannot be obtained; however, the knowledge could be used, for example, for noncommercial research. As was noted by the UK Commission on Intellectual Property Rights, TRIPS Articles 8 and 40 allow a WTO member to determine an appropriate interface between intellectual property and competition law. However, many countries that implemented TRIPS recently did not and still do not have competition legislation.

115. See John H. Barton, *New Trends in Technology Transfer: Implications for National and International Policy*, at viii (Int'l Ctr. for Trade & Sustainable Dev., Issue Paper No. 18, 2007) (“The reduction of inventions to commercial application usually also requires skilled entrepreneurs and, depending on the particular field, skilled mechanics, lab technicians, or software writers. Many of the same skills are needed for the thoughtful adaption and application of a technology developed elsewhere. Hence, a broad range of scientific and technological skills is absolutely crucial for a nation to participate effectively in the international technological economy.”).

116. See Edmund W. Kitch, *The Patent Policy of Developing Countries*, 13 UCLA PAC. BASIN L.J. 166, 174 (1994).

world-class universities and research centers may then be established in the country, directly or in partnership with major foreign institutions. A country can hardly invest too much in education.

At a more technical level, training for policymakers, judges, high officials, and other persons involved in economic development projects should similarly be organized. It cannot be stressed enough that successful training program outcomes will depend on selecting the best candidates for each program, rather than basing decisions on other factors.

The development of educational institutions and services is naturally very costly. Developing intellectual property institutions such as patent, and perhaps even more, trademark offices, is essential to be able to benefit from the international IP *regime*.¹¹⁷ Developing countries can either delegate these roles to foreign institutions, a majority of which are located in the “First World,” thereby losing some of their ability to customize the services, or take the policy bull by the horns—and pay the price. Ideally, more industrialized nations should fund training and establishing of local patent and trademark offices, since these offices fulfill an educational role with local businesses and research facilities. Absent this kind of funding, another option, used in some parts of Africa for example,¹¹⁸ is to build regional offices.

3. Subsidies

Within WTO and other applicable rules, there is room for subsidies in the form of tax measures or otherwise. Subsidies and publicly funded and/or supported training, research, and development are essential ingredients of a successful innovation policy.¹¹⁹ Subsidies may also be used to attract foreign investment. By granting merit-based research subsidies or grants to local creators, a country gives an incentive to local innovators and creators. By rewarding significant achievements of successful innovators and creators at, for example, an annual award ceremony, a strong social signal is sent about the value of creation and innovation—which then functions as an additional incentive for others. This addresses the potential social norm barrier.¹²⁰

117. As noted in a study by Queen Mary University, “The implementation of international agreements in poor countries is often hindered through a lack of institutional structures that would serve as a basis for or facilitate the implementation of new legislation. In many cases this leads to incomplete implementation or adverse effects . . .” Queen Mary University, *Impacts of IPR Rules on Sustainable Development 3* (Nov. 2006) (unpublished report, on file with the Fordham Law Review).

118. See, e.g., The African Regional Industrial Property Organization, <http://www.aripo.org/> (last visited Mar. 15, 2008).

119. See Barton, *supra* note 115, at 32 (“[T]he subsidy criterion described previously must be the basis for all national technology policy. It clearly favors strong support for scientific education and for basic research in areas that are important to the particular nation and neglected by world technological research. The criterion favors academic research in areas of local interest, and, where the nation has specific capability, of global interest.”).

120. See *supra* note 95 and accompanying text.

4. Foreign Direct Investment

FDI is not an economic panacea, but, in the game of economic growth and development, it seems a better solution than a simple increase in imports. FDI generally comes with formal or informal knowledge and technology transfer and creates more and better local jobs than simple distributorships. Each country (and many are doing it aggressively already) should thus market its advantages bilaterally, at international fairs, through graduate students, etc. It could survey multinational companies operating in its priority areas to determine their perception of the country's strengths and weaknesses, address shortcomings identified in the survey, and provide information on positive aspects that are simply not known in interested circles.

5. Non-IP Regulatory Adaptation

Based on WTO and other rules and surveys, regulatory shortcomings should be addressed, including the potential "red tape" barrier.¹²¹ "Political stability, desirable geographic location, adequate infrastructure, human capacity, functioning legal institutions, enforceable contract rights, open trade policies, . . . intellectual property protection,"¹²² a competitive tax system, and access to a qualified workforce will rate fairly high in the list of FDI preconditions.

These are, of course, only examples of components of a full strategy. I outline in a different paper several more technical options concerning the transliteration of specific TRIPS standards in the language of national norms and regulations.¹²³ What that paper mostly wanted to demonstrate is that mechanical implementations of TRIPS are unlikely to generate positives measured in terms of domestic innovation and may generate significant administrative and welfare costs. The main point is not to present a full NSI, but rather to insist the need for a systemic approach, well beyond the metes and bounds of mere TRIPS compliance.

CONCLUSION

Debates about intellectual property at times sound either religious or theological. Religious when good is opposed to evil, whether good is very high or very weak (or no) intellectual property. Theological when the debate is actually a reasoned discussion. The first two phases of TRIPS, namely, the addition phase during which developing countries were sold a high level of intellectual property protection (the TRIPS Agreement), and the following, subtraction phase, when TRIPS and intellectual property

121. See *supra* note 99 and accompanying text.

122. Kevin Kennedy, *The 2005 TRIPS Extension for the Least-Developed Countries: A Failure of the Single Undertaking Approach?*, 40 INT'L L. 683, 699 (2006).

123. See generally Daniel J. Gervais, *A TRIPS Implementation Toolbox*, in INTELLECTUAL PROPERTY, TRADE AND DEVELOPMENT, *supra* note 6, at 527.

were resisted as policy negatives, were emblematic of those debates. The fact is that there is no canonical level of intellectual property protection. If one accepts intellectual property as (mere) instrumental regulation designed to optimize the level of innovation and commercialization of new creative products and inventions, then it is obvious that the level is not only open to debate, especially when the industrial, cultural, and economic situation of each WTO member is factored into the equation, but that this level will evolve and change as circumstances change. If one takes a more theoretical approach, the same conclusion may be drawn. Natural law rests on John Locke's proviso about not spoiling and leaving enough for others.¹²⁴ Utilitarians looking for an increase in aggregate welfare must also recognize that balance is required. And, an analysis informed by human rights leads to a similar conclusion.¹²⁵ In all cases, the need for balance and the quest for an optimum level of protection ensues. Translated into policy terms, this leads to a calibration analysis, where a country complies with TRIPS not to avoid disputes at the WTO, but rather to maximize the positives and opportunities for welfare while reducing welfare costs. This element is not covered in the TRIPS Agreement, except for rather vague obligations concerning technical cooperation and technology transfers.¹²⁶

Following in the footsteps of a previous effort¹²⁷ in which I discussed the contribution of economic analysis to the optimal implementation of intellectual property, this essay has discussed the contribution that work on NSIs and systems theory have made to understand the role of government, universities, and the private sector in developing innovation, and how those lessons may be applied by developing countries trying to play the global innovation game. The task is complex and multifaceted and ideally should have preceded the entry into force of the TRIPS Agreement. However, it is not too late, far from it, to reimplement TRIPS as part of a structured innovation policy.

124. JOHN LOCKE, TWO TREATISES OF GOVERNMENT 290, 295 (Peter Laslett ed., 1988) (1690).

125. See Gervais, *supra* note 39, at 3.

126. TRIPS, *supra* note 1, arts. 7, 66, 69.

127. See Gervais, *supra* note 6.

Notes & Observations