

Compulsory Licensing for Green Technology Transfer

Should green technology be subject to compulsory licensing
to advance green technology transfer?

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Chapter 1. Introduction

The problematic of climate change is unique in many ways, as it is one of the only ones that affect the entire globe. Some critics like to argue against it, but most people would agree that the development of human activity is the main cause of global warming. Especially through the rapid industrial and technological development of the 20th century, humans have managed to "emancipate from nature"¹, which has led to great damages to the environment that have gotten out of hand.

The biggest impact that human activity has on the environment is through greenhouse gas ("GHG") emissions, as they are said to be greatly responsible for global warming. Although scientists do not speak unanimously about the foreseeable consequences for the earth, there is a range of well-documented consequences of GHG emissions, such as increases in the average global temperature, increased frequency and intensity of extreme weather-related events, and average sea-level rise^{2,3}. The risk of the earth's deterioration is to be taken seriously, and there is a clear need of change to protect the environment, stop global warming and eventually reverse the existing damages. To make this change, there are two options.⁴

The technological revolution and the societal desire to continuously improve comfort and consumer-lifestyle are currently supported by an industry that emits greenhouse gases, and is in other ways detrimental to the planet (pollution, high energy consumption, exhaustion of resources etc.).

For the first option to stop generating these damaging effects, we would need to revolutionize our lifestyles, and regress our consumer-based society. This could also mean a regression of the advancement of our lifestyles. This cutback on human activity, however, seems very unlikely to find support from the masses, and we would have to rely on the goodwill and altruism of an entire consumer-based society, which seems infeasible. If we wanted to enforce it, there is a high risk of "environmental dictatorship"⁵, the success of which would be questionable anyways.

1 Guillaume Henry, 'Intellectual Property Rights and Green Technologies' (2010) 42nd World Congress of the International Association for the Protection of Intellectual Property (AIPPI)

2 IPCC, 2007: Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, Pachauri, R.K and Reisinger, A. (eds.)]. IPCC, Geneva, Switzerland, 104

3 Brown H Hall, Christian Helmers, 'The role of patent Protection in (Clean/Green) Technology Transfer' (2010) National Bureau of Economic Research Working Paper 16323 <<http://www.nber.org/papers/w16323>> accessed 29 may 2017

4 Guillaume Henry, 'Intellectual Property Rights and Green Technologies' (2010) 42nd World Congress of the International Association for the Protection of Intellectual Property (AIPPI)

5 ibid

This is where the second option comes into play, which is to use today's technological knowledge to the environment's advantage, and put effort into research and development of technical methods that help protect the environment, without reducing human activity. The ideal would be that the development of green technologies were advanced enough to substitute as many current eco-unfriendly technologies as possible, so that we humans will not find ourselves forced to drastically change our lifestyles, in order to prevent the worst. But for this option to be successful, sufficient solutions do not only need to be discovered and developed, but also made available and implemented as fast as possible.

For the entire population to be able to quickly transition into mainly using environmentally sound technologies ("EST"), we need to encourage the innovation, promote their distribution to consumers, and ensure the transfer of such technology to people and countries that do not have the abilities to invest in research and development⁶. Only cooperation by the entire globe on that matter can create an effect that is large enough to actually have a positive effect on the environment and global warming. This is why access to green technology needs to be ensured to all countries. Especially developing countries, that are often more prone to suffering from global warming because they lack the means to adapt to the climatic and environmental changes, need the help of developed countries.

One of the auxiliary means that have been developed is green technology transfer ("GTT"). The "transfer of environmentally sound technologies", as it is also called, has been regularly brought into discussion in the United Nations since the first Earth Summit in Rio de Janeiro in 1992. The concept of GTT will be explained in Chapter 2 of this paper. GTT is beneficial to developing countries, not only in the respect of climate change adaptation and abatement, but also for their general economic growth and competitiveness in world markets.⁷

Several mechanisms have been installed to help the diffusion of green technology, such as the web platform "TT:CLEAR" which offers improved access to knowledge about technology transfer. It "houses information on the Technology Mechanism, the Technology Executive Committee (TEC) and technology needs assessments"⁸, which are all mechanisms that are designed to help the aim of green technology transfer. Another institution with green technology diffusion as main goal is the Climate Technology Centre and Network.⁹

But still, some criticize that GTT is not happening quickly enough¹⁰, which means that the mechanisms fail to live up to their full potential. Although there are many potential reasons for

6ibid

7Matthew Littleton, 'The TRIPS Agreement and Transfer of Climate- Change-Related Technologies to Developing Countries' (2008) DESA Working Paper No. 71

8<http://unfccc.int/ttclear/about>

9<https://www.ctc-n.org/about-ctcn>

10Matthew Littleton, 'The TRIPS Agreement and Transfer of Climate- Change-Related Technologies to Developing Countries' (2008) DESA Working Paper No. 71

this, some insist that a major reason are global intellectual property rights ("IPR"), because of their high costs, long processing delays and competition issues. In general, the aim of IPRs are to foster innovation and protect the interests of the inventor, but in the context of GTT, there is a lot of debate among scientists and scholars on whether IPRs, especially patent protection, are boosting the transfer of such technologies, or rather hindering it. Some argue that unduly stringent IPR protection is nothing but a barrier to an effective access to green technology in developing countries.¹¹

On the other hand, there are reasons to believe that IPRs, if used in the right way, can be a great tool for transferring technologies that aid in climate change adaptation and abatement. There are strong arguments from both perspectives, and in this paper, the impact of IPRs on green technology transfer is one of the main research questions that we will seek to answer by taking a look at empirical case studies and different theoretical approaches. This rather big controversy will be discussed in Chapter 3 of this thesis.

Whether one believes that IPRs should be strengthened or weakened, there seems to be a common consensus that the current IPR system architecture is not ideal, which is why there are many different suggestions on how to better deal with intellectual property rights for green technology. One suggestion that will be discussed is the option of using compulsory licensing, which is a mechanism that allows people to get certain IP licences, without needing the author's consent on the licensing. This mechanism became especially interesting for green technology as it was introduced by the Doha Declaration on the TRIPS Agreement and Public Health¹², as a means of ensuring the dispersion of certain medicine in order to protect public health. There are many aspects which appear to make this mechanism applicable and helpful for green technology transfer.

Whether compulsory licensing is a suitable instrument for green technology transfer is the main research question of this paper, and will be analysed and discussed throughout, and specifically in Chapter 4.

Lastly, we will conclude the research questions of this thesis in Chapter 5.

11 *ibid*

12 The Doha Declaration on the TRIPS Agreement and Public Health was adopted by the WTO Ministerial Conference of 2001 in Doha on November 14, 2001

Chapter 2. Green Technology Transfer

2.1. Definition of Green Technology and Technology Transfer

2.1.1. Green Technology

Green technology can only be defined to a certain degree, and it depends on the perspective, the aim, as well as the field of expertise. As a first general definition, we can say that green technology is technology that is environmentally friendly. To understand the width of the range of goods that can be described as green technology, we can take a look at the use of the term „technology”.

Technology, which, by its Greek etymological background means „science of craft”, can be described as „(the study and knowledge of) the practical, especially industrial, use of scientific discoveries”¹³. The term technology is being kept very imprecise on purpose, because the meaning is constantly changing, and because technology itself is the emblem of innovation and development, and it would be paradoxical to limit the flexibility of the term, and run the risk of it not adapting to its own growth and development.

Green technology is also sometimes called „clean technology” or „environmental technology”. These terms are mostly used to describe in a very broad manner various types of technology that aim towards reducing, mitigating or adapting to detrimental effects to the environment. These terms encompass a very broad range of environmentally friendly technology, and often address several challenges, like „Global Change, Depletion of Resources, Living in a Healthy Environment, Competitiveness and Growth”.¹⁴

Another vocabulary that is sometimes used is „sustainable technology”, but this term is not very favourable, as it does not clarify whether only the technology itself is sustainable, or whether it aims towards sustainability as such.¹⁵

The perception of the concept of green technology has gone through a shift, from being mostly

13 Cambridge Advanced Learner's Dictionary & Thesaurus, Definition of “technology” © Cambridge University Press, <<http://dictionary.cambridge.org/de/worterbuch/englisch/technology>>

14 KK Matthias Weber, ‘Environmental Technologies’ (2005) Background Paper for the European Commission’s High Level Group on „Key Technologies”

15 Jonathan MWW Chu, Developing and Diffusing Green Technologies: The Impact of Intellectual Property Rights and their Justification, 4 Wash. & Lee J. Energy, Climate & Env’t. 53 (2013), <<http://scholarlycommons.law.wlu.edu/jece/vol4/iss1/4>>

relevant in individual sectors and serving as a response to direct environmental impacts, to a perception through which the impact is also assessed from an ecological and societal perspective¹⁶, which brings up new problems and new needs for solutions. Weber says that, in that way, from a European perspective, environmental technologies represent new incentives in the export opportunities in the world market.¹⁷

From a more industrial point of view, in the Report of the Institute for Prospective Technological Studies (IPTS) called „Assessing the environmental potential of clean material technologies“¹⁸, Researchers defined key technologies with a potential for reducing environmental effects, and these include production technologies, application technologies, recycling technologies and end-of-pipe technologies. This reinforces the idea that our definition of environmental/green technology should not be limited to any part of the production chain in the market.

The important factors are, again, their ability to reduce the impact on the environment, whether that concerns diminishing the harm caused during the industrial production itself, or retroactively repairing the harm which occurs as a by-product to that production. Some expressions like „climate technology“, for example as in “Climate Technology Centre and Network”¹⁹ concentrate more on the specific issue of climate change, but are not strictly exclusive.

The UN mainly uses the wording „environmentally sound technologies” or “ESTs”, and the first document to ever thoroughly define ESTs was the non-binding voluntarily implemented action plan of the UN called „Agenda 21“, which was a product of the first Earth Summit, held in Rio de Janeiro in 1992 by the UN.

According to the definition of Agenda 21, ESTs

“protect the environment, are less polluting, use resources in a sustainable manner, recycle more of their wastes and products, and handle all residual wastes in a more environmentally acceptable way than the technologies for which they are substitutes”²⁰.

Other characteristics mentioned are that ESTs cover technologies that concern the process as well as the product and even the „end of the pipe” technologies, as they call them, specifically in the context of pollution. They are „not just individual technologies, but total systems which include know-how, procedures, goods and services, and equipment as well as organizational

16 id. p3

17 K Matthias Weber, ‘Environmental Technologies’ (2005) Background Paper for the European Commission’s High Level Group on „Key Technologies”

18 European Commission, Joint Research Centre, ‘Assessing the Environmental Potential of Clean Material Technologies’ (2002)

19 <https://www.ctc-n.org/about-ctcn>

20 Agenda 21, United Nations Conference on Environment & Development Rio de Janeiro, Brazil, 3 to 14 June 1992, Chapter 34

and managerial procedures”. It is important that EST’s are „compatible with nationally determined socio-economic, cultural and environmental priorities“.

The definition of „Environmental Technologies” by the Environmental Technologies Action Plan of the European Commission²¹ is very similar to the one of Agenda 21.

Due to its thorough analysis and development of the definition, „Environmentally sound technologies” is the expression used in various official documents, works and projects by many institutions under the umbrella of the UN.

In order to have an overview at least on the patent information on green technology or EST’s, the WTO has established the “International Patent Classification Green Inventory”²², conform to the UNFCCC. The WTO does not claim the Inventory to be exhaustive, but the different categories can give a certain idea of what fields are covered as EST’s, from a patentability perspective. The categories include: alternative energy production, transportation, energy conservation, waste management, agriculture and forestry, administrative, regulatory or design aspects, as well as nuclear power generation.

It is interesting to note that nuclear power generation as a green energy source is a good example for controversial issues that go beyond the problematic of intellectual property.²³

For simplicity reasons, the term „green technology” will be used throughout this thesis, while keeping in mind mainly the UN’s perspective of the definition.

2.1.2. Technology Transfer

Technology Transfer is a concept that has its utility in many different sectors. Passing on technology plays a role in the global economy and trade, as well as in scientific research and development, where technology is passed from research centres to development departments, or between scientific/research institutions and universities.

But primarily, technology transfer happens on an international level, and often in the context of development aid for least developed or developing countries, where the focus can be the enhancement of growth, and the general living conditions of the people, for example.

This thesis however will revolve around green technology transfer, in the context of fulfilling the objective of the many international conventions about preserving the environment, and more specifically about preventing the impacts of climate change, such as described by the

21 http://ec.europa.eu/environment/ecoap/about-action-plan/etap-previous-action-plan_en

22 <http://www.wipo.int/classifications/ipc/en/est/>

23 Jonathan M.W.W. Chu, Developing and Diffusing Green Technologies: The Impact of Intellectual Property Rights and their Justification, 4 Wash. & Lee J. Energy, Climate & Env’t. 53 (2013), <http://scholarlycommons.law.wlu.edu/jece/vol4/iss1/4>

UNFCCC, which we will elaborate on in the following sub-chapter.

Several international agreements concern technology transfer.

The Agreement on Trade-related Aspects of Intellectual Property Rights (“TRIPS”) for instance, has as one of the primary objectives to “contribute to the promotion of technological innovation and to the transfer and dissemination of technology”²⁴.

Article 66.2 of TRIPS specifically obliges “industrialized countries to facilitate and promote technology transfer to least developed countries”, and is one of the only international mandatory articles on the transfer of technology.

The effectivity of this provision has however been called in question on several occasions. After evaluating the existing records for technology transfer after TRIPS, Moon concluded that, due to the inconsistency in recording practices, compliance with the article cannot really be proven, and the imprecise language in article 66.2 makes the obligations weak and hard to follow for developed countries as well as complicated to enforce for developing countries.²⁵

So, the fact that TRIPS does not provide a clear definition of technology transfer has been problematic, and has been further discussed in the WTO “Working Group on Trade and Transfer of Technology” (“WGTTT”). A 2002 background note from the secretariat then provided an identification of 4 stages of technology transfer²⁶, which, if respected, create successful technology transfer:

- “1) Cross border transfer or acquisition
- 2) Learning – acquiring know-how and know-why
- 3) Adaptation – fitting the technology to local conditions
- 4) Diffusion – the spread of the technology within a country”

Another international treaty that has a big impact on technology transfer is the World Intellectual Property Organization (“WIPO”). Article 10 of the Agreement between WIPO and the UN obliges WIPO to the cooperation “in promoting and facilitating the transfer of technology to developing countries in such a manner as to assist these countries in attaining their objectives in the fields of science and technology and trade and development.”²⁷

24 TRIPS Article 7

25 Suerie Moon, ‘Does TRIPS Art. 66.2 Encourage Technology Transfer to LDCs? An Analysis of Country Submissions to the TRIPS Council (1999-2007)’ (2008) UNCTAD - ICTSD Project on IPRs and Sustainable Development, Policy Brief Number 2

26 See ‘A Taxonomy on Country Experiences on International Technology Transfers: Note by the Secretariat’ 2002 WT/WGTTT/W/3, 11 November 2002.

27 Agreement between the UN and the WIPO (entered into force 17 December 1974)
<<http://www.wipo.int/treaties/en/agreement/index.html>> accessed 29 May 2017.

The most-cited definition of all is probably the one from the United Nations Conference on Trade and Development (UNCTAD) Draft International Code of Conduct on the Transfer of Technology.

According to that Code of conduct, technology transfer is to be defined as

“the transfer of systematic knowledge for the manufacture of a product, for the application of a process or for the rendering of a service and does not extend to the transactions involving the mere sale or mere lease of goods.”²⁸

After evaluating all existing international instruments which tried to define technology transfer, and concluding that “there is no universally recognized or legally enforceable definition as to what technology transfer is or what form it must take”, Shabalala gathers a definitional “package” of four “modes of technology transfer”, which all must be present in varying proportions in order to constitute “successful” technology transfer:

- Transfer of physical capital and goods
- transfer of skills and know-how
- transfer of information and data
- transfer of the ability to improve and adapt the technology.²⁹

In the IPCC report “Methodological and Technological Issues in Technology Transfer”³⁰, technology transfer is defined as a “broad 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”.³¹

As the instrument of technology transfer as such has been a widely recognized approach to try and conquer various imbalances between developed and least developed countries (“LDC”), it comes as no surprise that it was considered a suitable approach to tackle one more specific problem, being the adaptation and mitigation of climate change in least developed countries. Yang describes that, in combination with international cooperation, technology transfer is an “inseparable component of any climate change policies”.³²

The development of the vehicle of green technology transfer shall be explained in more depth.

28UNCTAD, ‘Compendium of International Arrangements on Transfer of Technology: Selected Instruments - Relevant Provisions in Selected International Arrangements Pertaining to Transfer of Technology’ (2001)

UNCTAD/ITE/IPC/Misc.5 <<http://www.unctad.org/en/docs/psiteipcm5.en.pdf>> accessed 29 May 2017

29Dalindyabo Shabalala, ‘Climate Change, Technology Transfer and Intellectual Property: Options for Action at the UNFCCC’ (PhD dissertation, Maastricht University 2014), 22-23

30IPCC, ‘Methodological and Technological Issues in Technology Transfer’ (2000) Cambridge University Press, UK

31Zili Yang, ‘An Analysis of Technology Transfers as a Response to Climate Change’ Copenhagen Consensus on Climate, 6

32Ibid 16

2.2. Legal Framework of Green Technology Transfer

The single most influential international convention for tackling the issues of climate change nowadays is the UN Framework Convention on Climate Change (“UNFCCC”). Green technology transfer is only one small part of the many objectives of the UNFCCC.

In order to fully understand the sources of GTT, it would be best to take a look at the historical development of the relevant conventions and institutions which helped generate the concept.

In 1988, the two UN organizations, the UNEP and the WMO, established the Intergovernmental Panel on Climate Change (“IPCC”), which became the main scientific body under the UN for climate change. The IPCC regularly publishes reports that are called „assessment reports“, and the first one was published in 1990 and created the basis for the UNFCCC. It was the first UN Earth Summit in Rio de Janeiro in 1992 that opened the UNFCCC up for signatures, as well as its two sister-agreements the „Convention on Biological Diversity” and the „United Nations Convention to Combat Desertification”.

One very important document that has come out of the Rio Summit, also called the „United Nations Conference on Environment and Development“ (“UNCED”), is Agenda 21, which is a non-binding action plan of the UN for sustainable development.

In 1994 the UNFCCC entered into force, and became the most powerful contractual stimulus for global action against climate change. Via the UNFCCC, the so called „Conferences of Parties” or COPs are taking place on a regular basis, in which the parties discuss the results and advancements regarding the provisions of the treaties, as well as eventual amendments to it. The 21st COP took place on 15 December 2015 in Paris and has brought the latest treaty (“the Paris Agreement”). On 7 November 2016, COP22 took place, and served as the first Meeting of the Parties of the Paris Agreement (CMA1).³³

It wasn’t until the Bali Action Plan was agreed to at the 13th COP of the UNFCCC in 2007, that the importance of technology transfer was emphasized.³⁴

The implementation of this plan took place later in the 2010 Cancun conference, as they created the Technology Mechanism, which consists of two main bodies: the Technology Executive Committee (TEC) and the Climate Technology Centre and Network (CTCN).³⁵

Thus, the idea of green technology transfer has been around since the creation of the UNFCCC and has been regarded as a crucial mechanism to realize the overall aim, which is

33 <http://sdg.iisd.org/events/unfccc-cop-22/>

34 Paragraph 1(d), Bali Action Plan, UNFCCC (2007), FCCC/CP/2007/6/Add.1
<<http://unfccc.int/resource/docs/2007/cop13/eng/06a01.pdf>> 1/CP.13

35 A A Latif and others, ‘Overcoming the Impasse on Intellectual Property and Climate Change at the UNFCCC: A Way Forward’ (2011) ICTSD Programme on Innovation, Technology and Intellectual Property, Policy Brief No 11, 2

the „stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system”.

The two main ways in which climate change needs to be addressed have formed throughout the years and have concentrated into mitigation and adaptation.

In order to allow mitigation and adaptation, the development of adequate innovation and technology is of utmost importance, as well as the global availability of that technology, which is why the UNFCCC includes the following provisions, which are the source of the development of Green Technology, as well as the Transfer of Green Technology:

Article 4.1 (c) “All Parties ... shall: (c) Promote and cooperate in the development, application and diffusion, including transfer, of technologies, practices and processes that control, reduce or prevent anthropogenic emissions of greenhouse gases...”³⁶

Article 4.5 “The developed country Parties ... 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...”³⁷

To enhance and accelerate the development the transfer of technology, the UN created the Technology Mechanism in 2010.³⁸ As an operational arm of the Technology Mechanism, and to speed up the Technology Transfer, the Climate Technology Centre and Network (CTCN) has been established in 2012, as well as the Technology Execution Committee, which is the policy arm. Those are some institutions that are focussing specifically on Green Technology Transfer.

2.2.1. What makes green technology particularly challenging?

One reason why the development and diffusion of Green Technology is particularly complicated is what Hall and Helmers call the "double externality". An externality is defined as "an unintended consequence of market decisions which affect individuals other than the decision maker"³⁹ and means that the private costs for the decision maker are smaller than the social costs. The prime example for one negative external effect of economic activity is

36 1992 United Nations Framework Convention on Climate Change

37 1992 United Nations Framework Convention on Climate Change

38 http://unfccc.int/ttclear/templates/render cms_page?TEM_home

39 R N Stavins, Environmental Economics (edited by Steven N Durlauf and Lawrence E Blume, Second Edition, The New Palgrave Dictionary of Economics, 2008)

environmental pollution. The effects of decisions such as to prefer polluting technologies because they seem to be more productive, will not be felt immediately by the deciding group of people. This is why, from a subjective perspective of, for example the consumer, the choice of the polluting technology seems more reasonable.

The second externality is that, the knowledge that is used to develop green technology is "non-excludable" and "non-rival", as one cannot deprive actors of using the knowledge, and it cannot be exhausted. This is an externality that "leads to a gap between private and social returns to innovation". Hall et Helmers call this the "imperfect appropriability of knowledge". This way, Green Technology has the effects of the double externality playing against it, which makes it harder to promote and realize the permanent instalment of the concept on a societal level.

And, not only do these two externalities interact, they also act on a global scale, which makes the problem even bigger.

Chapter 3. Green Technology and Intellectual Property

3.1. The Framework of the Problematic

The most controversial topic in (green) technology transfer policy making is the role and impact of intellectual property.

In this chapter, I will analyse the studies, researches and commentaries of various institutions and scholars, in the attempt to find answers.

3.1.1. Intellectual Property in the history of climate law

To show the abstruseness of the issue about the role of IP in green technology transfer, we can take a quick look back at the way IPRs have been viewed and addressed throughout the history of environmental law, and specifically throughout the years of UNFCCC Conferences of Parties.

The potential role of IPRs in the matter was acknowledged early on: already during the implementation process of the Montreal Protocol on Substances that Deplete the Ozone Layer (1987), IPRs were part of the discussions.⁴⁰

Up until the thirteenth session of the Conference of Parties (COP-13) in Bali in 2007, IPRs were kept an eye on in connection to green technology transfer, because several developing countries (Cuba, India, Indonesia, Tanzania and China) insisted on them being a barrier. Other countries, such as the U.S. refused to agree to any kind of weakening of international IP regulations.

At the time the debate on the implementation of technology transfer was put in forefront in the COP in Bali (2007), discussions and the search of agreement on IPRs have been set aside.⁴¹ But the disagreements continue to exist, and in the first meeting of the Technology Executive Committee (“TEC”) of the UNFCCC⁴² in 2011, India has made a point to ask for further

40 A A Latif and others, ‘Overcoming the Impasse on Intellectual Property and Climate Change at the UNFCCC: A Way Forward’ (2011) ICTSD Programme on Innovation, Technology and Intellectual Property, Policy Brief No 11, 3-4

41 A A Latif and others, ‘Overcoming the Impasse on Intellectual Property and Climate Change at the UNFCCC: A Way Forward’ (2011) ICTSD Programme on Innovation, Technology and Intellectual Property, Policy Brief No 11, 2

42 <http://unfccc.int/ttclear/tec>

discussion on IPRs as they found that IPRs and “prohibitive costs” put important technologies “out of reach”.⁴³

There have been several efforts to shed light on the situation.

Independent organizations have stepped in, such as the International Association for the Protection of Intellectual Property (“AIPPI”), that has opened up a dedicated Committee Q189 “IP and Green Technology”, which has been created specifically to shed light on the ongoing debate of the implications of IP on Green Technology Transfer.

The International Centre for Trade and Sustainable Development (“ICTSD”) Programme on Innovation, Technology and Intellectual Property has produced several reports and studies on this question.

In 2012, the UNFCCC Ad-hoc Working Group on Longterm Cooperative Action (AWG-LCA) that had worked on different proposals on how to deal with IP in order to support the regulations of the UNFCCC.

Also, on a more general technological scale, the World Intellectual Property Organization (WIPO) has been assigned early on in 1974 by the UN to “facilitate the transfer of technology related to industrial property to the developing countries”, but it is often said that they have not been too successful.

Besides the many valuable contributions made as part of organization programmes, countless academics and experts of various fields have offered their insight on the matter, without necessarily finding an accord, which we will see further on.

3.1.2. TRIPS as a legal framework

Not only is TRIPS as the legal basis for technology transfer crucial for its relationship with the IPRs that protect said technology, but the TRIPS agreement also serves as the main reference for their behaviour in an international market structure, and also in technology transfer.

Ever since it became effective in 1995, all member states of the WTO are required to have a certain level of IP protection which in turn will ameliorate trade, which was meant to be especially beneficial for developing and least developed countries. Supported by the conviction that IPRs can foster innovation and development in all areas of the market, TRIPS is supposed

43 India, Proposals for Inclusion of Additional Agenda Items in the Provisional Agenda of the Seventeenth Session of the Conference of the Parties – Addendum (2011), FCCC/CP/2011/INF.2/Add.1, available at <http://unfccc.int/resource/docs/2011/cop17/eng/inf02a01.pdf>

to enhance international trade.

Very soon, the TRIPS agreement has been criticized in general, for being mainly profitable for developed countries, and for not being as beneficial for investment and diffusion of knowledge as intended. Thus, the effects of IPRs on developing and least developed countries were further questioned, as we will see later.

It is important to keep the TRIPS agreement in mind while investigating about the influence of IP on green technology transfer, since international trade is one of the most important vehicles that allows technology transfer to happen.

In this analysis I will also be discussing studies and articles which address the influence of IP on general technology transfer, since more information is available, and it also applies to green technology. However, green technology will also be addressed more precisely, as I do believe that there is another layer of obstacles on the subject of green technology, due to its importance for the bigger goal of combatting climate change.

3.2. The current situation of Intellectual Property Rights for Green Technology Transfer

Intellectual property rights, especially patents, play a crucial role in today's world economy, as they generate market power. Technology transfer relies heavily on the functioning of the market, which is why IPRs are so important.

However, scholars and politicians regularly question whether IPRs are that beneficial for all economies, especially since most countries the southern hemisphere have a completely different relationship to IPRs, and seem to struggle.

There have been many arguments whether IPRs are beneficial or detrimental to technology transfer. In this part of the thesis, we will attempt to find an answer to the question.

3.2.1. Patents

The patent system is the mechanism that awards inventors of innovative technology with a protection, which gives them the exclusive property rights to the invention.

This means that the inventor alone has the right to prevent anybody else to use the invention, to make profit from it, and to amend it.

Without the property right, the inventor would have to protect their invention by keeping it secret.⁴⁴ First of all, this would be tedious and detrimental for the business of the inventor, and

⁴⁴Nuno Pires de Carvalho, *The Trips Regime of Patent Rights* (3rd Edition, Kluwer Law International, 2010), 30ff

if everybody keeps their inventions a secret, the general growth of society would be extremely slow. Thus, patents grant the protection of inventors all the while opening the knowledge up to the society. This increases transparency and dissemination of knowledge, and prevents free riding and imitation.

However, patents might also delay the market flow and increase prices.

Patents, in principle, are meant to foster innovation and circulation of knowledge, and also simply advance the production of technology in a given market, but that is not the only role they can take. Due to the fact that they are used in the technical field, which is highly competitive on the market, they can be used as “a tool of ownership or as a determinant of the freedom to operate.”⁴⁵

Furthermore, since patents give exclusive rights to their owners, they can create a type of monopoly control, which reduces competition. The patent owner can have limited incentives to keep prices low.⁴⁶ This can be even worse with patent pools, in the event that the patents are similar.⁴⁷

It is important to note that patents are a powerful business tool, that can be used to lure in investors, and to block competitors from entering a certain sector, etc...

A critique by Shabalala is:

“Patents are well-suited to encouraging innovations, encouraging initial disclosure of knowledge but, other than licensing, are not specifically directed at increasing diffusion of technologies.”⁴⁸

This is a heavy critique which questions an entire global system of IPRs, as well as the legitimacy of international agreements such as the TRIPS, but scholars have been critical of the IPR system in many ways, which we will see further, because, in the end, it plays a big role in whether IPRs are suitable to deal with the important issue of green technology diffusion.

3.2.2. The absorptive capacity

The AIPPI Committee Q198 stresses that, in their task as a tool for innovation, IPRs only play a role as part of a bigger ecosystem which, only in its entity, is able to effectively promote development and innovation. The Committee states that “IP laws alone do not, at least not sufficiently, promote technology development“, but instead, need to be part of a larger

45 Dalindyabo Shabalala, ‘Climate Change, Technology Transfer and Intellectual Property: Options for Action at the UNFCCC’ (PhD dissertation, Maastricht University 2014), 9

46 Boldrin, M and D Levine ‘The Case against Patents’, (2013) 27 The Journal of Economic Perspectives, 3

47 See den Uijl, S et al. ‘Managing Intellectual Property Using Patent Pools: Lessons from Three Generations of Pools in the Optical Disc Industry’ (2013) 55 California Management Review 31

48 Dalindyabo Shabalala, ‘Climate Change, Technology Transfer and Intellectual Property: Options for Action at the UNFCCC’ (PhD dissertation, Maastricht University 2014) 10

framework, which furthermore contain investment in education, research and development, as well as professional services and a favouring legal framework.⁴⁹

They explain that one reason for the lack of licenses towards developing countries, is the missing infrastructure to welcome the technologies, such as expertise, capital and favourable market conditions. Hall and Helmers call this concept “the absorptive capacity”. It signifies the way a country is equipped to exploit the patents and technologies, with infrastructure, the know-how, education and expertise, as well as the readiness of the market. The ability of the recipient countries to host these technologies and use them to their full potential is decisive for the success of the technology transfer. It is the absorptive capacity that explains why emerging countries, such as Brazil and China have much better chances to attract investors than least developed countries.

To counteract the problem of an insufficient absorptive capacity, Committee Q198 suggests that the licenses in question should be granted in the form of a package license, that additionally also confers the necessary know-how and research and development, in order to enable actual effective use of the license.⁵⁰ Consilvio, too, suggests that transfer of technology should always include the transfer of the relevant knowledge and skill to use it.⁵¹

Although the IP system cannot lift the weight of green technology transfer by itself, the importance of an IP system for a good functioning of this architecture is still not to be underestimated. Sufficient IP protection can be very important for technology development and commercialization, as it endorses investment in intangible assets, to promote collaboration.⁵² All of these aspects are crucial parts of the collaborative efforts that are needed to actively combat climate change.

3.3 The North-South Divide

Most problems that we face regarding climate change stem from the division of the world into the richer global north and the poorer global south. It is the loaded historical background which resulted in the extreme socio-economic inequality of today. Unfortunately, these differences are what makes it extremely complicated to ask for joint effort facing climate change, when, roughly said, the south suffered from indirect and direct socio-economic abuse and recklessness from the north for centuries.

The UN does their best to respect the disparities in needs and efforts, for example by the

49 AIPPI Special Committee (SC) Q198 Intellectual Property and Green Technology, Report (May 2014) 6

50 Ibid 14

51 M Consilvio ‘The Role of Patents in the International Framework of Clean Technology Transfer: A Discussion of Barriers and Solutions’ (2011) American University Intellectual Property Brief

52 AIPPI Special Committee (SC) Q198 Intellectual Property and Green Technology, Report (May 2014) 7

concept of Common But Differentiated Responsibilities⁵³, which allows for fairer expectations on countries of their contribution to address climate change.

However, the problem subsists that we are racing towards the destruction of the planet, and that every possible step to minimize or reverse these effects is desperately needed.

We will now analyse the interaction between the north-south divide and intellectual property.

3.3.1 The IP Divide

The gaping disparity in economies is not only a roadblock for complete and equal globalization, but, on a smaller scale, it also means that the diffusion of markets and innovation is impeded.

By looking at the global IPR situation, we can clearly identify differences in approaches and profit of the IPR system. This problem is called the “IP Divide”, and refers to the fact that nationals from less than 10 nations own the vast majority of patents worldwide, which by extension means that developing countries have limited access to the most innovative climate change technologies.⁵⁴

In fact, the biggest portion of patents is owned by OECD countries, and the closest developing country, which is still far away, is China, which owns most patents of the developing world.⁵⁵

We see that, not only are the profits of the IP system divided unequally, but, in general, the approaches towards the concept of IPRs in certain economies are often times antipodal. Falvey and Foster have thoroughly analysed the socio-economic effects of IPRs in both northern and southern countries.

One important element that creates the disparity is the way countries traditionally develop technology. Generally speaking, developed countries (i.e. northern) rely on innovation as their means of producing technology, whereas developing or least developed countries mostly thrive off imitation, which is often cheaper because less marginal costs are involved.

The massive difference in incomes between the north and the south create different social priorities, which has a repercussion on how the economies work. Often times the protection and the respect of IPRs might just be too expensive, especially since the top half of the hemisphere holds most of the IPRs, which is why the focus is not on IPR protection, but rather on the lowering of marginal costs and the increase of profit. When capital is limited, short term financial results from the production of imitations can seem much more attractive and valuable than long term societal benefits.

This could explain why southern countries “perceive the trade-off between profits and

53 UNFCCC article 3 paragraph 1., and article 4 paragraph 1

54 AIPPI Special Committee (SC) Q198 Intellectual Property and Green Technology, Report (May 2014) 2

55 Dalindyabo Shabalala, ‘Climate Change, Technology Transfer and Intellectual Property: Options for Action at the UNFCCC’ (PhD dissertation, Maastricht University 2014) 112

innovation differently”⁵⁶, and focus on imitation rather than investment in innovation.

3.3.2. Impact of IPRs on North vs South

Because of this discrepancy of attitudes towards the production of technology, a strengthening of IPRs can have drastically different results for both situations.

It is generally assumed that, at least for developed countries, IPRs encourage innovation, by supporting inventors and developers. In 1977, Mansfeld et al. have even stated that the “social rate of return to innovation” is much higher than the benefits to the innovator alone⁵⁷, meaning that innovation has a very high value for society as a whole, even more than to the inventor themselves.

Yet, as we have seen, the option of focussing the efforts on long term societal goals might be a luxury that companies in least developed countries can simply not afford.

For the Global South, it is said that too strong IPRs can have a stalling effect on growth of these economies, because it reduces the access to the technology which is needed for the imitation process. It also inhibits the possibility of further innovating on existing technology. Furthermore, increased IPR protection would mean “shifting profits from domestic imitative firms to foreign firms and reducing output in the domestic economy, rather than encouraging domestic innovative activity.” which would, again, lower innovative activity.⁵⁸

Kim⁵⁹ argues that IPRs impede Technology development in the early stages, as there is a big value in imitation and reverse-engineering, to which IPRs stand in the way.

Kumar gives the example of Asia, where extensive amounts of technological knowledge has been acquired with weak IPR in place. But this could just as well be due to many other reasons and incentives.

A curious phenomenon in China is that foreign enterprises don’t want to locate R&D to China „for fear of misappropriation and patent infringement”, which is why they then only transfer older technology.⁶⁰

Too much IPR protection can create a number of adverse results, such as the creation of a monopoly in innovation in developing countries, which hinders the even dissemination of new

56 Rod Falvey, Neil Foster, ‘The Role of Intellectual Property Rights in Technology Transfer and Economic Growth: Theory and Evidence’ (2006) United Nations Industrial Development Organization

57 EJ Mansfield and others, ‘Social and Private Rates of Return from Industrial Innovations’ (1977) Quarterly Journal of Economics, 16 221-240.

58 A V Deardoff, ‘Welfare Effects of Global Patent Protection’ (1992) 59 *Economica*, 33-51

59 L Kim, ‘Technology Transfer and Intellectual Property Rights: The Korean Experience’ (2002) BRIDGES, ICTSD 6 (8), November-December

60 Rod Falvey, Neil Foster, ‘The Role of Intellectual Property Rights in Technology Transfer and Economic Growth: Theory and Evidence’ (2006) United Nations Industrial Development Organization

knowledge. It can even have high societal costs⁶¹, as it incites a wasteful use of capital, for example in “patent races”, where two companies invest for basically identical R&D, and of course judicial actions to enforce the IPRs.⁶²

From the globalization standpoint though, the big differences in national IPR are crucial, which is why firms insisted in levelling out the global IPR regime with the TRIPS agreement. That way, imports, Foreign Direct Investment (“FDI”) and licensing should increase Technology Transfer to developing countries.

The problem is that this still does not change the fact that the Global South depends on the Global North, and that IPRs still only benefit the North, unless R&D becomes so productive in the south that the greater part of a given market shifts to the south.⁶³

Also, as Deardoff points out, as more and more countries will have strengthened their IPR regimes, the benefits on innovation by IPRs will diminish, since “the extra market covered and the extra innovation that can be stimulated by such protection diminishes”.⁶⁴

3.4. The impact of IPRs

The different ways of technology transfer still remain one of the most practiced ways to achieve equal diffusion of environmentally friendly technology, and IPRs continue to have their importance in the three main vehicles of international technology transfer which are licensing, foreign direct investment and trade.⁶⁵ We will investigate how experts perceive the influence of IP in these three cases.

3.4.1. The Impact of IPRs on the three channels of Technology Transfer

Foreign Direct Investment

FDI usually means “technology transfer from the parent firm to the subsidiary in a developing country”⁶⁶, and can be an organic way for firms to introduce technology in a new country, as it is also beneficial for them.

61 K E Maskus ‘Intellectual Property Rights in the Global Economy’ (2000) Washington, DC: Institute for International Economics

62 *ibid*

63 J Chin and G M Grossman, ‘Intellectual Property Rights and North-South Trade’ (The Political Economy of International Trade, Cambridge, MA: Basil Blackwell, 1990) 90-107

64 A V Deardoff, ‘Welfare Effects of Global Patent Protection’ (1992) 59 *Economica*, 33-51

65 Dalindyabo Shabalala, ‘Climate Change, Technology Transfer and Intellectual Property: Options for Action at the UNFCCC’ (PhD dissertation, Maastricht University 2014), 83

When firms decide on whether to engage in FDI or not, stronger IPRs seem to have a positive influence on the decision rather than a negative one. However, it might be oblivious to deduce a distinct impact of IPRs on FDI, because there are many other factors that come in to play in determining activities of FDI.⁶⁷ When firms take these other factors into account, such as country risks or prospects of high quality knowledge exchange, some choose to invest into R&D, even in countries with weak IPR. This means that there are some determinants that have a much higher priority for firms and investors than IPRs.

There have also been suggestions that strong patent rights might be positive for FDI into middle income and large developing countries, but no impact for FDI into least developed countries.⁶⁸

One would generally assume that stronger IPR would encourage FDI and shift production to the South. But if the production ends up in a country where imitation is common, and the products from northern firms then become easier to imitate than if they were produced in the north, that might just make the firms want to shift production back to the north.⁶⁹ On the other hand, if we take a look at China and Brazil, we can observe that stronger IPR is not necessary nor sufficient to promote FDI.

Considering these different arguments, the impact of the strengthening of IPRs in southern countries on FDI is not clear.⁷⁰

Trade

In technology transfer through trade, there are numerous experts that find empirical evidence for a positive relation between imports and strength of IP protection and enforcement in the host countries⁷¹.

In general, IPRs have better impact on growth in open economies, but, as studies show, this seems to entail a strong decline in locally created technology in the South, because a

66Cameron Hutchison, 'Does TRIPS Facilitate or Impede Climate Change Technology Transfer into Developing Countries?' 3:2 (2006) University of Ottawa Law & Technology Journal 517, 529

67A Fosfuri, 'Determinants of international activity: evidence from the chemical processing industry.' (2004) Research Policy, 1599-1614

68BM Hoekman, KE Maskus and K Saggi 'Transfer of Technology to Developing Countries: Unilateral and Multilateral Policy Options' (2004) Working Paper PEC2004-0003, Institute of Behavioral Science (Boulder: University of Colorado)

69A Glass and K Sagi, 'Intellectual Property Rights and Foreign Direct Investment' (2002), Journal of International Economics, 56 387-410

70Jerme H Reichman, Keith E Maskus 'The Globalization of Private Knowledge Goods and the Privatization of Global Public Goods' (2004) Journal of International Economic Law 7(2) 279-320

71K E Maskus, M Penubarti, 'How trade-related are intellectual property rights?' (1995) Journal of International Economics, 39, 227-48.

strengthening of IPRs seems to lead to more foreign patenting but less domestic patenting. In that sense, the trade flow can only be boosted in countries that rely on imitation.⁷² Trade flows to least developed countries however “are not responsive to patent rights”⁷³

Licensing

Technology transfer can also happen through licensing, and here, too, experts, such as Smith⁷⁴ and Yang and Maskus⁷⁵ find a positive correlation between stronger IPR and the desire of firms of developed countries to license technology out to developing countries. Licensing can be an efficient “mechanism for horizontal and vertical market based technology transfer”⁷⁶ as it can assure the return of investment to the right holder, and encourage diffusion.

However, Shabalala finds a major structural problem in licensing for technology transfer, as especially technology can be used as a competitive advantage of a firm. This means that the licensee can act in a way as to ensure his competitive advantage towards other domestic firms. The aim of it however, is to allow the diffusion to all the primary actors in the relevant market.⁷⁷

Also, whether foreign patenting fosters or inhibits growth seems to be determined by the size of a country’s market.⁷⁸

As one can assume that northern firms will want to assure that imitation is discouraged for licensees in the south, this means that licensing should be cheap enough. So, in the long run, IPRs will reduce the cost of licensing⁷⁹, which would be beneficial.

However, even if there is licensing to southern countries, this is not a dead giveaway of successful technology transfer. This is due to the fact that licensing can also be used for many other things than the production and diffusion of technology. It is a very powerful market tool, that can be used strategically, and is not always followed by production.⁸⁰

72 Rod Falvey, Neil Foster, ‘The Role of Intellectual Property Rights in Technology Transfer and Economic Growth: Theory and Evidence’ (2006) United Nations Industrial Development Organization

73 Bernard M Hoekman, Keith E Maskus & Kamal Saggi, ‘Transfer of Technology to Developing Countries: Unilateral and Multilateral Policy Options’ (2004) World Bank Policy Research Working Paper 3332 15

74 P J Smith ‘How Do Foreign Patent Rights Affect U.S. Exports, Affiliate Sales, and Licenses?’ (2001) Journal of International Economics, 55, 411-440

75 L Yang, K E Maskus, ‘Intellectual property rights, technology transfer and exports in developing countries.’ (2009) Journal of Development Economics, 90, 231-236

76 Dalindyabo Shabalala, ‘Climate Change, Technology Transfer and Intellectual Property: Options for Action at the UNFCCC’ (PhD dissertation, Maastricht University 2014), 87

77 *ibid*

78 Rod Falvey, Neil Foster, ‘The Role of Intellectual Property Rights in Technology Transfer and Economic Growth: Theory and Evidence’ (2006) United Nations Industrial Development Organization

79 *ibid*

80 Dalindyabo Shabalala, ‘Climate Change, Technology Transfer and Intellectual Property: Options for Action at the UNFCCC’ (PhD dissertation, Maastricht University 2014), 10

This means that, especially when we look at green technology transfer, it is crucial to know that licensing does not mean that the technology will be produced nor used in the country they are licensed in, which is a common critique point for studies in that field.

Not only is a license not a guarantee for production, higher IPRs are also not a guarantee for licensing. Gollin has pointed out several reasons why companies would want to license in general. These are either that they do not need the technology for themselves, meaning that it is not part of their main business, or has no competitive advantage, and they can easily part with, or, that it represents some kind of nuisance for them, as in that it is too difficult to fulfil a demand, or if there is a high risk of the technology creating liability.⁸¹

These reasons all revolve around the question of profit for the companies, and it basically means that, if the license is at all worth having, it is going to be very hard to convince companies to license it. This makes voluntary licensing an unreliable and arbitrary means for organic technology transfer, which is inoperative for the goal of diffusing green technology. This problematic would be a good reason to consider compulsory licensing, which we will address later.

3.4.2. The impact of IPRs on Green Technology Transfer

As for the impact of intensifying IPRs for Technology Transfer as a whole, Falvey and Foster have found that in general, one can say that IPRs have a better impact on growth in a country that has a more open economy, meaning where there are practically no barriers to trade of goods and services with other countries.⁸²

Interestingly, they say that it is most beneficial for developed and least developed countries, but has NO significant effect on middle-income countries, which have the capacity to imitate, which is cheaper. This can have either a positive or a negative effect on Technology Transfer. However, they have not found a highly positive significance on the classic technology diffusion channels (trade, licensing and FDI).

Since developing countries are very likely to have enough resources to imitate, stronger IPRs can have two different effects: either encouraging TT because FDI gets encouraged, or discouraging TT because it cannot be imitated.

A side note, which however is very important for our conclusion, is that “In no case, however, do the authors find evidence of stronger IPR protection having a negative impact on growth.”⁸³

81 Michael A Gollin, ‘Using Intellectual Property to improve Environmental Protection’ (1991) Volume 4, Spring Issue, Harvard Journal of Law & Technology, 193 219-220

82 Cambridge University Press <<http://dictionary.cambridge.org/de/worterbuch/englisch/open-economy>>

83 Rod Falvey, Neil Foster, ‘The Role of Intellectual Property Rights in Technology Transfer and Economic Growth: Theory and Evidence’ (2006) United Nations Industrial Development Organization

From the opposite perspective, the World Bank 2010 Development Report suggests that neither strong IPRs in middle-income countries, nor weak IPRs in low-income countries have shown to be a big barrier to Green Technology Transfer.⁸⁴ As a response to that, Johson and Lybecker explain that some technologies, such as emissions reduction technologies, are already in the public domain, and can be improved without having to deal with patents, which would explain why, in some isolated cases, patent rights may not be of importance for innovation.⁸⁵

Some argue that there is a risk that the host countries with weak IP protection or enforcement might not be able to prevent unlawful imitation of technology of foreign companies, which can lose them some profits. This risk would be diminished if the host countries had good IP protection and enforcement mechanisms, which leads them to conclude that foreign direct investment of Green Technology into developing countries should be more attractive, if IP protection is guaranteed.

Wright and Pardey⁸⁶ however, argue that there were no problems diffusing technology from the U.S. to developing countries with lower IPR protection. On the other hand, firms might be discouraged to invest into R&D locally, and prefer to license out, if IPRs are too strong, according to Hall et Helmers.

We have seen that the stimuli for the promotion or investment in green technology must be strong, in order to be convincing. If we consider that more incentives are needed in order to promote local R&D of green technology, the role of IPRs might not be as minor anymore. Littleton sees the same risks as Consilvio for technology transfer and the market to which they should be transferred. For example, IPRs might incite the owners to demand higher prices or to monopolize the markets, which could lead to anti-competitive behaviour and hamper innovation.

For Korea, Falvey and Foster say that strong IPR hinder technology transfer in the early stages of industrialization, if the country relies on reverse-engineering and imitation. Only after becoming advanced enough to do creative imitation, IPRs become important for industrial activities and Technology Transfer. India is another example for a country which is at a very low level of development, and in which weak IPRs at the beginning are important for building up local capabilities. Also in Lebanon, strong IPR has a static effect on prices, employment and output, which is negative for most industries in Lebanon.

However, dynamic gains are possible, if other possibilities are increased, such as FDI, local product development, and the ability to enter joint ventures or product licensing.⁸⁷

84 World Bank 'World Development Report 2010: Development and Climate Change. Washington D.C.' (2010) 310, **See Annex 1**

85 D K Johnson, K M Lybecker, 'Innovating for an Uncertain Market: A Literature Review of the Constraints on Environmental Innovation.' (2009) Colorado College Working Paper No. 2009-06.

86 B Wright and P G Pardey, 'Changing intellectual property regimes: implications for developing country agriculture.' (2006) International Journal of Technology and Globalisation, 2(1/2), 93-114.

Interestingly, the AIPPI Committee has come to the conclusion that patent law cannot be considered a barrier to technology transfer due to the fact that there are not many green technology patents in developing and least developed countries, and that, even if they are, it is not a sufficient indicator for efficient transfer of technology, because it needs other components for that.⁸⁸

However, this conclusion seems very arbitrary and misleading, because, firstly, in quite the opposite way, one would assume that a lack of patents would indicate a lack of incentives to create patents. This might be the fault of the IP system or it might not, but it does indicate that the framework is neither appealing nor ideal.

Secondly, as many other experts have noted, it is overall very perilous to deduce anything for technology transfer from either the existence of patents or the lack thereof, because there can be so many factors explaining it, which can all have either positive effects or negative effects on technology transfer.

3.5. Chapter Conclusions

3.5.1. Critiques on the studies

Besides the criticism on the current patent system itself, many writers agree on the fact that the majority of the studies on green technology transfer have not been done in a satisfactory manner, and that they are flawed and insufficient.

A flaw that has been recognized by many scholars is that the distribution of patents in countries is not indicative of how they are exercised, since they can, among others, also be used for blocking competition etc.⁸⁹

It does not tell us whether the patent has been distributed to domestic actors, and whether the technology has made it to the market and has been successfully commercialized.

Shabalala suggests that this info can only be collected if we know whether the patents have been assigned or licensed, which is not easy to find out. He also agrees that a shortage of patents in a country does not indicate “freedom to use or import the technology”.

Furthermore, sometimes the definition of “green technology” is not clearly set out in most studies, and it can include various types of technology, but not others. Other times, it is not clear what constitutes “technology transfer”.

A big critique point to these studies are the interpretations drawn from some of the facts.

It is quite the black and white thinking to assume that either patenting means licensing, or that

87 Rod Falvey, Neil Foster, ‘The Role of Intellectual Property Rights in Technology Transfer and Economic Growth: Theory and Evidence’ (2006) United Nations Industrial Development Organization, 44

88 AIPPI Special Committee (SC) Q198 Intellectual Property and Green Technology, Report, May 2014, 13

89 Dernis, H et al. ‘Using Patent Counts for Cross-Country Comparisons of Technology Output’ (2001) STI Review 27 129

licensing means production. There many other factors which determine either. Shabalala criticizes that most studies are “focused on static patent landscapes in a limited set of technologies”. Almost no studies have been done which inquire whether the problem might be the costs of IP vehicles, which would explain problems of access. He also points out that no surveys have been done to find out which barriers actors in developing countries face in respect to licensing of (green) technologies.

All of these lacunae make legal analysis even more complicated and it might be that the insufficient quality of research is what causes the big disagreement on the matter.

3.5.2. Chapter Synthesis

The question of IP and Green Technology Transfer is a very controversial topic, and it seems that experts can not unanimously agree on whether IP has positive or negative effects on GTT, if any at all.

Latif et al. call this peculiar position of IPRs in-midst the climate change discussions an “impasse”, and offer two possible explanations. One being the fact that countries might like to use IPRs as a vehicle for further negotiation and bargaining on much broader commitments. The other reason are the particularly divided views on IPRs, that do not allow for fruitful dialogue and middle-ground settlements.⁹⁰

Latif et al. opine that those defending IP are afraid that opening up the discussion on IPRs may lead to a solution that would overly impinge upon global IP rules, a phenomenon that can be observed with the Doha Agreement.⁹¹

As we can observe from the arguments in the previous sub-chapters⁹², strong IPRs in receiving countries could have positive effects on FDI and licensing in some instances, but it is difficult to say since there are so many other factors that can play a role for FDI.

Also, it is unclear whether IPRs have good influence on growth in a country, especially considering how important imitation can be in some instances, and how detrimental in others. A direct influence of stronger IPRs on licensing and technology transfer in general has been

90 AA Latif and others, ‘Overcoming the Impasse on Intellectual Property and Climate Change at the UNFCCC: A Way Forward’ (2011) ICTSD Programme on Innovation, Technology and Intellectual Property, Policy Brief No 11 2

91 J Barton ‘Intellectual Property and Access to Clean Energy Technologies in Developing Countries: An Analysis of Solar Photovoltaic, Bio-fuel and Wind Technologies’ (2007) Trade and Sustainable Energy Series, Issue Paper Number 2, ICTSD, <<http://ictsd.org/i/publications/3354>>, F Abbott, ‘Innovation and Technology Transfer to Address Climate Change, Lessons from the Global Debate on Intellectual Property and Public Health’ (2009) Intellectual Property and Sustainable Development Series, Issue Paper Number 24, ICTSD, <<http://ictsd.org/i/publications/50454/>>

92 See **Annex 2** for a synthesis of the arguments

hard to substantiate, especially with examples like Korea and Lebanon, which seemed not to benefit from it.⁹³

By analysing the current IPR situation, it has become clear that the right framework for successful technology transfer is essential.

But more than that, the concept of green technology transfer opens up much more fundamental questions: is the free market patent system at all adapted to this kind of worldwide collaboration? If patents only make sense in a setting where so many other aspects need to be given, it may not be suited for countries in which these aspects are not present. This is a clear indication that, even if an IP system is established, it might not be fitting into the developing countries' economical system, which in turn creates a higher IP Divide, and inhibits a proper international collaboration on green technology transfer, which is crucial for a challenge as big as climate change.

It might not even be a legal problem per se, but it shows that the architecture as such is flawed. The AIPPI Committee Q198 seems to suggest that the only problem is "bad communication" of the IP system, but there might be deeper underlying problems, and eventually show for some counter-incentives that prevent inventors from developing countries from using the IP system. A functioning IP system, either as such or as a part of a whole, in my eyes loses its battle, if it doesn't attract its audience correctly.

The only sure thing the collection of opinions seems to suggest is the fact that the answer on this important question can neither be a definite "yes" nor a definite "no", but something in between, and that it depends on who's talking.

Some important comments that most experts have in common is that the research that has been done so far in attempt to answer the question, is far from ideal. Many studies get criticized for being too biased, too imprecise, or lack consideration of important variables, which all contribute to these results not being as revealing as we would need.

But, they do serve a different purpose, namely the unveiling of other unexpected innate problems, that the current mechanism may bear, including the lack of absorptive capacity. The main difficulties are, firstly, to ensure that the knowledge on green technology is rightly distributed, and second, that the patents are used to produce green technology for those who need it most.

We now have a little more guidance for what defaults need to be corrected by potential improvement methods that we want to test. In this case, we will primarily focus on the idea of compulsory licensing as a mechanism for technology transfer, and with the above-mentioned criteria, we have some reference that can help us put the mechanism to the test.

⁹³Rod Falvey, Neil Foster, 'The Role of Intellectual Property Rights in Technology Transfer and Economic Growth: Theory and Evidence' (2006) United Nations Industrial Development Organization, 44

Chapter 4: Compulsory Licensing

4.1. Compulsory Licensing, an Introduction

A compulsory license is a “governmentally mandated arrangement allowing third parties to use another’s intellectual property upon payment of a specified fee regardless of objections of the owner of the intellectual property”⁹⁴.

In other words, the third party does not need the consent from the patent holder, because the authority has waived the patent holder’s right to decline the issue of a license. This can generally only happen if a series of conditions are met, and the patent holder also keeps the right to adequate remuneration.

4.1.1. History

One of the first times that the concept of compulsory licensing has been introduced on a bigger scale is in The Paris Convention for the Protection of Industrial Property (“Paris Convention”) of 1883. Its article 5A.(2) gives contracting party countries

“the right to take legislative measures providing for the grant of compulsory licenses to prevent the abuses which might result from the exercise of the exclusive rights conferred by the patent, for example, failure to work.”

This mention of compulsory licensing is quite general, whereas in the TRIPS agreement, compulsory licensing is one of the flexibilities proposed, and is explained mainly in article 31 of TRIPS which states

“Where the law of a Member allows for other use¹ of the subject matter of a patent without the authorization of the right holder, including use by the government or third parties authorized by the government, the following provisions shall be respected:”

and is followed by some conditions, as we will see later.

Originally, the article 31(f) set up the possibility of compulsory licensing “predominantly for the supply of the domestic market”, which was then criticized to be inconsiderate of least developed countries and countries that do not have the production capacity to address extreme public health emergencies. In response, the WTO Ministerial Conference of 2001 in Doha on 14 November 2001 adopted The Doha Declaration on the TRIPS Agreement and Public Health (“Doha Declaration”), in order to reaffirm the flexibilities of TRIPS, and to waive

⁹⁴ J.Thomas McCarthy et al. McCarthy’s Desk Encyclopedia of Intellectual Property (3rd ed., 2nd printing, BNA, Washington DC, 2005) 305

article 31(f) to open up compulsory licensing for export.⁹⁵ The Doha Declaration has been added as an amendment to the TRIPS Agreement on 6 December 2005⁹⁶, which has been accepted by the European Union in 30 November 2007, and took effect on 23 January 2017.⁹⁷

4.1.2. Legal Basis

Article 8(1) of TRIPS⁹⁸ seems to set a gateway towards the basic idea of the necessity of compulsory licensing, by giving the contracting parties the right to

“adopt measures necessary to protect public health and nutrition, and to promote the public interest in sectors of vital importance to their socio-economic and technological development”.

The right of the member states to provide flexibilities to patent rights becomes more concrete with articles 30⁹⁹ and 31 of TRIPS.

The difference between the two articles is that article 30 of TRIPS confers the right to member states to provide exceptions to the patent rights, which do not result in compulsory licensing, which is given in article 31 specifically.

Article 31 of TRIPS reads:

TRIPS

Article 31

Other Use Without Authorization of the Right Holder

Where the law of a Member allows for other use¹⁰⁰ of the subject matter of a patent without the authorization of the right holder, including use by the government or third parties authorized by the government, the following provisions shall be respected:

(a) authorization of such use shall be considered on its individual merits;

95 This change does however still need to be implemented in national legislation in all the member states.

96 World Trade Organization General Council, ‘Amendment of the TRIPS Agreement’ (2005) WT/L/641
<https://www.wto.org/english/tratop_e/trips_e/wtl641_e.htm>

97 World Trade Organisation ‘Amendment of the TRIPS Agreement’
<https://www.wto.org/english/tratop_e/trips_e/amendment_e.htm>

98 Article 8(1) TRIPS: „Members may, in formulating or amending their laws and regulations, adopt measures necessary to protect public health and nutrition, and to promote the public interest in sectors of vital importance to their socio-economic and technological development, provided that such measures are consistent with the provisions of this Agreement.“

99 Article 30 TRIPS: „Members may provide limited exceptions to the exclusive rights conferred by a patent, provided that such exceptions do not unreasonably conflict with a normal exploitation of the patent and do not unreasonably prejudice the legitimate interests of the patent owner, taking account of the legitimate interests of third parties.“

100 "Other use" refers to use other than that allowed under Article 30. (TRIPS)

- (b) such use may only be permitted if, prior to such use, the proposed user has made efforts to obtain authorization from the right holder on reasonable commercial terms and conditions and that such efforts have not been successful within a reasonable period of time. This requirement may be waived by a Member in the case of a national emergency or other circumstances of extreme urgency or in cases of public non-commercial use. In situations of national emergency or other circumstances of extreme urgency, the right holder shall, nevertheless, be notified as soon as reasonably practicable. In the case of public non-commercial use, where the government or contractor, without making a patent search, knows or has demonstrable grounds to know that a valid patent is or will be used by or for the government, the right holder shall be informed promptly;
- (c) the scope and duration of such use shall be limited to the purpose for which it was authorized, and in the case of semi-conductor technology shall only be for public non-commercial use or to remedy a practice determined after judicial or administrative process to be anti-competitive;
- (d) such use shall be non-exclusive;
- (e) such use shall be non-assignable, except with that part of the enterprise or goodwill which enjoys such use;
- (f) any such use shall be authorized predominantly for the supply of the domestic market of the Member authorizing such use;
- (g) authorization for such use shall be liable, subject to adequate protection of the legitimate interests of the persons so authorized, to be terminated if and when the circumstances which led to it cease to exist and are unlikely to recur. The competent authority shall have the authority to review, upon motivated request, the continued existence of these circumstances;
- (h) the right holder shall be paid adequate remuneration in the circumstances of each case, taking into account the economic value of the authorization;
- (i) the legal validity of any decision relating to the authorization of such use shall be subject to judicial review or other independent review by a distinct higher authority in that Member;
- (j) any decision relating to the remuneration provided in respect of such use shall be subject to judicial review or other independent review by a distinct higher authority in that Member;
- (k) Members are not obliged to apply the conditions set forth in subparagraphs (b) and (f) where such use is permitted to remedy a practice determined after judicial or administrative process to be anti-competitive. The need to correct anti-competitive practices may be taken into account in determining the amount of remuneration in such cases. Competent authorities shall have the authority to refuse termination of authorization if and when the conditions which led to such authorization are likely to recur;
- (l) where such use is authorized to permit the exploitation of a patent ("the second patent") which cannot be exploited without infringing another patent ("the first patent"), the following additional conditions shall apply:
- (i) the invention claimed in the second patent shall involve an important technical advance of considerable economic significance in relation to the invention claimed in the first patent;
 - (ii) the owner of the first patent shall be entitled to a cross-licence on reasonable terms to use the invention claimed in the second patent; and
 - (iii) the use authorized in respect of the first patent shall be non-assignable except with the assignment of the second patent.

As we see, one important condition for a government to allow the use of a patent without the authorization of the right holder is that

“prior to such use, the proposed user has made efforts to obtain authorization from the right holder on reasonable commercial terms and conditions and that such efforts have not been successful within a reasonable period of time.”¹⁰¹

Another very important condition is that the right holder still has to be paid an adequate remuneration.¹⁰²

While compulsory licensing means that the patent holder does not have the right to decline the issue of a license after being requested to do so by the authority, normally the prospected user still needs to first have made reasonable efforts to obtain a voluntary license.

However, Article 31(b) gives an exception to that rule in “the case of a national emergency or other circumstances of extreme urgency or in cases of public non-commercial use”. Then the Member state can waive the obligation of reasonable efforts, and skip to the compulsory licensing, and thus save time in those exceptional urgent situations.

At this point it is important to note that these cases from 31(b) do not represent possible grounds for granting compulsory licenses, but only grounds for waiving the need for approval by the patent holder. The fact that a situation is urgent is not a motive in itself, which is important to note, in order to avoid “frivolous ground” that is presented in a subjective way as extremely urgent by a country. There must be public interest.¹⁰³

The Doha Declaration explained that each member state can decide what they deem a national emergency or circumstances of extreme urgency, in terms of public health crises, such as “HIV/AIDS, tuberculosis, malaria or other epidemics”¹⁰⁴

Other than in case a government wants to waive the obligation to first ask for the patent holder’s approval, the TRIPS Agreement does not foresee any limitations to the grounds on which regular compulsory licenses may be issued in a member state.¹⁰⁵

Further, the Max Planck Institute even states that technically, compulsory licensing under TRIPS Article 31 can be used to remedy

“abuse of patent rights or for practices that unreasonably restrain trade or adversely affect the international transfer of technology, even when

- the proposed licensee has not made prior efforts to obtain authorization from the patent holder, and

- the use is authorised predominantly for the supply of foreign markets.”¹⁰⁶

101 Article 31(b) TRIPS

102 Article 31(h) TRIPS

103 Nuno Pires de Carvalho, *The Trips Regime of Patent Rights* (3rd Edition, Kluwer Law International, 2010), 436

104 WT/MIN(01)/DEC/2 of 20 November 2001, Doha Declaration, Article 5 (c)

105 Max Planck Institute for Innovation and Competition, *DECLARATION ON PATENT PROTECTION* Regulatory Sovereignty under TRIPS, (2014) 15

106 *ibid*

Additionally, the government's use of the patents coming from compulsory licensing is not limited either, and an eventual third party would not even need it to be non-profit use.¹⁰⁷

These blind spots in the TRIPS Agreement are quite useful tools to potentially make compulsory licensing work for green technology, which we will see in the following subchapters.

4.2. Compulsory Licensing for Green Technology?

Not only can the use of regular compulsory licenses be considered as a method to allow for better diffusion of green technology, but specifically, there have been discussions whether “the case of a national emergency or other circumstances of extreme urgency or in cases of public non-commercial use” could also be applied to climate change adaptation and mitigation technologies.

Once the Doha Declaration opened the doors for the accelerated export of compulsory licenses to LDCs for public health reasons, it became even more interesting for green technology transfer. The question has arisen whether it would be possible to recreate the Doha Declaration for the purposes of climate change.¹⁰⁸

Especially in LDCs and countries without the production capacities, climate change technology is most needed, particularly for adaptation, as these countries are most vulnerable in most cases.

As we have seen, one of the main concerns of climate change is to make green technology available to all countries, especially the most vulnerable ones, and the countries with the highest rates of greenhouse gas (“ghg”) emissions.

A dominant problem with diffusion of green technology are the prices, which are often too high for lower and lowest income countries. As some people believe that strong IPRs are the reason for the high prices, the concept of weakening IPRs for the specific purpose of green technology diffusion has gotten support both in developing and developed countries.¹⁰⁹

Especially the concept of compulsory licensing has been a common suggestion to tackle the problem.

Seeing how compulsory licensing can be used in cases of health emergencies, some scholars have found that there is no prohibition as such to granting compulsory licenses for green

¹⁰⁷ *ibid*

¹⁰⁸ Kuei-Jung Ni, ‘Legal Aspects (Barriers) of Granting Compulsory Licenses for Clean Technologies in Light of WTO/TRIPS Rules: Promise or Mirage?’ (2015) *World Trade Review* 14: 4, 701 702

¹⁰⁹ Robert Fair, ‘Does Climate Change Justify Compulsory Licensing of Green Technology?’ (2010), 6 *BYU Int'l L. & Mgmt. R.* 21, (2010). <<http://digitalcommons.law.byu.edu/ilmr/vol6/iss1/3>> 23

technology, and it seems in line with other provisions of TRIPS to engage in technology transfer.¹¹⁰

The idea is that compulsory licensing would allow lower or lowest income countries to bypass a patent in order to create generic copies of a technology¹¹¹, like it can be the case with pharmaceuticals.

4.2.1.Examples of uses of compulsory licensing

Interestingly, there have been cases where the threat alone of the use of compulsory licensing by the government had the effect of lowering prices of patented pharmaceuticals.¹¹²

One example was during the global bird flu epidemic in 2005-2006. The patent of the potentially lifesaving drug Tamiflu® was owned by Roche, a Swiss pharmaceutical company, who were unable to deliver on the high demand. The U.S. publicly denounced Roche, while other countries, such as Taiwan, India, Thailand and Argentina announced that they would ignore the patent and make their own generic versions of Tamiflu®. Eventually, Roche yielded to the pressure, and lowered the licensing prices for the production of the drug.¹¹³

Most other times though, compulsory licensing needed to be invoked under TRIPS.

During an AIDS epidemic in 2005, the Brazilian government issued a suspension of the patents of all drugs that could treat HIV, so that generic versions could be produced locally. In 2007, Thailand issued a compulsory license for the AIDS drug Kaletra, after not being able to receive a price reduction on the drug.

Compulsory licensing has also been used by Eritrea, Ghana, Guinea, Malaysia, Swaziland, and Zimbabwe for importation of drugs to treat AIDS.¹¹⁴

As we can see, compulsory licensing, permitted by article 31 of TRIPS for cases of “national emergency” or for “public non-commercial use” definitely has its utility in health emergencies.

The case can also be made that climate change also fits the description of article 31 of TRIPS.

110Ibid 24

111Rishi R Gupta, ‘Compulsory Licensing in TRIPS: Chinese and Indian Comparative Advantage in the Manufacture and Exportation of Green Technologies.’ (2012) Sustainable Development Law & Policy 12, no. 3 21

112Robert Fair, ‘Does Climate Change Justify Compulsory Licensing of Green Technology?’ (2010), 6 BYU Int’l L. & Mgmt. R. 21, (2010). <<http://digitalcommons.law.byu.edu/ilmr/vol6/iss1/3>> 27

113Ibid 28

114James Packard Love, ‘Research Note, Recent Examples of the Use of Compulsory Licenses on Patents’ (2007) KNOWLEDGE ECOLOGY INT’L 2 <http://www.keionline.org/misc-docs/recent_cls.pdf>

4.2.2. Arguments in favour of compulsory licensing of green technology

The conditions for a compulsory license without the need to seek prior authorization from the patent holder are that the grounds are a case of “a national emergency or other circumstances of extreme urgency or in cases of public non-commercial use.”¹¹⁵

The many detrimental effects of climate change to humankind are well known. One of the biggest problems is air pollution, which “alone prematurely kills between two and three million people annually, and about ninety percent of those deaths occur in the developing world.”¹¹⁶

Another example are the extreme temperatures that have caused more than 70000 excess deaths in Europe during the heatwave of summer 2003.¹¹⁷

These situations could be assimilated to a “national emergency”, especially since the risk of health impacts is increasing at a rapid pace.

It first needs to be noted that article 31 of TRIPS does not mention any prohibition to using it for green technology¹¹⁸, nor does it give any limitations to the grounds of use whatsoever, for that matter.¹¹⁹ Also, Article 27(2) of TRIPS gives the possibility to prohibit a patent in case it creates “serious prejudice to the environment”, which at least indicates that environmental impact can be taken into consideration.

Also, the spectrum of included public health issues has been widened ever since the Doha Declaration, and the 2003 WTO Decision¹²⁰ states that there are “no limits on the scope of diseases”. For example, Thailand has widened the scope of compulsory licenses to chronic diseases since 2008.¹²¹

Another argument is that developing countries such as China and India have the advantage of being able to produce the technologies at a much lower cost compared to most developed countries¹²², which would contribute a lot to the dissemination of green technology. It would additionally allow for these countries to reduce high start-up costs to better implement their

115 TRIPS article 31 (b)

116 Robert Fair, ‘Does Climate Change Justify Compulsory Licensing of Green Technology?’ (2010), 6 BYU Int’l L. & Mgmt. R. 21, (2010). <<http://digitalcommons.law.byu.edu/ilmr/vol6/iss1/3>> 29

117 JM Robine JM, and others ? ‘Death toll exceeded 70,000 in Europe during the summer of 2003’ . C R Biol. 2008;331(2):171-8.

118 Cynthia M Ho, ‘Patent Breaking of Balancing?: Separating Strands of Fact from Fiction Under TRIPS’ (2009), 34 N.C.J. INT’L L. & COM. REG. 397

119 Max Planck Institute for Innovation and Competition, DECLARATION ON PATENT PROTECTION Regulatory Sovereignty under TRIPS, (2014) 15

120 World Trade Organization, ‘Implementation of Paragraph 6 of the Doha Declaration on the TRIPS Agreement and Public Health’ (2004) WT/L/540 and Corr.1 <http://www.wto.org/english/tratop_e/trips_e/implement_para6_e.htm>

121 Robert Fair, ‘Does Climate Change Justify Compulsory Licensing of Green Technology?’ (2010), 6 BYU Int’l L. & Mgmt. R. 21, (2010). <<http://digitalcommons.law.byu.edu/ilmr/vol6/iss1/3>> 32

122 Rasmus Lema, Adrian Lema, ‘Whither Technology Transfer? The Rise of China and India in Green Technology Sectors’ (2010), paper prepared for the 8th GLOBELICS International Conference, Kuala Lumpur, Malaysia 17

emission cut goals.¹²³

Besides, compulsory licensing could be a measure against the problem of the IP Divide, where the northern countries hold a great deal of power over important growth enhancing patents. And, since patents are more favourable to the northern countries, critiques say that it could be interpreted as “neocolonialism”.¹²⁴

Moreover, green technology could eventually also be used in a “public non-commercial” way, mentioned in TRIPS article 31(b), although it is much more likely that it would be commercialized. The use would be considered “non-commercial” if it was used for non-profit, or eventually only if the contract is eventual, sporadic and non-systematic.¹²⁵ There might be some green technologies that could be exclusively of public use, non-profit and that would need to be installed only once in order to better the quality of life for people. However, the WTO still has not given a clear definition of “public non-commercial” which is why it is suggested that the member states define it for themselves.¹²⁶

Furthermore, besides the possibility of making green technology fit into the same use as in public health situation, which gives governments the privilege not to have to consider the patent holder’s approval, there is always the option for regular compulsory licensing, according to TRIPS 31, to which no limitations to the ground of issuance are set.

Establishing a law that allows for the use of compulsory licensing for green technology in a member state can easily be made in a way as to respect the conditions listed in article 31. The law would have to make sure that compulsory licensing may be only permitted if:

- each case was considered individually¹²⁷
- authorisation from the patent holder has been sought to a reasonable extend¹²⁸
- the scope and duration is clearly set out for the purpose of the specific green technology¹²⁹
- the use of the compulsory license will be non-exclusive¹³⁰, which perfectly fits the interest of green technology transfer
- the use will be non-assignable¹³¹, which also aligns with the interest
- it will be used for domestic supply in the country to which it is licensed¹³² or, since this has

123 Robert Fair, ‘Does Climate Change Justify Compulsory Licensing of Green Technology?’ (2010), 6 BYU Int’l L. & Mgmt. R. 21, (2010). <<http://digitalcommons.law.byu.edu/ilmr/vol6/iss1/3>> 21-22

124 Muhammed Zaheer Abbas, ‘Pros and Cons of Compulsory Licensing: An Analysis of Arguments’ (2013) International Journal of Social Science and Humanity Vol. 3, No. 3 255

125 Nuno Pires de Carvalho, The Trips Regime of Patent Rights (3rd Edition, Kluwer Law International, 2010), 444

126 Cynthia M Ho, ‘Patent Breaking of Balancing?: Separating Strands of Fact from Fiction Under TRIPS’ (2009), 34 N.C.J. INT’L L. & COM. REG. 397 404

127 TRIPS 31(a)

128 TRIPS 31(b)

129 TRIPS 31(c)

130 TRIPS 31(d)

131 TRIPS 31(e)

132 TRIPS 31(f)

been waived by the Doha Declaration, international technology transfer is easier

- the circumstances of the use are predetermined, limited and to be reviewed¹³³
- the right holder will be remunerated adequately¹³⁴
- these issuances stay subject to judicial review¹³⁵
- the provisions regarding the remuneration of the patent holder stay subject to judicial review.¹³⁶

Additionally, in case the government considers the patent holder of the targeted green technology patent is showing anti-competitive behaviour in his choice not to license, the member states have the right to ignore conditions 31(b) to 31(f) of TRIPS in their provisions.¹³⁷

Even in the case that a green technology patent ("the second patent") relies on another first patent, article 31(l) foresees conditions in which the exploitation of that second patent is still possible.¹³⁸ This could easily apply to a situation in which the first patent is not green, but the second is, as long as the conditions are respected.

All of these cases and blind spots allow to make a case for the use of compulsory licensing for green technology.

4.2.3. Arguments against compulsory licensing of green technology

In general, some concerns have been raised about compulsory licences in that they are not only detrimental for patentees but also for the countries in which they are granted for the following reasons.

First, they deny the basic rights of the patentees, which is to prevent others from using their patent. Secondly, it is said to be bad for the countries, since it hampers attempts to the establishment of an independent, research-based industry, that is able to meet the demands of its own market, especially in countries that are focussed on imitation rather than innovation.¹³⁹ But even if there is an adequate infrastructural framework to receive the patent, and they could

¹³³ TRIPS 31(g)

¹³⁴ TRIPS 31(h)

¹³⁵ TRIPS 31(i)

¹³⁶ TRIPS 31(j)

¹³⁷ TRIPS 31(k)

¹³⁸ TRIPS 31(l): where such use is authorized to permit the exploitation of a patent ("the second patent") which cannot be exploited without infringing another patent ("the first patent"), the following additional conditions shall apply: (i) the invention claimed in the second patent shall involve an important technical advance of considerable economic significance in relation to the invention claimed in the first patent; (ii) the owner of the first patent shall be entitled to a cross-licence on reasonable terms to use the invention claimed in the second patent; and (iii) the use authorized in respect of the first patent shall be non-assignable except with the assignment of the second patent.

¹³⁹ Nuno Pires de Carvalho, *The Trips Regime of Patent Rights* (3rd Edition, Kluwer Law International, 2010), 433

continue inventing around the patent, empirical evidence suggests that follow-on innovation is not promoted by compulsory licensing, but rather that it is a “parasitical act”¹⁴⁰, as it allows for the exploitation of the patent owner’s rights, and does not require for the receiver to act on it in a socially profitable way. This was the case for the Canadian pharmaceutical industry, which was granted many compulsory licenses, and ended up only manufacturing copies, instead of investing in R&D.¹⁴¹

Additionally, although there are no clear legal inhibitions towards accepting compulsory licensing for green technologies, there are many other disadvantages linked to that concept.¹⁴²

Economic Backlashes

Firstly, although a country would not necessarily risk to be challenged by the WTO’s dispute resolution system, they could still suffer “unilateral trade sanctions”¹⁴³ such as being put on the “priority watch list” of the United States, which happened to Thailand after they issued compulsory licensing to the Kaletra drug¹⁴⁴. Additionally, Thailand suffered from a private action, namely the original patent owner Abbott Laboratories refusing to continue to sell some new AIDS medicine in Thailand.¹⁴⁵

Or, in a little less aggressive way, the instalment of compulsory licensing could provoke the industry to “bury more inventions into the domain of proprietary technology and trade secrets”.¹⁴⁶

In that way, the economic repercussions can outweigh the benefits of the compulsory license.¹⁴⁷

The next argument against compulsory licensing adds to the observations made earlier in Chapter 3, which is the importance of a functioning patenting system for innovation and diffusion of technology. Firms might be discouraged to invest, especially into developing countries, if they assess the risk of their patents not being respected.¹⁴⁸ Especially for the case of green technology this would be detrimental, since middle-income states “include China,

140 *ibid*

141 *ibid*

142 Robert Fair, ‘Does Climate Change Justify Compulsory Licensing of Green Technology?’ (2010), 6 *BYU Int’l L. & Mgmt. R.* 21, (2010). <<http://digitalcommons.law.byu.edu/ilmr/vol6/iss1/3>> 33

143 Cynthia M Ho, ‘Patent Breaking of Balancing?: Separating Strands of Fact from Fiction Under TRIPS’ (2009), 34 *N.C.J. INT’L L. & COM. REG.* 397 450

144 Robert Fair, ‘Does Climate Change Justify Compulsory Licensing of Green Technology?’ (2010), 6 *BYU Int’l L. & Mgmt. R.* 21, (2010). <<http://digitalcommons.law.byu.edu/ilmr/vol6/iss1/3>> 34

145 Keith Alcorn, ‘Abbott to Withhold New Drugs from Thailand in Retaliation for Kaletra Compulsory License’ (*AIDS Map News*, Mar. 15, 2007) <<http://www.aidsmap.com/en/news/00C7641B-57F5-4AB8-8876-9040425D4464.asp>>

146 AIPPI Special Committee (SC) Q198 Intellectual Property and Green Technology, Report, May 2014, 15

147 Cynthia M Ho, ‘Patent Breaking of Balancing?: Separating Strands of Fact from Fiction Under TRIPS’ (2009), 34 *N.C.J. INT’L L. & COM. REG.* 397 447-8

148 Robert Fair, ‘Does Climate Change Justify Compulsory Licensing of Green Technology?’ (2010), 6 *BYU Int’l L. & Mgmt. R.* 21, (2010). <<http://digitalcommons.law.byu.edu/ilmr/vol6/iss1/3>> 35

India and Russia, which are the major contributors to the increase in global pollution.”¹⁴⁹

Another issue with green technology is that, contrary to pharmaceuticals, it is very unlikely that one patent is the one and only solution to climate change¹⁵⁰. There are technological alternatives, and the risk is not that high that a “patent owner has a monopoly over the solution and can charge high prices for the duration of the patent”¹⁵¹

Furthermore, the fact that the field of green technology is so broad and undefined would make it a big deal to open the flood gates to compulsory licensing for green technology. It might “effectively eliminate intellectual property rights on most innovative technologies and the incentives those rights create.”¹⁵²

From the perspective of effectivity and success for green technology transfer, compulsory licensing does not seem a promising solution. As we have seen, if the hosting country is not equipped with know-how, software, qualified manpower and infrastructure, the license alone will not be able to make an effect to the full potential of the technology. In a situation of compulsory licensing, it would seem odd to expect the patent holder to voluntarily offer the needed know-how, especially since they can retain these information as “trade secrets”¹⁵³.

As we see, even if there are no obvious legal repercussions to the introduction of a compulsory licensing mechanism for green technology, there are many other disadvantages that would harm the society in the long run.

There are some other proposals to the problems of technology transfer.

149 Ibid 37

150 Sidney A Rosenzweig, ‘PFF on Cooling the World By Misappropriating Patent Rights’ (Intellectual Property Watch, Apr. 1, 2009) <<http://www.ip-watch.org/weblog/2009/04/01/cooling-the-world-by-misappropriating-patent-rights/>>

151 Robert Fair, ‘Does Climate Change Justify Compulsory Licensing of Green Technology?’ (2010), 6 BYU Int’l L. & Mgmt. R. 21, (2010). <<http://digitalcommons.law.byu.edu/ilmr/vol6/iss1/3>> 38

152 Sidney A Rosenzweig, ‘PFF on Cooling the World By Misappropriating Patent Rights’ (Intellectual Property Watch, Apr. 1, 2009) <<http://www.ip-watch.org/weblog/2009/04/01/cooling-the-world-by-misappropriating-patent-rights/>>

153 M Consilvio ‘The Role of Patents in the International Framework of Clean Technology Transfer: A Discussion of Barriers and Solutions’ (2011) American University Intellectual Property Brief 3 13

4.3. Alternative propositions

4.3.1. Solutions concerning IPRs

One problem of the TRIPS system for green technology transfer is said to be that the means of evaluation of countries behaviour is non-transparent and lacks satisfactory methods of enforcement.¹⁵⁴ A first, non-legal step for developing countries or LDCs could be to “demand accountability from developed countries regarding their incentive and reporting obligations vis-à-vis technology transfer”.¹⁵⁵ Littleton suggests putting pressure on the WTO to monitor, or even privately engage in the “naming and shaming” of developed countries that do not fulfil their obligations of article 8 TRIPS.¹⁵⁶

Another phenomenon that has an impact on technology transfer is when companies “refuse to deal”, or refuse to patent an important technology and act on the verge of anti-competitive behaviour that hinders technology transfer and is frowned upon under TRIPS articles 8.2 and 40.1.¹⁵⁷, and even article 31(k).

There have been cases in Korea and India of refusals to license green technology out of fear of competition, which were deemed anti-competitive.¹⁵⁸

However, it is hard to rely on this method, because patent rights primarily grant the right to exclude others from using an idea for a product, so it is hard to fathom that “refusal to deal” can constitute an anti-competitive act per se.¹⁵⁹

Further, the modification of the TRIPS Agreement would be an option to optimize the situation for green technology transfer, such as to ameliorate the current IPR system in certain ways.

For example, the procedures for challenging patents could be facilitated, so that LDC’s would easier defy fraudulent and frivolous patents or patent abuse by developed countries.¹⁶⁰

Other proposals include the idea to redefine the patentability criteria in favour of environmentally sound technologies. Some propose to give favourable terms for green

154Matthew Littleton, ‘The TRIPS Agreement and Transfer of Climate- Change-Related Technologies to Developing Countries’ (2008) DESA Working Paper No. 71 16

155Ibid 15

156Ibid

157Dalindybo Shabalala, ‘Climate Change, Technology Transfer and Intellectual Property: Options for Action at the UNFCCC’ (PhD dissertation, Maastricht University 2014) 287

158Cameron Hutchison, ‘Does TRIPS Facilitate or Impede Climate Change Technology Transfer into Developing Countries?’ 3:2 (2006) University of Ottawa Law & Technology Journal 517, 531

159Dalindybo Shabalala, ‘Climate Change, Technology Transfer and Intellectual Property: Options for Action at the UNFCCC’ (PhD dissertation, Maastricht University 2014)287

160Joseph E Stiglitz, ‘Economic Foundations of Intellectual Property Rights’ (2008) Duke Law Journal 57

technology patents, such as extending the life of the patent. Others even suggest to prohibit polluting inventions.¹⁶¹ However, it is not to expect that these suggestions will earn positive feedback from most actors.

Another idea is to provide rules for fixed, moderate fees for green technology licensees, or simply improved licensing conditions for developing countries.

For example, there is a mechanism in the UK, which allows for green patents to be fast-tracked, which is supposed to create one more incentive for application for green technology patents.¹⁶²

Some even propose to impose green patent holders the burden of proof as to why compulsory licensing would be unwarranted.¹⁶³ However, I believe this might create long term repercussions in that it would make investment in green innovation less attractive to firms.

Because the idea of compulsory licensing as it exists does not seem an ideal method for green technology, there are some proposals to adapt the concept. For example, one could imagine the grant of temporary compulsory licenses, until the technology is “tropicalized”, meaning adapted to local requirements.¹⁶⁴

We have seen how much the effects that IPRs have on a country can vary depending on whether it is least developed, developing or developed. From that we can conclude that the IPR system is simply not appropriate for all economic situations. This is why Littleton proposes to allow the countries a certain level of flexibility and autonomy in deciding their levels of IPR practices. He assimilates this to the well established principle of common but differentiated country responsibilities at the UNFCCC.

This argument especially stands to reason considering the historical issue of imbalance of powers and unequal rates of development, in which the IPRs of the southern countries have not necessarily been respected.¹⁶⁵

161 AIPPI Special Committee (SC) Q198 Intellectual Property and Green Technology, Report, May 2014, 12-13

162 Dalindyabo Shabalala, ‘Climate Change, Technology Transfer and Intellectual Property: Options for Action at the UNFCCC’ (PhD dissertation, Maastricht University 2014) 119

163 Joseph E Stiglitz, ‘Economic Foundations of Intellectual Property Rights’ (2008) Duke Law Journal 57

164 Matthew Littleton, ‘The TRIPS Agreement and Transfer of Climate- Change-Related Technologies to Developing Countries’ (2008) DESA Working Paper No. 71 16

165 Ha-Joon Chang ‘Intellectual Property Rights and Economic Development: Historical Lessons and Emerging Issues’ (2001) Journal of Human Development 2(2) 287-309

4.3.2. Other policies

Another aspect of improving the absorptive capacity of host countries is to prevent “brain drain”¹⁶⁶, or the flight of human capital to foreign countries, and to increase efforts to support (higher) education in least developed countries.

To tackle the problem of limited absorptive capacity in the hosting country, especially a lack of know-how to use the technologies, the concept of an open-source access to information could be valuable.

Barton and Maskus have developed an “Agreement on Access to Basic Science and Technology” (“ABST”) “to ensure widespread access to essential scientific results and to enhance the transfer of basic technological information to the developing world at reasonable cost”¹⁶⁷

As we have seen, anti-competitive behaviour involved with patent rights are also a problem, and Ullrich suggests that a “unified pro-competition agreement” might assist green technology transfer.¹⁶⁸

Another big factor in the issues of green technology transfer are caused by the lack of funds. Subsidies and tax benefits could be incentives to invest into R&D, especially in developing countries. This could also be encouraged by trust funds¹⁶⁹ or patent acquisition funds¹⁷⁰.

One could also introduce a tiered pricing system, or “equity pricing”, where the price of a technology is lower for least developed countries. This does not work as well for pharmaceuticals, because there is this fear of re-importation¹⁷¹, but that is less likely to be a problem for green technology.¹⁷²

166 Keith E Maskus, ‘Encouraging International Technology Transfer’ (2004) Issue Paper 7, UNCTAD-ICTSD Project on IPRs and Sustainable Development, UNCTAD and ICTSD, Geneva.

167 John H Barton, Keith E Maskus, ‘Economic Perspectives on a Multilateral Agreement on Open Access to Basic Science and Technology’ (2006) Economic Development and Multilateral Trade Cooperation. World Bank and Palgrave MacMillan, Washington, DC

168 Hanns Ullrich, ‘Competition, Intellectual Property Rights and Transfer of Technology’ (2001) International Technology Transfer: The Origins and Aftermath of the United Nations Negotiations on a Draft Code of Conduct. Kluwer Law International, The Hague: 363-380.

169 Pedro Roffe, ‘Preliminary Note on the WTO Working Group on Trade and Transfer of Technology.’ (2002) United Nations Conference on Trade and Development, Geneva, New York.

170 United Nations Framework Convention on Climate Change (2008). Ad Hoc Working Group on Long-Term Cooperative Action Under the Convention, Report on the Workshop on Investment and Financial Flows to Address Climate Change, FCCC/ AWGLCA/2008/CRP.3, June 6.

171 Sidney A Rosenzweig, ‘PFF on Cooling the World By Misappropriating Patent Rights’ (Intellectual Property Watch, Apr. 1, 2009) <<http://www.ip-watch.org/weblog/2009/04/01/cooling-the-world-by-misappropriating-patent-rights/>>

172 Robert Fair, ‘Does Climate Change Justify Compulsory Licensing of Green Technology?’ (2010), 6 BYU Int’l L. & Mgmt. R. 21, (2010). <<http://digitalcommons.law.byu.edu/ilmr/vol6/iss1/3>> 40

Some researches also insist that the most powerful indirect incentive for technology transfer is market access. Poor countries would need to increase market access for products which poorer countries can produce easier.

This would overall increase attractiveness for trade and FDI. The influence of multilateral organizations such as the WTO should not be underestimated here.¹⁷³

We can see that, besides there being a lot of room for improvement concerning the mechanisms for green technology transfer, there are numerous suggestions.

As for compulsory licensing, it does not seem to have the potential to be used as a sustainable mechanism for green technology transfer. However, the idea of implementing the TRIPS agreement in a way to allow compulsory licensing in certain situations of extremely abusive behaviour of green patent holders, still seems reasonable.

Chapter 5 Conclusion

Global warming bears an innumerable amount of problems and challenges for us humans, and unfortunately, not even the production of technology, which is the one thing that we do best and that caused most of the problems, can constitute a clear-cut solution.

Because the world economy is divided in two, and the dominant mechanisms do not work homogeneously in the entire world, it seems that global collaboration is a massive challenge.

It looks like the question of the exact influence of IPRs on green technology transfer can just not be answered in a unanimous way at this point. In some aspects, such as trade, global IPRs seem beneficial, but in others, such as foreign direct investment and economic growth, the impact is ambiguous.

These different assessments could lead into a deep spiralling discussion on whether the IPR system is at all suitable for developing markets, but this would exceed the scope of this thesis. Shabalala concludes that IP is a “necessary but insufficient condition” for technology transfer, but that it is more important to find solutions that balance IP and spillovers.¹⁷⁴

We have seen that it is complicated to study the impacts, and to find results that can lead the way to sure-fire policy making on green technology transfer. However, that does not mean that policy makers can continue to stagnate on taking action.¹⁷⁵

173 Rod Falvey, Neil Foster, ‘The Role of Intellectual Property Rights in Technology Transfer and Economic Growth: Theory and Evidence’ (2006) United Nations Industrial Development Organization

174 Ibid 148

As for compulsory licensing for export of green technology, it seems like a good solution to the problem of firms abusing their market power. However, it is by no means a sustainable solution, since global warming abatement requires nothing less than maximum continuous efforts, and in fact some permanent changes in our habits.

Compulsory licensing does not provide the possibility to be used in a perpetual way, because it insinuates defensive and noncooperative behaviour, which has detrimental effects on socio-economical growth.

This is why I conclude that, while I would still encourage discussions about compulsory licensing for green technology in very limited cases, it should not be seen as a solution to the green technology transfer problems. The focus should stay the promotion of both “push” and “pull” incentives for green technology transfer.¹⁷⁶

To me, the most important element for climate change abatement and mitigation is global joint effort. Unfortunately, it seems that we tellurians still have not even arrived at the stage of unanimously agreeing on the existence or gravity of the problem.

Especially the USA, the second-to-biggest emitter of GHG, effectively renouncing to join the cause would induce definite irreparable damage to the earth.

Finally, despite Stephen Hawking’s certitude that we will need to colonize a new planet in 100 years to avoid human extinction¹⁷⁷, I think we should not give up on earth quite yet.

175 Dalindyabo Shabalala, ‘Climate Change, Technology Transfer and Intellectual Property: Options for Action at the UNFCCC’ (PhD dissertation, Maastricht University 2014) 147

176 Cameron Hutchison, ‘Does TRIPS Facilitate or Impede Climate Change Technology Transfer into Developing Countries?’ 3:2 (2006) University of Ottawa Law & Technology Journal 519

177 Julia Zorthian ‘Stephen Hawking Says Humans Have 100 Years to Move to Another Planet’ (4 May 2017) <<http://time.com/4767595/stephen-hawking-100-years-new-planet/>>

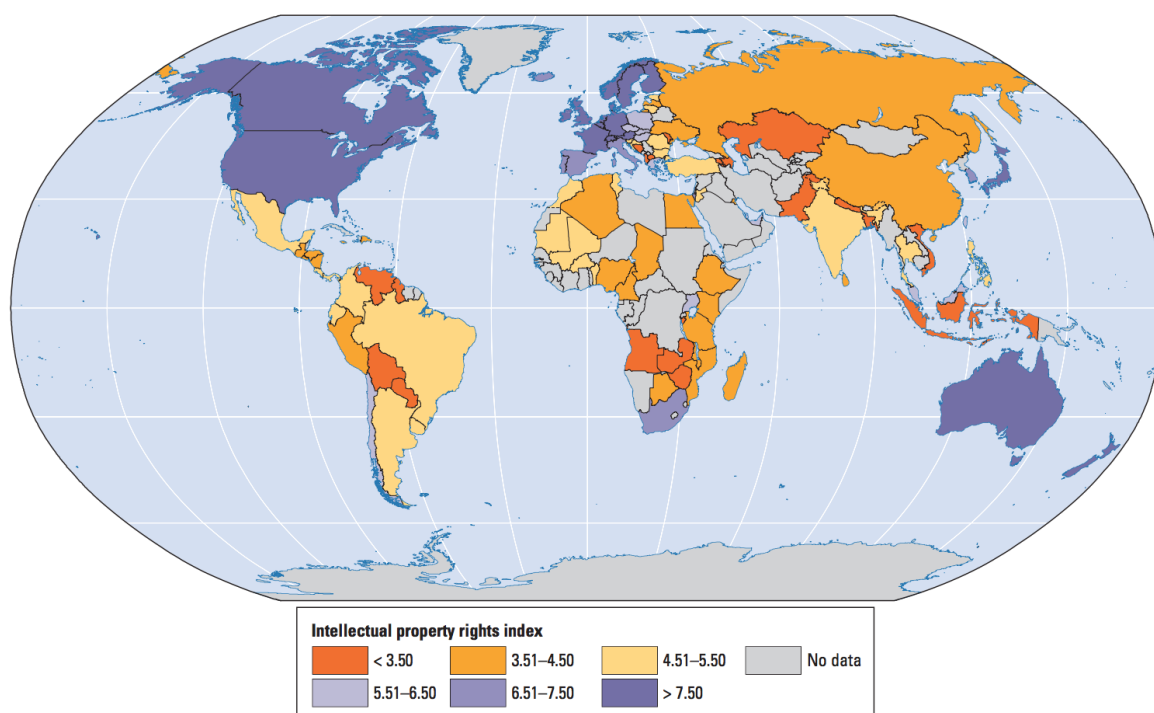
Chapter 6 Annex

Annex 1

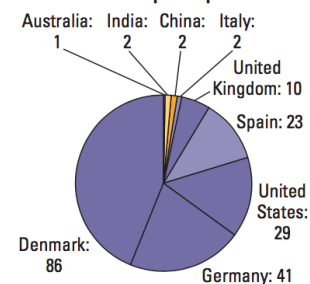
**World Bank ‘World Development Report 2010:
Development and Climate Change. Washington D.C.’ (2010)
309**

Figure 7.9 Middle-income countries are attracting investments from the top five wind equipment firms, but weak intellectual property rights constrain technology transfers and R&D capacity

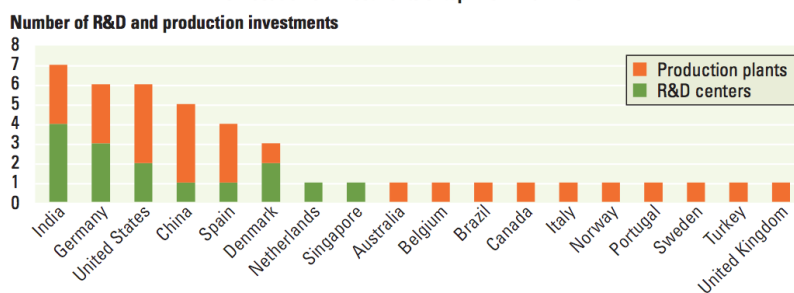
a. Intellectual property rights performance



b. Number of wind power patents in 2007



c. Location of investments of top five wind firms



Sources: Published patent data from U.S., Japanese, European, and international patent application databases, annual reports, and Web sites of Vestas, General Electric, Gamesa, Enercon, and Suzlon (accessed on March 4, 2009); Dedigama 2009.

Note: A country's IPR score reflects its ranking according to an IPR index based on the strength of its intellectual property protection policies and their enforcement.

Annex 2

The Impact of IPRs on Technology Transfer - Synthesis of Statements in Chapter 3.4.

Subject	Object	Impact	Source
Strong IPRs	On Firms decision to engage in FDI or not	Maybe positive, but many factors could be the influence on that decision	A Fosfuri, 'Determinants of international activity: evidence from the chemical processing industry,' (2004) Research Policy, 1599-1614
Strong IPRs	On FDI into middle income countries	positive	BM Hoekman, KE Maskus and K Saggi 'Transfer of Technology to Developing Countries: Unilateral and Multilateral Policy Options' (2004) Working Paper PEC2004-0003, Institute of Behavioral Science (Boulder: University of Colorado)
Strong IPRs	On FDI into large developing countries	positive	ibid
Strong IPRs	On FDI into least developed countries	No impact	ibid
Strong IPRs	On encouragement of FDI and the shift of production to South	Theoretically positive but imitation could shift production back to north	A Glass and K Sagi, 'Intellectual Property Rights and Foreign Direct Investment' (2002), Journal of International Economics, 56 387-410
Strong IPRs	On the promotion of FDI to China and Brazil	No impact: IPRs do not seem necessary nor sufficient	Jerme H Reichman, Keith E Maskus 'The Globalization of Private Knowledge Goods and the Privatization of Global Public Goods' (2004) Journal of International Economic Law 7(2) 279-320
Strong IPRs	On locally created Technology in the South	Negative impact, because IPRs seem to lead to more foreign patenting but less domestic patenting	Rod Falvey, Neil Foster, 'The Role of Intellectual Property Rights in Technology Transfer and Economic Growth: Theory and Evidence' (2006) United Nations Industrial Development Organization
Strong IPRs	On the desire of firms of developed countries to license out to developing countries	Positive, but the problem is that licensing can be used for competitive advantage	P J Smith 'How Do Foreign Patent Rights Affect U.S. Exports, Affiliate Sales, and Licenses?' (2001) Journal of International Economics, 55, 411-440, L Yang, K E Maskus, 'Intellectual property rights, technology transfer and exports in developing countries.' (2009) Journal of Development Economics, 90, 231-236, Dalindyabo Shabalala, 'Climate Change, Technology Transfer and Intellectual Property: Options for Action at the UNFCCC' (PhD dissertation, Maastricht University 2014), 87
Strong IPRs	On the cost of	Could have positive	Rod Falvey, Neil Foster, 'The Role of Intellectual Property Rights in

	international licensing in the long run	impact, since northern firms will want to assure that imitation is discouraged in the south	Technology Transfer and Economic Growth: Theory and Evidence' (2006) United Nations Industrial Development Organization
Strong IPRs	As a guarantee for licensing	NO	
Strong IPRs	On growth in a country	Positive, but only in open economies. Also, NO evidence of negative impact!!	Rod Falvey, Neil Foster, 'The Role of Intellectual Property Rights in Technology Transfer and Economic Growth: Theory and Evidence' (2006) United Nations Industrial Development Organization
Strong IPRs	On growth in developed countries	positive	ibid
Strong IPRs	On growth in least developed countries	positive	ibid
Strong IPRs	On growth in middle-income countries	NO positive effect, and unclear whether positive or negative effect on technology transfer	ibid
Strong IPRs in middle income countries	On green technology transfer	No negative effect	World Bank 'World Development Report 2010: Development and Climate Change. Washington D.C.' (2010) 310
Weak IPRs in low-income countries	On green technology transfer	No negative effect	ibid
Strong IPRs	On markets	Could incite higher prices or monopolies and anti-competitive behaviour	
Strong IPRs	On technology transfer in early stages of industrialization	Negative effect, because reverse-engineering and imitation are valuable, such as in Korea	Rod Falvey, Neil Foster, 'The Role of Intellectual Property Rights in Technology Transfer and Economic Growth: Theory and Evidence' (2006) United Nations Industrial Development Organization, 44
Strong IPRs	On prices employment and output in Lebanon	Negative, static effect	ibid

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