https://doi.org/ 10.33472/AFJBS.6.10.2024.462-472

African Journal of Biological Sciences

Journal homepage: http://www.afjbs.com

Research Paper Open Access

Trade Aspects Related to Transfer of Technology to Developing Nations; The Alignment of Trade Rules towards Environmentally Sound Technologies Transfers.

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Article History

Volume 6,Issue 10, Feb 2024

Received:17 Feb 2024

Accepted : 01 Apr 2024

doi: 10.33472/AFJBS.6.10.2024.462-472

ABSTRACT

Environmentally sound technologies or low-carbon technologies promote Sustainable Development. The environmentally sound technologies (ESTs) are concentrated in the hands of multinational corporations in developed countries. The paper presents the requirement for the equitable distribution of the ESTs. The paper describes the international legal framework governing the transfer of low-carbon technologies. International technology transfer takes place through trade and trade rules obviously expedite the transfer. In view of the requirement of ESTs worldwide, this paper examines the mechanisms of transfer, the factors that drive the transfer and the barriers that hamper the transfer. Deeply analysing such factors is required to formulate rules, regulations, and policies that enhance the transfers. This Article reviews the role of patents and trademarks in the transfer of ESTs. The paper also analyses the TRIPS provisions that drive the supply of ESTs. Further, this paper investigates trade-related measures for technological drive in the light of climate change and the legal backdrop.

Keywords

TRIPS Agreement, Climate Change Technology (Environmentally Sound Technology), Technology Transfer, Developing Countries, Trade Policies, Mechanisms, Barriers, Funding Mechanisms.

Introduction

Technology transfer plays a pivotal role in advancing the adoption of low-carbon solutions. The majority of the Environmentally Sound Technologies are developed in a small percentage of developed countries.[1] These technologies are instrumental in lessening the emissions of greenhouse gases into nature. These technologies are required to be transferred to developing nations and Least Developed Countries that are incapable of producing such technologies. The process not only addresses the environmental challenges but also presents an opportunity for the development of economies. Further, it helps countries pursue the path of economic development without compromising their commitments to environmental protection. Therefore, there should be no impediments to such transfer. The actual process of transfer takes place via trade. Hence, the transfer of technology obviously involves trade and investment policies. Liberalized trade in environmental goods is likely a potential driver for technology transfer. The TRIPS Agreement has provisions applicable to technology transfers, especially green technologies. Even WTO created a body to examine the trade rules that influence technology transfer. Mutual supportiveness between trade policies and climate change adaptation policies strengthens the transfers. In the context of technology transfer, the IP system has to be examined to determine whether it constitutes a tool for promoting innovation and also to analyse the credibility of the argument that access to climate change technologies depends on broadening and strengthening the IP system.

Developing States have limited resources and capacity for investment in research and development. The other factors are weak infrastructure and technological disadvantage. The MNCs own a major chunk of technologies. As the production of technologies is costlier than acquisition, it is advantageous for developing countries to obtain them through transfers. The technology transfer has advantages like economic growth, technological development, increasing capabilities, enhancing organizations' competitiveness, increase in productivity, and development of local industry.[2] Apart from these, the developing countries will derive better living standards, progress in innovation, and increase in finances. MNCs benefit from market expansion. The technology transfers take place through various channels. The most usual mechanisms are Licensing, FDI and Joint ventures. In transferring ordinary technologies, it is observed that the MNCs preferred to transfer advanced technologies to their subsidiaries in their own countries, old ones to subsidiaries in affiliated countries, and older inventions via licensing. The mechanisms of technology transfer can be broadly classified into formal market transactions and nonformal market transactions.[3]

Transfer of technology through formal market transactions: The direct exporting process involves the direct transfer of capital goods and equipment by the MNCs out of their boundaries. In this process, the MNCs have less control over the utilization and sales in the importing country. It offers advantages like cost-effectiveness and safe entry into alien markets.[4]

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[1] www.worldbank.org

[2] Sozali Abdul Wahab., et al., "Exploring the Technology Transfer Mechanisms by the Multinational Corporations, A Literature Review," (2012)

[3] Mascus. K. E, "Encouraging International Technology Transfer." (2003)

[4] Lu, J & Blemish, P, "The Internalization & Performance of SMEs," (2001)

In the process of FDI, the technology is transferred to subsidiaries in the receiving country. In this process, access to the technology, organization, knowledge, marketing, and expertise are available.[5] An example of a foreign direct investment mode of transfer of EST is photovoltaic systems in Kenya. It has been identified that solar PV systems are cheaper to use in Kenya than other systems. Kenya has become a potential market for investment in PV systems.[6]. Foreign direct investment is preferred when the production cost of technology is high and complex and the technology is new. Spill over is expected in this process.

Licensing is granting permission by the MNC to an unconnected concern. This process has a low-risk and stable income. The decision depends on the market size and policies of the host country. Licensing is preferred when the IPR protection in the host country is strong.[7] The licensing mode of transfer is used for the transfer of standardized, simple, and mature technologies.

Joint ventures are collaborations between MNCs and local firms, wherein resources, skills, knowledge and expertise are shared. The main advantage is that the local firms know the local conditions.

Transfer of technology through nonformal, nonmarket transactions takes place through imitation, movement of people (scientists, managers, students, employees), and data available in patent applications and media.

The Concerns of Intellectual Property Rights

IPRs have a noteworthy role regarding environmentally sound technologies. IPRs ensure economic returns for investors, which encourages innovation. Strong IPR protection encourages inventors to collaborate, license, and transfer the technologies.[8] The WIPO takes responsibility for the protection as well as the equitable distribution of intellectual works for human welfare.

Intellectual property is broadly of two types. Industrial property is protected by patents, trademarks, geographical indications, and copyrights that cover literary works. TRIPS concluded at the Uruguay round in 1994 is the most significant Agreement that has significance for technologies. Article 7 stresses the protection to be in such a way that it encourages further innovation and the use of such innovations for the welfare of humankind. During technology transfer, the MNCs face a risk of imitation of the technology. A patent protects the technology. Copyrights also play a role in technology transfer. The scope of the license determines what rights are transferred. Franchising is one method by which technology is transferred, and the essential element in franchising is a trademark.

Similarly, Geographical Indications mark the place of origin of the product. Trademarks and Geographical indications enable consumers to differentiate the products. Of all the above, the protection of patents is significant.

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[5] Ivarsson., et al., "Technology Transfer from Transnational Corporations to local suppliers in Developing Nations: A study of AB Volvo's Trucks and Bus plans in Brazil, China, India, and Mexico," (2005)

[6] Duke R., et al., "Photovoltaic Cells in the Kenyan Market for Solar Home Systems", (2002)

[7] Thee, KW, "The Major Mechanisms of International Technology Transfer to Indonesia; An Assessment," (2005)

[8] Damien Dussaux, Antoine Dechezlepretre, and Matthieu Glachant, "Protection of Intellectual Property Rights and the Transfer of Low Carbon Technologies," (2018) Centre for Climate Change Economics and Policy Linking.

The impact of the protection of human intellectual creations over the distribution of technology is the primary concern of many researchers.[9] It has been established with evidence that the transfer was lower to countries where there is weak protection of IPRs. However, more than mere protection of IP is required to bring about the transfer of technology. There are several other factors, such as incentives, subsidies, local market conditions, investment climate, human skills, and infrastructure policies, that influence the decision to transfer technology.[10]

A positive perspective of TRIPS is that it provides a legal framework within which trading concerns can act with certainty.[11] The preamble of TRIPS calls for a viable technological base in the least developed countries. Article 7 notes that the protection of IPR must also contribute to developmental objectives. The agreements made for trade in innovations should be complementary to this Article. Article 8 specifies that members should adopt policies that prevent the actions by owners that are unfavourable to the supply of technologies.

Article 66.2 directly provides for technology transfer, which states that developed countries have to bestow incentives upon firms for extending innovations to least developed countries.[12] Though the language sounds mandatory, the governments cannot force MNCs to transfer the technologies. The maximum the Government can do is liberalize IPR laws and extend suitable incentives to the firms that are engaged in such welfare activities.

A system with sensible IP protection can significantly contribute to technology transfer. For example, trademark protection will increase the willingness of MNCs to give licenses for production and distribution. Enhanced protection may lead to doubling the license fee. The developing countries may get the technology at no cost by simple imitation. Articles 27.2 and 27.3 of the TRIPS allow member countries to exclude some critical technologies, including plants and animals, from patentability. Article 31, though, has some limitations; it provides for governments to grant compulsory licensing in furtherance of the welfare of the community. Article 40 of the TRIPS requires member nations to define and make laws to prevent the monopoly of technology licensing. TRIPS allows fair use of copyrighted works to achieve social and economic objectives. TRIPS permits reverse engineering for developing computer software, which helps in the establishment of software industries. Article 66.2 is crucial and could be more effective. The main reason was that the technologies are mainly in the province of MNCs, which may not elect to accept the incentive. However, many developed countries submit annual reports to the TRIPS Council regarding the incentives offered for the transfer of technology. Trade in agricultural inputs, genetically engineered crop technologies and biotechnologies and plant varieties can be increased by reducing trade barriers and increasing subsidies. The governments of developed

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[9] Jasmeeth Gulati, "Challenges Before International Technology Transfer, Maximizing the Principle of Sustainable Development," (2012)

[10] Branletter L Fishman., et al., “Do Stronger Intellectual Property Rights Increase Transfer of Technology ? Empirical Evidence from U.S. Firm-level Panel Data", (2004)

[11] Carlos M. Correa, "Can the TRIPS Agreement Facilitate Technology Transfer to Developing Nations in International Environmental Goods and Technology Transfer under a Globalized Intellectual Property Regime," (2005).

[12] For details of the report submitted by countries IP/C/W/536.wtoandip/C/W/55

countries have to grant financial assistance and technical expertise for the absorption of technology. Training programs in modern technology would be beneficial.

Developing countries need to be more effective in developing and enforcing anti-monopoly laws. The enforcement can be undertaken by the developed countries against their firms in their countries. Sometimes, developed countries offer fiscal benefits to firms that provide jobs in the host country. The same may be provided to the firms that transfer technologies to developing nations. The measure is covered by Article 66.2 and also satisfies the principles of favoured differential treatment. Developed countries may offer fiscal incentives to MNCs for hiring people from developing countries and allow them later to move to their home countries. Such employment helps in the indirect movement of technology.

Some of the public funds may be allocated to foster the supply of technology. The public funds may be directed toward the development of water treatment, energy, and environmental technologies that are essential in developing countries. A special fee may be collected from the patent applicants for improving systems in developing nations. The particular fee may be of little concern to the MNCs, as they are the beneficiaries after the patents are granted. The GATS Agreement provides for price differentiation across countries with respect to medicine, software, education, material, agricultural inputs, and other technologies that are conducive to Article 66.2.[13]

The TRIPS has the scope for the transfer of technology worldwide, which brings in the development of humankind. The TRIPS Agreement established a system that restricts patenting of certain environmentally sound technology.

TRIPS Agreement does not give any measures to create an environment favorable for technology transfer in developing countries. More factors are causing the pull than factors that aid in the push. The provisions of TRIPS require more clarity regarding the definition of technology, eligibility for patentability, the scope of compulsory licensing, incentives for technology transfer and LDCs. The TRIPS needs to address the asymmetry in bargaining capacity and information between the owners and recipients.[14] The TRIPS agreement could be modified for the conception of a multilateral fund that supports transfers to LDCs.[15]

The Scope of Transfer of Environmentally Sound Technology (EST):

At its inception, Sustainable Development refers to the utilization of natural resources by the people, leaving sufficient resources for the next generations. Thus, Sustainable Development has its goal in the conservation of natural resources. With the changing dynamics, Sustainable Development calls for human development by balancing social, economic, and environmental goals. The theme of sustainable development is the sustainable utilization of resources and the protection of nature. Growth is only possible by balancing these two. Developing countries may not reduce their industrial activities for the sake of environmental objective. The industrial activities and the large populations in the developing nations depend on conventional sources of energy thereby resulting in enormous

[13] GATS, WTO Agreement, Annex 1B, 331.L.M.1125 (1994).

[14] Keith E Maskus, "Emerging International Technology Transfer," UNCTAT-ICISP Project on IPRs and Sustainable Development, Issue Page 7 (2004)

[15] Mathew Littleton, "The TRIPS Agreement and Transfer of Climate Change Related Technologies to Developing Countries," (2008)

greenhouse gas emissions. Eventually, climate problems like alarming temperatures and severe climatic conditions are obvious.

Deteriorating environmental conditions undermines the human rights of people who depend on agrarian sectors for their livelihood. This situation has become a concern for international organizations. The UNO has facilitated the formation of a series of Treaties, Conventions, Multilateral, Bilateral, and Regional Agreements, Working Groups, Experts Meetings, and Climate funds. The Paris Agreement culminated in 2015, and the member countries were called to check their activities to preserve the temperature to below 2 degrees Celsius. The Agreement was made as a result of the UNFCCC.[16]

Moreover, in the COP, which was held in Paris in 2015, it was agreed that the goal requires large-scale sharing of technologies. UNFCCC focuses on the international community's endeavour to combat global warming and it recognizes that the transfer of EST is very significant for attaining the aim of limiting the presence of GHGs to a limit that prevents detrimental interference with climate change.[17]

Most recently, COP 28, which met in Dubai, signalled the complete reduction of the use of fossil fuels.

ESTs are those that are non-polluting, use resources sustainably, and emit zero or negligible waste, whose transfer includes equipment, components, know-how, services, and organizational and managerial procedures. The process of transfer of EST is the same as that of ordinary technology.

Some specific factors drive the transfer of EST, which are environmental regulations and enforcement. The phasing out of trade barriers and tariffs, the lowering of the protection of IPR, and the increase in capacity will help developing countries utilize technology and financing mechanisms. The transfer of EST is dependent more on public funds. The LDCs rely on official development assistance to acquire technologies. The requirement of the recipients is another influencing factor.

Factors that drive the transfer of environmentally sound technologies:

- Public policy, regulatory environment, and multilateral environmental agreements.
- Funds are mainly public funds.

The Government of India bought the technology necessary for the manufacturing of eco-friendly refrigerators with the help of funds from Germany and Switzerland. This project is named as ‘Ecofrig’. The technology was given exemptions from customs and excise taxes.

Factors that facilitate/hinder the transfer of Environmentally Sound Technology:

1. ***Adequate information***: There should be a free and full exchange of information during the entire technology transfer process. Prior appraisal of local needs, suitability of the innovation in the importing country, knowledge about the administrative and taxation procedures in the host country, local business practices, proper training for the use of the technology, performance of the technology, and financial benefits are required.[18] In

[16] The UNFCCC came into effect in March 1994.

[17] Helen Argalias., et al., “Introduction: Environmentally Sound Technologies: An Overview" (2000)

[18] Zarrilli, S. “International Trade in Environmental Goods and the Role of Developing Countries in Energy and Environmental Services: Negotiating Objection on Development Priorities, ” (2 003)

South Africa, the funding Germany team continuously monitored the process of using solar stoves.

2. ***Regulations and policies***: The environmental regulatory framework creates a market for environmentally sound technology transfer. However, the transfer may be hindered by substandard regulation and enforcement. Phasing out of ozone-depleting substances has been made mandatory under the Montreal Protocol.[19] The mandate made it compulsory for countries to phase out their CFC-emitting technologies and substitute them with CFC-free technologies. As a result of this Agreement, the Ozone layer is slowly recovering. It is expected that the ozone layer revert to normalcy between 2040 and 2066.
3. ***Initiatives by the Government***: Under international law, the Government must take an active part in acquiring ESTs. The governments have been active in making policies and regulations to accelerate the transfer of ESTs. The Government mainly acquires solid waste management and water treatment technologies. Taiheyo, a Japanese company, invested in a research project in Indonesia to substitute natural ingredients for synthetic fibers. The country Indonesia was selected because of the abundant availability of natural bamboo. Indonesia accepted this technology and exported the goods produced. The initial investment made way for EST transfer.
4. ***Multilateral Environmental Agreements***: The multilateral environmental agreements proved to be the best for the transfer of EST. Montreal protocol paved the way for the transfer of CFC-free technologies. Japan has invested in the production of CFC-free refrigerators in Thailand. The removal happened with the target set by the Thai Government to phase out CFC.[20] India accessed the Montreal Protocol in 1992. India has declared that it could phase out one ozone-depleting substance, 1-Dichloro -1-Flouro-methane (HCFC-141b), from its cooling systems. The Government has also expressed that it will soon phase out all the ozone-depleting substances,[21] Official Development Assistance and funding under the Montreal Protocol,[22] The Global Environmental Facility under the UNFCCC and the Global Climate Fund under the Copenhagen Accord are funding mechanisms established for the transfer of technology. The UNFCCC, Kyoto Protocol, and other such climate agreements have brought thrust to the production and transfer of a wide range of climate technologies. The International Energy Agency has contributed to technological development, market development and collaboration between States.
5. ***Market incentives***: Fiscal incentives for the use of EST and fines for the use of dirty technologies provide an adequate place for the transfer of technology. Fiscal incentives are lowering taxes and tariffs for the achievement of environmental improvement. A WTO Working Group on Trade and Technology Transfer (WTO, 2003) recommended creating incentives. Further, if environmental costs are levied, the system will change to

[19] The Montreal Protocol, A global agreement finalized in 1987, has the objective of protecting the ozone layer by phasing out substances that deplete the ozone.
[20] Christina Tebar Less et al., "Achieving the Successful Transfer of Environmentally Sound Technologies: Trade-Related Aspects," (2005)
[21] The Economic Times, 03.10.2023
[22] Gilbert M Bankobeza, "Ozone Protection: The International Legal Regime," (2005)

some extent, replacing carbon technology with ESTs. The regulations require political commitment and enforceability, as well as adequate knowledge about the requirements and the capacity of the local people to adapt to the technology. In the Swiss experience, it was observed that environmental sanctions have improved the environment and health of citizens and the transfer of EST.

6. ***Voluntary approaches***. Multinational firms have to follow trade practices that help transfers to needy countries. The UN Compact and ICC business charters provide charters for corporate responsibility for sustainable development. A report from WBCSD stated that the chemical industry has taken up crop development projects in the countries of Guatemala and Brazil and has shown commitment to development and extensive training for local people.
7. ***Research and Development and Industry Policies***: The developing countries have started to prioritize the direct distribution of their funds for R&D in ESTs. There are numerous examples of countries where timely decisions have paved the way for producing energy-efficient electricity. Efficient use of public funds for research, training of critical persons, and recognizing experience in innovation activities shall nurture the development of indigenous systems.
8. ***Privatization and decentralization****:* Privatisation showed excellent results for environmentally sound electricity technology production, which once used to be the domain of government enterprises. Cogeneration from biomass was another example of effective production in a private field. Similarly, decentralization provided market coordination to facilitate private investment. Government funds saved from decentralization can be directed to support the poorest communities.

Trade-related measures for the transfer of technology:

The member nations of the WTO have recognized the requirement for sustainable technologies all over the world. However, clear procedures were not prescribed for worldwide distribution. Many working groups were formed under the WTO to frame the transfer process in consonance with climate laws. The lowering of tariffs on the import of EST goods can enhance the transfer of technology. Reduction of tariffs was stressed in the Conference conducted in 2001 at Doha. In the year 2000, the Finance Minister of Kenya decided to evade the tariffs entirely on environmental goods. This timely decision led to the domestic production of batteries, lamps and charge regulators used in home solar power projects.[23]

Trade-related measures suitable for the transfer of ESTs are of two types:

i. Tariff measures
ii. Non-tariff measures.

Some of the non-tariff measures can be described as price regulation mechanisms, imposing quotas and funding mechanisms. The NTMs are illustrated here under:

- Some NTMs are conditions that producers and sellers have to comply with. For example, labelling (giving information), use of low-emission material and fuel standards.

[23] Hankins. M, "A Case Study On the Private Provision of Photovoltaic Systems in Kenya, Energy Services for the World's Poor," (2002).

- Some incentives are given to one's partnership firms to take climate-suitable procedures. These are in the form of Carbon border adjustments. The vice-versa action includes the removal of incentives for climate-non-friendly measures.
- Sanitary and phytosanitary applications, competitive laws, investment-friendly measures, export-encouraging provisions and flexibilities in intellectual property protection laws are all examples of non-tariff measures.

It is recognized that various nations have introduced over 1000 non-tariff measures for exchanging ESTs. The climate change-related non-tariff measures were adopted with the following objectives.

To reduce the emission of GHG gases during the trade.

- To bring out more energy-efficient appliances.
- To prevent deforestation.
- To reduce the use of plastics.

Out of all the non-tariff measures, Technical Barriers to Trade (TBT) have proved to meet the transfer requirements. Energy efficiency requirements and labelling requirements are the most common technical barriers to trade. The United States of America has regulations for carbon dioxide emission levels for cars. Countries like India, Brazil, the European Union, and the USA have accommodated several technical inhibitors relating to the standards required for biofuels. Labelling requirements are significant in providing information to consumers about international standards, the composition of the product, carbon footprint data, and energy efficiency performance.

Legal basis for trade regulation relevant to climate change:

Climate change law and trade law are not similar with respect to environmental requirements. The CBDR Principle is embedded in climate change laws such as those of the UNFCCC. The principle obligates the developed nations to take more measures to combat the climate change problem. The Paris Agreement removed this distinction. However, by virtue of the possession of technologies and financial resources, developed nations should lead the war against climate change. The golden rule of trade law is 'Non-discrimination', which is precisely the opposite of the differentiated responsibility principle—the common objective of environmental goal to be achieved by reconciling the differences in these two fields. The laws adopted for climate change do not prescribe any particular procedure for EST transfer. Trade law, particularly the principles of WTO, lays down specific rules that individual countries may accommodate when exchanging climate-friendly technology. Interestingly, trade constitutes a significant factor in increasing greenhouse gas concentrations. Therefore, specific rules and laws have to be adopted in a trade that fosters the exchange of climate-congruent technologies.

The climate legal framework does not mention any particular measures that the states should adopt in order to support the supply of ESTs. Article 6 in the Paris Agreement signifies that members may adopt Nonmarket Approaches (NMAs) to achieve their Nationally Determined Contributions (NDCs). The recognized NMAs are taxes, subsidies, and information. The Agreement leaves the choice to the States to select such measures. Principle 12 of the Rio Declaration, 1992 warns that technical regulations imposed for

achieving climate change objectives should not be arbitrary, discriminatory, and restrict trade.

The WTO panel appreciated certain exceptions in GATT as conducive to human welfare objectives. The appellate panel applied certain exceptions in disputes before it. For example, Article XX was applied in the Brazil-Tyres case and Article XI was applied in the US-Shrimp case.[24]

The scope of the TBT Agreement:

The Agreement covers all kinds of technical regulations applicable for all the stages involved in the transfer of ESTs. Such regulations may include specifications for the composition, packaging, and flammability of the goods, which may be positive, i.e., the goods can contain. The negative terms are those which the goods must not contain. The Agreement specifies that the regulations have to be prepared by a recognized body. The Agreement also specifies that conformity assessment procedures have to be followed to achieved the target of such regulations. The Agreement aims to achieve the highest human welfare objectives including the protection of ecosystems in which humans thrive. The technical barriers prevail over WTO rules.

The Position in Developing Countries:

It may become challenging for developing countries to meet the certified labelling schemes required in developed countries. The reason is the need for energy-efficient technologies. These difficulties of the developing countries are considered both in climate law and trade law. The UNFCCC, Kyoto Protocol,[25] Cancun Agreements emphasized that the steps taken by developing countries for climate change mitigation shall conform with the welfare objectives of humankind. The developed countries may help the developing countries enhance their innovation capabilities. Developing countries are also required to avoid such restrictions that may cause unreasonable hindrances to trade in ESTs. These issues are under discussion at the 'Forum held to measure the impacts of response measures' established under the UN Framework Convention. It was admitted that some of the provisions in WTO Agreements conform with the principle of CBDR. Examples are transitional periods, technical assistance and special provisions for LDCs. Article 12 of the TBT expressly declares that there should not be any impediments during exports from developing countries.

Conclusion:

Trade rules can influence the transfer of mitigation and adaptation technologies for climate change. The trade rules have to be aligned with the climate change requirements. There are several flexibilities available in the trade laws in WTO for the transfer of ESTs to developing nations. The trade rules enable such transfer by reducing barriers, protecting intellectual property, promoting collaboration, providing capacity building, incentivizing green growth initiatives, establishing funding mechanisms, facilitating internal research and development. Further, trade rules foster FDI, facilitate knowledge spill over, provide technical assistance and training, enable licensing agreements, manufacturing, and adopting the technology through government policies and promote research and development efforts. By leveraging

[24] Prohibition of import of certain Shrimp, WTO One WT/0558/R

[25] Anthi Koskina et al., "Trade in Clean Energy Technologies: Study from Protection to Protectionism through Obligations for Technology Transfer in Climate Change law or vice versa?" (2020)

trade relationships effectively, developing countries can enhance their capabilities, derive economic growth, and achieve Sustainable Developmental Goals.

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