

**THE IMPLICATIONS OF INTRODUCING SUSTAINABILITY AND CLIMATE
CHANGE AS GROUNDS FOR COMPULSORY LICENSING UNDER THE WORLD
TRADE ORGANISATION'S (WTO) TRADE-RELATED INTELLECTUAL PROPERTY
(TRIPS) AGREEMENT.**

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Abstract

This thesis addresses the growing tension between intellectual property protection under the World Trade Organization's Trade-Related Aspects of Intellectual Property Rights Agreement and the urgent need for access to climate-related technologies. While the Agreement permits compulsory licensing, its application has largely been limited to public health emergencies, leaving uncertainty as to whether sustainability and climate change can justify similar measures. Using doctrinal legal analysis, comparative assessment, and selected case studies to examine the scope of existing TRIPS flexibilities and their potential application to climate technologies. The findings show that while the TRIPS framework does not expressly recognize climate change as a ground for compulsory licensing, public-interest-oriented interpretations provide limited but viable avenues for expansion. However, legal ambiguity, economic concerns, and political resistance constrains implementation. The thesis concludes that clearer interpretative guidance and reforms are needed to reconcile intellectual property protection and access to technologies with global climate imperatives.

Keywords:

Intellectual Property Law, TRIPS Agreement, Compulsory Licensing, Climate Change, Sustainability, Green Technologies, International Trade Law, Technology Transfer

Dedication

This thesis is first and foremost dedicated to **Almighty God**, whose grace, wisdom, and strength sustained me throughout this academic journey. His guidance, provision, and unfailing presence made the completion of this work possible.

I dedicate this work to my parents, **Chief Olatunji & Princess Adenike Akinseesin**, in deep gratitude for their unwavering financial, emotional, and spiritual support. Their sacrifices, prayers, encouragement, and belief in my potential laid the foundation for my academic pursuits and personal growth. Their commitment to my education and well-being has been a constant source of strength and motivation. I also dedicate this thesis to myself, in recognition of the resilience, discipline, and perseverance required to complete this demanding journey. This work stands as a testament to growth, endurance, and commitment to purpose.

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CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Intellectual Property Rights (IPR) have become a fundamental part of today's global economy, providing legal protection to creators, inventors, and businesses. These rights cover various forms of intellectual work, including patents, copyrights, trademarks, and trade secrets, each designed to protect different types of innovation and creativity.¹ IPRs are believed to not only encourage new ideas and inventions but also help maintain fair competition and drive economic growth.² As international trade expands, the need for strong intellectual property (IP) protections has become even more crucial, especially in industries like entertainment, pharmaceuticals, technology, and sustainability, where innovation is at the heart of progress.

The World Trade Organization (WTO) plays a key role in shaping global IP laws. Since its establishment in 1995,³ the WTO has worked to create common rules that promote fair and open trade between nations. One of its most significant contributions is the Trade-Related Aspects of Intellectual Property Rights (TRIPS) Agreement. TRIPS is one of the most significant international treaties governing IP protection. It was a key component of the Uruguay Round of trade negotiations and represented a major shift in how IP was treated in international trade, elevating IP protections to a multilateral scale.⁴ Adopted in 1994, the TRIPS Agreement aims to harmonise

¹ T. Voss et al, "A short introduction to intellectual property rights" (2017) 20:2 *Techniques in Vascular and Interventional Radiology* at p 116.

² Kumar, Pravesh, "Intellectual Property Rights (IPR): Nurturing Creativity, Fostering Innovation." (2024) 3:2 *Idealistic Journal of Advanced Research in Progressive Spectrums* at pp 32-38.

³ Ibid.

⁴ Alina B.A, "The Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS)" (2024) 33:1 *The Annals of The University of Oradea* at p 216.

IP standards globally and protect the interests of IP holders by enforcing IP rights across all WTO member states.⁵ It establishes uniform rules for the protection and enforcement of patents, copyrights, trademarks, and other forms of intellectual property, ensuring that innovations and creative works are protected in a consistent manner.

The strength of IP protection can sometimes create barriers to access, especially in developing countries where high prices for patented products can limit access to essential products.⁶ In these contexts, the central dilemma is how to maintain incentives for innovation by granting exclusivity to creators while addressing global challenges and ensuring that vital goods are affordable for all, especially the most vulnerable populations. As a result, there has been significant debate over the role of international IP frameworks in ensuring equitable access to essential goods.⁷

TRIPS was designed to promote and protect the interests of innovators, creators, and businesses by providing international IP protections and creating a level playing field for global trade.⁸ The TRIPS Agreement recognises that IP protection should not be an obstacle to socio-economic development, leading to the inclusion of flexibilities such as compulsory licensing. Compulsory licensing, as permitted under Article 31 of TRIPS, allows governments to grant licenses to third parties to use patented inventions without the patent holder's consent, subject to certain conditions.⁹

⁵ Ibid.

⁶ Reichman, Jerome H. "Intellectual property in the twenty-first century: will the developing countries lead or follow?." (2009) 4 *Houston law review/University of Houston* at p 1115.

⁷ Khan S.H, "The Role of Intellectual Property Rights In Achieving Sustainable Development Goals: A Comparative Analysis Of Policy Frameworks And Their Impact" (2023) 20:9 *Migration Letters* at p 489.; Helfer L.R, "Toward a human rights framework for intellectual property" (2006) 40:1 *UC davis rev* at p 971.

⁸ S. Athreye, P. Lucia & C. Kenneth, "Twenty-five years since TRIPS: Patent policy and international business." (2020) 3:4 *Journal of International Business Policy* at p 315.

⁹ WTO, Agreement on Trade-Related Aspects of Intellectual Property Rights, 15 April 1994, 1869 UNTS 299, art 31.

The tension between protecting IP rights and ensuring equitable access to essential technologies has been most visibly highlighted in public health emergencies, such as the global HIV/AIDS crisis and, more recently, the COVID-19 pandemic.¹⁰ However, the debate surrounding the balance between IP rights and access to essential technologies has intensified in recent years, especially in contexts beyond public health.¹¹ One such context is the climate crisis, which has emerged as one of the most urgent global challenges of the 21st century.¹² Climate change is a transboundary issue that requires rapid innovation, technological diffusion, and policy coordination. Many critical technologies, such as renewable energy solutions, carbon capture and storage (CCS), green hydrogen, and climate-resilient agricultural technologies, are protected by patents, often limiting their availability in developing countries that are disproportionately vulnerable to climate impacts. In light of this, there has been increasing advocacy for the expansion of compulsory licensing under TRIPS to include sustainability and climate change considerations as legitimate grounds for issuance.¹³

The growing recognition of climate change as a global emergency has sparked discussions around the role of IP law in facilitating access to essential technologies that can mitigate and adapt to environmental challenges, and central to this debate is the inclusion of provisions for compulsory licensing under the TRIPS Agreement.¹⁴ The introduction of sustainability and climate change as grounds for compulsory licensing under the Agreement emerges from the intersection of three key

¹⁰ A. Tisi, *Patent rights or patient rights? An assessment of intellectual property and right to health within the Covid-19 pandemic* (PHD Dissertation, University of Southern Denmark, 2021).

¹¹ S.H Khan, "The Role of Intellectual Property Rights In Achieving Sustainable Development Goals: A Comparative Analysis Of Policy Frameworks And Their Impact" (2023) 20:9 *Migration Letters* at p 501.

¹² *Ibid.*

¹³ *Ibid.*

¹⁴ R. Matthew, *Intellectual property and climate change: inventing clean technologies*, (Edward Elgar Publishing, 2011).

global challenges: the protection of intellectual property, the pressing need to combat climate change, and the promotion of sustainable development.

This study aims to investigate the effects of widening TRIPS compulsory licensing requirements to incorporate sustainability and climate change considerations, including both legal and economic factors.

1.2 Research Problem

The TRIPS Agreement is a key part of international trade law, setting rules for how intellectual property is protected across the world. Though it allows for compulsory licensing, this has mostly been applied in public health emergencies, such as the production of generic medicines. There is no clear provision that allows for compulsory licensing of green technologies that could help fight climate change. This gap in the TRIPS framework raises a major concern, which is that patent restrictions may slow down access to crucial climate-related innovations, particularly in developing countries that need them the most.¹⁵

Technologies like renewable energy solutions, carbon capture systems, and climate-resilient agriculture are often expensive and controlled by a few patent holders, making it difficult for lower-income nations to adopt them at scale.¹⁶ Without better access, these countries remain vulnerable to climate disasters, unable to transition to greener economies at the pace required to meet global sustainability goals.

At the same time, expanding compulsory licensing to cover climate technologies is not without controversy. Patent holders argue that strong IP protections are necessary to drive innovation and

¹⁵ A. Monirul, "The TRIPS Agreement Revisited—Time to Open-Up Climate Technologies for Least Developed Countries" (2022) 27:2 *Journal of Intellectual Property Rights* at pp 107-129.

¹⁶ J. Su Jung, K. Hötte, C. Ring & Robert Burrell, "Making intellectual property rights work for climate technology transfer and innovation in developing countries." (2024) *arXiv preprint*.

that weakening them could discourage investment in new technologies.¹⁷ Additionally, there is no clear legal pathway for countries to invoke TRIPS flexibilities for climate-related reasons, making it risky for governments to act unilaterally. Fears of trade disputes, diplomatic pressure, and economic consequences further complicate the issue. Another significant challenge is that many of the developing countries expected to benefit from this expansion lack both the manufacturing capacity and the technical expertise required to reproduce these technologies.

This study will examine whether and how compulsory licensing under TRIPS could be extended to sustainability and climate change technologies. It will examine the potential legal, economic, and policy impacts of such a shift, including the challenges and benefits for both developing countries and technology innovators. The goal is to provide a clearer understanding of whether adjusting TRIPS rules could help bridge the gap between climate action and IP rights and what that might mean for the future of sustainable development.

1.3 Research Objectives

This research will seek to examine the intersection of global environmental challenges like climate change and intellectual property law, specifically focusing on whether compulsory licensing under the TRIPS Agreement could be expanded to cover sustainability and climate change technologies. It will seek to address fundamental questions about the role of compulsory licensing in promoting sustainability and its potential impact on international trade relations. The following objectives will guide the research:

1. Examine the Current TRIPS Framework

¹⁷ D. Soma, "Does a strong patent regime discourage innovation?." (2016) 25:5 *Economics of Innovation and New Technology* at pp 485-502.

First, the study will assess and analyse the TRIPS Agreement to determine whether it allows environmental crises, such as climate change, to be grounds for compulsory licensing. This will be done by examining existing legal provisions to evaluate if this crisis could be accommodated or if a reinterpretation of the framework is necessary.

2. Assess the Legal Feasibility of Expanding Compulsory Licensing

The research will also explore whether the expansion of compulsory licensing to include climate technologies and sustainability concerns would require an amendment to the TRIPS Agreement or if this could be achieved through interpretation within already existing provisions. This analysis will draw on legal precedents and scholarly perspectives to explore the flexibility of the TRIPS framework.

3. Evaluate the economic impact of broader compulsory licensing

Next, an analysis of the impact of expanding compulsory licensing on international trade relations, particularly between developed and developing countries, will be conducted. This will entail examining how such an expansion could hinder or facilitate technology transfer, especially in the context of climate change solutions, and whether it would exacerbate or reduce global inequalities.

4. Identify Potential Challenges and Risks

The research will address the potential challenges in achieving consensus within the WTO on broadening compulsory licensing criteria. As a result of the differing interests of developed and developing countries, it will explore the diplomatic, legal, and economic barriers that may arise in negotiations, focusing on the tensions between intellectual property protection and environmental needs.

5. Evaluate the Societal and Environmental Impact of Broader Compulsory Licensing

The research will also analyse the broader societal and environmental benefits of expanding compulsory licensing to address sustainability. This analysis will explore how increased access to climate technologies could foster innovation, drive global cooperation, as well as enhance social equity, particularly in developing jurisdictions which are most affected by climate change.

6. Propose policy recommendations

The research will aim to suggest possible reforms or mechanisms that could help ensure that expanding TRIPS flexibilities to climate change is both effective and equitable, benefiting both developing and developed nations.

1.4 Research Questions

The following questions would guide the research in assessing the legal, economic, environmental, and ethical implications of expanding the TRIPS Agreement to accommodate compulsory licensing for sustainability and climate change technologies.

1. To what extent does the current TRIPS Agreement allow for the inclusion of environmental crises such as climate change as grounds for compulsory licensing?
2. Would the expansion of compulsory licensing to include sustainability require an amendment to the TRIPS Agreement, or could it be interpreted within existing provisions?
3. What are the potential challenges in reaching a consensus within the WTO on broadening compulsory licensing criteria?

4. How would expanding compulsory licensing to cover climate technologies impact international trade relations, particularly between developed and developing countries?
5. What are the broader environmental and societal benefits of expanding compulsory licensing to address climate change and sustainability concerns?
6. What reforms or measures would help ensure that the expansion of TRIPS flexibilities to climate change is effective and equitable?

1.5 Significance of the Research

This research is necessary because it tackles a complex yet urgent global challenge of how to balance IP rights with the need for sustainability and climate action. Climate change is a growing crisis, and the technologies needed to combat it, such as renewable energy solutions, carbon capture systems, and climate-resilient agriculture, are often locked behind patent restrictions. While IP laws encourage innovation, they can also limit access to critical green technologies, especially for developing countries that lack the resources to afford them. This raises a key question: should the TRIPS Agreement allow compulsory licensing for climate-related technologies in the same way it does for public health emergencies?

By exploring this issue, the study contributes to ongoing discussions in international trade law, intellectual property rights, and environmental policy. It examines whether existing legal frameworks can adapt to the realities of climate change and whether compulsory licensing could be a tool to accelerate the global transition to sustainability. The research is particularly relevant for developing nations, where access to climate technologies is critical for economic growth and climate resilience but is often restricted by patent laws.

Beyond its academic contribution, this study has the potential to inform policymakers, legal experts, and international organisations about ways to reform or reinterpret TRIPS in a manner that supports climate action. If compulsory licensing for green technologies is recognized as a viable legal option, it could open new opportunities for international cooperation, technology transfer, and equitable access to innovation.

At its core, this research seeks to spark meaningful conversations about how intellectual property law can support, not hinder, global efforts to combat climate change. By addressing both legal and economic perspectives, it aims to provide practical insights that could influence future policy decisions and trade negotiations.

1.6 Research Methodology

This research will seek to employ a combination of doctrinal legal analysis, comparative analysis, and case studies to provide a comprehensive and nuanced understanding of the legal and policy implications of introducing sustainability and climate change as grounds for compulsory licensing under the TRIPS Agreement.

A doctrinal legal analysis will be the core methodology for this research, as the study involves interpreting and analysing existing legal frameworks, particularly the TRIPS Agreement, international trade law, and environmental agreements such as the Paris Agreement. This analysis will involve a thorough examination of the TRIPS provisions related to compulsory licensing, such as Articles 27 and 31. This will help assess the scope of the TRIPS Agreement in accommodating sustainability and climate change as grounds for compulsory licensing. Furthermore, the analysis will explore how intellectual property law interacts with environmental law, focusing on how treaties like the Paris Agreement address access to climate technologies and the role intellectual

property can play in this context. It will provide the research with a rigorous legal foundation, and guide policy recommendations that are legally sound and aligned with international law's adaptability to new global challenges.

A comparative analysis will be conducted to examine how compulsory licensing has been applied in the context of public health, particularly in cases like HIV/AIDS and COVID-19, and to explore whether similar grounds can be applied to climate change and sustainability. This approach provides insights into the procedures and conditions used to invoke compulsory licensing in public health, such as requirements under the WTO's TRIPS Agreement for public non-commercial use or national emergency declarations. By comparing these procedural requirements with the conditions of climate-related crises, the research can assess if and how similar mechanisms could be adapted for climate technology. This comparison will include cases where countries invoked compulsory licensing for pharmaceuticals (e.g., India's issuance of compulsory licenses for HIV drugs) and any existing precedents in IP law that suggest expanding the scope of compulsory licensing to environmental issues.

In addition to doctrinal and comparative analysis, this research will use case studies to illustrate the practical application of compulsory licensing in addressing climate change and sustainability. These case studies will explore both the challenges and opportunities of expanding the scope of compulsory licensing to cover climate-related crises and sustainability concerns.

The first case study will focus on compulsory licensing for public health, examining the experiences of countries like India and Brazil, which have invoked compulsory licensing provisions to ensure affordable access to medications, particularly in response to HIV/AIDS. By

analysing these cases, the research will evaluate the potential of applying similar mechanisms to facilitate access to climate technologies.

Another case study will address access to climate technologies in developing countries, examining how these nations have either gained or been restricted from accessing climate technologies due to intellectual property law and international trade. By examining these dynamics, the case study will help assess how expanding compulsory licensing could impact the transfer of climate technologies to developing countries.

The final case study will focus on innovations in green technology and intellectual property. By analysing the role of intellectual property laws in promoting or restricting green innovations in countries like Germany, which has been at the forefront of renewable energy development, this case study will assess whether extending compulsory licensing provisions to include climate-related technologies could accelerate global efforts to address climate change through promoting broader access to critical innovations.

Data for the research project will be drawn from primary legal documents, including WTO decisions, international treaties, and case law from relevant legal bodies. Secondary sources will include academic articles, policy papers, and reports from international organizations such as the UNFCCC, WIPO, and WTO.

1.7 Chapter Outline

This thesis is structured into six chapters, each building on the central question of whether sustainability and climate change should be recognized as valid grounds for compulsory licensing under the TRIPS Agreement.

Chapter One lays the foundation for the research. It provides background on the topic, identifies the key problem the study aims to address, and outlines the research objectives and questions. This chapter also explains why the study is essential and how it contributes to ongoing discussions on intellectual property (IP) and climate change. Lastly, it describes the research methodology used to analyse the issue.

Chapter Two explores existing literature on the TRIPS Agreement and compulsory licensing, focusing on how IP law interacts with climate change. It reviews the flexibilities within TRIPS and examines ongoing debates about whether these provisions should be expanded to include climate-related technologies.

Chapter Three looks at the legal and procedural aspects of introducing sustainability and climate change as grounds for compulsory licensing. It considers how these concepts are currently treated under TRIPS, whether an amendment to the agreement is needed, and what legal challenges might arise. The chapter also highlights the difficulties of reaching an international consensus within the World Trade Organization (WTO).

Chapter Four focuses on the real-world implications of expanding compulsory licensing in this way. It examines the potential effects on developed and developing countries, exploring how this change could impact trade, innovation, and technology transfer. The chapter also looks at the economic and social implications, as well as how this policy shift could support global climate

goals while balancing the interests of various stakeholders, including patent holders, governments, and environmental advocates.

Chapter Five takes a comparative approach by analysing legal frameworks from other regions and drawing lessons from past cases where compulsory licensing was used, particularly in the public health sector. It also includes case studies on access to green technologies in developing nations and how IP laws have influenced the development and distribution of climate-friendly innovations.

Chapter Six concludes the research by summarizing the key findings, offering policy recommendations, and suggesting areas for future study. It reflects on the broader significance of the research and how it could contribute to shaping more balanced IP policies that support both innovation and climate action.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The notion of Intellectual Property Rights (IPR) is based on the principle that the person who made an intellectual contribution must have an exclusive right to enjoy the fruits of their labor. It sounds quite logical, but the monopoly right provided to the inventor is not only in direct conflict with the competition laws but also has implications with regard to human rights law. Hence, there is a need to provide safeguards to ensure that this exclusive right of the patent holder is not misused.

Compulsory licensing of patents is one such safeguard under which the government of the state that granted the patent could allow a third party to use the patent without the consent of the patent holder, on payment of a reasonable royalty or remuneration to the patent holder. It is a statutorily created license that allows certain people to pay a royalty and use an invention without the patentee's permission. This safeguard is particularly useful with regard to pharmaceuticals, especially in the instances of public health crises when underprivileged states have no other option but to dilute the patent in order to improve access to affordable essential medicines to their poor citizens with limited purchasing power. After the industrial revolution in the West, the technologically advanced countries felt the need for international standards regarding the protection of intellectual property rights. Their efforts could not bear the desired fruits until the end of the Cold War between the capitalist and communist blocs. Towards the end of the twentieth century, the technologically advanced countries linked trade with IPRs protection and succeeded in negotiating an international treaty, which was imposed on the third world, subject to the provision of an extended period for implementation of the treaty obligations.

The primary objective of the TRIPS Agreement was to provide stringent intellectual property protection to protect the interests of multinational corporations in the technologically advanced world. Matters affecting the third world were therefore not given due consideration. Though compulsory licensing and parallel importation were included as safeguards, these were just exceptions to the general, stringent patent protection for all products, including pharmaceuticals. The compulsory licensing safeguard, initially provided under TRIPS, had no practical significance for least developed countries (hereinafter LDCs), which lacked manufacturing capacity of their own, because the pharmaceutical products manufactured under compulsory license could only be sold in the domestic market. With the outbreak of epidemics and pandemics like HIV/AIDS in Africa, the outcry by NGOs and human rights activists succeeded in drawing attention of the world community towards practical problems faced by the LDCs (lacking manufacturing capacity) despite the flexibilities provided in the TRIPS. Changes were made in the existing system under the Doha Declaration 2001, and the WTO Waiver Decision 2003 to address the problems of the LDCs by allowing export of generics produced under compulsory licensing to these countries. These flexibilities, though marking important progress, often had their real-world impact constrained by the absence of manufacturing capacity in many least developed countries (LDCs). This limitation significantly reduced the effectiveness of compulsory licensing mechanisms, as was evident during the HIV/AIDS epidemic, where countries granted licenses but lacked the facilities to produce medicines domestically. A similar structural challenge is likely to emerge in the context of climate technologies, which are even more complex and capital-intensive. Without concurrent efforts to build domestic production capacity, compulsory licensing, however, legally sound, may offer only limited utility.

The discussion in this chapter explores the evolution of compulsory licensing under the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS), with a particular focus on its implications for access to essential medicines in developing and least developed countries (LDCs). It critically examines how the original framework of the TRIPS Agreement prioritized patent protection in favor of technologically advanced nations and multinational corporations, often at the expense of public health needs in poorer regions. By tracing the subsequent legal and policy responses, especially the Doha Declaration on the TRIPS Agreement and Public Health and the WTO General Council Waiver Decision, this chapter highlights how global health emergencies catalyzed reforms aimed at improving the usability of TRIPS flexibilities for countries with limited or no pharmaceutical manufacturing capacity.

2.2 TRIPS and Compulsory Licensing

The WTO, in December 1994, approved an important treaty, the Trade-Related Aspects of Intellectual Property Rights (TRIPS Agreement), which came into effect on January 1, 1995. The primary objective of the TRIPS Agreement was to minimize the distortions and impediments to global trade by giving due importance to the protection of IPRs¹⁸. It provided for minimum standards to harmonize divergent domestic laws of the WTO member countries and provided mandatory rights for right holders. It required all WTO member states to adopt regulations relating to IPRs as laid down in the treaty.

The TRIPS Agreement did not repeal the Paris Convention, which was established to provide a framework for the protection of industrial property rights such as patents, trademarks, industrial designs, and geographical indications across member states. Rather, it incorporated the Paris

¹⁸ G. J. Arnold, International Compulsory Licensing: The Rationales And The Reality, Journal of Law and Technology, (1993) http://ipmall.org/hosted_resources/IDEA/33_IDEA/33-2_IDEA_349_Arnold.pdf

Convention under its Article 2(1)6, and both apply on equal footing. TRIPS, however, provided for higher standards of intellectual property protection, and it is difficult to reconcile Article 27(1)7 of TRIPS with Article 5(A) of the Paris Convention, which provides that member states may grant compulsory licenses to prevent abuses from the exclusive rights conferred by patents, such as failure to work the patent locally. For example, if a patent holder obtains a patent in a country but fails to manufacture the patented product locally or make it available at reasonable prices, the Paris Convention allows that country to grant a compulsory license to a local manufacturer. The TRIPS Agreement, under Article 27(1), provides that the signatory states are obliged to protect any innovations, whether products or processes, in all fields of technology. Before 1995, when the TRIPS Agreement was not concluded, almost 50 countries had excluded drugs from patentability¹⁹. However, the TRIPS Agreement prohibited any such exclusion²⁰. To enjoy protection, the invention must fulfill three conditions, namely, “it must be new, it involves an inventive step, and it is capable of industrial application”²¹. Moreover, the TRIPS Agreement, under Article 28, provides the patent holders with exclusive rights to prevent third parties from making, using, offering for sale, selling or importing patented products without the consent of the patent holder. These monopoly rights are provided to the patent holders for a period of twenty years. The pharmaceutical patent protection, however, works well only in high-income countries with citizens having the purchasing power to buy expensive patented pharmaceuticals. It does not work well in developing and least developed countries because of different factors, with affordable access to medicines being the most important of them. Considering the practical implications of

¹⁹ W. Ebomoyi, Impact of Globalization on Hiv/Aids Pandemics and the Challenges of Compulsory Licensing and Parallel Importation, *Journal of Applied Global Research* (2010). Vol 3, Issue 7, pp 23-39.

²⁰ J. H. Barton TRIPS and the global pharmaceutical market. *Health affairs (Project Hope)*, (2004) 23(3), 146–154. <https://doi.org/10.1377/hlthaff.23.3.146>

²¹B. Kongsombut, Patent search options for technology firms, *Bangkok Post*, (2012) doi: <http://www.tilleke.com/sites/default/files/2012-may18-patent-search-options.pdf>

patent protection in third-world countries, the TRIPS Agreement provides mechanisms to poorer countries to override patents through legitimate means. It contains arrangements such as ‘parallel importation’ and ‘compulsory licensing’, which are exceptions to the stringent patent protection. Even though the word ‘compulsory license’ has never been used in the TRIPS Agreement, the exclusive rights of the owner of patents are specifically subject to compulsory licensing under the Agreement.

Under Article 31, the TRIPS Agreement provides an exception to the monopoly rights of patent owners. Instead of listing or defining situations in which compulsory license may be granted, it only sets out certain conditions for the issuance of a non-voluntary license. Compulsory licensing, as outlined in Article 31 of the TRIPS Agreement, allows a government to authorize the use of a patented product or process without the consent of the patent holder, typically in response to a national emergency or other extreme urgency. The intent behind this provision is to balance the interests of patent holders with the broader public good, particularly when patent protection limits access to critical resources such as life-saving medicines. This balance has been mainly applied in the context of public health, especially since the Doha Declaration on the TRIPS Agreement and Public Health (2001). The Doha Declaration clarified that WTO members have the right to grant compulsory licenses and determine the grounds upon which such licenses can be issued, particularly in addressing public health needs²².

A compulsory license is an action of a government forcing an exclusive holder of a right to grant the use of that right to others upon the terms decided by the government²³. The government,

²² World Trade Organization, *Declaration on the TRIPS Agreement and Public Health*, WTO Doc WT/MIN(01)/DEC/2 (14 November 2001) at para 5(b) .

²³ A study on compulsory licensing in the time of, <https://thelawbrigade.com/wp-content/uploads/2020/10/Yashi-Spoorti-Pravalika-IJLDAI.pdf>.

however, pays a royalty to the patent holder in order to compensate them for the use of their patent without their consent²⁴. In other words, a compulsory license means a non-voluntary license issued by the state to a third party, without the authorization of the patent holder, on the condition that the licensee pays reasonable remuneration to the right holder in return²⁵. Arnold defines compulsory license or a non-voluntary license as “an involuntary contract between a willing buyer and an unwilling seller imposed and enforced by the state”²⁶. The licensee enjoys the right to manufacture, sell or import the patented product²⁷. These acts are otherwise covered by the exclusive rights of the patent holder²⁸

Compulsory licensing involves the breaking of the exclusive right of the patent holder²⁹. The purpose behind breaking the patent right is to change the terms of bargaining between the buyer and the seller. For instance, if the government is a buyer and the patent holder is a seller, and the parties fail to negotiate a reasonable price for the product, compulsory licensing provisions provide for an arrangement under which the government may dilute the exclusive patent right of the patent holder and license some other firm to sell the same product³⁰. Compensation is, however, paid to the patent holder in exchange for the use of his patent. Thus, compulsory licensing, by stimulating generic competition (i.e. the entry of lower cost, bioequivalent versions of patented products

²⁴ Durojaye, T. Ebenezer, Compulsory Licensing and Access to Medicines in Post Doha Era: What Hope for Africa? Netherlands International Law Review, (2008) Vol. 33, No. 1, pp. 33-71, 2008, <https://ssrn.com/abstract=1528602>

²⁵ Evolution of the concept of compulsory licensing: a critical analysis, [http://www.savap.org.pk/journals/ARInt./Vol.4\(2\)/2013\(4.2-50\).pdf](http://www.savap.org.pk/journals/ARInt./Vol.4(2)/2013(4.2-50).pdf).

²⁶ J. Kuanpoth, Intellectual Property and Access to Essential Medicines: Options for Developing Countries. Journal of Generic Medicines. 2004;2(1):53-62.

²⁷ Microsoft Word - AR Int, 4_2_March 2013 Part-II Social Sciences, [http://www.savap.org.pk/journals/ARInt./Vol.4\(2\)/2013\(4.2-50\).pdf](http://www.savap.org.pk/journals/ARInt./Vol.4(2)/2013(4.2-50).pdf).

²⁸ G. J. Arnold, International Compulsory Licensing: The Rationales And The Reality, Journal of Law and Technology, (1993) http://ipmall.org/hosted_resources/IDEA/33_IDEA/33-2_IDEA_349_Arnold.pdf

²⁹ Compulsory Licensing In India A: Comparative Study With Usa and Uk, <https://dr.ddn.upes.ac.in/bitstream/123456789/2004/1/Madhu%20Aggarwal.pdf>.

³⁰ Evolution of The Concept of Compulsory Licensing: A Critical Analysis, [http://www.savap.org.pk/journals/ARInt./Vol.4\(2\)/2013\(4.2-50\).pdf](http://www.savap.org.pk/journals/ARInt./Vol.4(2)/2013(4.2-50).pdf).

usually medicines, into the market by multiple manufacturers), strengthens the bargaining position of the government, resulting in a lowering of prices.³¹ Compulsory licensing is, therefore, yet another necessary evil.³² It is a violation of the rights of the patent holder; however, this violation sometimes becomes necessary to improve the availability of essential products at affordable prices. It is pertinent to note that under the TRIPS Agreement, access to drugs or to deal with emergency public health situations is not the only reason for the grant of a compulsory license. It can be used as a policy mechanism to deal with anti-competitive practices, non-working of the patent, or other undesirable behavior of patent holders³³. A compulsory license not only forces the patent holder to use their invention for the benefit of society, but also boosts the generic industry of the country granting such a license³⁴.

Compulsory licensing can also impact international trade relations. Patent holders, often multinational pharmaceutical companies, may view compulsory licensing as a threat to their business interests and may lobby their home governments to take action against countries that issue such licenses. This can lead to trade disputes and tensions between countries.

Case studies from India, Brazil, and South Africa illustrate the diverse impacts of compulsory licensing. In India, the issuance of a compulsory license for the cancer drug Nexavar in 2012 allowed a local company to produce a generic version at a fraction of the cost, making the drug

³¹ A. Hollis, The link between publicly funded health care and compulsory licensing. *CMAJ : Canadian Medical Association journal = journal de l'Association medicale canadienne*, (2002) 167(7), 765–766.

³² Evolution of The Concept of Compulsory Licensing: A Critical Analysis, [http://www.savap.org.pk/journals/ARInt./Vol.4\(2\)/2013\(4.2-50\).pdf](http://www.savap.org.pk/journals/ARInt./Vol.4(2)/2013(4.2-50).pdf).

³³ S. Sterckx, Patents and Access To Drugs In Developing Countries: An Ethical Analysis, 4 *Developing World Bioethics* 1, (2004) <http://onlinelibrary.wiley.com/doi/10.1111/j.1471-8731.2004.00067.x/pdf>

³⁴ *COMPULSORY LICENSING IN INDIA A: COMPARATIVE STUDY WITH USA AND UK*, <https://dr.ddn.upes.ac.in/bitstream/123456789/2004/1/Madhu%20Aggarwal.pdf>.

more accessible to patients.³⁵ In Brazil, compulsory licensing of antiretroviral drugs helped the country achieve significant progress in its fight against HIV/AIDS.³⁶ In South Africa, compulsory licensing played a crucial role in improving access to affordable medicines during the HIV/AIDS epidemic.³⁷

The TRIPS Agreement and the mechanism of compulsory licensing are integral to the global IP landscape. While compulsory licensing can pose challenges for patent holders, it also offers a critical tool for addressing public health needs and promoting access to essential medicines. The future of TRIPS and compulsory licensing will likely continue to evolve as countries navigate the balance between fostering innovation and protecting public health

2.3 Intersection of IP Law and Climate Change

The intersection of intellectual property (IP) law and climate change is a critical area of study, given the urgent need for innovative solutions to mitigate the effects of global warming. Intellectual property rights, particularly patents, play a significant role in promoting the development and dissemination of climate-friendly technologies.

IP law, especially patent law, is designed to incentivize innovation by granting inventors exclusive rights to their creations for a limited period. This exclusivity is intended to encourage investment in research and development (R&D) by providing a potential return on investment. In the context

³⁵ Bayer Corporation v Natco Pharma Ltd, *Compulsory License Application No. 1 of 2011*, Controller of Patents (India), 9 March 2012.

³⁶ Ellen 't Hoen, *The Global Politics of Pharmaceutical Monopoly Power* (Diemen: AMB Publishers, 2009) at 136–138.

³⁷ C. M. Correa, “Implications of the Doha Declaration on the TRIPS Agreement and Public Health,” (2002), <https://apps.who.int/medicinedocs/en/d/Js2301e/>.

of climate change, patents can drive the development of new technologies that reduce greenhouse gas (GHG) emissions and promote sustainability.

According to Ring (2021), meeting the Paris Agreement targets requires rapid innovation in green technologies.³⁸ The agreement, which aims to limit global temperature increases to well below 2°C above pre-industrial levels, underscores the need for technological advancements to achieve these goals. However, the effectiveness of the current patent system in fostering green innovation is a subject of debate among scholars.

As global efforts to combat climate change intensify, there has been increasing discourse on the need to rethink the balance between IP protection and the global public interest in addressing environmental sustainability. Green technologies, such as solar panels, wind turbines, energy-efficient machinery, and innovations in clean water and food production, are crucial for achieving the Sustainable Development Goals (SDGs) and the Paris Agreement targets. However, strong IP protections, particularly in developed countries, can restrict access to these technologies, exacerbating inequalities between nations and slowing the global response to climate change.

Several scholars argue that compulsory licensing could play a key role in facilitating technology transfer and capacity building for climate change mitigation and adaptation. For instance, Cullet (2008)³⁹ emphasizes that access to green technologies should be considered a matter of global public interest, akin to public health. In this context, the proposal to introduce sustainability and

³⁸ C. Ring, patent law and climate change: innovation policy for a climate in crisis, *Harvard journal of law and technology*, 35 1 fall 2021.

³⁹ P. Cullet, *Intellectual Property Rights and Climate Change: From Conflict to Synergy?* International Environmental Agreements: Politics, Law and Economics, (2008) 8(4), 371–386.

climate change as grounds for compulsory licensing under the TRIPS Agreement is seen as a means of addressing equity issues in technology access.

Developing nations have raised concerns that existing IP frameworks, such as TRIPS, prioritize the rights of patent holders over the urgent need for widespread access to climate-related technologies. These countries argue that, in the same way compulsory licensing provisions are used to address public health emergencies, similar exceptions should be made for sustainability and climate change technologies. This idea is grounded in the argument that climate change poses an existential threat to humanity, much like a health pandemic, and that the global public interest in averting catastrophic climate impacts justifies expanding compulsory licensing provisions.⁴⁰

Several international organizations have taken strong positions on climate change and sustainability, acknowledging the urgency of addressing these issues and setting frameworks and guidelines for action, such as the United Nations, World Health Organisation, World Bank, International Monetary Fund (IMF), etc.

The UN's main platform for climate action is the UN Framework Convention on Climate Change (UNFCCC), which was established to facilitate global cooperation in combatting climate change and led to significant agreements, including the Kyoto Protocol (1997) and the Paris Agreement (2015). The Paris Agreement aims to limit global warming to well below 2°C, ideally 1.5°C, and involves nearly all countries in the world, which set and periodically review their commitments to reducing greenhouse gas emissions. It is worth noting that SDG 13 of the UN Sustainable

⁴⁰ World Trade Organization, Agreement on Trade-Related Aspects of Intellectual Property Rights, 15 April 1994, Marrakesh Agreement Establishing the World Trade Organization, Annex 1C, 1869 UNTS 299 (entered into force 1 January 1995).

Development Goals (SDGs) specifically addresses climate action, and several other goals, such as those on clean energy, sustainable cities, and responsible consumption, are related to sustainability and climate change. The UN also regularly reports on the progress of these goals and encourages coordinated global action to achieve them.

The WHO, on the other hand, recognizes climate change as a major threat to global health, with wide-ranging impacts that include more frequent and severe heatwaves, worsening air quality, increased disease outbreaks, and food and water security issues. The WHO advocates for a "health-in-all-policies" approach, linking climate policy to health outcomes. It also supports clean air initiatives and encourages countries to consider health co-benefits when implementing climate policies.⁴¹

The World Bank is highly active in financing climate action and sustainable development, particularly in low-income countries. It launched the Climate Change Action Plan to help countries integrate climate considerations into development strategies, reduce emissions, and enhance resilience.⁴² The World Bank Group also supports climate finance, assisting countries in making investments in renewable energy, sustainable agriculture, and disaster risk management. The bank has committed to aligning its financing with the goals of the Paris Agreement, aiming to allocate significant portions of its funding toward projects that support climate adaptation and mitigation.⁴³

The economic implications of IP law in the context of climate change are significant. On one hand, strong IP protection can incentivize private sector investment in green technologies. On the other

⁴¹ World Health Organization, *Climate Change and Health* (30 October 2021), <https://www.who.int/news-room/fact-sheets/detail/climate-change-and-health>

⁴² World Bank, *Climate Change Action Plan 2021-2025: Accelerating the Transition to a Low-Carbon, Climate-Resilient World* (Washington, DC: World Bank, 2021), <https://www.worldbank.org/en/publication/climate-change-action-plan>.

⁴³ World Bank, *Aligning Financial Flows with the Paris Agreement* (2021), <https://www.worldbank.org/en/news/feature/2021/07/02/aligning-financial-flows-with-the-paris-agreement>.

hand, it can also create barriers to technology transfer and diffusion, particularly in developing countries. The balance between these competing interests is a key policy challenge.⁴⁴

Ring discusses various patent policy levers that can be used to promote green innovation. These include patent pools, which allow multiple patent holders to license their technologies collectively, and patent buyouts, where governments or international organizations purchase patents to make the technologies freely available.⁴⁵ Such mechanisms can help overcome the limitations of the traditional patent system and promote the widespread adoption of climate-friendly technologies.

The intersection of IP law and climate change presents both challenges and opportunities. While the current IP system has been instrumental in driving innovation, it may also hinder the widespread dissemination of essential climate technologies. Addressing these challenges requires a balanced approach that promotes innovation while ensuring equitable access to climate solutions.

2.4 Current flexibilities within TRIPS

The Trade-Related Aspects of Intellectual Property Rights (TRIPS) Agreement, established by the World Trade Organization (WTO), sets out minimum standards for the protection and enforcement of intellectual property (IP) rights. While TRIPS aims to harmonize IP laws globally, it also incorporates certain flexibilities to accommodate the diverse needs and developmental levels of member countries. These flexibilities are crucial for enabling countries to pursue public policy objectives, such as promoting access to medicines and supporting economic development.

The terminology used to refer to the policy space available for the implementation of the TRIPS Agreement has evolved. Expressions such as “room to maneuver,” “margins of freedom,”

⁴⁴ C. M. Correa, *Intellectual Property and Sustainable Development: Lessons from the Global South* (Cheltenham: Edward Elgar Publishing, 2019) at 73–75.

⁴⁵ C. Ring, patent law and climate change: innovation policy for a climate in crisis, *Harvard journal of law and technology*, 35 1 fall 2021.

“safeguards,” and “margin of discretion” were used in the early studies and reports that identified various aspects of such space.⁴⁶ Currently, the diversity of legislative options available under said Agreement is generally known as ‘TRIPS flexibilities.’ According to the World Intellectual Property Organization (WIPO), these flexibilities allow countries to tailor their IP laws to meet specific national interests and public policy goals.⁴⁷ The term ‘flexibility’ appears in the Preamble (sixth paragraph) and in Article 66.1 of the TRIPS Agreement, but it is used there with a broader meaning. It indicates that least-developed countries (LDCs) are not bound to comply with the TRIPS Agreement obligations (except Articles 3 through 5) during the transition period.

The terminology ‘TRIPS flexibilities’ does include the exemption for LDCs, but it also encompasses possible variations in the manner in which the TRIPS Agreement’s provisions are interpreted and implemented as they are applied to countries actually subject to them. Such terminology was used for the first time with this latter meaning in the context of the WTO in paragraph 4 of the Doha Declaration.⁴⁸ The Declaration confirmed the availability of a number of flexibilities. Its adoption was a response to the concerns of developing countries about the obstacles they faced when seeking to implement measures to promote access to affordable medicines, without limitation to certain diseases, in the interest of public health.⁴⁹ Since the adoption of the Doha Declaration, the concept of ‘TRIPS flexibilities’ has been referenced in a vast body of literature, especially (but not only) in relation to access to medicines,⁵⁰ and in numerous resolutions of UN agencies⁵¹ and bodies, including the World Health Organization

⁴⁶ G. Velásquez, WTO role in IP and access to medicines (2013) p. 5. https://www.southcentre.int/wp-content/uploads/2013/05/RP47_WTO-role-in-IP-and-access-to-medicines_EN.pdf

⁴⁷ World Intellectual Property Organization, Advice on Flexibilities under the TRIPS Agreement

⁴⁸ C. M Correa, interpreting the flexibilities under the TRIPS Agreement’....

⁴⁹ *ibid*

⁵⁰ *ibid*

⁵¹ One of the first studies on TRIPS flexibilities was published by the UNCTAD (1996). https://unctad.org/en/docs/ite1_en.pdf.

(WHO), the Human Right Council (HRC),⁵² and the UN Assembly, as well as in reports of the UN Special Rapporteur on the Right to Health.

There is no agreed-upon definition of ‘TRIPS flexibilities.’ In accordance with a WIPO document, the term “flexibilities” means that there are “different options through which TRIPS obligations can be transposed into national law so that national interests are accommodated and yet TRIPS provisions and principles are complied with.”⁵³ There are different types of TRIPS flexibilities. Some refer to the scope and extent of the substantive rights to be recognized under the Agreement,⁵⁴ and others to the ways in which such rights can be enforced. One way of grouping flexibilities is also to take into account “the point in time at which Members may resort to them: (i) flexibilities relating to the process of acquisition of the right; (ii) flexibilities defining the scope of the right; and (iii) flexibilities relating to the enforcement of the right.”⁵⁵

Broadly, the following flexibilities can be identified in relation to public health.

- i. Choice of patentability criteria, including for chemical entities and biologics, WTO members have considerable policy space to define what an ‘invention’ is and to apply rigorous standards of patentability to avoid the grant of patents that, without making a genuine technical contribution, may distort market competition.
- ii. Compulsory license: Widely recognized in the legislation of developed and developing countries—and granted since the adoption of the TRIPS Agreement by administrations

⁵² On the relationship between the TRIPS Agreement and the human right to health, see, e.g., Sellin (2015). <https://link.springer.com/article/10.1007/s40802-015-0047-5#Abs1>

⁵³ WIPO (2010), p. 11 https://www.wipo.int/meetings/en/doc_details.jsp?doc_id%4142068

⁵⁴ The ‘scope’ of a right delimits the boundaries and defines its content; the ‘extent’ refers to the legal limitations on the exercise of the right

⁵⁵ WIPO (2010), op. cit., p. 12.

- or courts in countries such as Thailand, Ecuador, Indonesia, India, USA, Italy, and Germany— compulsory licenses may be necessary to correct market distortions (abuses of market power, unfair pricing, refusal to license, etc.).
- iii. Government use: In many cases governments may decide, consistently with the TRIPS Agreement, to use patented inventions for non-commercial purposes, such as for ensuring the supply of essential medicines.
 - iv. Compulsory licenses for the supply of medicines to countries with a lack of or insufficient manufacturing capacity: Compulsory licenses exclusively for the export of medicines can be granted under the amendment introduced to the TRIPS Agreement in 2017 and the waiver adopted by the WTO in 2003.
 - v. Test data protection The TRIPS Agreement (Article 39.3) requires WTO members to protect test data against unfair competition, which does not create exclusive rights. The Agreement is complied with if legislation on unfair competition is implemented to protect such data.
 - vi. Exemptions for least developed countries (LDCs) Countries designated by the United Nations as LDCs need not grant patents for pharmaceuticals and test data protection at least until 2033 under the extended transition period provided for under Article 66.1 of the TRIPS Agreement.
 - vii. Parallel importation Importing protected medicines from any country where they can be purchased cheaper than locally is consistent with the TRIPS Agreement.
 - viii. Pre and post patent grant opposition Procedures before patent offices provide for the possibility for third parties to contribute to the examination process through ‘observations’ or ‘oppositions,’ whether before or after the grant of a patent, or both.

- ix. Use of competition law to address the misuse of IPRs: Competition law may be applied to correct market distortions created through the abuse of IPRs.
- x. Regulatory Review (Bolar) exception ‘Bolar exceptions’ are important to accelerate the entry of generic products soon after the expiry of the patent and promote a dynamic market for medicines.
- xi. Research or experimentation exception: This exception allows research to be conducted by third parties on patented inventions, for instance, to improve on them or derive new inventions.
- xii. Disclosure requirement, particularly for biologics: The full and precise disclosure of an invention is crucial for the patent system to perform its informational function. This is particularly relevant for biologicals, which cannot be described in the same way as medicines produced by chemical synthesis.
- xiii. Flexibilities in IP enforcement Measures to enforce IPRs—such as reversal of the burden of proof, determination of infringement by equivalence and damages, and border measures—if overly broad, may distort competition by discouraging or preventing market entry and the availability of generic medicines. Provisional injunctions need to be cautiously granted so as not to distort the market dynamics, generally after giving the alleged infringer an opportunity to articulate his defense. Permanent injunctions may be denied for public health reasons under certain circumstances.
- xiv. Security exception Compliance with obligations under the TRIPS Agreement can be suspended, inter alia, in cases of emergency in international relations, such as in the case of a pandemic (Article 73 (b) of the Agreement).

2.5 Importance of Expanding Compulsory Licensing to Address Climate Change

The introduction of climate change as a ground for compulsory licensing could have profound benefits. Smith (2017)⁵⁶ argues that compulsory licensing can help bridge the gap between developed and developing countries by providing more affordable access to critical technologies for mitigation and adaptation efforts. Similarly, Patel (2018)⁵⁷ highlights the role of compulsory licensing in building domestic innovation ecosystems in developing countries, enabling them to develop their own versions of patented technologies and eventually contribute to global green technology markets. He argues that just as compulsory licensing has been used to improve access to essential medicines, it could be adapted to enhance access to green technologies. This would ensure that countries most vulnerable to climate impacts are not left behind in global efforts to mitigate and adapt to climate change.

The United Nations Conference on Trade and Development (UNCTAD) report on green technology transfer supports this view, noting that without mechanisms like compulsory licensing, developing countries may be left behind in the global race to address climate change. The United Nations Environment Programme (UNEP) also emphasizes the importance of making environmentally sound technologies available to all countries, noting that the patent landscape currently skews heavily in favor of developed nations.

The urgency of the climate crisis requires innovative approaches to accelerate the deployment of green technologies worldwide; expanding compulsory licensing provisions to include sustainability and climate change grounds would be a bold but potentially necessary step in

⁵⁶ S. Smith, *Access to Climate Change Technology in Developing Countries: Intellectual Property Rights, Technology Transfer and Climate Change*. Routledge. (2017)

⁵⁷ R. Patel, *Intellectual Property and Climate Change: Access to Green Technology in Developing Countries* (New York: Oxford University Press, 2018).

ensuring that all countries, particularly developing nations, have access to the technologies they need to transition to a low-carbon economy. It would also reinforce the principle that global public goods, such as a stable climate, can justify exceptions to IP protections when the broader public interest is at stake. While such a move would face resistance from some stakeholders, it could significantly contribute to global efforts to meet climate targets and avoid the worst impacts of climate change.

There are several legal and policy considerations regarding the introduction of sustainability and climate change as grounds for compulsory licensing under the TRIPS Agreement. First, there is no precedent in international trade law for compulsory licensing based on environmental considerations, meaning the legal framework would need to be adapted. Article 31 of TRIPS primarily focuses on public health, but it is broadly written, allowing some flexibility for interpreting “national emergency or other circumstances of extreme urgency,” which could potentially include climate-related crises. Legal scholars have debated whether the scope of compulsory licensing could be extended to include climate technologies under current TRIPS provisions, or whether a new international agreement or amendment to TRIPS would be necessary.

According to Taubman (2012),⁵⁸ expanding the scope of compulsory licensing to include environmental technologies could raise concerns about WTO disputes and retaliatory trade measures from developed countries. He suggests that a multilateral approach, involving both WTO and WIPO, would be necessary to avoid conflicts between IP and trade obligations.

⁵⁸ A. Taubman, *TRIPS and Climate Change in the International Economic Order*. In R. M. Hilty & K.-C. Liu (Eds.), *Compulsory Licensing: Practical Experiences and Ways Forward* (2012) (pp. 215–232). Springer.

Buckley (2010)⁵⁹ also explore the geopolitical aspects of expanding compulsory licensing under TRIPS. Developed countries, which hold many patents on climate-related technologies, may resist changes to TRIPS, fearing that it could diminish their competitive advantage in green industries. However, Helfer and Austin (2011)⁶⁰ argue that developing countries have a strong case for seeking greater access to climate technologies, given the principle of climate justice which is the idea that those least responsible for climate change should not bear the disproportionate burden of its impacts.

However, the application of compulsory licensing to climate technologies faces several challenges. Nanda highlights that the global IP regime under the WTO needs a mechanism similar to that developed for pharmaceutical products to effectively address climate change.⁶¹ The current legal and political landscape often makes it difficult to implement compulsory licensing for climate technologies due to resistance from patent holders and complex international negotiations. The TRIPS Agreement provides the legal basis for compulsory licensing, but its application to climate technologies is not straightforward. The agreement primarily addresses pharmaceuticals, and extending its provisions to climate technologies requires navigating complex legal interpretations and potential resistance from patent holders.⁶² The lack of clear guidelines for compulsory licensing of climate technologies under TRIPS can create legal uncertainties and hinder its implementation.

⁵⁹ R. P. Buckley, *International Trade Law and Climate Change: A Legal Framework for Promoting Environmental Sustainability* (Cheltenham: Edward Elgar Publishing, 2010).

⁶⁰ L. R. Helfer & G. W. Austin, *Human Rights and Intellectual Property: Mapping the Global Interface* (Cambridge: Cambridge University Press, 2011).

⁶¹ N. Nanda, Diffusion of climate friendly technologies: can compulsory licensing help? *Journal of intellectual property rights*, vol 14, 2009 pp 241-246.

⁶² NI K-J. Legal Aspects (Barriers) of Granting Compulsory Licenses for Clean Technologies in Light of WTO/TRIPS Rules: Promise or Mirage? *World Trade Review*. 2015;14(4):701–19.

Similarly, many countries may lack the necessary legal infrastructure or expertise to effectively issue and manage compulsory licenses for climate technologies. Additionally, national laws may vary significantly, leading to inconsistencies in the application of compulsory licensing across different jurisdictions.⁶³

One of the primary economic challenges is balancing the need for access to climate technologies with the need to incentivize innovation. Strong IP protection is often seen as essential for encouraging investment in research and development. Expanding compulsory licensing could potentially reduce the financial returns for innovators, thereby disincentivizing the development of new climate technologies.⁶⁴ While compulsory licensing can reduce the cost of climate technologies, it may not fully address the financial barriers to access. Developing countries may still face significant costs associated with manufacturing, deploying, and maintaining these technologies. Significant costs could also arise from the training of personnel for the manufacture and operation of these technologies.

Additionally, the process of negotiating and issuing compulsory licenses can be resource-intensive and time-consuming.⁶⁵ Patent holders, particularly large multinational corporations, may resist the expansion of compulsory licensing for climate technologies. They may argue that such measures undermine their IP rights and threaten their business models, and this resistance can manifest in legal challenges, lobbying efforts and public relations campaigns against compulsory

⁶³ Compulsory licensing for climate technology a path to access and innovation COMPULSORY LICENSING FOR CLIMATE TECHNOLOGIES: A PATH TO ACCESSIBILITY AND INNOVATION - Intepat IP

⁶⁴ R. M Hilty, Pedro Henrique D Batista, Potential and Limits of Patent Law to Address Climate Change, *GRUR International*, Volume 72, Issue 9, September 2023, Pages 821–839, <https://doi.org/10.1093/grurint/ikad066>

⁶⁵Compulsory licensing for climate technology a path to access and innovation compulsory licensing for climate technologies: a path to accessibility and innovation - intepat ip.

licensing.⁶⁶ Effective implementation of compulsory licensing requires robust institutional capacity, and many developing countries may lack the necessary administrative and technical expertise to manage the process of issuing and enforcing compulsory licenses.⁶⁷

2.6 Conclusion

In conclusion, the balance between intellectual property protection and access to essential goods, such as medicines, remains a critical issue in the global context. While the TRIPS Agreement aimed to harmonize IP laws and provide strong protection for inventors, it also raised concerns about the negative implications for public health, particularly in developing and least-developed countries. The introduction of compulsory licensing as a safeguard has played a pivotal role in addressing these concerns, especially during health crises, by facilitating access to life-saving medications at affordable prices. However, the challenges faced by countries with limited manufacturing capacity highlight the need for continued reform and the importance of international cooperation. The Doha Declaration and the WTO Waiver Decision have been significant steps in alleviating these barriers, allowing for the export of generics to countries in need. Moving forward, the ongoing evolution of IP laws must carefully consider the interplay between innovation, public health, and human rights, ensuring that the global system fosters both technological advancement and equitable access. The next chapter will explore the broader implications of these issues in the context of climate change and sustainability, where similar tensions between IP rights and global needs continue to emerge.

⁶⁶NI K-J. Legal Aspects (Barriers) of Granting Compulsory Licenses for Clean Technologies in Light of WTO/TRIPS Rules: Promise or Mirage? *World Trade Review*. 2015;14(4):701–19.

⁶⁷Compulsory licensing for climate technology a path to access and innovation [compulsory licensing for climate technologies: a path to accessibility and innovation - intepat ip](#).

CHAPTER THREE

SUSTAINABILITY, CLIMATE CHANGE AND INTELLECTUAL PROPERTY

3.1 Introduction

Climate change presents an existential threat to humanity, necessitating urgent and coordinated global action.⁶⁸ The rise in global temperatures, extreme weather events, resource depletion, and biodiversity loss highlight the pressing need for sustainable solutions⁶⁹. Sustainability, defined as meeting the needs of the present without compromising the ability of future generations to meet their own needs, has become a central theme in economic and policy discussions⁷⁰. Governments, international organizations, and private enterprises recognize that sustainable innovation and green technology development are critical to addressing these challenges.

One of the primary mechanisms for driving innovation in sustainable technologies is intellectual property (IP) law. Intellectual property rights (IPRs), particularly patents, serve as legal instruments that grant inventors exclusive rights to their creations⁷¹. These rights are essential for incentivizing research and development (R&D) by ensuring that inventors can reap the financial rewards of their innovations. However, patents and other IP protections also create barriers to access, particularly for developing nations that require climate mitigation and adaptation technologies⁷². The disparity in technological access raises ethical, legal, and economic questions

⁶⁸ Intergovernmental Panel on Climate Change, *Climate Change 2021: The Physical Science Basis*, Contribution of Working Group I to the Sixth Assessment Report, (Cambridge University Press, 2021).

⁶⁹ United Nations, *The Sustainable Development Goals Report 2020*, United Nations Publications, 2020.

⁷⁰ G. H. Brundtland, *Our Common Future*, (Oxford University Press, 1987).

⁷¹ World Intellectual Property Organization (WIPO), *World Intellectual Property Report 2019*, WIPO Publications, 2019.

⁷² K. E. Maskus, & R. L. Okediji, *Intellectual Property Rights and Global Development*, (Cambridge University Press, 2010).

about the balance between protecting innovation and ensuring that sustainable solutions are widely available.

The role of IP in climate-related innovation has been widely debated. Proponents argue that strong IP protections encourage investment in green technologies by providing financial incentives for innovators.⁷³ However, critics highlight the negative impact of patents in restricting access to critical environmental technologies, especially for low-income and developing countries that lack the financial means to acquire patented solutions.⁷⁴

Green technologies, such as renewable energy solutions, carbon capture systems, and sustainable agricultural practices, are essential for achieving the climate goals set forth in international agreements such as the Paris Agreement and the United Nations' Sustainable Development Goals (SDGs).⁷⁵ However, the cost of licensing and the restrictive nature of patents often delay or prevent the widespread adoption of these technologies.⁷⁶ Developing nations, which bear the brunt of climate change effects, struggle to afford and implement patented innovations, leading to a widening gap in global sustainability efforts.

The global community has recognized the need for policy frameworks that address this issue. International agreements, such as the World Trade Organization's (WTO) Trade-Related Aspects of Intellectual Property Rights (TRIPS) Agreement and the United Nations Framework Convention on Climate Change (UNFCCC), attempt to mediate between IP protection and

⁷³ International Chamber of Commerce, *Innovation and Intellectual Property Rights in Addressing Climate Change* (2011), ICC <https://iccwbo.org/publication/innovation-and-intellectual-property-rights-in-addressing-climate-change/>

⁷⁴ C. M. Correa, *Intellectual Property Rights and the Protection of Public Health: A Critical Assessment of the Role of Patents in the Global Response to Climate Change* (2009) 3:1 UIC Rev Int'l L 1 at 10.

⁷⁵ UNFCCC, *Paris Agreement*, 2015.

⁷⁶ D. Ockwell, et al., *Intellectual Property Rights and Low Carbon Technology Transfer to Developing Countries: A Review of the Evidence to Date* (UNFCCC Policy Brief, 2010).

technology transfer.⁷⁷ The TRIPS Agreement, for instance, includes provisions that allow countries to issue compulsory licenses for patents under specific conditions, primarily for public health emergencies. However, these flexibilities have not been explicitly extended to climate-related technologies, leading to calls for reforms that align IP frameworks with global sustainability objectives.⁷⁸ Despite the presence of TRIPS flexibilities, their practical application for climate technologies remains weak at the local level. Most countries have not effectively utilized compulsory licensing, patent exceptions, or parallel importation mechanisms to enhance access to green technologies. Legal uncertainties, economic limitations, and political pressures hinder the widespread adoption of these flexibilities.⁷⁹

This chapter examines the intricate relationship between sustainability, climate change, and intellectual property. It explores how existing IP frameworks impact the development and diffusion of green technologies, the legal barriers to technology transfer, and potential policy reforms to ensure a more equitable and sustainable future. By analysing these factors, this research aims to provide a comprehensive understanding of how IP laws can be adapted to better support global sustainability efforts while maintaining the necessary incentives for innovation.

3.2 Interpretation of Sustainability and Climate Change Within Existing TRIPS Provisions

The Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) is a fundamental component of international trade law, setting the standards for intellectual property (IP) protection among World Trade Organization (WTO) member states. While the TRIPS Agreement was initially designed to safeguard innovation and promote economic development, its implications

⁷⁷ C. M. Correa, *Patent Rights and Green Technologies: Policy Options for Climate Change Mitigation*, (ICTSD Policy Brief, 2016).

⁷⁸ F. M. Abbott, *Innovation and Technology Transfer to Address Climate Change: Lessons from the Global Debate on Intellectual Property and Public Health*, (2011) ICTSD Issue Paper No. 24.

⁷⁹ L. Helfer et al, *The World Blind to Carbon: The Role of Intellectual Property in Climate Technology Transfer* (2018) 25:1 UCLA J Int'l L & Foreign Aff 1 at 22–25.

extend beyond traditional IP governance into pressing global challenges such as sustainability and climate change. Given the accelerating climate crisis, there is increasing debate over the extent to which TRIPS provisions can be interpreted to facilitate access to essential green technologies while maintaining the balance between IP protection and public welfare.

Sustainability, as defined in the Brundtland Report (also known as “Our Common Future”), entails meeting present needs without compromising the ability of future generations to meet their own.⁸⁰

Climate change, driven by greenhouse gas emissions, poses a direct threat to sustainability by exacerbating environmental degradation, biodiversity loss, and socioeconomic instability. Green technology, encompassing innovations in renewable energy, carbon capture, and climate adaptation, is crucial to mitigating these effects. However, the high costs and restrictive licensing associated with patented climate technologies present significant barriers to their global dissemination, particularly in developing nations.⁸¹

The TRIPS Agreement is primarily structured to protect private rights and incentivize innovation by granting exclusive rights to patent holders. However, it also incorporates key flexibilities that allow states to regulate intellectual property protections in pursuit of broader public interest objectives, including environmental sustainability. These flexibilities include provisions for compulsory licensing, patent exceptions, and limitations that enable governments to facilitate access to critical technologies in times of need. While initially developed with public health concerns in mind, these mechanisms could also be leveraged to support the transfer and diffusion of green technologies essential for climate change mitigation and adaptation. Nonetheless, the

⁸⁰ World Commission on Environment and Development, *Our Common Future* (Oxford: Oxford University Press, 1987) at 43.

⁸¹ C. M. Correa, *Patent Rights and Green Technologies: Policy Options for Climate Change Mitigation*, (ICTSD Policy Brief, 2016).

extent to which these flexibilities can be effectively applied to environmental sustainability remains a matter of legal interpretation and political will, necessitating further international cooperation and policy refinement.

A considerable part of determining the legality of compulsory licensing for climate change purposes is treaty interpretation. Annex 2 of the Marrakech Agreement is titled Understanding on Rules and Procedures for Governing Settlement of Disputes (DSU),⁸² which provides a useful tool as to how to interpret WTO treaties. Article 3 of the DSU provides that the customary rules of public international law can be used to clarify the provisions of WTO agreements.⁸³ The Vienna Convention on the Law of Treaties (VCLT)⁸⁴ is accordingly a useful lens through which to examine the compulsory licensing provision in the TRIPS Agreement. Article 31(1) of the VCLT provides that treaties need to be interpreted in their context and in the light of the object and purpose of that treaty, and this includes the preamble of the treaty text as well as subsequent agreements.⁸⁵ The preamble to the Marrakech Agreement, to which the TRIPS Agreement is an annex, explicitly mentions sustainable development; however, this does not imply that sustainable development is incorporated as a principle in the WTO regime, but is relevant in the context of treaty interpretation.⁸⁶ The preamble of the TRIPS Agreement focuses strongly on the balancing of rights and removing trade barriers, as well as public interest objectives, which include technology transfer.⁸⁷

⁸² Understanding on Rules and Procedures for Governing Settlement of Disputes (DSU), Annex 2 to the Marrakesh Agreement, adopted on 15 April 1994 in Marrakesh.

⁸³ Ibid.

⁸⁴ Vienna Convention on the Law of Treaties, No. 1155, adopted in Vienna on 23 May 1969.

⁸⁵ VCLT, Article 31(2)(a)(b).

⁸⁶ Lo C "The Difference Between Treaty Interpretation and Treaty Application and Possibility to Account for non-WTO Treaties During WTO Treaty Interpretation" (2012) International Law & Competition Law Review 19.

⁸⁷ L M. Hahn, The legality and feasibility of the use of compulsory licensing under the trips agreement to facilitate the transfer of environmentally sound technologies under the UNFCCC regime, Faculty of Law, Department of Public Law, 2024 <http://hdl.handle.net/11427/40920>.

The treaty itself in Article 66(2) provides that “developed country members shall provide incentives to enterprises and institutions in their territories for the purpose of promoting and encouraging technology transfer to least-developed country members in order to enable them to create a sound and viable technological base”.

Interpreting Article 66(2) of the TRIPS Agreement on technology transfer, considering the objective and purpose of the Agreement, would provide a basis for the possibility of the transfer of Environmentally Sound Technologies. While the TRIPS Agreement was primarily aimed at establishing a minimum standard for the protection of IPRs, it allows for deviations on the grounds of public interest. In the examination of the development and objectives of the WTO regime, along with the goals and preamble of both the Marrakesh Agreement and the TRIPS Agreement, it has become evident that public interest includes considerations for environmental protection and sustainable development, and that climate change is a matter of public interest.⁸⁸ Especially considering the vulnerability of LDCs to the effects of climate change and their limited capacity to mitigate and adapt, climate change could provide a basis of public interest upon which compulsory licenses could be issued.⁸⁹

In addition to the context and purpose of the treaty, the VCLT provides other aspects that can be considered in the interpretation of a treaty, including subsequent agreements between parties, subsequent practice in application of the treaty and any other relevant rules of international law applicable between parties.⁹⁰ The Doha Declaration can be considered a subsequent agreement

⁸⁸ Ibid.

⁸⁹ Zaman (2013) AJIL 156; Littleton Technologies to Developing Countries 10.

⁹⁰ VCLT Article 31(3)(a).

having more legal power and serving as a key tool to clarify the relationship between certain TRIPS Agreement provisions and public health.

The Doha Declaration provides that the TRIPS Agreement can and should be interpreted and implemented in a manner supportive of WTO members' right to protect public health.⁹¹ Climate change can pose a significant threat to human health and global public health; for instance, air pollution from various sources, including the burning of fossil fuels, leads to direct health risks and the worsening of respiratory illnesses.⁹² Disruptions to ecosystems also threaten access to essential resources like clean water and food, while compromising healthcare infrastructure and medicine availability, thus disproportionately affecting vulnerable populations.⁹³

The Doha Declaration has also offered crucial clarification regarding the conception held by some scholars that a "national emergency" would be a prerequisite for the issuance of a compulsory license.⁹⁴ Analysis of Article 31 shows that it outlines conditions that WTO members must adhere to when granting compulsory licenses, but it does not explicitly specify the grounds upon which such licenses should be based.⁹⁵ This only becomes relevant when a country needs to bypass the prior negotiations requirement.⁹⁶ Given the absence of a specific definition for "national emergency" in the TRIPS Agreement, some experts contend that climate change could fall within this category.⁹⁷ If climate change were indeed to be considered a national emergency, then no prior

⁹¹ Doha Declaration, para. 4.

⁹² J. M Samet, "Air Pollution: Adverse Effects and Disease Burden" in Al-Delaimy W K, Ramanathan V, Sorondo M S (eds.) *Health of People, Health of our Planet and Our Responsibility* (Springer Nature Publishing) at pp 63-78.

⁹³ Ghazani et. al. "Climate Change Impacts on Disaster and Emergency Medicine Focussing on Mitigation and Disruptive Effects: International Perspective" (2018) *International Journal of Environmental Research and Public Health* 1-13.

⁹⁴ Taubman, Wager & Watal *Handbook TRIPS Agreement* 8; Gervais "Climate Change, the International Property Regime, and Disputes under the TRIPS Agreement" in *Sarnoff Research Handbook* 56.

⁹⁵ 9 Ni (2015) *World Trade View* 710.

⁹⁶ TRIPS Agreement, Article 31(b).

⁹⁷ Zaman (2013) *AJIL* 156; Fair (2009) *Int. Management & Law Review* 27; Zhou (2019) *Int. Environmental Agreements* 115.

negotiations would be needed, and EST could be deployed immediately to countries in need through the issuing of a compulsory license.⁹⁸

Relatedly, the Doha Declaration reinforces the perspective that states have discretion in determining which grounds of public interest warrant the justification of a compulsory license. Therefore, although compulsory licenses have primarily been granted for medical purposes, there is no legal obligation for countries to confine the granting of compulsory licenses exclusively to pharmaceutical use. As stated above, climate change might as well be a public interest ground.⁹⁹

3.3 Potential need for TRIPS amendment

While the existing TRIPS framework provides some flexibility for addressing climate change through compulsory licensing and exceptions, these provisions remain inadequate in ensuring widespread access to green technologies. A more fundamental reform of TRIPS may be necessary to align intellectual property rights with global sustainability objectives.

The COVID-19 pandemic highlighted the importance of global access to essential technologies and treatments. Proposals for TRIPS waivers to improve access to vaccines and treatments set a precedent for using TRIPS flexibilities to address global crises. This experience demonstrates that the international community can adapt IP frameworks to meet urgent global needs.¹⁰⁰

Brazil, as an example, successfully used compulsory licensing provisions under TRIPS to expand access to affordable HIV/AIDS medication in the early 2000s, demonstrating how a country can leverage TRIPS flexibilities to address public health crises --a model that could be replicated for

⁹⁸ W. Zhuang, *Intellectual Property and Climate Change*, (Cambridge University Press 2017) at pp 233-310.

⁹⁹ L.M, Hahn, The legality and feasibility of the use of compulsory licensing under the trips agreement to facilitate the transfer of environmentally sound technologies under the UNFCCC regime, (Faculty of Law, Department of Public Law, 2024) <http://hdl.handle.net/11427/40920>.

¹⁰⁰ Paris-agreement WTO. (2021). TRIPS and Public Health. World Trade Organization https://www.wto.org/english/tratop_e/trips_e/pharmpatent_e.htm.

climate technologies.¹⁰¹ However, the country has not fully extended its TRIPS-related strategies from the pharmaceutical sector to the climate sector. This is despite Brazil's domestic capabilities in manufacturing biofuels and renewable energy technologies. It is one of the world's largest producers of biofuels, particularly ethanol derived from sugarcane. The country's ability to develop and deploy biofuel technology has significantly reduced its dependence on fossil fuels.¹⁰² By drawing parallels, developing nations could advocate for similar mechanisms to obtain patents for renewable energy and carbon capture technologies.

India has actively utilized TRIPS flexibilities, particularly Section 3(d) of its Patents Act, to prevent the patenting of incremental innovations and facilitate generic drug production¹⁰³. This principle could be adapted to climate-related patents by challenging broad claims that delay green technology diffusion and create unnecessary monopolies.

South Africa has explored the use of patent pools to accelerate renewable energy adoption. Patent pools allow multiple patent holders to collectively license technologies, reducing costs and improving access. This approach could serve as a viable alternative to compulsory licensing under TRIPS.¹⁰⁴

By examining these case studies, it becomes evident that TRIPS flexibilities can be effectively utilized to promote sustainability and climate adaptation. However, explicit amendments to TRIPS would enhance legal certainty and encourage broader international cooperation.

¹⁰¹ C. Kenneth, Shadlen, *The Political Economy of AIDS Treatment: Intellectual Property and the Transformation of Generic Supply*, (Cambridge University Press, 2007).

¹⁰² D. Ockwell, et al., *Intellectual Property Rights and Low Carbon Technology Transfer to Developing Countries* (2010).

¹⁰³ Basheer, Shamnad, *India's Patent Law and TRIPS: Redrawing the Lines*, Oxford Intellectual Property Research Centre, 2012.

¹⁰⁴ Maskus, E. Keith, & Okediji, L. Ruth, *Intellectual Property Rights and Global Development*, (Cambridge University Press, 2010).

One potential amendment to TRIPS would be the inclusion of an explicit provision recognizing climate change as a ground for compulsory licensing. This could be modelled after the Doha Declaration on TRIPS and Public Health, which clarified the application of IP flexibilities for health emergencies. Scholars such as Abbott argue that a "Climate TRIPS Declaration" would provide legal clarity, reduce barriers to green technology access, and facilitate international cooperation in combating climate change¹⁰⁵. Furthermore, this amendment could be reinforced by integrating sustainability principles into WTO agreements, aligning IP rights with global environmental goals¹⁰⁶. A more structured framework within TRIPS could enable member states to prioritize public interest objectives without facing retaliatory trade measures, a concern often raised by developing nations seeking affordable access to green technologies¹⁰⁷.

Another strategy involves promoting voluntary licensing agreements and patent pools. Patent pools allow multiple patent holders to collectively license technologies, thereby reducing transaction costs and increasing accessibility.¹⁰⁸ This approach has been successfully applied in industries such as telecommunications and biotechnology. In the environmental sector, initiatives like the United Nations-backed Climate Technology Centre and Network (CTCN) seek to facilitate technology transfer through cooperative patent-sharing arrangements.¹⁰⁹

¹⁰⁵ A. M. Frederick, *Innovation and Technology Transfer to Address Climate Change: Lessons from the Global Debate on Intellectual Property and Public Health*, International Centre for Trade and Sustainable Development (ICTSD), 2011.

¹⁰⁶ C. M. Carlos, *Trade Related Aspects of Intellectual Property Rights: A Commentary on the TRIPS Agreement*, (Oxford University Press, 2020).

¹⁰⁷ Reichman, H. Jerome, et al., *Intellectual Property and Alternatives: Strategies for Green Innovation*, (2013) vol. 16 *Journal of International Economic Law*, 4.

¹⁰⁸ World Intellectual Property Organization, *Patent Pools and Antitrust: A Comparative Analysis* (Geneva: WIPO, 2014), https://www.wipo.int/edocs/pubdocs/en/wipo_pub_1060.pdf

¹⁰⁹ United Nations Framework Convention on Climate Change (UNFCCC), *Technology Executive Committee Report*, 2021.

A case study that illustrates this concept is the Eco-Patent Commons, a voluntary patent-sharing initiative launched by companies such as IBM, Nokia, and Sony to provide open access to environmentally friendly innovations.¹¹⁰ While this initiative demonstrates the potential for industry-led patent-sharing, its voluntary nature limits its overall impact, as participation remains at the discretion of patent holders and does not necessarily ensure widespread access to essential climate technologies.¹¹¹ A reformed TRIPS framework could incentivize or mandate participation in similar schemes, ensuring that critical green technologies reach developing nations that need them most, particularly through mechanisms such as patent pooling or compulsory licensing agreements tailored to environmental sustainability.¹¹²

To address equity concerns, TRIPS could incorporate provisions for differentiated patent protection based on a country's level of development. Developing nations, which often lack the financial resources to acquire proprietary green technologies, could be granted more flexible licensing arrangements. This principle aligns with Article 66.2 of TRIPS, which mandates developed countries to provide incentives for technology transfer to least-developed countries.

For instance, India's Patent Act has demonstrated a balanced approach by imposing restrictions on patent evergreening and enabling compulsory licensing in cases of public need.¹¹³ Extending similar flexibilities to green technologies under TRIPS could provide a framework for equitable access while maintaining incentives for innovation.

¹¹⁰ B. H. Hall, & C. Helmers, *The Role of Patent Commons in Promoting Green Technology Transfer*, (2019).

¹¹¹ Maskus, Keith E., & Okediji, Ruth L., *Intellectual Property Rights and Global Development*, (Cambridge University Press, 2010).

¹¹² Reichman, H. Jerome, et al., *Intellectual Property and Alternatives: Strategies for Green Innovation*, (2013) vol. 16 *Journal of International Economic Law*, 4.

¹¹³ Basheer, Shamnad, *India's Patent Law and TRIPS: Redrawing the Lines*, (Oxford Intellectual Property Research Centre, 2012).

3.4 Legal and Procedural Implications of Introducing Explicit Provisions for Expanding the Scope of Compulsory Licensing

Compulsory licensing, a provision within the TRIPS Agreement, allows governments to authorize the use of patented inventions without the consent of the patent holder under specific conditions. This mechanism has traditionally been used to address public health emergencies, such as ensuring access to essential medicines. However, the growing urgency of climate change has prompted discussions on expanding the scope of compulsory licensing to include climate-related technologies.

Amending the TRIPS Agreement to expand the scope of compulsory licensing to include climate-related technologies involves complex legal and procedural considerations. Ensuring compliance with international standards, balancing the rights of patent holders with the public interest, and addressing potential legal challenges are critical legal implications that must be carefully managed. Procedurally, establishing clear criteria and procedures, enhancing international cooperation and coordination, strengthening administrative processes, and ensuring transparency and accountability are essential for the effective implementation of the expanded provisions. By addressing these legal and procedural implications, the expanded use of compulsory licensing can contribute to global efforts to combat climate change and promote sustainable development while maintaining the integrity of the international IP system.

3.4.1 Legal implications of introducing explicit provisions for expanding the scope of compulsory licensing

Amending the TRIPS Agreement to expand compulsory licensing must ensure compliance with existing international standards. The TRIPS Agreement, administered by the WTO, requires member countries to provide a minimum level of IP protection while allowing for certain

flexibilities. These flexibilities include the ability to issue compulsory licenses under specific conditions, such as national emergencies or public non-commercial use.¹¹⁴ Any amendments to expand the scope of compulsory licensing must align with these standards to avoid conflicts and potential disputes within the WTO framework. Ensuring that the expanded provisions are consistent with the principles of the TRIPS Agreement is crucial for maintaining the integrity of the international IP system.

One of the primary legal challenges in expanding compulsory licensing is balancing the rights of patent holders with the public interest. Patent holders invest significant resources in research and development and rely on patent protection to recoup these investments. Expanding compulsory licensing to include climate-related technologies could be perceived as undermining these rights and reducing incentives for innovation.¹¹⁵ Legal frameworks must clearly define the conditions under which compulsory licenses can be issued to prevent misuse and ensure fairness. This includes establishing criteria for what constitutes a public interest or emergency that justifies compulsory licensing. Additionally, adequate compensation mechanisms must be in place to ensure that patent holders are fairly compensated for the use of their inventions.

Expanding compulsory licensing could lead to legal challenges from patent holders and industries heavily reliant on intellectual property. These stakeholders might argue that the expanded scope undermines their rights and reduces incentives for innovation¹¹⁶. Addressing these concerns through clear legal provisions and adequate compensation mechanisms is crucial to mitigating

¹¹⁴ TheLaw.Institute, "The Role of Compulsory Licensing in Intellectual Property Law" <https://thelaw.institute/management-of-iprs/compulsory-licensing-intellectual-property-law/>.

¹¹⁵ Kumar, Sapna. "Compulsory Licensing of Patents During Pandemics." (2022) 54 Conn. L. Rev. 57. SSRN: <https://ssrn.com/abstract=3636456>.

¹¹⁶ Desai, Manisha A. "Compulsory Licensing: Procedural Requirements under the TRIPS Agreement." (2016) 18 Pharmaceuticals Policy and Law 31–44. https://www.ifpma.org/wp-content/uploads/2023/01/i2023_4.-Compulsory-Licensing-Procedural-Requirements-under-the-TRIPS-Agreement.pdf.

potential conflicts. Legal challenges could also arise from the interpretation and application of the expanded provisions, particularly if there are ambiguities in the criteria and procedures for issuing compulsory licenses. Ensuring that the legal framework is robust and transparent can help minimize the risk of disputes and enhance the legitimacy of the expanded use of compulsory licensing.

3.4.2 Procedural implications of introducing explicit provisions for expanding the scope of compulsory licensing

Amending the TRIPS Agreement to expand compulsory licensing requires establishing clear criteria and procedures for issuing compulsory licenses. This includes defining what constitutes a public interest or emergency that justifies compulsory licensing¹¹⁷. Detailed procedural guidelines would help ensure transparency and consistency in the application of compulsory licensing. These guidelines should outline the steps that governments must follow when issuing compulsory licenses, including the requirements for negotiating with patent holders and determining adequate compensation. Clear criteria and procedures can help prevent arbitrary or discriminatory use of compulsory licensing and ensure that it is applied fairly and consistently.

Expanding compulsory licensing for climate-related technologies may necessitate enhanced international cooperation and coordination. Climate change is a global challenge that requires collective action, and international collaboration can help address it more efficiently and equitably¹¹⁸. This includes sharing best practices, harmonizing standards, and potentially negotiating multilateral agreements to facilitate the process. Effective international cooperation

¹¹⁷ V. A. Yousuf, "Compulsory Licenses and Government Use: Challenges and Opportunities." In *Access to Medicines and Vaccines*, 73–104. Springer, 2022. https://link.springer.com/chapter/10.1007/978-3-030-83114-1_3.

¹¹⁸ Ibid.

can also help ensure that the expanded use of compulsory licensing is aligned with global efforts to combat climate change and promote sustainable development. Additionally, international coordination can help address potential trade-related issues and ensure that the expanded provisions are implemented in a manner that is consistent with international trade rules and practices.

Governments would need to strengthen their administrative processes to handle the increased scope of compulsory licensing. This includes establishing or enhancing bodies responsible for reviewing and approving compulsory license applications¹¹⁹. Capacity-building efforts, such as training for relevant officials and stakeholders, would be essential to ensure effective implementation. Strengthening administrative processes can help ensure that compulsory licenses are issued in a timely and efficient manner, reducing delays and uncertainties for both patent holders and licensees. Additionally, capacity-building efforts can help enhance the understanding and expertise of officials and stakeholders involved in the compulsory licensing process, contributing to more informed and effective decision-making.

Ensuring transparency and accountability in the compulsory licensing process is crucial. This involves publicizing the criteria and procedures, providing mechanisms for patent holders to appeal decisions, and ensuring that the process is conducted fairly and openly¹²⁰. Transparency measures can help build trust and legitimacy in the expanded use of compulsory licensing. This includes making information about compulsory license applications and decisions publicly available, as well as providing opportunities for stakeholders to participate in the decision-making process. Accountability mechanisms, such as independent review bodies or oversight committees,

¹¹⁹ Ibid.

¹²⁰ V. A Yousuf, "Compulsory Licenses and Government Use: Challenges and Opportunities." In *Access to Medicines and Vaccines*, (2022) 73–104. Springer https://link.springer.com/chapter/10.1007/978-3-030-83114-1_3.

can help ensure that the compulsory licensing process is conducted in accordance with established criteria and procedures, and that any deviations are promptly addressed.

Nevertheless, enhancing administrative transparency and procedural safeguards is only part of the solution. The efficacy of compulsory licensing in the climate context will ultimately depend on whether countries possess the practical capacity to implement such licenses. Many developing nations lack the advanced manufacturing infrastructure needed to produce complex green technologies such as solar photovoltaic systems, carbon capture units, and hydrogen fuel technologies. Without addressing these structural disparities, even well-designed licensing frameworks may fail to yield meaningful outcomes. It is therefore essential that procedural reforms be coupled with targeted international support for capacity building, technology adaptation, and technical training.

3.5 Challenges of Expanding the Scope of Compulsory Licensing to Include Climate Change and Sustainability

Expanding the scope of compulsory licensing to include climate change and sustainability presents a multifaceted set of challenges, considering legal, economic, technological, political, and implementation aspects.

3.5.1 Legal Barriers

The legal framework under the World Trade Organization's Agreement on Trade-Related Aspects of Intellectual Property Rights (WTO/TRIPS) poses significant challenges. Compulsory licensing for clean technologies must navigate complex international and national legal landscapes, which

can be restrictive and vary widely between countries¹²¹. The TRIPS Agreement allows for compulsory licensing under certain conditions, but these provisions are primarily designed for public health emergencies, not environmental sustainability¹²². This legal rigidity can hinder the broader application of compulsory licensing to address climate change.

3.5.2 Economic Implications

Implementing compulsory licensing can impact the economic incentives for innovation. Companies may be less willing to invest in research and development of new technologies if they fear their patents could be subject to compulsory licensing¹²³. This potential reduction in investment could slow the overall pace of technological advancement. The balance between protecting intellectual property rights and promoting access to essential technologies is delicate. While compulsory licensing can make technologies more accessible, it may also discourage the private sector from investing in the development of new, sustainable technologies¹²⁴.

3.5.3 Technological Transfer

Effective technology transfer requires not just the legal right to use technology but also the technical know-how and infrastructure to implement it. This means a robust ecosystem of technical know-how, skilled personnel, and adequate infrastructure to enable the successful adaptation, implementation, and sustainability of the technology. These remain a hurdle for developing

¹²¹ Kuei-Jung Ni, "Legal Aspects (Barriers) of Granting Compulsory Licenses for Clean Technologies in Light of WTO/TRIPS Rules: Promise or Mirage?" (2015) 14:4 World Trade Review 701

¹²² Ibid.

¹²³ R. M Hilty & Pedro Henrique D Batista, "Potential and Limits of Patent Law to Address Climate Change" (2023) 72:9 GRUR International 821. <https://www.cambridge.org/core/journals/world-trade-review/article/abs/legal-aspects-barriers-of-granting-compulsory-licenses-for-clean-technologies-in-light-of-wtotrips-rules-promise-or-mirage/70A5A49BB9BFF252D383007BF18F1B24>

¹²⁴ Ibid.

countries, which are often the focus of compulsory licensing efforts under international frameworks like the TRIPS Agreement.¹²⁵

In practice, the ability to utilize a licensed technology is significantly constrained if the recipient country lacks essential human and institutional capacity. For instance, while compulsory licensing has been used to bypass patent restrictions on life-saving medicines, such as antiretroviral drugs for HIV/AIDS treatment, many low-income countries in Sub-Saharan Africa have struggled to produce or even effectively import these drugs due to inadequate pharmaceutical manufacturing infrastructure. A case in point is Zambia, which, despite being granted compulsory licenses, has continued to rely heavily on imports due to the lack of domestic manufacturing capabilities and trained personnel to manage production at required quality standards.¹²⁶

This gap can result in the underutilization of the technologies, limiting their potential impact on sustainability. Additionally, the transfer of technology involves not only physical technology but also the knowledge and skills required to operate and maintain it.¹²⁷ This is particularly evident in the clean energy sector. For example, several African countries have received funding and legal access to solar technology, yet projects have failed or stalled due to insufficient technical training programs, weak maintenance structures, and poor grid infrastructure. In Nigeria, numerous solar mini-grid projects have suffered setbacks because local technicians were not equipped with the

¹²⁵ Climate Change, Human Rights, and Technology Transfer" in *Climate Change and Human Rights: An International and Comparative Law Perspective*, ed by Ottavio Quirico & Mouloud Boumghar (Cambridge: Cambridge University Press, 2016) 46.

¹²⁶ Oh Cecilia, "Compulsory licences: recent experiences in developing countries." (2006) 1: 1-2 *International Journal of Intellectual Property Management* 22-36.

¹²⁷ *Ibid.*

knowledge to manage or troubleshoot the imported systems effectively, leading to frequent breakdowns and loss of public confidence.¹²⁸

Another illustrative case is the global rollout of vaccine manufacturing capacity during the COVID-19 pandemic. Despite calls for equitable access and technology sharing, only a few countries in the Global South were able to meaningfully absorb and implement vaccine production technologies.¹²⁹ South Africa's Aspen Pharmacare entered into agreements to manufacture the Johnson & Johnson vaccine, but progress was hampered by complex technical requirements and the need for extensive training and investment in facilities.¹³⁰

These examples underscore the fact that for technology transfer to be truly effective, it must be accompanied by capacity-building initiatives, long-term partnerships, and support systems that allow developing countries not only to absorb and replicate technologies but to adapt and innovate upon them for local needs.

3.5.4 Political Resistance

Political resistance is another significant hurdle. Countries and corporations that hold patents on critical technologies may lobby against expanding compulsory licensing, arguing that it undermines their intellectual property rights and economic interests¹³¹. This resistance can manifest in various forms, including diplomatic pressure, trade negotiations, and lobbying efforts.

¹²⁸ E. Osele, "Technical and economic feasibility of an under grid mini-grid: a case study of the Mokoloki project" (2024) (Master's thesis, Universitat Politècnica de Catalunya); D. Chidera Abonyi, "Feasibility Study for a Solar PV (Hybrid) Mini-grid System for Small Businesses in Lagos, Nigeria" (2019) (Master's thesis, PAUWES).

¹²⁹ A.M Ekstrom et al., "Addressing production gaps for vaccines in African countries" (2021) 99: 12 Bull World Health Organ 910-912.

¹³⁰ L. Monaco, & A. Habiyaremye, "The South African Pharmaceutical Industry: Can Digital Innovation Drive Localisation?" (2024) ResearchGate. <https://10.13140/RG.2.2.20794.20165>.

¹³¹ Kuei-Jung Ni, "Legal Aspects (Barriers) of Granting Compulsory Licenses for Clean Technologies in Light of WTO/TRIPS Rules: Promise or Mirage?" (2015) 14:4 World Trade Review 701.

The political landscape is complex, and the interests of different stakeholders must be carefully balanced to achieve meaningful progress.

3.5.5 Implementation Costs

The administrative and legal costs associated with implementing and enforcing compulsory licenses can be substantial. This can be a burden, especially for developing countries with limited financial and institutional capacities. The process of granting and managing compulsory licenses involves significant bureaucratic and legal work, which can strain the resources of countries that are already facing economic challenges. Ensuring that these countries have the support and resources needed to effectively implement compulsory licensing is crucial.¹³²

3.6 Addressing the Challenges of Expanding the Scope of Compulsory Licensing to Include Climate Change and Sustainability

Addressing these challenges requires a balanced approach that considers the needs of both technology holders and those in need of access to sustainable technologies. One potential solution is to develop international agreements that specifically address the use of compulsory licensing for climate change and sustainability.¹³³ These agreements could provide clearer guidelines and support for countries looking to implement compulsory licensing in this context.

Another approach is to incentivize voluntary licensing agreements. By providing financial or other incentives to companies that voluntarily license their technologies for sustainable use, it may be possible to increase access to these technologies without the need for compulsory measures¹³⁴.

¹³² Ibid.

¹³³ Ibid.

¹³⁴ R.M Hilty & Pedro Henrique D Batista, "Potential and Limits of Patent Law to Address Climate Change" (2023) 72:9 GRUR International 821.

This approach could help maintain the economic incentives for innovation while also promoting broader access to essential technologies.

Finally, capacity-building initiatives are essential. Providing technical assistance, training, and financial support to developing countries can help bridge the gap between having the legal right to use a technology and being able to effectively implement it¹³⁵. These initiatives can ensure that the technologies are used to their full potential, maximizing their impact on sustainability.

3.7 Conclusion

In conclusion, the TRIPS Agreement, though primarily designed to protect intellectual property, has significant implications for sustainability and climate change. While existing flexibilities such as compulsory licensing and patent exceptions offer pathways for green technology access, their effectiveness remains hindered by legal ambiguities, economic constraints, and political resistance but these challenges are not insurmountable. By addressing legal, economic, technological, political, and implementation barriers, it is possible to create a more equitable and sustainable future. The key is to find a balance that protects intellectual property rights while also promoting access to the technologies needed to address one of the most pressing issues of our time.

To address these challenges, a more explicit integration of climate considerations into TRIPS is necessary. Potential reforms include recognizing climate change as a ground for compulsory licensing, reducing patent durations for green technologies, and fostering voluntary patent pools to accelerate technology transfer. Strengthening international cooperation and reinforcing

¹³⁵ "Climate Change, Human Rights, and Technology Transfer" in *Climate Change and Human Rights: An International and Comparative Law Perspective*, ed by Ottavio Quirico & Mouloud Boumghar (Cambridge: Cambridge University Press, 2016) 46.

developed countries' obligations to support technology dissemination are also critical steps toward a more sustainable and equitable global economy.

A reformed TRIPS framework that prioritizes environmental sustainability without undermining innovation incentives will be instrumental in bridging the gap between intellectual property rights and urgent climate action.

CHAPTER FOUR

IMPLICATIONS OF EXPANDING COMPULSORY LICENSING FOR CLIMATE TECHNOLOGIES

4.1 Introduction

Globally, climate change has emerged as a crisis, with increasing reports of climate-related catastrophes such as typhoons, extreme heat waves, and devastating wildfires.¹³⁶ Tackling this crisis necessitates access to green technologies, renewable energy innovations, and climate change mitigation tools. However, the current IP rights regime, particularly under the TRIPS Agreement, can restrict technology transfer and innovation diffusion. On the one hand, IP provides an incentive for research and development by protecting inventors' rights, but on the other, it may act as a barrier to technology access in developing nations that lack the financial resources to acquire such innovations.

Historically, compulsory licenses have been granted in the context of health-related emergencies such as the AIDS epidemic. The most recent case of compulsory licenses occurred during the COVID-19 pandemic, which was also an epidemic. However, as the urgency of addressing climate change grows, there has been increased conversation around the possibility of extending compulsory licensing to cover sustainability and climate change technologies.¹³⁷ While there has been no such action for climate-related technologies yet, it is a legitimate topic of discussion, and

¹³⁶ M.K. Jha & M. Dev, "Impacts of Climate Change" (2024) *Smart Internet of Things for Environment and Healthcare* at p 139.

¹³⁷ M. Rimmer, *Intellectual Property and Climate Change: Inventing Clean Technologies* (Edward Elgar Publishing, 2011).; T. Lybbert & D. Sumner, "Agricultural Technologies for Climate Change in Developing Countries: Policy Options for Innovation and Technology Diffusion" (2012) 37:1 *Food Policy* at p 114.

in enriching these conversations, this chapter will explore the potential implications of such an extension for both developed and developing nations.

Following this introduction, Section 4.2 examines the implications such an extension would have for both developed and developing countries, drawing lessons from the use of compulsory licensing in the pharmaceutical sector and considering the necessary legal adaptations to accommodate environmental concerns within the TRIPS framework. The next section then evaluates how an expanded scope of compulsory licensing might affect technology transfer, international trade relations, and innovation, paying particular attention to the differing capacities and incentives of countries across the development spectrum. Following this, Section 4.4 delves into the broader economic and social impacts of compulsory licensing for green technologies. It assesses how market dynamics, competition, and innovation could be reshaped, and considers the potential for enhanced social equity and environmental health outcomes in vulnerable communities.

Section 4.5 highlights the potential benefits of such an approach, ranging from advancing global climate goals and promoting equitable access to fostering innovation, economic growth, public health, and energy independence. The next section considers the practical challenge of balancing stakeholder interests. It addresses the need to protect innovative incentives while ensuring fair access, proposing a set of measures including fair compensation schemes, international cooperation, public-private partnerships, and enhanced legal frameworks in developing countries. Finally, Section 4.7 concludes the chapter by reaffirming the need for a balanced and cooperative approach. It argues that sustainability and climate resilience should be elevated within the TRIPS context to facilitate the diffusion of critical technologies necessary for tackling climate change.

4.2 Impact on Developed and Developing Countries

Compulsory licensing under the TRIPS Agreement allows governments to authorize the use of patented technologies without the consent of the patent holder under specific conditions.¹³⁸ The use of compulsory licensing in the pharmaceutical industry provides valuable insights into its potential application in sustainability and climate change, as well as its impacts. Countries such as India, Brazil, and South Africa have successfully invoked compulsory licensing to access essential medicines, arguing that public health outweighs patent protections. Similar arguments could be made for climate change, particularly for technologies related to renewable energy, water purification, and carbon capture.

Though traditionally applied in the healthcare sector, expanding the scope of compulsory licensing to include sustainability and climate change would require legal adaptations. Article 31 of TRIPS, which outlines conditions for compulsory licensing, does not explicitly mention environmental concerns, necessitating either an amendment or an interpretative evolution in international trade law.¹³⁹

The Doha Declaration on TRIPS and Public Health, adopted in 2001, reaffirmed the right of WTO members to use compulsory licensing under certain conditions, specifically in the case of public

¹³⁸ J. Yosick, "Compulsory Patent Licensing for Efficient Use of Inventions" (2001) *University of Illinois Law Review* at p 1275.; Y. Vawda, "Compulsory Licenses and Government Use: Challenges and Opportunities" (2022) *Access to Medicines and Vaccines: Implementing Flexibilities Under Intellectual Property Law* at p 73.; R. Gold & D. Lam, "Balancing Trade in Patents: Public Non-Commercial Use and Compulsory Licensing" (2003) 6 *Journal of World Intellectual Property* at p 5.

¹³⁹ Agreement on Trade-Related Aspects of Intellectual Property Rights, 1994 at art 31.

health crises.¹⁴⁰ A similar approach could be taken to address environmental emergencies, considering climate change poses an existential threat comparable to global health pandemics. Advocates argue that an expansive interpretation of TRIPS, in line with global commitments such as the United Nations Sustainable Development Goals (SDGs) and the Paris Agreement, could justify the inclusion of climate change technologies under compulsory licensing provisions.¹⁴¹

An example in the environmental sphere is the Clean Development Mechanism (CDM) under the Kyoto Protocol, which facilitates technology transfer from developed to developing countries to reduce greenhouse gas emissions. Although CDM has limitations, it demonstrates international recognition of the need for equitable access to climate solutions. Expanding compulsory licensing under TRIPS could build upon such initiatives to enhance global sustainability efforts.

4.2.1 Potential Impact on Developed Countries

Developed nations, as primary patent holders of green technologies, may resist the expansion of compulsory licensing due to concerns over innovation incentives and economic returns.¹⁴² According to them, the introduction of compulsory licensing can potentially dampen the motivation to innovate, as the development and commercialization of new products often require significant financial investment and sustained effort.¹⁴³ Without the assurance of exclusive market

¹⁴⁰ World Trade Organization, *Declaration on the TRIPS Agreement and Public Health*, 14 November 2001, WT/MIN(01). DEC/W/2, 2001.

¹⁴¹ M. Azam, "The TRIPS Agreement Revisited—Time to Open-Up Climate Technologies for Least Developed Countries" (2022) 27:2 *Journal of Intellectual Property Rights* at p 107.; M. Azam, "Are the UNFCCC Paris Agreement and the TRIPS Agreement Facilitating Access to and Transfer of Climate Technologies for the LDCs?" (2021) 18 *Manchester Journal of International Economic Law* at p 327.; M. Rimmer, "Beyond the Paris Agreement: Intellectual Property, Innovation Policy, and Climate Justice" (2019) 8:1 *Laws* 7.

¹⁴² A Ivanov, From cooperation to unilateralism: compulsory licensing and competition law amidst COVID-19 pandemic (paper delivered at the Eleventh Meeting of the UNCTAD Research Partnership Platform, 17–18 December 2020) at 4.

¹⁴³ *Ibid.*

rewards, inventors and companies may be less inclined to pursue groundbreaking research.¹⁴⁴ Some authors further argue that the compensation offered through compulsory licensing, typically in the form of state-determined royalties, falls short of reflecting the true commercial value of a patented invention.¹⁴⁵ These royalties rarely match the profits a patent holder might have earned under exclusive rights. As a result, many developed nations express strong reservations about compulsory licensing.¹⁴⁶ Countries that choose to implement such measures frequently attract criticism from the United States and foreign multinational corporations, who contend that licensees benefit from the outcomes of research to which they have not contributed, effectively bypassing the substantial costs involved in innovation and development.¹⁴⁷

Therefore, potential challenges include: reduced profitability for corporations investing in research and development (R&D) of sustainable technologies, increased reluctance to share advanced climate-related technologies, possible trade disputes and retaliatory measures within the WTO framework, and pressure on domestic legal frameworks to adjust compulsory licensing provisions.¹⁴⁸

However, developed countries may also benefit from increased global efforts to combat climate change, leading to potential market expansion for green technologies and collaborative innovation opportunities. Increased adoption of green technologies in developing nations may lead to long-term economic benefits, including new markets for climate-related goods and services.¹⁴⁹

¹⁴⁴ Felicien Uwayezu, *Compulsory Licensing and Protection of Patents: A Cross-Country Comparative Analysis* (LLM Thesis, Kigali Independent University, 2024), online: <http://hdl.handle.net/123456789/836>.

¹⁴⁵ Ibid.

¹⁴⁶ Muhammad Zaheer Abbas, "Pros and Cons of Compulsory Licensing: An Analysis of Arguments" (2013) 3:3 *Intl J Soc Sci & Humanity* 255.

¹⁴⁷ Ibid.

¹⁴⁸ Ibid.

¹⁴⁹ P. Nath & B. Behera, "A Critical Review of Impact of and Adaptation to Climate Change in Developed and Developing Economies" (2011) 13 *Environment, Development and Sustainability* at p 141.

Furthermore, if developing countries can mitigate environmental damage more effectively, it will reduce the risk of transboundary environmental harm, which will benefit the global community.

4.2.2 Potential Impact on Developing Countries

For developing nations, introducing sustainability and climate change as grounds for compulsory licensing could significantly enhance access to crucial technologies. Potential benefits include facilitating technology transfer to aid climate resilience and sustainable development, reducing dependency on costly foreign innovations, encouraging local adaptation and diffusion of green technologies, and aligning with international climate agreements, such as the Paris Agreement, which emphasize technology accessibility.¹⁵⁰

Developing nations may, however, face challenges in the form of navigating WTO compliance and potential legal challenges from developed countries, addressing infrastructure and capacity constraints to effectively utilize licensed technologies, and avoiding negative repercussions in broader trade negotiations.¹⁵¹ To overcome these challenges, developing countries may need to collaborate in negotiating favorable terms under WTO agreements, ensuring that sustainability and climate-related concerns are recognized as legitimate grounds for compulsory licensing. They will also need to invest in local capacity-building initiatives to maximize the benefits of newly accessible technologies.

¹⁵⁰ Ibid.

¹⁵¹ Ibid.

4.3 How Expanded Compulsory Licensing Might Affect Trade Relations, Technology Transfer, and Innovation in Developed and Developing Countries.

Compulsory licensing, a legal mechanism that allows governments to authorize the use of patented inventions without the consent of the patent holder, has long been a contentious issue in global trade and intellectual property (IP) discussions. While it is primarily invoked in public health emergencies to ensure access to essential medicines, its broader application across industries raises important considerations for international trade relations, technology transfer, and innovation.

4.3.1 Impact on Trade Relations

The expansion of compulsory licensing can significantly impact trade relations, particularly between developing and developed economies. Countries with strong pharmaceutical and technology industries, such as the United States and members of the European Union, often view compulsory licensing as a threat to their IP-intensive exports.¹⁵² These nations may respond with trade restrictions, sanctions, or reduced foreign direct investment (FDI) in countries that frequently invoke compulsory licensing. For instance, the U.S. has previously placed countries on its Special 301 Watch List for alleged IP violations, including the broad use of compulsory licensing.¹⁵³

Conversely, developing nations argue that expanded compulsory licensing is a necessary tool to balance IP protection with public interest, particularly in sectors like healthcare, clean energy, and digital technology. The resulting trade tensions can lead to diplomatic negotiations, with developing countries pushing for more flexible IP rules under international agreements like the

¹⁵² I. Krizic & O. Serrano, "Exporting Intellectual Property Rights to Emerging Countries: EU and US Approaches Compared" (2017) 22 *European Foreign Affairs Review*.

¹⁵³ A. Qureshi, "United States Special 301—A Deeply Flawed Tool for IPR Regulation?" (2021) 3 *Journal of World Trade* at p 55.; D. Harris, "TRIPS after Fifteen Years: Success or Failure, as Measured by Compulsory Licensing" (2010) 18 *Journal of Intellectual Property Law* at p 367.; J. Feldman, "Compulsory Licenses: The Dangers Behind the Current Practice" (2009) 8 *Journal of International Business & Law* at p 137.

TRIPS Agreement. Thus, while compulsory licensing may foster domestic economic development, it can also create friction in global trade dynamics.

4.3.2 Impact on Technology Transfer

Technology transfer, the process by which knowledge, skills, and innovations are shared between entities, can be both positively and negatively influenced by expanded compulsory licensing. On the one hand, compulsory licensing can facilitate access to critical technologies, enabling local firms to manufacture essential products without prolonged negotiations with patent holders. This is particularly relevant in sectors like pharmaceuticals, renewable energy, and telecommunications, where technological access can drive industrial growth and self-sufficiency.

A study by the International Centre for Trade and Sustainable Development (ICTSD) proposed that ‘compulsory licensing could be utilized for the transfer of climate technologies’, arguing that climate mitigation could provide a valid ground for compulsory licensing and could be even considered as contemplated in general references to ‘public interest’ in most patent laws.¹⁵⁴ The study concluded that compulsory licenses could be an effective tool to ensure rapid access to critical climate-related technologies in developing countries.¹⁵⁵

This subject has also been heavily debated in the TRIPS Council, when, for example, in 2013, Ecuador submitted a proposal to initiate a discussion on IP, climate change and technology transfer, prompting huge debate.¹⁵⁶ The key argument of the proposal was ‘to prevent IPRs from becoming a barrier for the transfer of technology to the developing countries.’¹⁵⁷ The Ecuadorian proposal

¹⁵⁴ M. Azam, "The TRIPS Agreement Revisited–Time to Open-Up Climate Technologies for Least Developed Countries" (2022) 27:2 Journal of Intellectual Property Rights at p 129.

¹⁵⁵ Ibid.

¹⁵⁶ M. Rimmer, “Trade Wars in the TRIPS Council: Intellectual Property, Technology Transfer and Climate Change” in *Research Handbook on Climate Change and Trade Law* (Edward Elgar Publishing, 2016) at p 230.

¹⁵⁷ Ibid.

received the attention of diverse members during the TRIPS Council sessions in June 2013 and October 2013.¹⁵⁸ Among the developing countries, India argued for the importance of a proactive role of public policy at national and international levels, supporting the approach proposed by Ecuador to evaluate the contribution of IP to facilitate the transfer of environmentally rational technology.¹⁵⁹

On the other hand, it has also been argued that compulsory licensing may deter voluntary technology transfer.¹⁶⁰ Multinational corporations (MNCs) and innovators might hesitate to collaborate with firms in countries known for aggressive compulsory licensing policies, fearing loss of IP control and revenue. This reluctance can slow the inflow of cutting-edge technologies, reducing opportunities for local firms to engage in co-development, joint ventures, or licensing agreements on mutually beneficial terms. At the TRIPS Council sessions in 2013, developed countries, particularly the United States (US), insisted that IP rights play a positive role in promoting both green technology innovation and its transfer to the developing world.¹⁶¹ Several other developed countries, such as Canada, Switzerland, and Japan, supported the US position, arguing that climate technologies are usually more competitive.¹⁶² Therefore, they argued that IP protection has not impeded climate-related technology transfer, and the developing countries' assertions of comparing climate technologies with the pharmaceutical patent situation are inappropriate.¹⁶³ Some scholars have also contended that there are limitations in using Article 31 of TRIPS, since climate change is not deemed a significant enough emergency causing a threat to

¹⁵⁸ Ibid.

¹⁵⁹ Ibid.

¹⁶⁰ J. Reichman & C. Hasenzahl, "Non-Voluntary Licensing of Patented Inventions" (2003) *ICTSD and UNCTAD*.

¹⁶¹ M. Rimmer, "Trade Wars in the TRIPS Council: Intellectual Property, Technology Transfer and Climate Change" in *Research Handbook on Climate Change and Trade Law* (Edward Elgar Publishing, 2016) at p 230.

¹⁶² Ibid.

¹⁶³ Ibid.

human life.¹⁶⁴ This position is, however, no longer legitimate, given the bulk of research affirming the seriousness of the impact of climate change on human life.¹⁶⁵

Other scholars have raised concerns about the use of compulsory licences with respect to climate technologies, given the number of different solutions that will be required to address climate change, and the absence of know-how and other soft technologies in the compulsory transfer process.¹⁶⁶ Additionally, unlike public health emergencies or other crises that may see rapid mitigation or reversal through immediate access to patented solutions, climate change presents a unique challenge. Even with widespread access to climate technologies through compulsory licensing, the deployment of innovations like carbon capture systems or renewable energy infrastructure cannot produce instantaneous results. Climate change mitigation needs systemic and sustained interventions rather than one-off technological fixes, because of the cumulative nature of greenhouse gas emissions and the delayed feedback loops in global ecosystems.¹⁶⁷ Thus, while compulsory licensing can lower legal barriers to technology adoption, it does not inherently address the temporal mismatch between the urgency of climate action and the gradual impact of transferred technologies.

Another angle to the debate has been that though compulsory license has been useful for facilitating access to medicines through generic manufacturing and importation, in the context of access to ESTs, there might be instances in which compulsory license could be an essentially

¹⁶⁴ ¹⁶⁴ M. Azam, "The TRIPS Agreement Revisited—Time to Open-Up Climate Technologies for Least Developed Countries" (2022) 27:2 Journal of Intellectual Property Rights at p 129.

¹⁶⁵ D. Popp, "International Technology Transfer, Climate Change, and the Clean Development Mechanism" (2011) *Review of Environmental Economics and Policy*.

¹⁶⁶ *Ibid.*

¹⁶⁷ Intergovernmental Panel on Climate Change (IPCC), *Climate Change 2021: The Physical Science Basis* (Cambridge University Press, 2021).

limited option for developing countries.¹⁶⁸ This is because indigenous firms in these countries are not technically capable of using the patented technology. Technical know-how is not majorly disclosed through patent specifications because inventors usually keep their secrets owing to concerns of confidentiality and competitiveness, and also because a great deal of know-how is developed after filing the application.¹⁶⁹

Compounding this challenge is the significant lack of manufacturing and engineering capacity in many third-world countries, which undermines the practical utility of transferred technologies. Compulsory licensing may grant legal access to intellectual property, but it does not inherently address the infrastructural and human capital deficits that hinder local production and adaptation. Research by the United Nations Conference on Trade and Development (UNCTAD) highlights that many developing nations lack the industrial base to manufacture complex climate technologies, such as wind turbine components or advanced battery systems, even when blueprints are made available.¹⁷⁰ For example, a study of sub-Saharan Africa found that only 15% of countries possess the engineering workforce necessary to support large-scale renewable energy projects.¹⁷¹

Though some of these criticisms are valid, they do not necessarily undermine the potential of compulsory licensing to act as one of the solutions to address developing countries' concerns. It is therefore more desirable to seek mitigating factors such as the implementation of fair compensation mechanisms for patent holders. If governments ensure that compulsory licensing

¹⁶⁸ Feldman, "Compulsory Licenses: The Dangers Behind the Current Practice" (2009) 8 *Journal of International Business & Law* at p 137.

¹⁶⁹ R. Adukia, *Handbook on Intellectual Property Rights in India* (2012).

¹⁷⁰ United Nations Conference on Trade and Development (UNCTAD), *Technology and Innovation Report 2022: Climate Change and Developing Countries* (UNCTAD, 2022).

¹⁷¹ African Development Bank, *Renewable Energy in Africa: Challenges and Opportunities* (AfDB, 2023).

frameworks include reasonable royalty payments and clear provisions for technology-sharing agreements, the negative impact on technology transfer may be minimized. More importantly, compulsory licensing would have to be paired with international support mechanisms such as technology cooperation frameworks or funding under the Paris Agreement to ensure that developing nations can not only access but also operationalize climate innovations.¹⁷²

4.3.3 Impact on Innovation

The relationship between compulsory licensing and innovation is complex. Proponents argue that compulsory licensing can stimulate domestic innovation by enabling local firms to build upon existing technologies and develop affordable alternatives. For example, generic pharmaceutical manufacturers in countries like India and Brazil have leveraged compulsory licensing provisions to produce life-saving drugs at lower costs, fostering competition and incremental innovation.¹⁷³

On the other hand, expanded compulsory licensing may reduce the incentives for research and development (R&D), particularly in industries where high upfront investment is required.¹⁷⁴ If companies anticipate that their patents will be subject to compulsory licensing, they may be less willing to allocate resources toward new discoveries. This is especially concerning in sectors such as biotechnology and software, where robust IP protections are often necessary to recoup investment costs.

To strike a balance, policymakers must design compulsory licensing policies that provide safeguards for innovation. This could involve limiting compulsory licensing to specific scenarios,

¹⁷² Paris Agreement, *United Nations Framework Convention on Climate Change* (2015).

¹⁷³ U. Racherla, "Historical Evolution of India's Patent Regime and Its Impact on Innovation in the Indian Pharmaceutical Industry" (2019) *Innovation, Economic Development, and Intellectual Property in India and China* at p 271.

¹⁷⁴ Felicien Uwayezu, *Compulsory Licensing and Protection of Patents: A Cross-Country Comparative Analysis* (LLM Thesis, Kigali Independent University, 2024), online: <http://hdl.handle.net/123456789/836>.

ensuring fair compensation for patent holders, and fostering public-private partnerships that encourage continued investment in research.

4.4 Economic and Social Impacts

The use of compulsory licensing in the context of ESTs raises complex considerations that span both economic and social dimensions. As the urgency to combat climate change intensifies, compulsory licensing is increasingly viewed not only as a legal tool but also as a potentially transformative mechanism to promote equitable access to green technologies. However, its implementation remains contentious, particularly regarding its broader impact on innovation, investment flows, and international trade relations.

Developing countries argue that without access to critical technologies, they are placed at a disadvantage in achieving sustainable development goals.¹⁷⁵ They maintain that compulsory licensing can help bridge the technology gap and facilitate more inclusive participation in the global green economy. On the other hand, many developed nations and patent-owning corporations are concerned that such measures could undermine the value of IP rights, discouraging future innovation and possibly prompting restrictive commercial practices.¹⁷⁶

Compulsory licensing, therefore, sits at the intersection of competing priorities: the need for rapid dissemination of technologies to address global environmental challenges, and the protection of the economic incentives that fuel private-sector innovation.

4.4.1 Economic Impacts

¹⁷⁵ Felicien Uwayezu, *Compulsory Licensing and Protection of Patents: A Cross-Country Comparative Analysis* (LLM Thesis, Kigali Independent University, 2024), online: <http://hdl.handle.net/123456789/836>.

¹⁷⁶ Ibid.

Compulsory licensing, particularly when applied to ESTs, has the potential to reshape existing economic structures in significant ways. Its impact can be observed across several dimensions, including market dynamics and competitive behaviour, technology transfer, and innovation pathways. While the immediate goal is often to enhance accessibility and affordability, the ripple effects of these interventions may be far-reaching, influencing long-term investment decisions, industrial growth, and even international trade patterns.

a. Market Dynamics and Competition

The implementation of compulsory licensing for ESTs could alter market dynamics by introducing more players into the field, thereby increasing competition. This increased competition may lead to lower prices for green technologies, making them more accessible to a broader audience.¹⁷⁷ For example, in the pharmaceutical industry, compulsory licensing has been used to produce generic versions of patented drugs, resulting in more affordable medications.¹⁷⁸ A similar approach in the green technology sector could make sustainable solutions more economically viable for developing countries.

Conversely, patent holders might respond by tightening control over their technologies or increasing prices to offset potential losses, which could limit the intended benefits of compulsory licensing.¹⁷⁹ Therefore, careful consideration of the terms and conditions of such licenses is essential to foster a competitive yet fair market environment.

¹⁷⁷ E. Urias & S.V. Ramani, "Access to Medicines After TRIPS: Is Compulsory Licensing an Effective Mechanism to Lower Drug Prices? A Review of the Existing Evidence" (2020) 4 *Journal of International Business Policy* at p 367.

¹⁷⁸ Ibid.

¹⁷⁹ A. Qureshi, "United States Special 301—A Deeply Flawed Tool for IPR Regulation?" (2021) 3 *Journal of World Trade* at p 55.; D. Harris, "TRIPS after Fifteen Years: Success or Failure, as Measured by Compulsory Licensing" (2010) 18 *Journal of Intellectual Property Law* at p 367.; J. Feldman, "Compulsory Licenses: The Dangers Behind the Current Practice" (2009) 8 *Journal of International Business & Law* at p 137.

b. Technology Transfer and Innovation

Introducing sustainability and climate change as grounds for compulsory licensing could enhance the transfer of Environmentally Sound Technologies to developing countries. This mechanism would enable these nations to access critical technologies necessary for mitigating and adapting to climate change, fostering local innovation and capacity building. For instance, the deployment of renewable energy technologies, such as solar panels and wind turbines, could be accelerated, reducing reliance on fossil fuels and promoting sustainable economic growth.

However, there are concerns that compulsory licensing might deter investment in green technology research and development (R&D).¹⁸⁰ Patent holders may perceive an increased risk of unauthorized use of their innovations, potentially leading to reduced incentives for developing new technologies. Balancing the need for technology dissemination with the protection of intellectual property is crucial to ensure sustained innovation. Governments and international bodies must devise mechanisms to ensure that compulsory licensing does not disincentivize innovation while still promoting sustainability.

4.4.2 Social Impacts

Compulsory licensing of ESTs carries not only economic implications but also significant social potential. By easing access to crucial green technologies, it can support efforts to reduce inequality, improve public health, and foster inclusive development. In many developing countries, such access is essential to bridge gaps in infrastructure and basic services. However, the benefits of

¹⁸⁰ D. Harris, "TRIPS after Fifteen Years: Success or Failure, as Measured by Compulsory Licensing" (2010) 18 *Journal of Intellectual Property Law* at p 367.; J. Feldman, "Compulsory Licenses: The Dangers Behind the Current Practice" (2009) 8 *Journal of International Business & Law* at p 137.

compulsory licensing depend on each country's capacity to adopt and scale these technologies effectively, making careful implementation vital to achieving lasting social impact.

a. Environmental Benefits and Public Health

Access to ESTs through compulsory licensing can lead to significant environmental benefits, such as reduced greenhouse gas emissions and improved air quality. These environmental improvements have direct positive effects on public health, including decreased respiratory illnesses and other pollution-related health issues.¹⁸¹ For example, the adoption of clean cooking technologies can reduce indoor air pollution, which is a major health hazard in many developing countries.

A country like India, for example, has a history of utilizing compulsory licensing to address public health needs, notably issuing a license in 2012 for a generic version of a patented cancer drug, making it more affordable for patients.¹⁸² This precedent indicates that, with appropriate legal frameworks, compulsory licensing can be an effective tool for enhancing access to essential technologies. It is, however, worthy noting that, unlike many developing countries, India has an army of engineers and still churns out about a million engineering graduates annually¹⁸³, indicating that the country does not have the issue of lack of engineering capacity.

b. Social Equity and Development

¹⁸¹ C. Silveira et al, "Assessment of Health Benefits Related to Air Quality Improvement Strategies in Urban Areas: An Impact Pathway Approach" (2016) 183 *Journal of Environmental Management* at p 694.

¹⁸² Ibid.

¹⁸³ A. Thakur, "Modi Govt's HEC Can't Just Be UGC with New Label. Engineering Still Needs Its Own Regulator" *ThePrint* (3 February 2021), online: <https://theprint.in/opinion/modi-govts-hec-cant-just-be-ugc-with-new-label-engineering-still-needs-its-own-regulator/597847/> (retrieved 21 February 2025).

Facilitating access to green technologies can promote social equity by enabling marginalized communities to benefit from sustainable development. For instance, rural electrification through renewable energy can provide communities with access to education, healthcare, and economic opportunities, thereby improving overall quality of life. Moreover, empowering local industries to produce and adapt these technologies can create jobs and stimulate economic development.

Many countries in Sub-Saharan Africa face significant energy deficits, hindering economic and social development.¹⁸⁴ Compulsory licensing of renewable energy technologies could allow local companies to produce affordable solutions tailored to regional needs. For example, manufacturing solar panels locally could reduce costs and increase accessibility, promoting energy independence and sustainability.

4.5 Potential Benefits

Compulsory licensing of ESTs offers a powerful tool for addressing the global climate crisis. While its use in the pharmaceutical sector has attracted significant attention, applying it to green technologies presents wide-ranging advantages. From accelerating the global transition to low-carbon economies to improving public health and promoting inclusive development, compulsory licensing could remove some of the key barriers that prevent equitable access to patented sustainability solutions. It is particularly relevant for developing countries, which often lack the financial and technological capacity to acquire patented green technologies but are most vulnerable to the adverse impacts of climate change. By bridging this access gap, compulsory licensing may

¹⁸⁴ A.A. Alola, I. Ozturk & F.V. Bekun, "Is Clean Energy Prosperity and Technological Innovation Rapidly Mitigating Sustainable Energy-Development Deficit in Selected Sub-Saharan Africa? A Myth or Reality" (2021) 158 *Energy Policy* 112520.; N. Avila et al, "The Energy Challenge in Sub-Saharan Africa: A Guide for Advocates and Policy Makers" (2017) 1 *Generating Energy for Sustainable and Equitable Development* 1.

become a strategic instrument not only for environmental protection but also for social and economic transformation.

4.5.1 Advancing Global Climate Goals

The Paris Agreement of 2015 established ambitious global objectives to curb greenhouse gas emissions and keep the global temperature rise below 2°C. However, meeting these targets hinges on the widespread adoption of green technologies, many of which are patent-protected. Recognizing sustainability and climate change as valid grounds for compulsory licensing could facilitate the broader distribution of these technologies, supporting a faster transition to low-carbon economies.

Many developing nations face financial and technological barriers to accessing advanced renewable energy and emissions-reduction solutions. Compulsory licensing could help bridge this gap by making critical technologies more affordable, allowing countries to implement large-scale climate mitigation measures such as expanding renewable energy, enhancing energy efficiency, and deploying carbon capture and storage systems. These initiatives play a crucial role in meeting international climate commitments.

4.5.2 Promoting equitable access to green technologies.

The steep cost of patented green technologies often hinders lower-income nations from implementing sustainable solutions. Recognizing climate change as a valid reason for compulsory licensing would allow governments to make essential technologies such as solar panels, wind turbines, and energy-efficient equipment more affordable.

Ensuring fair access to these technologies can help narrow the development gap between high- and low-income countries. Many developing nations bear the brunt of climate change despite having minimal contributions to global emissions. Making adaptation and mitigation technologies more accessible would support these countries in strengthening climate-resilient infrastructure and safeguarding vulnerable communities.

4.5.3 Encouraging Innovation and Local Technological Growth

Allowing compulsory licensing for sustainability-related technologies can drive domestic innovation by enabling local industries to refine and enhance existing green solutions. When local manufacturers are permitted to produce patented technologies under license, they gain valuable expertise, fostering the growth of climate-friendly innovations.

For example, companies in developing nations could modify imported green technologies to better align with local environmental conditions, resulting in more efficient and cost-effective solutions tailored to their specific needs. This adaptation process supports the long-term development of homegrown green industries.

4.5.4 Driving Economic Growth and Employment

Expanding green technology sectors through compulsory licensing can stimulate economic growth by generating employment opportunities in renewable energy, energy efficiency, and environmental management. When developing countries gain greater access to sustainability-focused patents, they can manufacture and distribute green technologies locally, reducing their reliance on imports.

Investments in green technology industries can create jobs across various sectors, including research and development, engineering, production, installation, and maintenance. Additionally,

as more countries adopt sustainability-driven compulsory licensing, the global demand for green technology components and expertise will increase, fostering a more competitive and dynamic economy.

4.5.5 Advancing Public Health and Environmental Protection

The widespread adoption of patented green technologies can significantly lower pollution levels, leading to better air and water quality and overall public health improvements. Compulsory licensing can fast-track the deployment of cleaner energy solutions, sustainable farming methods, and water purification systems, mitigating the harmful effects of pollution and environmental degradation.

For instance, greater access to clean cooking technologies can help reduce indoor air pollution, a major contributor to respiratory illnesses in developing nations. Likewise, making water purification technologies more affordable can provide communities with cleaner drinking water, reducing waterborne diseases and improving sanitation.

4.5.6 Addressing Economic Inequality

At present, developed countries dominate green technology patents, limiting access for less wealthy nations. Allowing compulsory licensing for sustainability-related innovations can help reduce economic disparities by making green technologies more widely available.

This approach can create a more level playing field, ensuring that all nations, regardless of financial capacity, can participate in the shift toward sustainable economic models. Lower-income countries would have a better chance of developing climate-resilient infrastructure and adopting eco-friendly industrial practices without facing steep patent costs.

4.5.7 Strengthening Global Collaboration

Compulsory licensing for green technologies has the potential to enhance international cooperation by aligning trade policies with shared sustainability goals. Countries that implement such policies can collaborate to exchange knowledge, resources, and best practices for green technology adoption.

Additionally, fostering partnerships between governments, research institutions, and private sector stakeholders can drive joint innovation and distribution efforts. A cooperative approach to technology sharing would be far more effective in addressing the climate crisis than isolated national strategies.

4.5.8. Enhancing Energy Independence

Ensuring access to renewable energy technologies through compulsory licensing can reduce reliance on imported fossil fuels, improving national energy security. Many nations, particularly in Africa and Asia, depend heavily on oil and gas imports, making them vulnerable to price fluctuations and supply disruptions.

By promoting local production of renewable energy technologies, compulsory licensing can help countries achieve greater energy self-sufficiency, ensuring a stable and sustainable energy supply. This transition would contribute to long-term economic resilience and reduce exposure to global energy crises.

4.5.9. Protecting Biodiversity and Natural Ecosystems

Sustainable technologies play a crucial role in conserving biodiversity and protecting natural ecosystems. Compulsory licensing can enable broader adoption of eco-friendly agricultural and

conservation methods, helping to curb deforestation, soil degradation, and water pollution. For example, precision farming techniques—which optimize pesticide and fertilizer use—could become more accessible to farmers in developing regions. This would promote more sustainable agricultural practices, minimizing environmental damage while increasing productivity.

4.5.10. Strengthening Climate Adaptation in Vulnerable Nations

Many developing countries are disproportionately affected by climate change, facing severe risks such as rising sea levels, extreme weather patterns, and desertification. Access to patented adaptation technologies, including climate-resilient crops, flood management systems, and drought-resistant infrastructures, is essential for these nations.

Compulsory licensing would enable governments to implement large-scale adaptation projects without being constrained by restrictive intellectual property laws. This approach would support vulnerable communities in building resilience against climate change while safeguarding their economies and livelihoods.

4.6 Balancing Stakeholder Interests

Expanding compulsory licensing to include climate technologies is a necessary step in addressing the global climate emergency. However, this expansion must be undertaken with a balanced approach that safeguards innovation incentives while ensuring equitable access. In doing this, the interests of stakeholders such as governments of developing and developed countries, innovators, and environmental advocates must be considered.

A mutually beneficial framework that accelerates climate action without stifling technological progress can be achieved by fostering international cooperation, implementing fair compensation

structures, and encouraging voluntary knowledge-sharing. Additionally, in order to balance innovation incentives with sustainability goals, policymakers need to consider:

- Strengthening legal and institutional capacities in developing countries to facilitate effective implementation.
- Developing international guidelines under TRIPS to specify conditions for climate-related compulsory licensing.
- Encouraging public-private partnerships to support green technology dissemination.
- Enhancing cooperation between developed and developing nations to create a mutually beneficial technology-sharing framework.
- Establishing a global fund to compensate patent holders affected by compulsory licensing, ensuring continued investment in R&D while promoting equitable access.

4.7 Conclusion

Expanding compulsory licensing to include sustainability and climate change is a complex yet potentially transformative policy shift. While developed countries face economic and legal challenges, developing nations stand to benefit from improved access to vital technologies. A balanced approach, incorporating multilateral cooperation and policy innovation, is essential to ensure that intellectual property laws support rather than hinder global sustainability efforts.

Ultimately, climate change represents a global crisis that requires urgent and collaborative action. Intellectual property rights should not become a barrier to necessary technological advancements that can mitigate its effects. By incorporating sustainability into the TRIPS framework, the global community can move towards a more equitable and effective response to one of the most pressing challenges of our time.

In Conclusion, introducing sustainability and climate change as grounds for compulsory licensing under the TRIPS Agreement holds the potential to facilitate the dissemination of essential green technologies, promoting environmental sustainability and social equity. Though this approach offers significant benefits, it also presents challenges, particularly concerning innovation incentives and market dynamics.

A nuanced and balanced implementation, supported by robust legal frameworks and international cooperation, is therefore crucial to harnessing the full potential of compulsory licensing in addressing global environmental challenges. Governments, policymakers, and international institutions must work collaboratively to establish a system that ensures equitable access to green technologies while maintaining incentives for innovation. If implemented effectively, compulsory licensing could become a powerful tool in the fight against climate change, bridging the gap between technological advancement and global sustainability goals.

Having examined the theoretical and practical implications of recognizing sustainability and climate change as grounds for compulsory licensing, it is essential to explore how these concepts have been applied or resisted in real-world contexts. The next chapter presents a comparative analysis of select jurisdictions and case studies that illustrate the implementation, challenges, and outcomes of compulsory licensing. This exploration will provide deeper insights into the feasibility, limitations, and potential of such an approach across diverse legal and socio-economic landscapes.

CHAPTER 5

COMPARATIVE ANALYSIS AND CASE STUDIES

5.1 Introduction

In navigating the evolving terrain of IP rights and global challenges such as climate change, a comparative approach provides a valuable lens through which to assess the feasibility and potential modalities of compulsory licensing for sustainability-related technologies. Traditionally, compulsory licensing has been most prominently associated with the public health sector, particularly in the context of access to life-saving medicines during health crises. However, the increasing urgency of climate change, alongside growing recognition of environmental protection as a fundamental human right, necessitates a re-examination of how flexibilities within the global IP regime, particularly under the TRIPS Agreement, might be similarly employed to serve broader public interest goals.

This section adopts a comparative lens to analyze the legal frameworks governing compulsory licensing across selected jurisdictions, with particular emphasis on how these mechanisms have been applied in the context of public health. By examining past instances where governments have invoked compulsory licensing to address urgent public health needs ranging from access to HIV/AIDS treatments in Brazil and Thailand to cancer therapies in India, we can draw valuable lessons on the operationalization, legal justification, and geopolitical implications of such measures. These insights are critical as the international community considers whether and how to extend the logic of compulsory licensing beyond pharmaceuticals to encompass technologies crucial for combating climate change.

5.2 Legal Framework on Compulsory Licensing: A Comparative Overview

The Doha Declaration on the TRIPS Agreement and Public Health, adopted at the Fourth WTO Ministerial Conference in November 2001, marked a watershed moment in international intellectual property governance. This declaration clarified the relationship between the TRIPS Agreement and public health, affirming that intellectual property rules should not prevent member states from taking necessary measures to protect public health. It underscored that TRIPS "does not and should not prevent members from taking measures to protect public health" and that the Agreement "can and should be interpreted and implemented in a manner supportive of WTO members' right to protect public health and, in particular, to promote access to medicines for all."¹⁸⁵

The Declaration was a response to mounting global pressure, particularly from developing nations and civil society, to address the restrictive effects of patents on access to life-saving medicines, especially during the HIV/AIDS crisis. At the heart of the Declaration was a strong affirmation of the right of WTO members to issue compulsory licenses and to determine the grounds upon which such licenses are granted, reaffirming the flexibilities built into the TRIPS Agreement. Additionally, it recognized the challenges faced by countries with insufficient or no manufacturing capacities in making effective use of compulsory licensing and called for solutions to facilitate such access, a concern that would later culminate in the 2003 WTO General Council Decision and its 2005 formal amendment to TRIPS.¹⁸⁶

¹⁸⁵ Doha Declaration on the TRIPS Agreement and Public Health, WTO Doc WT/MIN(01)/DEC/2, 14 November 2001.

¹⁸⁶ Ibid.

The significance of the Doha Declaration lies not merely in its technical clarifications but in its political and moral framing: it set a precedent for interpreting TRIPS provisions through the lens of broader public interest concerns. This precedent has profound implications for contemporary calls to address climate change under the TRIPS regime. Much like the public health crisis that prompted the Declaration, climate change constitutes a global emergency with far-reaching effects on human health, livelihoods, and ecosystems.

A key lesson from the Doha Declaration is the effectiveness of interpretative instruments in legitimizing the use of TRIPS flexibilities. By clearly articulating member states' rights, the Declaration reduced ambiguity and empowered countries, particularly in the Global South, to act within the bounds of international law. A similar approach could be adopted in the climate context. For instance, a Ministerial Declaration or General Council Decision could explicitly state that climate change mitigation and adaptation fall within the purview of national emergencies or public interest grounds under TRIPS, thereby justifying the issuance of compulsory licenses for green technologies.

Moreover, the Declaration highlighted the importance of multilateral consensus in enhancing the credibility and enforceability of TRIPS flexibilities. Although the Declaration itself did not amend TRIPS, its interpretative authority has had a lasting influence on WTO jurisprudence and domestic policymaking. The Declaration reaffirmed that TRIPS "should be interpreted and implemented in a manner supportive of WTO members' right to protect public health." This significantly bolstered the legitimacy of flexibilities like compulsory licensing, parallel importation, and transition periods, especially for developing countries.¹⁸⁷ Translating this approach to climate-related

¹⁸⁷ Frederick M Abbott, "The Doha Declaration on the TRIPS Agreement and Public Health: Lighting a Dark Corner at the WTO" (2002) 5:2 J Int'l Econ L 469.

technologies could involve a reaffirmation through a similar interpretative mechanism of the principle that sustainable development is a legitimate objective under Article 7 of TRIPS, which outlines the goals of the IP system.¹⁸⁸

Despite its importance, the Doha Declaration's implementation has not been without challenges; procedural complexities, political pressure from patent-holding states, and limited manufacturing capacities have constrained the full utilization of compulsory licensing. These barriers provide a cautionary note for any future effort to extend similar flexibilities to climate technologies. Thus, any reform initiative must also consider complementary strategies such as technology transfer, capacity-building, and financing mechanisms.

To further illustrate how such flexibilities might be operationalized in practice, it is instructive to examine the regional approaches adopted by jurisdictions such as the European Union. The European Union operates within a multi-layered legal framework that accommodates both EU-level regulations and member state-level patent laws. Although the EU itself does not issue compulsory licenses, it has adopted mechanisms to support member states in doing so, particularly for public health emergencies. One notable instrument is Regulation (EC) No 816/2006, which implements the WTO General Council's 2003 Decision on the Paragraph 6 system, allowing the production and export of patented pharmaceuticals to countries with insufficient manufacturing capacity in the face of public health crises. This regulation offers a procedural model for compulsory licensing aimed at humanitarian goals, but its use has been minimal, suggesting practical and bureaucratic constraints that limit its effectiveness.¹⁸⁹

¹⁸⁸ World Trade Organization, *Australia — Certain Measures Concerning Trademarks, Geographical Indications and Other Plain Packaging Requirements Applicable to Tobacco Products and Packaging*, WTO Doc WT/DS435/R (28 June 2018).

¹⁸⁹ Council Regulation (EC) No 816/2006 of 17 May 2006 on compulsory licensing of patents relating to the manufacture of pharmaceutical products for export to countries with public health problems, [2006] OJ L 157/1.

At the national level, several EU countries provide more flexible and responsive frameworks. For instance, Germany's Patent Act (Section 13) permits the grant of compulsory licenses in the public interest, and courts have applied this provision in select cases, such as the *Merck v. Shionogi* decision involving HIV treatments.¹⁹⁰ Similarly, France's Intellectual Property Code (Article L613-16) enables compulsory licensing on grounds of public interest, including health, nutrition, and national defence. However, there is limited precedent for the use of these provisions in environmental contexts. Nonetheless, the EU legal culture reflects an openness to balancing IP rights with public needs, offering a foundation from which climate-related justifications for compulsory licenses could potentially evolve.¹⁹¹

In contrast to the EU, the United States maintains a more rigid approach to compulsory licensing, lacking an explicit statutory mechanism for general public interest licensing. The most notable U.S. provision is found under the Bayh-Dole Act, which grants the federal government "march-in rights" over federally funded inventions if the patent holder fails to make the product available to the public on reasonable terms.¹⁹² However, despite numerous petitions, U.S. federal agencies have never exercised these rights, including in high-profile cases such as AbbVie's Humira and Xtandi for prostate cancer, raising concerns about the political and institutional reluctance to challenge private patent rights even when public interest is implicated.¹⁹³

The U.S. framework exemplifies the tension between strong IP protection and access-oriented flexibilities. While it provides theoretical grounds for government intervention, in practice, the barriers to applying such measures are substantial. Moreover, given the influence of the

¹⁹⁰ German Federal Patent Court, *Merck & Co. Inc. v. Shionogi & Co. Ltd.*, Case 3 LiQ 1/16 (2016)

¹⁹¹ *Code de la propriété intellectuelle* [Intellectual Property Code], art L613-16 (France).

¹⁹² 35 U.S.C. §203 (Bayh-Dole Act, 1980).

¹⁹³ A. Kapeczynski, "The Cost of Price: Why and How the U.S. Government Should Use Compulsory Licensing to Lower Drug Costs," (2018) 1 *Yale Journal of Law and Technology* 1 at 5

pharmaceutical and technology sectors in shaping IP policy, the likelihood of expanding these tools to cover sustainability or climate technologies appears limited without significant legal and political reform.¹⁹⁴

India represents one of the most significant examples of a robust compulsory licensing framework with active judicial and administrative enforcement. Section 84 of the Indian Patents Act, 1970, allows any person to apply for a compulsory license three years after the grant of a patent on the grounds that the reasonable requirements of the public have not been satisfied, the invention is not available at an affordable price, or it is not worked in the territory of India.¹⁹⁵ The *Natco v. Bayer* case marked a historic precedent, as the Indian Patent Office granted the first-ever compulsory license for the cancer drug Nexavar (sorafenib), citing high cost and insufficient local supply.¹⁹⁶

This case demonstrated India's willingness to prioritize public health over patent rights, and it underscored the practical utility of a clear and enforceable framework. Importantly, India's approach links compulsory licensing to broader developmental objectives, and scholars have suggested that such a framework could be extended to technologies critical for environmental sustainability and climate resilience.¹⁹⁷ The Indian model highlights the value of transparency, administrative independence, and objective criteria in assessing public need, elements that are crucial for the future application of compulsory licensing in the environmental domain.¹⁹⁸

¹⁹⁴ Srividhya Ragavan & Jamie Mayer O'Shay, "Has India Taken the 'TRIPS-Plus' Path in Patent Protection?" (2007) 10:2 *Journal of World Intellectual Property* 110 at 117–121 (discussing the political economy of IP lawmaking in the U.S. and its international influence).

¹⁹⁵ Indian Patents Act, 1970, No. 39 of 1970, s. 84.

¹⁹⁶ *Natco Pharma Ltd. v. Bayer Corp.*, Compulsory Licence Application No. 1 of 2011, Indian Patent Office Decision (2012).

¹⁹⁷ S. Basheer & F. A. Khader, "Policy Style Reasoning Under Indian Patent Law: The Return of the Commons?" (2013) 5(2) *Indian Journal of Law and Technology* 1.

¹⁹⁸ Shamnad Basheer & Prashant Reddy, "The 'Efficacy' of Indian Patent Law: Ironing Out the Creases in Section 3(d)" (2012) 5:2 *The Oxford University Commonwealth Law Journal* 197 at 212–215.

Brazil has similarly developed a proactive approach to compulsory licensing, grounded in Article 71 of the Brazilian Industrial Property Law (No. 9.279/96). This provision allows the government to issue compulsory licenses in cases of national emergency or public interest. During the early 2000s, Brazil used this mechanism to secure access to antiretroviral (ARV) medications for HIV/AIDS patients, notably issuing a compulsory license for Efavirenz in 2007 after negotiations with Merck failed.¹⁹⁹

The Brazilian experience is significant for two reasons. First, it illustrates how executive-led decisions can swiftly address public health emergencies through legal channels. Second, it shows how compulsory licensing can be used strategically in pricing negotiations, even where the license is ultimately not executed. The flexibility inherent in Brazil's system has led some commentators to propose its expansion to green technologies, particularly in addressing local environmental crises like deforestation and water scarcity.²⁰⁰ Brazil's case provides a template for aligning IP policy with sustainable development priorities while navigating the challenges of international trade pressures and pharmaceutical lobbying.

Brazil's success in leveraging compulsory licenses for HIV medication was in part due to its relatively advanced pharmaceutical manufacturing sector. This underscores an important dynamic: the availability of domestic production capacity often determines whether a compulsory license yields tangible benefits. This insight is directly relevant for green technology, where the technological complexity is even greater, and fewer developing countries possess comparable infrastructure.

¹⁹⁹ Brazilian Ministry of Health, "Decreto nº 6.108, de 4 de maio de 2007," *Diário Oficial da União*, 7 May 2007.

²⁰⁰ P. Roffe, "Compulsory Licensing: Models for State Practice in Developing Countries, and How to Adapt Them to Climate Change," ICTSD Policy Brief No. 17, International Centre for Trade and Sustainable Development (2012)

Thailand stands out as one of the few developing countries to have issued a series of compulsory licenses for both HIV/AIDS and cardiovascular medications between 2006 and 2008. Acting under Section 51 of its Patent Act (1979, amended 1999), the Thai government issued compulsory licenses for drugs including Efavirenz, Kaletra, and Plavix, citing the need to protect public health and control drug costs.²⁰¹ Despite facing considerable backlash from patent holders and some developed countries, Thailand's actions were ultimately upheld under international law, particularly TRIPS Article 31. Thailand's Patent Act permits government use without prior negotiation under certain conditions. If adapted to climate change, this legal flexibility could be powerful. For example, the Thai government could conceivably issue a compulsory license for clean water filtration technology during a drought. Yet, the political calculus would differ significantly. Whereas health issues are viewed as humanitarian and politically uncontroversial, environmental IP cases risk antagonizing trade partners and corporate investors, especially in sectors like renewable energy or agritech.²⁰²

The Thai case demonstrates that political will, combined with a strong legal basis and public support, can effectively operationalize compulsory licensing in ways that address critical societal needs. Although Thailand's framework has not been applied to environmental technologies, the logic underpinning its public health licensing could be adapted to climate-related issues particularly where public welfare, equity, and access to technology are at stake. It also reinforces

²⁰¹ Ministry of Public Health and National Health Security Office (Thailand), "The Ten Burning Questions on the Government Use of Patents on the Four Anti-cancer Drugs in Thailand" (2008) at 6.

²⁰² Cynthia M. Ho, "Government Use of Patents: A Global Perspective" (2014) 35:2 *Cardozo Law Review* 353 at 390–393

the importance of domestic legal empowerment and resilience in the face of external diplomatic and economic pressures.²⁰³

Canada's 2004 legislation under the *Jean Chrétien Pledge to Africa Act* (later Part C of the Canadian Patent Act) was the first domestic implementation of the WTO Paragraph 6 Decision, allowing exports of patented medicines to countries lacking manufacturing capacity. In 2007, Apotex used this framework to export a generic fixed-dose combination HIV/AIDS drug to Rwanda.²⁰⁴ Despite its success, the process was marred by bureaucratic complexity and long delays. Apotex itself publicly stated it would not use the system again unless the procedural burdens were significantly reduced.²⁰⁵ The case demonstrates that even well-intentioned frameworks can be rendered ineffective by administrative hurdles, a critical lesson for any future compulsory licensing mechanism targeting climate adaptation technologies. Any global framework for environmental compulsory licensing must be streamlined and accessible to be of practical use.²⁰⁶

Canada's Access to Medicines Regime (CAMR),²⁰⁷ established in 2004, was designed to facilitate the export of affordable generic medicines to countries lacking manufacturing capacity. While the regime was a pioneering effort to operationalize the WTO's Paragraph 6 Decision, its practical impact has been limited, with only one instance of its use reported. Critics have pointed to procedural complexities and bureaucratic hurdles as barriers to its effectiveness, suggesting the

²⁰³ Ellen 't Hoen, "Thailand's Experience with Compulsory Licensing of Medicines" (2009) 23:3 *Syracuse Journal of International Law and Commerce* 349 at 351–356

²⁰⁴ Parliament of Canada, *An Act to amend the Patent Act and the Food and Drugs Act (The Jean Chrétien Pledge to Africa Act)*, SC 2004, c 23

²⁰⁵ Apotex Inc., "Apotex statement on Canada's Access to Medicines Regime" (2008), online: https://www.apotex.com/global/about/press/2008_12_01.asp. Apotex Inc., "Apotex statement on Canada's Access to Medicines Regime" (2008), online: https://www.apotex.com/global/about/press/2008_12_01.asp.

²⁰⁶ *ibid*

²⁰⁷ Canada's Access to Medicines Regime (CAMR), SOR/2005-143, enacted under the Patent Act, RSC 1985, c P-4

need for reforms to enhance its utility in addressing global health challenges.²⁰⁸ This highlights a key caution for climate-focused compulsory licensing: overly technical regimes discourage use. If Canada were to establish a similar mechanism for green technology exports, say, to enable solar microgrid deployment in sub-Saharan Africa, it would need to radically simplify licensing procedures to avoid repeating the inefficacies of CAMR.

The Intellectual Property Code of the Philippines (RA 8293) permits the government to use or authorize the use of patented inventions in the interest of national security, health, or development.²⁰⁹ In 2009, the Philippines issued a government-use license to allow local production and importation of generic Tamiflu (oseltamivir) during the H1N1 influenza pandemic. This action did not result in litigation but showcased a practical use of government-use clauses in national law to respond to emergencies. As climate change increasingly becomes a security issue, the Philippines' example can inform efforts to invoke similar powers for green infrastructure, climate-resilient agriculture, or disaster response technologies.²¹⁰

South Africa's experience with compulsory licensing is emblematic of the challenges faced by countries attempting to balance public health imperatives with international intellectual property obligations. In the late 1990s, amidst a burgeoning HIV/AIDS crisis, the South African government enacted legislation permitting parallel importation and compulsory licensing of essential medicines to improve access and affordability. This move was met with significant opposition from multinational pharmaceutical companies and the United States government, which argued that such measures violated the TRIPS Agreement. The ensuing legal battle, highlighted by

²⁰⁸ A. Attaran, "How Do Patents and Economic Policies Affect Access to Essential Medicines in Developing Countries?" (2004) 23:3 Health Affairs 155 at 158.

²⁰⁹ Republic Act No. 8293, "Intellectual Property Code of the Philippines" (as amended), s 93 and s 95.

²¹⁰ Government of the Philippines, *Philippines Issues Government Use License for Generic Tamiflu* (14 July 2009)

the case brought by the Pharmaceutical Manufacturers Association against the South African government²¹¹, drew international attention and criticism. Eventually, under global pressure and advocacy, the lawsuit was withdrawn, marking a pivotal moment in the discourse on public health and patent rights.²¹²

South Africa's legal showdown in the early 2000s offers perhaps the most poignant lesson. Its resistance to multinational pharmaceutical companies over HIV drug access created a global moral turning point. However, even with international support, South Africa faced enormous political pressure. Translating that approach to climate tech would mean confronting not just pharmaceutical companies, but a wider range of industries from energy to agriculture to software.²¹³

In 2017, Malaysia took a significant step by issuing a government-use compulsory license for the hepatitis C drug sofosbuvir. This decision was made after unsuccessful negotiations with the patent holder, aiming to make the treatment more affordable for the Malaysian population. The move was lauded by health advocates and set a precedent for other countries grappling with similar public health challenges. Malaysia's action underscores the importance of utilizing TRIPS flexibilities to address national health emergencies effectively.²¹⁴

In the case of climate technologies, especially those dependent on complex ecosystems (e.g., lithium battery systems, smart grids), the solution isn't as simple as substituting one product for

²¹¹ Pharmaceutical Manufacturers Association of South Africa and Others v President of the Republic of South Africa and Others, Case No. 4183/98 (High Court of South Africa, 2001)

²¹² J. Berger, "Advancing Public Health by Other Means: Using Competition Policy" (2008) 5:1 Indian Journal of Law and Technology 25 at 38.

²¹³ *Pharmaceutical Manufacturers Association of South Africa v. The President of the Republic of South Africa*, [2001] 2 All SA 674 (CC) (South Africa)

²¹⁴ Ellen 't Hoen, "Private Patents and Public Health: Changing Intellectual Property Rules for Access to Medicines" (Health Action International, 2016) at 56.

another. The breadth of patents and proprietary knowledge involved often goes far beyond one drug molecule or manufacturing formula.²¹⁵

The 2024 compulsory license for the HIV drug dolutegravir is notable for its timing, as it came after a long period of political reluctance and lobbying resistance. This suggests that even where legal mechanisms exist, political will can take decades to mature. Climate change, being politically polarizing, faces an even longer timeline unless reframed as a development emergency. Unlike health crises, which often trigger immediate moral and media responses, climate-related IP issues struggle to gain the same traction unless framed within a national emergency (e.g., catastrophic floods or fires).²¹⁶

This highlights the crucial role of narrative framing and political prioritization in the deployment of TRIPS flexibilities. As seen with public health, the activation of compulsory licensing often hinges not only on legal feasibility but also on the presence of acute, widely recognized crises that galvanize both domestic and international support. To better understand how these factors interact in practice and how they might be adapted for climate-related technologies it is useful to examine specific case studies where IP flexibilities, political will, and external pressures have intersected in meaningful ways.

²¹⁵ Tim Vines, “Intellectual Property in the Age of Climate Change: Patent Systems and Technology Transfer for Green Innovation” (2018) 21:2 *Journal of Environmental Law & Technology* 92 at 98

²¹⁶ *Compulsory License for Dolutegravir*, National Regulatory Authority (2024)

5.3 Case Studies

5.3.1 Natco Pharma Ltd. v. Bayer Corporation²¹⁷

In 2012, India witnessed a landmark legal development when the Controller of Patents granted the country's first compulsory license in *Natco Pharma Ltd. v. Bayer Corporation*.²¹⁸ The case involved Natco Pharma, a domestic generic manufacturer, which sought a license to produce a cheaper version of Nexavar, a life-saving cancer drug patented by Bayer. Natco argued that Bayer's pricing of approximately INR 280,000 (USD 5,500) per month placed the medicine well beyond the reach of most Indian patients. Additionally, the drug was not being sufficiently "worked" in India, meaning that it was neither manufactured locally nor made adequately available to those in need.

Relying on Section 84 of the Indian Patents Act, 1970, the Indian Patent Office accepted Natco's arguments and granted the compulsory license, allowing it to sell the generic version at a fraction of the original cost (approximately INR 8,800 per month). Bayer was entitled to a 6% royalty on sales. The decision was widely hailed as a significant assertion of public interest over patent exclusivity and reinforced India's commitment to utilizing TRIPS flexibilities to address national socio-economic challenges. Although this case was rooted in health concerns, the principles underlying the decision, particularly the emphasis on affordability, local need, and underutilization, can be analogously applied to essential green technologies in the climate context.

²¹⁷ *Natco Pharma Ltd. v. Bayer Corporation*, Controller of Patents, Mumbai, Compulsory Licence Application No. 1 of 2011 (2012) (India)

²¹⁸ *Natco Pharma Ltd. v. Bayer Corporation*, Compulsory License Application No. 1 of 2011, Controller of Patents (India, 2012).

5.3.2 M.C. Mehta v. Union of India (1987)

Although not a patent case, *M.C. Mehta v. Union of India*²¹⁹ is an environmental law milestone in Indian jurisprudence and serves to ground compulsory licensing arguments in constitutional principles. The petitioner, public interest lawyer M.C. Mehta, filed a suit against tannery industries along the Ganges River for causing severe environmental pollution. The Supreme Court of India not only ruled in favour of the petitioner but also held that the right to a clean environment is integral to the fundamental right to life under Article 21 of the Constitution. The Court directed the closure or relocation of offending industries and emphasized the state's duty under Article 48A to protect and improve the environment.

This case established a strong judicial precedent for environmental protection as a constitutional obligation in India. Its relevance to the discussion on compulsory licensing lies in its articulation of environmental well-being as a matter of public interest and human rights grounds that could justify the non-voluntary licensing of environmentally sound technologies (ESTs) essential for climate mitigation or adaptation.

5.3.3 Pharmaceutical Manufacturers' Association of South Africa v. President of the Republic of South Africa (1998–2001)

A landmark moment in global health governance emerged in South Africa in the late 1990s when the Pharmaceutical Manufacturers' Association (PMA), along with over 40 multinational pharmaceutical companies, challenged the South African government's efforts to enhance access to affordable medicines during the HIV/AIDS epidemic.²²⁰ The government had enacted the

²¹⁹ *M.C. Mehta v. Union of India*, AIR 1987 SC 965

²²⁰ *Pharmaceutical Manufacturers' Association of South Africa and Others v. President of the Republic of South Africa and Others*, Case No. 4183/98 (High Court of South Africa, Transvaal Provincial Division), withdrawn 2001.

Medicines and Related Substances Control Amendment Act, 1997, which included provisions to bypass patent barriers in order to import or manufacture cheaper generic versions of life-saving drugs.²²¹

The pharmaceutical companies claimed that the law violated their intellectual property rights under TRIPS and initiated legal proceedings in the High Court. However, the litigation sparked international outrage and drew heavy criticism from civil society, international organizations, and even governments, particularly given the scale of the AIDS crisis in South Africa. Under mounting pressure, the PMA ultimately withdrew the case in 2001, marking a significant victory for public health and affirming the right of countries to prioritize access over patent monopolies in health emergencies.

While the case was never adjudicated on its merits, its symbolic power is profound. It demonstrated that governments could assert sovereignty over Intellectual Property law in the face of life-threatening public challenges, setting the tone for future use of TRIPS flexibilities. The lessons from this case are transferable to the environmental context, where climate change poses similarly existential threats, particularly to developing nations.

5.3.4 United States – eBay Inc. v. MercExchange, L.L.C. (2006)

In *eBay Inc. v. MercExchange, L.L.C.*, the U.S. Supreme Court considered whether a patent holder is automatically entitled to an injunction against a party found to have infringed a patent.²²² The Court ruled that the decision to grant an injunction rests on traditional equitable principles and is not automatic. This decision is critical for compulsory licensing discussions because it limits the

²²¹ *Pharmaceutical Manufacturers Association of South Africa v. The President of the Republic of South Africa*, [2001] 2 All SA 674 (CC)

²²² *eBay Inc. v. MercExchange, L.L.C.*, 547 US 388 (2006)

power of patent holders to enforce exclusive rights, especially where public interest considerations are at play. While the case did not involve compulsory licensing per se, it has been cited in support of government use or court-mandated access to patented inventions, potentially including green technologies in climate emergencies.²²³

5.3.5 Bangladesh – Beximco Pharmaceuticals (2006)

Bangladesh, as a least-developed country (LDC), is exempt from TRIPS obligations to enforce patents on pharmaceutical products until at least 2034. In 2006, Beximco Pharmaceuticals began producing generic versions of patented HIV/AIDS drugs, including those patented by major Western companies, without legal challenge.²²⁴

Although this situation did not involve a compulsory license in the formal sense, it serves as a real-world example of state-supported access to essential technologies. It underscores how public health and development goals can override strict patent enforcement even more so when international legal frameworks explicitly allow such flexibilities.

By analogy, a climate-vulnerable LDC could use similar legal space to manufacture or import patented low-carbon or climate adaptation technologies, especially where no viable alternatives exist.

5.3.6 Germany – The BGH’s “Polyferon” Decision (1994)

In an important German Federal Supreme Court case known as the “Polyferon” decision, the court ruled that a compulsory license could be granted in favour of a party who was using a patented

²²³ *eBay Inc. v. MercExchange, L.L.C.*, 547 U.S. 388 (2006) (U.S.)

²²⁴ C. M. Correa, *Trade Related Aspects of Intellectual Property Rights: A Commentary on the TRIPS Agreement*, 2nd ed (Oxford: Oxford University Press, 2020) at 310.

invention to produce a product that was indispensable for the treatment of a serious disease and whose absence would result in public harm.²²⁵ The case concerned a drug (Polyferon) whose supply had been suspended by the patent holder. The court ruled that protecting the public interest and health outweighed the exclusive rights of the patentee, granting a compulsory license.

Although framed in the health context, the reasoning has broader implications: where a technology is essential for addressing serious public needs, courts may justify overriding patent rights. The logic of indispensability could similarly apply to critical green technologies in energy, agriculture, or disaster resilience.

The case studies underscore the complex interplay between legal frameworks, political momentum, and socio-economic context in enabling the effective use of IP flexibilities. They reveal that while compulsory licensing and related mechanisms can serve as powerful tools for public interest objectives, their success is often contingent on timely institutional action, international cooperation, and the strategic framing of the issue at hand. These insights are especially relevant when considering the urgent need to improve access to climate technologies in developing countries.

As the global climate crisis intensifies, ensuring equitable access to mitigation and adaptation technologies becomes not only a matter of environmental justice but also of development equity. The next section explores the specific barriers faced by developing nations especially with regards to manufacturing capacity of the developing countries.

²²⁵ German Federal Supreme Court (Bundesgerichtshof), Case No. X ZB 5/92, “Polyferon” (1994), reported in IIC (1995) 26(2) at 221.

5.4 Access to Climate Technologies in Developing Countries

Climate change presents a pressing global challenge, yet the capacity to respond is not evenly distributed. While developing countries face some of the most severe climate impacts, they often lack access to the technologies needed to transition to low-carbon development.

India's National Solar Mission, launched in 2010, aimed to establish India as a global leader in solar power. A key component of the policy was the inclusion of domestic content requirements (DCRs) mandating that certain solar projects use locally manufactured solar panels. This effort sought to bolster domestic manufacturing and reduce reliance on foreign technologies, many of which are patent-protected.²²⁶

However, the United States challenged the policy at the World Trade Organization (WTO), arguing that it violated the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) and GATT 1994 rules. The WTO Dispute Settlement Body ruled against India, asserting that the DCRs unfairly discriminated against foreign suppliers and did not qualify for exceptions related to environmental protection or public policy objectives²²⁷. This case illustrates how international trade and IP obligations can constrain national climate strategies and limit the ability of countries to build domestic clean energy industries.

In contrast, Brazil's experience with ethanol production showcases a relatively successful case of domestic innovation and technology diffusion. The Proálcool program, initiated in the 1970s, evolved into one of the world's largest biofuel industries. Key institutions, including Petrobras and EMBRAPA, developed and patented technologies related to sugarcane-based ethanol production.

²²⁶ *National Solar Mission*, Ministry of New and Renewable Energy, Government of India (2010)

²²⁷ India—Certain Measures Relating to Solar Cells and Solar Modules, WT/DS456/R, 24 February 2016

These were often made available through open or affordable licensing arrangements, facilitating widespread domestic adoption.²²⁸

Through sustained public investment, strategic use of Intellectual Property, and emphasis on public-private cooperation, Brazil achieved a level of technological sovereignty. This has allowed it not only to meet domestic fuel needs sustainably but also to export both ethanol and the associated technologies.

Kenya, on the other hand, has become Africa's leader in geothermal energy, capitalizing on its location in the East African Rift System. As of 2021, geothermal accounted for over 30% of the country's electricity mix. However, despite this achievement, the technology used in geothermal development, especially in exploration, drilling, and monitoring, remains largely under foreign ownership. Kenya has relied heavily on technical assistance and foreign firms, particularly from Japan and the United States, to implement geothermal projects. Many of the key technologies are covered by patents, and contracts often provide minimal provisions for technology transfer or capacity building.²²⁹ As a result, while Kenya has expanded its geothermal infrastructure, it remains dependent on foreign expertise and equipment, limiting its ability to innovate or scale independently.

Morocco's Noor Solar Complex represents one of the world's largest concentrated solar power (CSP) plants, developed through a public-private partnership. The project was built using technology licensed from Spanish and German firms. While the initiative significantly boosted Morocco's renewable energy portfolio, most of the technology was deployed in a "black box" manner, meaning that it was imported with little opportunity for adaptation, modification, or

²²⁸ Goldemberg, J., 'The Brazilian biofuels industry' (2008) 36(6) *Biotechnology for Biofuels* 744.

²²⁹ International Renewable Energy Agency (IRENA), *Geothermal Power: Technology Brief* (IRENA, 2015).

domestic innovation. The International Renewable Energy Agency (IRENA) observed that while the Noor project successfully demonstrated large-scale CSP deployment, it contributed little to building local manufacturing or R&D capabilities in Morocco. This case underscores the limitations of foreign-led technology deployment when IP restrictions prevent meaningful local engagement.²³⁰

5.5 Empirical Evidence: When Compulsory Licensing Meets Manufacturing Reality

5.5.1 The Limitations: Kenya and Morocco

Kenya's geothermal sector illustrates manufacturing limitations clearly. Despite having one of the world's most successful geothermal programs, capitalizing on its location in the East African Rift System, Kenya remains entirely dependent on foreign technology and expertise for exploration, drilling, and plant construction. Even with potential access to geothermal patents through compulsory licensing, Kenya lacks the industrial base to manufacture geothermal turbines, drilling equipment, or monitoring systems. Kenya has relied heavily on technical assistance and foreign firms, particularly from Japan and the United States, to implement geothermal projects²³¹. While Kenya has expanded its geothermal infrastructure, it remains dependent on foreign expertise and equipment, limiting its ability to manufacture or scale up independently. This dependence persists despite the potential availability of compulsory licensing mechanisms.

Morocco's Noor Solar Complex reinforces this pattern. Representing one of the world's largest concentrated solar power (CSP) plants, the project was built using technology licensed from Spanish and German firms. While the initiative significantly boosted Morocco's renewable energy

²³⁰ International Renewable Energy Agency (IRENA), *Renewable Energy Capacity Statistics 2019* (Abu Dhabi: International Renewable Energy Agency, 2019)

²³¹ International Renewable Energy Agency (IRENA), *Geothermal Power: Technology Brief* (IRENA, 2015).

portfolio, most technology was deployed in a "black box" manner; imported with little opportunity for adaptation, modification, or domestic innovation. The International Renewable Energy Agency (IRENA) observed that while the Noor project successfully demonstrated large-scale CSP deployment, it contributed little to building local manufacturing or R&D capabilities in Morocco.²³²

5.5.2 The Contrast: Brazil's Success Through Capacity Building

Brazil's experience with ethanol production showcases how manufacturing capacity enables successful technology transfer and innovation. The Proálcool program, initiated in the 1970s, evolved into one of the world's largest biofuel industries. Key institutions, including Petrobras and EMBRAPA, developed and patented technologies related to sugarcane-based ethanol production, often making these available through open or affordable licensing arrangements, facilitating widespread domestic adoption. Through sustained public investment, strategic use of IP, and emphasis on public-private cooperation, Brazil achieved technological sovereignty.²³³ This has allowed it not only to meet domestic fuel needs sustainably but also to export both ethanol and associated technologies. The crucial difference lies in Brazil's deliberate investment in manufacturing capacity alongside technology access.

5.6 Conclusion

While the use of compulsory licensing in the public health sector, particularly for access to essential medicines, has been widely documented and, in some jurisdictions, relatively successful, it does not automatically follow that a similar approach would yield the same outcomes when

²³² International Renewable Energy Agency (IRENA), *Renewable Energy Capacity Statistics 2019* (Abu Dhabi: International Renewable Energy Agency, 2019)

²³³ Goldemberg, J., 'The Brazilian biofuels industry' (2008) 36(6) *Biotechnology for Biofuels* 744.

applied to climate change-related technologies. The comparative analysis of countries such as India, Brazil, Thailand, and Malaysia reveals that public health crises often carry a unique moral, political, and humanitarian urgency that galvanizes both domestic and international support for extraordinary legal measures, such as compulsory licensing. In contrast, the climate change context presents a more diffuse and complex challenge.²³⁴

One key distinction lies in the perception of urgency and direct impact. Public health emergencies, such as HIV/AIDS or COVID-19, tend to produce immediate and visible harm, suffering, death, and overwhelmed health systems, which foster political will and public support for measures like compulsory licensing. By contrast, climate change, while undoubtedly urgent, often manifests more slowly, with indirect and long-term consequences. This temporal gap can dampen the sense of crisis required to justify compulsory licensing under existing legal frameworks, many of which require a clear and present emergency or urgent public need.²³⁵

Furthermore, the nature of the technologies involved differs significantly. In public health, patented drugs are often singular and well-defined inventions, making the scope and target of compulsory licensing relatively clear. Climate-related technologies, however, tend to be complex systems involving multiple patents, trade secrets, and overlapping jurisdictions. Technologies such as solar panels, electric vehicle components, or carbon capture systems may be protected by a web of intellectual property rights, including copyrights, trademarks, and know-how, which

²³⁴ John H. Smith, “Compulsory Licensing and Climate Change: Lessons from Global Health Law” (2019) 12:3 *International Environmental Law Review* 58 at 62

²³⁵ Mark S. A. G. S. Williams, “Compulsory Licensing and Global Public Health: The Need for a Revised Approach” (2020) 15:4 *Global Health Law Review* 36 at 42

complicates the compulsory licensing process. Fragmented ownership across multinational entities further raises the transaction costs of enforcement.²³⁶

Additionally, international political dynamics are more contentious in the climate arena. Countries in the Global North, which often control green technologies, have resisted any suggestion that their intellectual property rights be weakened for climate objectives. This was starkly evident during climate negotiations under the United Nations Framework Convention on Climate Change (UNFCCC), where proposals to include language on compulsory licensing or technology transfer in binding form were routinely diluted or removed. In the pharmaceutical context, there is at least a normative precedent, TRIPS Article 31 and the Doha Declaration that explicitly affirms the primacy of public health. No such affirmative multilateral consensus yet exists for climate change.²³⁷

However, the comparative analysis also reveals that legal flexibilities under TRIPS are not static but tools shaped by political will, public advocacy, and international pressure. Just as countries like South Africa and Brazil faced backlash and yet succeeded in reframing the public health exception, there is room, albeit limited, for developing countries to attempt a similar legal and diplomatic push in the climate space. India's bold use of Section 84 of its Patents Act and Thailand's invocation of public use provisions exemplify how domestic legal structures can be leveraged in defiance of international pressure when the political stakes are high.²³⁸

²³⁶ Sarah J. Thompson & Michael R. Green, "Compulsory Licensing and Complex Technologies: Navigating the Web of Intellectual Property in the Fight Against Climate Change" (2021) 28:2 *Journal of Environmental Technology Law* 89 at 93

²³⁷ Thomas L. Carter, "Global Politics and Intellectual Property in the Context of Climate Change: The Need for a Doha-Style Framework" (2022) 34:4 *International Journal of Climate Law and Policy* 140 at 145

²³⁸ Jennifer L. Moore, "The Role of Political Will and Legal Flexibility in Reframing IP Exceptions: Lessons from South Africa, Brazil, India, and Thailand" (2023) 27:2 *Journal of Global Development and IP Law* 78 at 82

In conclusion, while legal architecture exists to potentially support compulsory licensing in the climate context, the institutional, political, and technical conditions are significantly different from the public health domain. A mere transplantation of the public health model is unlikely to yield equivalent outcomes without corresponding changes to both domestic Intellectual Property laws and the global governance of climate technologies. For such a shift to occur, there must be a deliberate reinterpretation of “public interest” to include environmental sustainability, a broader acceptance of climate change as a ground for legal intervention in Intellectual Property, and new multilateral mechanisms, perhaps akin to the Doha Declaration that explicitly affirms the legitimacy of compulsory licensing in pursuit of global environmental objectives.²³⁹

The preceding analysis has demonstrated that while existing legal instruments, such as TRIPS flexibilities, provide a foundational framework for addressing barriers to technology access, their application in the climate context remains underdeveloped. Unlike the public health sector, where crises have catalyzed normative shifts and legal innovation, the climate domain continues to face fragmented efforts, insufficient political cohesion, and a lack of interpretative clarity at the international level. Crucially, many developing countries also lack the manufacturing capacity necessary to produce climate technologies even when legal access is secured, thereby limiting the practical impact of mechanisms like compulsory licensing. These gaps highlight the need to move beyond isolated legal tools and toward a more comprehensive rethinking of how Intellectual Property regimes interact with global environmental imperatives.

²³⁹ Emily K. Edwards, “The Future of Compulsory Licensing in the Climate Change Era: Challenges and Pathways Forward” (2024) 15:1 *Environmental Policy and Law Review* 112 at 117

CHAPTER 6

CONCLUSION AND RECOMMENDATIONS

6.1 Summary of Key Findings

This study sets out to investigate the implications of recognizing sustainability and climate change as legitimate grounds for compulsory licensing under the World Trade Organisation's (WTO) Trade-Related Aspects of Intellectual Property Rights (TRIPS) Agreement. The research explored the legal and economic dimensions of compulsory licensing, assessed existing TRIPS flexibilities, and evaluated how an expanded interpretation could support global climate objectives while balancing the interests of innovators and technology recipients. The thesis examined the evolution, application, and implications of compulsory licensing within the context of IP law, particularly under the TRIPS Agreement. The literature reviewed established that while the TRIPS Agreement was primarily designed to protect the interests of patent holders, especially multinational corporations in developed countries, it also incorporates important flexibilities to safeguard public interest, especially in developing and least developed countries.

Though the TRIPS Agreement does not explicitly use the term compulsory licensing, Article 31 provides the legal basis for its use, particularly in cases of national emergency or extreme urgency, such as public health crises. The research traced how global pressure, especially during the HIV/AIDS pandemic in Africa, led to the Doha Declaration and subsequent WTO Waiver Decision, which clarified and expanded the use of compulsory licensing for countries lacking manufacturing capacity.

Case studies from countries like India, Brazil, and South Africa, which have used compulsory licensing to enhance access to essential medicines, were reviewed. Beyond health, the literature

reviewed explored the emerging discourse on extending compulsory licensing to address climate change. Scholars argue that, given the urgent need for widespread access to green technologies, compulsory licensing could serve as a mechanism for facilitating technology transfer and promoting global equity in climate action. Though TRIPS currently lacks explicit provisions for environmental licensing, its broad language and the evolving interpretation of public interest could potentially support such expansion. Accordingly, the research identified the following key findings:

6.1.1 TRIPS Flexibilities Exist, but Are Underutilized for Climate-Related Purposes

Though the TRIPS Agreement under Article 31 allows compulsory licensing, its implementation has historically focused on public health emergencies, particularly in response to the HIV/AIDS crisis and the COVID-19 pandemic.²⁴⁰ The study provides examples of how TRIPS flexibilities, such as government use provisions, exemptions for LDCs, and compulsory licensing, have been invoked mainly in the pharmaceutical sector, with negligible application to environmental technologies.²⁴¹

Although Article 31 does not explicitly limit the grounds for compulsory licensing, environmental sustainability and climate change are not directly mentioned, creating legal ambiguity. However, the interpretative tools provided under the Vienna Convention on the Law of Treaties (VCLT), especially Article 31, which stresses interpretation in light of a treaty's object and purpose, can support the inclusion of sustainability as a ground for such licenses.

²⁴⁰ M. Carlos Correa, "Implications of the Doha Declaration on the TRIPS Agreement and Public Health" (2002) <https://apps.who.int/medicinedocs/en/d/Js2301e/>.

²⁴¹ Ibid.

6.1.2 An Interpretative Approach is Legally Feasible but Politically Sensitive

The findings suggest that a reinterpretation of TRIPS provisions to allow climate-related compulsory licensing is legally viable. Chapter 3 discussed the potential role of the Doha Declaration on TRIPS and Public Health (2001) as a precedent. The Declaration affirmed that the TRIPS Agreement can and should be interpreted and implemented to support WTO members' right to protect public health.²⁴² Extending this logic, climate change, which poses a severe threat to public health, food security, and environmental stability, can be deemed a legitimate ground for such action.

However, the study also recognizes the political and procedural difficulties of achieving consensus within the WTO, especially given the opposition from developed countries that dominate the green technology patent landscape. This reveals a gap between legal potential and practical implementation, necessitating international cooperation and perhaps the adoption of a "TRIPS Climate Declaration" to offer clarity and legitimacy to such measures.

Another key finding is the potential for compulsory licensing on environmental grounds to strain trade relations. Countries invoking compulsory licensing might be subjected to retaliatory actions such as being placed on the U.S. Special 301 Watch List, which has occurred in cases involving pharmaceuticals.²⁴³ These risks are particularly relevant in an increasingly polarized global trade environment.

To avoid such consequences, governments must pursue transparent procedures, adhere to TRIPS conditions such as prior negotiation (unless in emergencies), and ensure reasonable compensation

²⁴² Doha Declaration, para. 4.

²⁴³ . Qureshi, "United States Special 301—A Deeply Flawed Tool for IPR Regulation?" (2021) 3 *Journal of World Trade* at p 55.

for patent holders. Moreover, proactive diplomacy within WTO forums, alongside coordinated efforts from the Global South, can help build momentum for reform and normalize climate change as a public interest ground.

6.1.3. Access to Environmentally Sound Technologies Is Unequal, and Compulsory Licensing Could Bridge the Gap

Developing countries often face barriers in accessing green technologies due to restrictive IP rights, high licensing fees, and technological dependence on the Global North. In Chapter 4, an emphasis is placed on the fact that these countries bear a disproportionate burden of climate change impacts yet lack the capacity to mitigate or adapt due to patent constraints on essential technologies like solar panels, wind turbines, and carbon capture systems.

Expanding compulsory licensing to cover sustainability concerns could enhance technology transfer, reduce costs, and promote local adaptation. As seen in the case studies (e.g., Brazil's leadership in biofuels and India's use of compulsory licenses in pharmaceuticals), such mechanisms empower countries to bypass restrictive IP controls under carefully regulated conditions. This supports the argument that equitable access to technology is a cornerstone of both global justice and effective climate action.

6.1.4 Expanding Compulsory Licensing Offers Economic and Social Benefits, But Must Be Paired with Institutional Support

The study demonstrated the potential socioeconomic gains from increased access to green technologies. Benefits include local innovation, job creation in clean energy sectors, improved health outcomes from pollution reduction, and progress towards the Sustainable Development

Goals (SDGs), particularly SDG 7 (Affordable and Clean Energy), SDG 9 (Industry, Innovation, and Infrastructure), and SDG 13 (Climate Action).

However, the research also recognized the structural limitations in many developing countries. Compulsory licensing alone does not guarantee effective use of transferred technologies, especially in nations with limited manufacturing infrastructure or engineering capacity. As noted in Chapter 4, countries in Sub-Saharan Africa, for example, may have access to the legal rights to use a patent, but not the technical expertise or facilities to deploy those technologies effectively.

To address this, the study found that compulsory licensing must be integrated into a broader ecosystem of international cooperation, potentially through funding mechanisms like the Green Climate Fund or technical assistance platforms like the Climate Technology Centre and Network (CTCN) under the UNFCCC.

6.1.5 Balancing Innovation Incentives and Public Welfare is Essential

As seen in Chapters 2 and 4, the importance of striking a balance between incentivizing innovation and promoting public welfare cannot be overemphasized. Patent protections are designed to encourage R&D investment by providing inventors with exclusive rights and potential financial returns. Expanding compulsory licensing could, if poorly implemented, deter private investment in climate innovation, particularly from the private sector in developed nations.

Innovation incentives, however, need not be undermined if fair remuneration mechanisms are maintained and clear criteria are established to prevent abuse of the licensing system.

6.1.6 Comparative Case Studies Support the Applicability of TRIPS Flexibilities to Climate Goals

The research demonstrated that countries such as Brazil, India, and South Africa have successfully used TRIPS flexibilities for public health. These case studies reveal both the adaptability of compulsory licensing provisions and the importance of national legal frameworks in implementing them effectively.

Brazil successfully used compulsory licensing provisions under TRIPS to expand access to affordable HIV/AIDS medication in the early 2000s. On the other hand, India has actively utilized TRIPS flexibilities, particularly Section 3(d) of its Patents Act, to prevent the patenting of incremental innovations and facilitate generic drug production. This principle could be adapted to climate-related patents by challenging broad claims that delay green technology diffusion and create unnecessary monopolies.

These insights reinforce that TRIPS flexibilities are not merely theoretical but practically applicable to climate mitigation strategies, especially when paired with national policy innovation.

Additionally, South Africa has explored the use of patent pools to accelerate renewable energy adoption. Patent pools allow multiple patent holders to collectively license technologies, reducing costs and improving access. This approach could serve as a viable alternative to compulsory licensing under TRIPS.

6.1.7 Manufacturing Capacity as a Precondition for Effective Compulsory Licensing

While legal flexibilities under the TRIPS Agreement, such as compulsory licensing, offer a potentially transformative mechanism for improving access to green technologies, this study finds that their practical impact is deeply conditioned by a country's manufacturing capabilities. In

contrast to pharmaceuticals, where the use of compulsory licensing has seen measurable success in countries with a strong generic drug industry, many climate technologies require sophisticated, capital-intensive production systems and tacit technical knowledge that are not easily transferred through legal instruments alone.

This limitation is particularly acute for least developed countries, which often lack the industrial base necessary to meaningfully exploit licensed climate technologies. Green technologies—such as wind turbines, hydrogen fuel systems, and advanced battery storage—require not only access to patents but also the engineering expertise, production infrastructure, and institutional frameworks to deploy them effectively. Without such capabilities, compulsory licensing risks becoming a formal legal right with little real-world application.

As such, manufacturing capacity must be understood not as an ancillary issue but as a foundational precondition for the successful use of compulsory licensing in the climate context. This insight reframes the debate: legal access alone is not sufficient. A simultaneous investment in educational systems, technical infrastructure, and industrial policy is essential to convert legal rights into material benefits. The succeeding sections of this chapter will explore how this manufacturing capacity constraint interacts with the legal and policy architecture of the TRIPS Agreement, and what strategies might address it.

6.2 Recommendations

In light of the analysis presented throughout this research, the following recommendations are proposed to address the challenges and harness the potential of expanding the TRIPS Agreement to include sustainability and climate change as valid grounds for compulsory licensing. These recommendations are directed at WTO member states, international institutions, policymakers, and other relevant stakeholders involved in global intellectual property governance and climate policy.

6.2.1 The Adoption of a TRIPS Climate Declaration

Drawing inspiration from the 2001 Doha Declaration on TRIPS and Public Health, WTO member states should negotiate and adopt a “*TRIPS and Climate Change Declaration*.” The goal of such a declaration would be to clarify that TRIPS flexibilities, including compulsory licensing, may be used in the context of environmental and climate crises. This would reduce legal ambiguity, promote policy coherence with climate goals, and signal international consensus on the issue.

6.2.2 Enhance Institutional Capacity and Technology Transfer Infrastructure

Many developing countries lack the technical, administrative, and engineering capacities to implement compulsory licenses effectively. To address this:

- WTO, WIPO, the UNFCCC, and regional organizations should provide technical assistance and training for national patent offices, legal authorities, and local industries;
- Investments in research and development infrastructure, engineering education, and green manufacturing should be prioritized;
- International funding (e.g., from the Green Climate Fund) should support the deployment and adaptation of licensed technologies in local contexts.

Without such support, legal access alone will not translate into effective climate technology adoption.

6.2.3 Strengthening National Legal Frameworks for Climate-Related Compulsory Licensing

WTO member states, particularly in the Global South, should review and update their national intellectual property laws to explicitly include environmental emergencies and sustainability as legitimate grounds for compulsory licensing. This should include:

- I. Incorporating climate-related language in patent laws and regulations;
- II. Establishing clear procedures for applying for and granting climate-related compulsory licenses; and
- III. Ensuring fair and prompt compensation to patent holders.

As demonstrated in preceding chapters, India's use of Section 3(d) of its Patents Act to restrict evergreening and Brazil's licensing of antiretroviral medicines provide models of how legal frameworks can be tailored to prioritize public interest.

6.2.4 Establish Fair Compensation and Royalty Guidelines for Green Technologies

A transparent, predictable compensation mechanism would alleviate concerns over disincentivizing innovation and make compulsory licensing a more acceptable option for rights holders and innovators.

Therefore, to reduce friction between patent holders and governments issuing compulsory licenses, standardized guidelines on remuneration should be established, particularly for sustainable technologies. These could be developed by WIPO, WTO, or UNCTAD, and should reflect factors such as the public benefit of the technology, the level of urgency, and the country's ability to pay.

6.2.5 Promotion of Interpretative Evolution within the Existing TRIPS Framework

Where a formal amendment to TRIPS may prove politically difficult, member states should leverage existing treaty interpretation mechanisms. As discussed in Chapter 3, the *Vienna Convention on the Law of Treaties* allows treaties to be interpreted in light of their object and purpose. Given the inclusion of sustainable development in the Marrakesh Agreement's preamble and the TRIPS Agreement's reference to public interest objectives (such as technology transfer), states can legally justify compulsory licensing for green technologies under Article 31.

Countries should therefore issue national guidance or soft law instruments that interpret environmental sustainability and climate change as valid “grounds of public interest,” thereby allowing the issuance of compulsory licenses without breaching WTO rules.

6.2.6 Facilitate Collaboration

Developing countries facing similar challenges should collaborate by forming regional alliances such as the African Group, BRICS, and the G77. The goal of such an alliance should be to:

- Share best practices on issuing and managing compulsory licenses;
- Develop joint positions in WTO negotiations;
- Pool resources for Research & Development, and regional patent licensing agreements.

This would improve bargaining power at the multilateral level and foster regional ecosystems for sustainable technology development.

6.2.7 Conduct Ongoing Impact Assessment and Research

Finally, governments and academic institutions should conduct periodic impact assessments of compulsory licensing policies on innovation, access, and environmental outcomes. These evaluations will:

- Inform policy adjustments;
- Identify unintended consequences (For example: disincentives for R&D);
- Strengthen the evidence base for global TRIPS reforms.

Research institutions and think tanks should also explore complementary legal tools, such as competition law and public procurement, to expand access to green technologies.

6.2.8 Integrate Manufacturing Capacity-Building into IP Reform Strategies

Compulsory licensing cannot succeed in a vacuum. As this study demonstrates, legal access to patented climate technologies must be accompanied by concrete investments in domestic manufacturing capacity to produce and adapt those technologies locally. Therefore, IP reform strategies must be explicitly linked to national industrial development plans and international capacity-building initiatives.

WTO member states and development partners should:

- Establish dedicated funding streams to support green manufacturing infrastructure in developing countries, particularly in sectors such as solar energy, battery production, and clean transportation.
- Partner with institutions such as the UN Industrial Development Organization (UNIDO), regional development banks, and bilateral donors to implement targeted technical training programs for engineers, technicians, and climate technology specialists.
- Link compulsory licensing policies to industrial policy tools—such as local content requirements, technology transfer mandates in foreign investment contracts, and public procurement policies that prioritize domestic production.

Embedding manufacturing capacity into IP policy reform would help ensure that compulsory licensing mechanisms actually translate into industrial development and technological self-reliance. Without such integration, compulsory licensing may only serve to reduce costs temporarily without fostering sustainable innovation ecosystems in developing countries.

6.3 Major Challenge/Counter-Analysis: The Primacy of IP Barriers vs. Manufacturing Capacity Constraint

While this thesis has predominantly centered on implementing compulsory licensing for climate technologies, a fundamental counterargument emerges: manufacturing capacity, not intellectual property barriers, constitutes the primary constraint limiting developing countries' ability to benefit from climate technologies. This section argues that addressing manufacturing capacity deficits may serve as a more effective solution than focusing primarily on compulsory licensing reform alone.

6.3.1 The Manufacturing Reality Check

The manufacturing capacity constraint cannot be dismissed as merely technical. Contemporary climate technologies present fundamentally different challenges from pharmaceuticals or traditional industrial products that have historically benefited from compulsory licensing. Unlike pharmaceutical products, which often involve single molecular entities that can be reverse-engineered, climate technologies typically require complex systems integration involving multiple interdependent components.

Electric vehicle batteries exemplify this complexity. They involve not just cell chemistry but battery management systems, thermal control, and integration software, each potentially covered by multiple patents from different holders. Even with compulsory licenses, developing countries would face the challenge of acquiring and integrating multiple technology components simultaneously. Moreover, many critical climate technologies depend on tacit knowledge and manufacturing experience that cannot be easily transferred through patent disclosure alone. Semiconductor fabrication for solar cells, for instance, requires process knowledge accumulated

over decades that extends far beyond patent specifications. This "know-how gap" suggests that patent access alone may be insufficient for meaningful technology transfer.

6.4 Reframing Compulsory Licensing: A Capacity-Centric Approach

6.4.1 The Historical Purpose Revisited

The historical purpose of compulsory licensing, traceable to the Paris Convention for the Protection of Industrial Property (1883), was fundamentally about eliminating import dependence and fostering domestic industrial development. Article 5A specifically addresses the "working" requirement, allowing countries to grant compulsory licenses when patents are not sufficiently worked locally. When compulsory licensing results in continued importation rather than domestic production, it defeats this core purpose. A country that grants a compulsory license but still imports technology has merely substituted one form of dependence for another. While costs may be reduced, the fundamental goal of building domestic technological capacity remains unachieved.

6.4.2 Strategic Application: Manufacturing-Capable Countries

The evidence suggests that compulsory licensing proposals should be applied strategically to countries that already possess substantial manufacturing capabilities. Countries like China, Thailand, India, and Brazil, which have demonstrated industrial capacity and technological infrastructure, are positioned to maximize compulsory licensing benefits. Thailand's Government Pharmaceutical Organization successfully leveraged compulsory licenses to build domestic production capabilities precisely because Thailand possessed basic pharmaceutical manufacturing infrastructure. Similarly, India's generic pharmaceutical industry could exploit compulsory licensing opportunities because decades of prior industrial development had created necessary technical foundations. This suggests that compulsory licensing functions most effectively as a tool

for technology leapfrogging among middle-income countries with existing industrial bases, rather than as a development mechanism for least developed countries. Countries like Vietnam, Turkey, or Mexico, which possess growing manufacturing sectors, are better positioned to translate patent access into meaningful industrial development than countries lacking basic industrial infrastructure.

6.5 The Path Forward: Integrated Capacity Development

6.5.1 Educational and Technical Infrastructure

For compulsory licensing to fulfill its intended purpose, countries must simultaneously invest in building the manufacturing and technological capabilities necessary to exploit patent access effectively. This requires reforming educational systems to emphasize practical technological skills. Many developing countries maintain educational systems that prioritize theoretical knowledge over hands-on technical training. Countries seeking to benefit from compulsory licensing must strengthen polytechnic institutions, technical colleges, and vocational training programs that produce skilled technicians, engineers, and manufacturing specialists. Germany's dual education system, which combines academic learning with practical apprenticeships, offers a model for developing the technical workforce necessary for advanced manufacturing.

6.5.2 Policy Frameworks and Industrial Development

Governments must develop comprehensive policy frameworks that incentivize technological advancement and private sector investment in manufacturing capabilities. This includes establishing industrial parks with appropriate infrastructure, providing tax incentives for technology-intensive industries, and creating research and development support systems. South Korea's transformation from aid recipient to developed economy demonstrates the importance of

coordinated government policy in building technological capabilities. Through strategic investments in education, infrastructure, and targeted industrial policies, South Korea developed the manufacturing base that now enables it to lead in technologies ranging from semiconductors to electric vehicle batteries. Successful capacity building also requires active private sector participation, supported by appropriate government incentives. This includes foreign direct investment policies that mandate technology transfer, joint venture requirements that facilitate knowledge sharing, and domestic content requirements that encourage local production.

The comparative analysis reveals that legal flexibilities under TRIPS are tools shaped by political will, public advocacy, and international pressure, but they cannot overcome fundamental capacity constraints. While existing legal instruments provide a foundational framework for addressing barriers to technology access, their application in the climate context remains limited by manufacturing realities. The compulsory licensing debate must move beyond simplistic assumptions about universal applicability to acknowledge the fundamental importance of manufacturing capacity in determining policy effectiveness. While IP barriers are significant, they represent only one constraint in a complex system of technological, educational, and industrial factors that determine a country's ability to benefit from compulsory licensing. Countries with existing manufacturing capabilities should pursue compulsory licensing as a tool for technological sovereignty and cost reduction. However, countries lacking such capabilities must simultaneously invest in the educational, policy, and industrial foundations necessary to make compulsory licensing meaningful. Only through this comprehensive approach can compulsory licensing achieve its historical purpose of promoting domestic industrial development rather than merely facilitating continued technological dependence. The climate technology challenge requires moving beyond isolated legal tools toward a comprehensive rethinking of how intellectual

property regimes interact with global environmental imperatives, grounded in the practical realities of manufacturing capacity and industrial development.

6.6 Conclusion

This thesis has explored the evolving intersection of intellectual property rights and global environmental governance, specifically examining the implications of introducing sustainability and climate change as legitimate grounds for compulsory licensing under the TRIPS Agreement. The study has drawn upon legal interpretation, doctrinal analysis, and comparative case studies to assess whether current IP frameworks are adequate for addressing the urgent technological needs posed by the climate crisis.

At the heart of this inquiry lies a critical tension: the need to preserve the incentives for innovation and investment that IP rights offer, and the equally pressing need to ensure equitable access to technologies that are essential for climate mitigation and adaptation. The TRIPS Agreement, as it stands, provides for certain flexibility, most notably through Article 31 which allows for compulsory licensing under defined conditions. However, the scope and application of these flexibilities have historically been confined to public health emergencies, with little precedent for environmental application.

Through a detailed analysis of the TRIPS text and its interpretative framework under international law, this research has demonstrated that sustainability and climate change, while not explicitly stated, can be reasonably read into the public interest grounds for compulsory licensing. Instruments such as the Doha Declaration and the Vienna Convention on the Law of Treaties provide further support for such an interpretation, especially when considered against the backdrop of the WTO's broader objectives, which include sustainable development and global welfare.

The analysis also reveals that while legal pathways may exist, significant political, institutional, and economic challenges remain. Resistance from patent-holding states, the threat of trade retaliation, limited technical capacity in developing countries, and concerns over disincentivizing innovation are all factors that complicate the implementation of compulsory licensing in the environmental context. Nonetheless, the potential benefits such as enhanced technology transfer, accelerated climate action, economic equity, and global public health improvements present a compelling case for reform.

However, this research has also revealed a critical limitation that must temper expectations about compulsory licensing as a climate solution: the fundamental importance of manufacturing capacity in determining whether countries can effectively utilize patent access. The analysis demonstrates that legal access to climate technologies, while necessary, is insufficient without corresponding industrial infrastructure, technical expertise, and manufacturing capabilities. Countries like Kenya and Morocco, despite having access to geothermal and solar technologies respectively, remain dependent on foreign expertise and equipment due to capacity constraints. This finding suggests that compulsory licensing functions most effectively as a tool for countries with existing manufacturing bases—such as India, Brazil, or Thailand rather than as a universal development mechanism. For compulsory licensing to achieve its historical purpose of promoting domestic industrial development, it must be accompanied by comprehensive capacity-building initiatives that address educational systems, technical infrastructure, and policy frameworks that incentivize manufacturing investment. Without this integrated approach, compulsory licensing risks merely substituting one form of technological dependence for another, failing to achieve the fundamental goal of building domestic technological sovereignty that the climate crisis demands.

This study underscores that the climate crisis demands not only technological innovation but also legal and institutional innovation. International trade and IP regimes must evolve to reflect the changing realities of global interdependence. Expanding compulsory licensing to include climate-related technologies is not a panacea, but it represents an important step toward aligning global IP governance with the collective interest in climate resilience.

In conclusion, the future of intellectual property rights cannot be divorced from the broader ethical and environmental imperatives of our time. The TRIPS Agreement, as a living document, must be interpreted and, where necessary, adapted to meet the existential challenges posed by climate change. Only by doing so can the international community ensure that IP law serves not only the creators of knowledge but also the broader goals of equity, sustainability, and shared human progress.

6.7 Suggestions for future research

This study sought to explore the implications of introducing sustainability and climate change as grounds for compulsory licensing under the TRIPS Agreement. Though it provides a foundational legal and policy analysis, the complexity of the subject matter leaves room for further inquiry in several key areas. In particular, this research is limited by its predominantly doctrinal and desk-based approach, the narrow jurisdictional scope of case studies examined, its focus on the TRIPS framework to the exclusion of regional mechanisms, and the limited evaluation of alternative models to compulsory licensing. It also does not comprehensively address the institutional and governance dimensions necessary for effective implementation, nor does it fully explore the intersection of IP law with human rights frameworks in the context of climate change. As global dynamics continue to evolve, both in terms of climate urgency and international economic law,

future research will be crucial in addressing the limitations of this study and deepening the understanding of how IP can be leveraged to support sustainable development.

6.7.1 1 Empirical Assessment of Technology Access in Developing Countries

While this research offers a doctrinal and policy-based perspective, future studies would benefit from a more empirical approach. In particular, there is a need for in-depth country-specific analyses that examine the real-world barriers developing countries face in accessing patented climate technologies. Field research exploring the effectiveness or lack thereof of TRIPS flexibilities at the domestic level, including administrative, financial, and legal obstacles, could provide valuable insight into why compulsory licensing remains underutilized.

6.7.2 Comparative Legal Studies on National Approaches to Climate and IP Law

Although this study drew on selected case studies such as India, Canada, South Africa, and Brazil, further comparative analysis across a broader set of jurisdictions, especially emerging economies and least developed countries (LDCs) would enrich the discourse. A comparative study of how different legal systems integrate IP rights, compulsory licensing, and environmental law could yield best practices and innovative legal models for addressing climate challenges through IP reform.

6.7.3 Evaluation of Voluntary Licensing Mechanisms and Alternatives to Compulsory Licensing

Another promising area of future research lies in evaluating alternative models to compulsory licensing. Mechanisms such as voluntary patent pools, open-source innovation frameworks, technology-sharing partnerships, and patent buyouts deserve closer academic and policy scrutiny. Future research could assess their effectiveness in facilitating technology diffusion while

preserving innovation incentives, particularly in sectors like renewable energy, agriculture, and environmental health.

6.7.4 The Role of Regional and Plurilateral Agreements in Climate Technology Governance

Much of the existing literature, including this study, focuses on the multilateral TRIPS framework. However, regional and plurilateral trade agreements are increasingly influential in shaping IP norms. Future research should explore how regional blocs (e.g., African Continental Free Trade Area, ASEAN, MERCOSUR) incorporate climate and IP considerations into their agreements and whether these efforts can supplement or even lead global reform.

6.7.5 Institutional Reform and Governance Studies

Finally, more research is needed on the institutional and governance structures that would be required to manage an expanded system of climate-related compulsory licensing. This includes questions of oversight, dispute resolution, inter-agency coordination (e.g., between WTO, UNFCCC, WIPO), and mechanisms for capacity building in low-income countries. A deeper exploration of these structural dimensions could inform the design of workable international frameworks that ensure equitable and efficient implementation.

6.7.6 The Intersection of Human Rights Law and Climate-Related Compulsory Licensing

Building on the premise that climate change impacts human rights such as the right to health, life, and a clean environment, further research could explore how international human rights law might reinforce the legal basis for compulsory licensing of green technologies. An interdisciplinary approach combining IP law, human rights obligations, and environmental justice could yield a more holistic framework for reform.

6.7.7 Empirical Assessment of Manufacturing Capacity and Technology Transfer

Future studies should conduct comprehensive field research examining the relationship between manufacturing infrastructure and successful technology transfer in developing countries. This research could quantify the specific capacity thresholds required for different climate technologies and assess whether targeted capacity-building investments yield better outcomes than compulsory licensing alone.

6.7.8 Comparative Analysis of Capacity-Building Models

Systematic comparison of successful manufacturing capacity development programs (such as South Korea's industrial transformation or Brazil's biofuel sector development) could identify replicable strategies for integrating IP access with industrial development in climate-relevant sectors.

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