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# Technology, Technology Transfer and the WTO - TRIPS Agreement: A science policy and law analysis for Nigeria

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**ABSTRACT**

The introduction of the Trade Related Aspects of Intellectual Properties (TRIPS) Agreement has limited the access of developing countries like Nigeria to technologies critical for national development aspirations. Little attention has however been given to identifying the flexibilities that can be exploited in the Agreement. This study examines Nigeria's technology-driven socio-economic development aspirations, analyzed the TRIPS Agreement and its impact on technology-driven sustainable national development planning and identified flexibilities in the Agreement that could be utilized for enhanced access to technologies. The study utilized content analysis methodology and relied on sources of information which include Nigerian legislation and International conventions and treaties. The study revealed the flexibilities that Nigeria could use to enhance access to technologies for development. This includes compulsory licences, parallel imports and exemptions to patentability among others. Furthermore, the study revealed that the application of these flexibilities was not automatic but developing countries had to take advantage of them by amending their laws and putting in place appropriate policies to exploit them. The study concluded that until attention is given to the flexibilities within the TRIPS Agreement, the Agreement would continue to be perceived in Nigeria and other developed countries as a barrier to access appropriate technologies for national development.

**Keywords:**
Science, Technology, Technology Transfer, WTO, TRIPS Agreement, Development Planning, Intellectual Property Rights

## 1.0 Introduction

Science and technology are key drivers to socio-economic development. This is because scientific and technological revolution is the foundation of advancements, and improvements in national financial, educational and health system (Uwaifo and Uddin, 2009; FMST, 2011; Chetty, 2012 and UNCTAD, 2018).

Science is the pursuit and application of knowledge and understanding of the natural and social world following a systematic methodology based on evidence (Science Council, N. D.). From its early beginnings, science has developed into one of the greatest and most influential fields of human endeavor. The term 'Technology' is wide, and everyone has their way of understanding its meaning. Technology is the application of scientific knowledge for practical purposes or the application of science to solve problems (Wahab *et al.*, 2012; Ramey, 2013). Technology is used to extend human abilities, making people the most crucial part of any technological system. The application of technology typically results in products. The process of translating an idea or invention into a good and/or service that creates value for which customers will pay is called innovation (Wahab *et al.*, 2012). Engineers identify technology by the nature of the physical and chemical transformation involved or the equipment in which they take place and by the production factors and outputs. For entrepreneurs, the concept of technology is an extremely dynamic one, the ultimate goal being the offer of products according to market demand and in competitive conditions. Some see it as a commodity, as knowledge, or as a socio-economic process. If technology is well applied, it benefits humans and if not, harms humans (Franklin, 1999; Ramey, 2013).

The extent to which a country can harness, acquire, develop, or deploy science and technology is critical to its ability to achieve socio-economic development and enhance its status in the comity of nations. A nation lacking in science and technology will forever depend on the custodians of scientific and technological knowledge. As technology is the engine of growth, its acquisition and deployment are critical to national development planning, especially amongst developing countries like Nigeria (FMST, 2011).

Development planning in Nigeria pre-1986 was not based on the input of science and technology (S&T) (Ikeanyibem, 2009; Ejumudo, 2013). Since 1986, national development planning having taken into cognition the role of S&T, and has been focused on developing the Nigerian manufacturing sector, placing Nigeria on the firm path of industrialization, and increasing investment in critical infrastructure to unleash economic growth and wealth creation (FMBNP, 2017; UNCTAD, 2018). These development initiatives have however been severely limited by Nigeria being a technologically underdeveloped country with very limited capabilities for science and technology development, acquisition and exploitation (Ikeanyibem, 2009; Olaopa *et al.*, 2012; Ejumudo, 2013 and FMBNP, 2017).

In recognizing the limitations of the Nigerian state to develop required technologies domestically, development policy experts have looked at and advocated for the strengthening of national capabilities for technology acquisition and adoption through the process of technology transfer (Iheanacho, 2012; FMBNP, 2017). Nigeria, like any other developing country, must acknowledge that access to, and the transfer of technologies from technologically advanced countries to developing countries for the actualization of their development agendas is heavily dependent on the legal framework applicable to the development and distribution of these technologies (Ogundari, 2014). This legal framework includes national laws, international treaties and conventions, as well as intellectual property rights (Ogundari, 2014). These rights are protected by national and international laws, the most important of which is the WTO – TRIPS Agreement which has 164 countries as signatories. It therefore means that in order to successfully acquire technology through technology transfer the provisions of the TRIPS Agreement have to be taken into consideration (Uwaifo and Uddin, 2009 and Nikolski, 2016).

The Trade-Related Aspects of Intellectual Property Rights (TRIPS) Agreement of 1994 significantly altered the international landscape for intellectual property rights (WTO, N.D). This had implications for the acquisition of technologies by developing countries from technologically advanced countries. Prior to the TRIPS Agreement, the existing legal

regime, the Paris Convention for the Protection of Industrial Property, gave countries broad liberty and stipulate no minimum standards, to design their national intellectual property rights regimes (UNCTAD, 2001; WTO, N.D). Thus they could exclude from protection entire fields of technology, determine the patent term and define many other aspects of such regimes. The fundamental and pervasive changes engendered by the TRIPS Agreement have led to calls for a reconsideration of the relationship between intellectual property rights, national rights to technology-driven development, and the need for technology-limited countries to acquire the necessary technology from foreign sources for their national development aspirations. This is consequent to the fact that technologies are regarded as inventions and products of the human mind and are therefore the intellectual property of the inventors. Furthermore, Intellectual property rights are considered crucial to foster innovation by providing financial incentives to stimulate creativity (Ogundari, 2018).

Intellectual property rights in general refer to several types of creations of the mind to which the law recognizes exclusive legal rights. In this digital, globalized era, intellectual property is gradually occupying the former important position of real property (Adolf, 2001). Intellectual property rights are considered crucial to foster innovation by providing financial incentives to stimulate creativity (WIPO, 2000; Shashikant and Khor, 2010). The TRIPS Agreement requires all World Trade Organisation (WTO) members to provide a minimum standards of protection for a wide range of intellectual property rights including copyright, patents, trademarks, trade secrets, industrial designs, geographical indications, semiconductor topographies and undisclosed information, and measures governing how intellectual property rights should be enforced (WIPO, 2000). One of these minimum standards is the obligation of parties to the Agreement to grant patents in all fields of technology. In doing so, TRIPS incorporates provisions from many existing intellectual property international agreements such as the Paris and Berne Conventions administered by the World Intellectual Property Organisation (WIPO).

Policymakers are faced with the challenge of not only complying with internationally defined and binding minimum standards regarding technology patent protection, but also identifying and incorporating the right mix of policy options to best advance their national objectives of technology-based development. The poorer the country, the more dependent it is on foreign-developed technologies and the bigger the challenge to access these required technologies for national technology-based development.

### 1.1 Focus of the study

The introduction of the TRIPS Agreement has had significant implications on the ability of developing countries like Nigeria to acquire from foreign sources, the technologies critical for national development aspirations. The patent system as embodied by the TRIPS Agreement and enforced by its dispute settlement system is responsible for limiting access to technologies through granting patent holders exclusive rights for 20 years, while at the same time restricting the ability of developing countries to import, produce and market generic versions of these technologies. It is interesting to note that little or no attention has been given to identifying the flexibilities inherent in the TRIPS Agreement which could be exploited by developing countries to enhance access to the technologies required for sustainable development planning through appropriate legal and policy initiatives. This paper focused on examining these flexibilities within the context of the distinctive technology needs for Nigeria to achieve its sustainable development agenda. This was further as an input to Nigeria reviewing its national laws in order to inculcate the flexibilities identified in the TRIPS Agreement. The specific aims of this study were to examine Nigeria's technology-driven socio-economic development aspirations, analyze the TRIPS Agreement and its impact on technology-driven sustainable national development planning and identify flexibilities in the TRIPS Agreement that could be utilized for enhanced access to development technologies for and sustainable national development planning.

## 2.0 Technology Defined

The driving forces of technology in the 21st Century include telecommunications, biotechnology, nanotechnology, materials science, space applications, renewable energy technologies and microprocessor development (Allotey, N. D.; FMST, 2011). These technologies are altering the

global business environment, and modifying how people live, communicate and travel. The ability of these technologies to improve living conditions in developing economies is dependent on their access and application (Yu, 2004; Wahab *et al.*, 2012).

According to Kumar *et al*, (1999), technology consists of two primary components (1) a physical component which comprises of items such as products, tools, equipment, blueprints, techniques and processes and (2) the information component which consists of know-how in management, marketing, production, quality control, reliability, skilled labour and functional areas (Kumar *et al.*, 1999). Currently, technology is being viewed mostly as connected directly with knowledge and more attention is given to the process of research and development (Kranzberg, 1986). This knowledge is brought about both through research and innovation (moving ideas from invention to new products, processes and services in practical use), and through a complex and often costly process involving learning. Technology is always connected with obtaining certain results, resolving problems and completing tasks using particular skills, employing knowledge and exploiting assets (Lan and Young, 1996). The concept of technology does not only relate to the technology that is embodied in the product but it is also associated with the knowledge or information of its use, application and in the process of developing the product. This suggests the range of perceptions regarding the nature of the technology and the difficulty in finding an all-embracing definition (Wahab *et al.*, 2012).

Technology is the making, modification, usage, and knowledge of tools, machines, techniques, crafts, systems, and methods of organization, in order to solve a problem, improve a pre-existing solution to a problem, achieve a goal, handle an applied input/output relation or perform a specific function. It can also refer to the collection of such tools, including machinery, modifications, arrangements and procedures. Technology is also defined as the theoretical and practical knowledge, skills, artifacts that can be used to develop products and services as well as their production and delivery systems. Technology is also embedded in people, materials, cognitive and physical processes, facilities, machines and tools (Wahab *et al.*, 2012).

According to the WIPO Licensing Guide for Developing Countries:

> *Technology means systematic knowledge of the manufacture of a product, the application of a process or the rendering of a service; whether that knowledge be reflected in an invention, and in industrial design, a utility model, or in a new plant variety, or in technical information or skills or in services and assistance provided by experts for the design, installation, operation or maintenance of industrial or commercial enterprise or its activities.*

Maskus (2002) has broadened the concept of technology. The author defines technology as the information necessary to achieve a certain production outcome from a particular means of combining or processing selected inputs which include production processes, intra-firm organizational structures, management techniques, finance, marketing methods or any of its combinations.

According to the draft International Code of the Transfer of Technology, technology is the "systematic knowledge for the manufacture of a product, for the application of a process or for the rendering of a service." This definition encompasses all forms of commercially useable knowledge, whether patented or unpatented that can be the subject of a transfer transaction. According to UNCTAD (1999) it is the knowledge that goes into the creation and production of a product that constitute technology, not the finished product or service as such. This knowledge encompasses both the technical knowledge on which the end product is based and the organizational capacity to convert the relevant inputs into a finished product (UNCTAD, 1999). While scientific knowledge usually flows freely without significant constraints, technological know-how is a commodity that is traded on the world market under vigorous protection (Tellez, 2009).

Technology has some peculiar features. It has an intellectual character and consists of hardware and pure information that enables and conditions the

production process. Technology is also cumulative. The process of generating technical knowledge substantively differs from the production of material commodities (Sampath and Roffe, 2012). The process in question is cumulative which means that the present stock and level of technologies accumulated in the world result directly from scientific and technical developments laid down by past generations. Technology and access to technology plays a central role in catch-up growth; a process of closing the gap between those countries that produce new knowledge (industrial countries) and others that are learning to produce products and processes that are new to their contexts but not necessarily to the world at large (Sampath and Roffe, 2012).

## 3.0. Science, Technology and National Development: The Nigerian Perspective

Nigeria's first National Policy on Science and Technology was produced in 1986. Subsequent reviews took place in 1997, 2003 and 2011. The 2003 S&T policy gave prominence to flagship programmes of the Government of the day such as Biotechnology, Information and Communication Technology (ICT), Space Science and Technology, Energy and Engineering Materials (FMST, 2011).

In 2005, the need to carry out a system-wide reform was consummated and implemented under the Nigeria/UNESCO Science, Technology and Innovation (STI) reform initiative. It adopted the National Innovation System (NIS) approach as a framework for Science, Technology and Innovation (STI) system reform. The reform, among others issues, stressed that economic development initiatives, institutional governance, research and development (R&D) agenda for the country, funding mechanisms, Intellectual Property (IP) and STI Infrastructure development be addressed in any revised STI policy. Thus, the need to design a new policy that will address these challenges became indispensable (FMST, 2011).

The new STI policy, formulated in 2011, was a product of a novel, all-inclusive, participatory policy making involving various stakeholders across Nigeria as well as International Development Partners. One notable feature of this policy is its emphasis on 'Innovation', which has become a global tool for fast-tracking sustainable development. This policy was a clear demonstration of the country's renewed commitment to ensure that Nigeria's R&D engagements enhance new business development, encourage employment generation, and wealth creation through the creation and growth of Small and Medium Scale Enterprises (SMEs) that are ultimately translated into goods and services in the market place (FMST, 2011).

### 3.1 Development planning review

Development planning in Nigeria has evolved from the Colonial Development Plan of 1956 – 1968 to the Vision 20:2020 era from 1999 to date (Ikeanyibem, 2009; Ejumudo, 2013; FMBNP, 2017 and UNCTAD, 2018). Several development planning initiatives before the advent of the Fourth Republic in 1999 are the four 5-year national development plans (the First National Development Plan, 1962-68; the Second National Development Plan, 1970-74; the Third National Development Plan, 1975-80; and the Fourth National Development Plan, 1981-85), the medium-term 3-year rolling plans, the Structural Adjustment Programme (1986 – 1992), and the still-born Vision 2010 (Ikeanyibem, 2009; Ejumudo, 2013).

The third national development plan was the blue-print for Nigeria's the industrial development of Nigeria, while the fourth ND plan was to consolidate on this plan through the development and deployment of indigenous technological capability in national development. The first national S&T policy was formulated to promote this plan. Unfortunately, the focus on technology for national development brought about the complexities of technological transfer and its legal consequences.

Nigeria's quest for technology-based economic development is the premise for the formulation and implementation of several Development Programmes since 1999 – the National Economic Empowerment Development Strategy NEEDS) (1999 – 2007), the 7-Point Agenda (2007 – 2009), the Transformation Agenda (2009 – 2015), and the current Economic Recovery and Growth Plan (ERGP). The agricultural and industrial sectors were expected to be the growth drivers of the economy over the medium-term while the end-time growth would be driven by the manufacturing and service sectors. The strategies for this techno-

economic development agenda would involve the urgent and immediate addressing of the most serious constraints to Nigeria's growth and competitiveness. Siyanbola (2012) has argued that Nigeria's techno-economic development aspirations are achievable through strong growth in key economic sectors, which would serve as the economic growth engines. These sectors include those directly and indirectly linked to adequate energy supply (Oil, Gas and Energy; Electronics and Telecommunications; Industry, Trade and Investments). The development planning initiatives are discussed below (Ikeanyibem, 2009; Ejumudo, 2013; Usman, 2013; Iheanacho, 2014; Mashi *et al.*, 2014; FMBNP, 2017 and UNCTAD, 2018):

a. The Vision 20:2020, 7-Point Agenda, Transformation Agenda (Olusegun Obasanjo (1999 – 2007), Umar Musa Yar'Adua (2007 – 2010), and Goodluck Ebele Jonathan (2010 – 2015): These development plans are closely related. The Vision 2020 initiative was introduced by the President Olusegun Obasanjo Administration, framed and planned by the President Umar Yar'Adua Administration and largely executed, by the President Goodluck Jonathan Administration. The Vision set for Nigeria to be one of the 20 largest economies in the world by 2020. The main goal was to improve the well-being of Nigerians by reducing the problems of hunger, poverty, poor healthcare, inadequate housing, low quality human capital, gender imbalance, low productivity and poor basic facilities by 2020. The Obasanjo Administration set up the National Economic Empowerment and Development Strategy (NEEDS) as a short term strategy to accelerate growth and reduce poverty relying heavily on the deployment of technology. The major drawbacks of NEEDS were its weakness in poverty diagnostics and setting of economic targets. The plan also depended on its "trickle down" approach to poverty reduction. The Yar'Adua Administration set up the Seven Point Agenda with targets in, Power and energy, Food security, Wealth creation, Transport sector, Land reforms, security, and education. The agenda was to depend on the development and deployment of modern science and technology, diversification of production into agricultural and solid minerals sectors, rehabilitation and modernization of national roads and railways, release of land for commercialised farming and other large-scale businesses by the private sector, recognize security as necessary infrastructure for the development of a "modern Nigerian economy", and achieve a strategic educational development plan that "will ensure excellence in both the tutoring and learning of skills in science and technology" by students who will be seen as the "future innovators and industrialists of Nigeria.". The Goodluck Jonathan Administration established the National Transformation Agenda to attain the objectives of the Vision 20:2020 and the Yar'Adua 7-Point Agenda. The central aim of the Transformation Agenda was to transform Nigeria into a developed nation to the position of being at least the 20th Economy in the world by the year 2020. The Agenda focused on four key areas, Governance, Infrastructure, human capital development, and real sector development. Like the Vision 20:2020, NEEDS and the 7-Point Agenda, the Transformation Agenda was premised on the strategic development and deployment of science and technology for actualization.

b. The Economic Recovery and Growth Agenda (Muhammadu Buhari, 2015 – date): According to the Federal Ministry of Budget and National Planning (FMBNP) (2017), the Economic Recovery and Growth Plan (ERGP) is a Medium Term Plan for 2017 – 2020, which has been developed for the purpose of restoring economic growth while leveraging on the ingenuity and resilience of the Nigerian people – the nation's most priceless assets. It is articulated with the understanding that the role of government in the 21st century must evolve from that of being an omnibus provider of citizens' needs into a force for eliminating the bottlenecks that impede innovation and market-based solutions. The Plan recognizes the need to leverage Science, Technology and Innovation (STI) and build a knowledge-based economy. The ERGP is also consistent with the aspirations of the Sustainable Development Goals (SDGs) given that the initiatives address its three dimensions of economic, social and environmental sustainability issues. The ERGP has three broad strategic objectives that will help achieve its vision of inclusive growth –

restoring growth, investing in people, and building a globally competitive economy. The targets include social inclusion; job creation and youth empowerment through technology-based initiatives and creative industries/services; improved human capital through affordable and quality healthcare, and huge investment in quality education; investing in infrastructure, especially in power, roads, rail, ports and broadband networks; improving the business environment, and promoting digital-led growth, focusing on training IT Engineers in software development, programming, network development and cyber security.

In order to facilitate the goal of technological development through technology transfer on reasonable terms, the National Office for Technology Acquisition and Promotion (NOTAP), under the Federal Ministry of Science and Technology, has the mandate to implement the acquisition, promotion and development of technology and correct imperfections in the acquisition of foreign technology into the country (NOTAP, N. D). It was set up to encourage the flow of technology into the country to strengthen industrial development and to encourage domestic enterprises to acquire foreign technology that are suitable for the local environment. It has the mandate of encouraging a more efficient process for the identification and selection of foreign technology; the development of negotiation skills of Nigerians to ensure the best contractual terms while entering technology transfer agreements with foreigners; provision of a more efficient process for the adaptation of imported technology; the registration of all contracts of agreement having connection with the use of trademarks, patented invention, supply of technical expertise, the supply of basic or detailed engineering, the supply of machinery and plant and the provision of operating staff, managerial assistance and the training of personnel.

Nigeria had made attempts in the past to enhance the local production of goods needed in the country, improve its overall manufacturing capacity and reduce its dependence on imported products by acquiring the foreign technology needed. This was done by adopting the import substitution industrial policy (Uwaifo and Uddin, 2009; Siyanbola, 2012). This policy encouraged the building of assembly plants in Nigeria and importing completely knocked down parts for assembly in Nigeria. The policy also facilitated the establishment of steel plants like the Ajaokuta steel plant, vehicle assembly plants and machine tool companies like the Osogbo Machine Tool Company with the mandate to produce automobile parts to be used in the assembly plants and capital goods to facilitate industrial development (Okongwu, 2007). The objectives of these projects were not met and the country now depends on imports from industrialized countries (Uwaifo and Uddin, 2009; Wahab *et al.*, 2012). Some of the reasons given for the failure of the projects are the restrictive nature of the technology transfer agreements which did not provide for skill acquisition by the indigenous people (Uwaifo and Uddin, 2009; Siyanbola, 2012). Many technical projects in Nigeria are established on a supply, install, commission, operate and transfer basis and Nigerians are not given the opportunity to understudy and acquire the capability to carry out major repairs or to redesign the project making the internalization of the technology difficult (Siyanbola, 2012).

## 4.0 Intellectual Property and Intellectual Property Rights

Generally, Intellectual Property is the term applied to intangible forms of property, the value of which derives mainly from creative effort. Intellectual Property constitutes creative works that have economic value. Intellectual property is the result of human creativity. Its subject matter is formed by new ideas generated by man. Intellectual property differs from other forms of property because it is intangible, that is, it is a product of the human imagination. Intellectual property focuses on the produce of the mind rather than upon the produce itself (Phillips and Firth, 1995). New ideas may be applied in as many ways as the human mind can conceive. Their application to human needs and desires can be of considerable benefit to mankind. New ideas can be embodied in familiar things such as books, music and art, in technical designs, machinery and processes, amongst others. Once applied to human needs, the value of ideas ranges from the industrial and commercial, to the world of literature, art and design, and contributions to technological, economic, social and cultural

progress. Intellectual property has an increasingly important role to play in international trade and relations. Protecting the development and application of new ideas aids realization of benefits which can be derived from them. From the music industry to the drug industry, intellectual property is a lucrative market, and both individuals and corporations have a lot to lose from the infringement of intellectual property rights (Loew, 2006).

Intellectual property law is the means used to provide this protection. It comprises a discrete body of rights which are applied to the many and varied forms in which the human intellect expresses itself. Intellectual property rights cover that body of legal rights which arises from the mental and artistic product of the human intellect. The common feature that lies behind each of the intellectual property rights is that they are essentially negative (Cornish and Llewelyn, 2003). They allow the owner to stop others taking their creations. This preserves the integrity of and reserves the expectation and preservation of those creations for the right owners and essentially stop pirates, counterfeiters, imitators and even in some cases, third parties who have independently reached the same idea, from exploiting them without the license of the owner.

Countries have laws to protect intellectual property for two main reasons. One is to give statutory expression to the moral and economic rights of creators in their creations and the rights of the public in access to those creations. The second is to promote, as a deliberate act of Government policy, creativity and the dissemination and application of its results as well as to encourage fair trading which would contribute to economic and social development (WIPO, 2004). The industrial and transport revolutions which witnessed an explosion in new ideas and new means with which to spread their benefits gave intellectual property law increased significance. This is especially important to the advanced industrial countries particularly as the fund of exploitable ideas becomes more sophisticated and their hopes for a successful economic future come to depend increasingly on their superior corpus of new knowledge and fashionable concepts. The commercial and information age has only served to enhance the importance of intellectual property law (Colston, 1999).

Intellectual property is an exclusive proprietary right and can be dealt with as any other property, it can be assigned, licensed, mortgaged and bequeathed and even abandoned. It is conferred by the State and it can also be revoked by the State in certain cases even after grant, whether or not it has in the meantime been sold or licensed. It may also be subjected to a compulsory license in favour of another person if it has been inadequately exploited by the owner (Hodkinson, 1987).

Intellectual property rights are considered necessary in modern society and several justifications are given for their protection. Justifications for intellectual property rights are that new ideas will be stimulated if the creator is rewarded for the effort and expenditure of a creation, the investment needed to develop the idea for a commercially viable proposition is protected from unfair competition, including inward investment from countries and dissemination of the new idea is enhanced if its exploitation does not lay it open to immediate imitation, thus ensuring public access to new knowledge and ideas, whereas, without protection, the natural alternative would be to resort to secrecy and thus deprive the public the idea (Colston, 1999).

It is the position of developed countries therefore, that intellectual property rights over inventions have to be strictly protected to encourage inventors to invest time and money in the research and development of innovations. They say that weak intellectual property rights will harm industrialization efforts in the long run by discouraging new innovations and technology transfers. It is often argued that the availability of effective intellectual property rights protection provides foreign companies an incentive to transfer protected technologies to developing countries and will bring about technology transfer to the host countries and will encourage inflow of foreign direct investment which will in turn bring about technology transfer to the host country (Maskus, 2002). On the other hand, developing countries believe that strong intellectual property rights, especially in the area of patents and trade secrets do not encourage effective technology transfer but enable companies from developed countries sell

technology at exorbitant prices that they cannot afford and on terms that do not allow for the effective diffusion of the technology.

Furthermore, in so far as innovation is no longer driven by technological breakthroughs but by the routine of exploitation of existing technologies property systems designed to protect and exclude such as that embodied in the TRIPS Agreement have a chilling effect on innovation because they hinder vital diffusion of existing knowledge bases. To the extent that the nature of research and discovery is cumulative and most innovators "stand on the shoulders of giants" strong patent protection may result in socially inefficient monopoly pricing, and may provide deficient incentives for competitors to develop second generation products (Foray, 2004).

However, evidence that strengthened intellectual property rights will increase foreign direct investment and expand technology transfer flows is limited, ambiguous and inconclusive. The availability and enforceability of intellectual property rights is by no means a sufficient condition of an increase in foreign direct investment or for technology transfer to occur (Shashikant and Khor, 2010).

Generally, having intellectual property rights protected technology means that the intellectual property holder can control the use of his technology, and decide when, where and how to use it and whether to transfer it and the ways in which the technology can be utilized, if at all, in those countries where protection has been obtained. In some cases, the increased intellectual property protection may lead foreign firms to close down manufacturing facilities in the developing countries since the product can be imported from other locations. This effect was seen in the area of pharmaceuticals in some Latin American countries after the introduction of patent protection for pharmaceuticals (Shashikant and Khor, 2010).

## 5.0 The Concept of Technology Transfer

Technology and innovation play an increasingly important role in the global economy, and can potentially contribute to meeting urgent human needs for improved health, food security, water and energy, among others. The role of technology in development has attracted increased attention in recent years, particularly around the question of how to bridge the technological gap between countries with different levels of industrial capacity (Moon, 2011). Despite these insights on the important role of technological change for development, the world has been witnessing a widening technological divide emerging not only between the technologically developed and the developing world, but also within the developing countries themselves. Globally, there has been a greater divergence amongst the developing countries themselves, wherein several countries are well on their way to catching up and converging with the industrialized countries and many others are stagnating or even regressing in technological terms (Sampath and Roffe, 2012).

Technology transfer has many meanings, and many different terms are used for the processes involved in the development and international diffusion of technologies. The phenomenon of technology transfer is defined as "the process originating from the countries and the companies that developed and produced the innovation technology to the countries and subjects that will receive and facilitate their effective implementation and dissemination" (UNFCCC, 1998).

Many have concluded that technology transfer is most fundamentally the complex process of learning. It is not unreasonable to say that a transfer is not achieved until the transferee understands and can utilise the technology. A test of this criterion would be the ability of the transferee to choose and adapt the technology to the local socio-economic environment and raw materials, and to sell to someone else the original technology with improvements. The term "technology transfer" is defined as the broad set of processes covering the flows of knowledge, experience and equipment amongst different stakeholders (ICPC, 2000).

Technology transfer refers, in fact, to a comprehensive notion, including the tacit knowledge and "a broad set of processes covering the flows of know-how, experience and equipment'' following different pathways, where different entities intervene and influence these processes.

Transfer of Technology is an expression that suggests a whole range of forms through which

technological knowledge is transmitted from suppliers to recipients. In international practice, this may involve the following kinds of operations: the licensing of the use of patents, trademarks, models and other industrial property rights; the licensing and transmission of technical know-how and trade secrets; the supply of technical information by plans, diagrams, instructions and training of personnel; providing engineering services for the erection and commissioning of industrial plants; providing technical services for the management and operation of business enterprises (Okon, 1997).

Technology transfer is the process by which commercial technology is disseminated. This takes the form of technology transfer transaction, which may or may not be covered by a legally binding contract but which involves the communication by the transferor the relevant knowledge to the recipient. Technology transfer transactions may include the following (UNCTAD, 2001):

a. The assignment, sale and licensing of all forms of industrial property
b. The provision of know-how and technical expertise in the form of feasibility studies, plans, diagrams, models, instructions, guides, formulae, basic or detailed engineering designs, specifications and equipment for training, services involving technical advisory and managerial personnel and personnel training.
c. The provision of technical knowledge necessary for the installation, operation and functioning of plant and equipment and turnkey projects.
d. The provision of technological knowledge necessary to acquire, install and use machinery, equipment, intermediate goods and/or raw materials which have been acquired by purchase, lease or other means.
e. The provision of technological contents of industrial and technical cooperation arrangements.

It also includes non-commercial technology transfers such as those found in international cooperation agreements between developed and developing countries (UNCTAD, 2001).

The idea that a country should actively seek to transfer technology to another country is a relatively new one, seen in practice only during the second half of the 20th century. For most of history, countries have sought to protect knowledge of technologies, since knowledge is power, military power as well as economic power, the discussions on technology transfer has become a standard component in deliberations and negotiations in a variety of international fora starting with the landmark Earth Rio Summit of 1992 and the ensuing multilateral environmental agreements (MEAs) particularly the emblematic case of climate change in the UNFCCC, followed by the trade and intellectual property related negotiations in the WTO and WIPO and the public health negotiations under the WHO-CIPIH. Most of these discussions and debates have centered around how countries can acquire, use, and embark on learning and using technologies that already exist and are constantly being produced at the industrial frontier (Sampath and Roffe, 2012). The Intergovernmental Panel on Climate Change (IPCC) defined technology transfer as 'A broad set of processes covering the flows of know-how, experience and equipment for mitigating and adapting to climate change amongst different stakeholders such as governments, private sector entities, financial institutions, nongovernmental organizations (NGOs) and research/education institutions'.

Most technologies are improved incrementally over time, but occasionally there are opportunities for leapfrogging, especially for developing countries. It should be noted that the incremental improvement of technologies is accompanied by a continuous process of social and organizational change. Technology is a practical matter and it is supposed to enable the recipient to be able to develop the technology further into new products processes materials or services that will enhance the recipients' industrial competitiveness or otherwise improve their quality of life. The growth of multilateral organizations, such as the United Nations system, as well as of transnational corporations, and developments in communications and in intellectual property legislation were major factors in influencing technology cooperation and change in recent history (ICPC, 2000).

## 6.0 Effective Technology Transfer to Developing Countries

The ineffectiveness of early efforts to promote technology transfer led to a review of the factors that facilitate or impede its transfer and use. The

general view by developing countries was that the cost of acquiring technology was too high and imposes extreme difficulties on indigenous firms. On the other hand, the owners of technology do not consider its transfer to countries with weak enforcement of intellectual property rights a good business venture because of the likelihood of losing control of their intellectual property. They may prefer not to enter into a technology transfer contract at all, transfer obsolete technology, deal only with subsidiaries thereby keeping the knowledge within the firm or supply the market with exports (Maskus and Okediji, 2010). Furthermore many of the technology transfer agreements contained restrictive clauses making it difficult for the transferee to obtain the best from the acquired technology. This necessitated the setting up of technology transfer offices by many developing countries to ensure that their nationals acquire technology best suited for their needs and that it is transferred on the best possible contractual terms and conditions.

Further explorations of why technology transfer was not working began to focus on difficulties faced by recipients of technology to apply them. The early concept of technology as hardware holds that technology is generally applicable and easy to reproduce and reuse. However, some authors contend that technology is firm-specific information concerning the characteristics and performance properties of the production process and product design. They further argue that the production process or operation technology is embodied in the equipment or the means to produce a defined product while the product design or product technology is that which is manifested in the finished product. Pavitt (1985) suggests that technology is mainly differentiated knowledge about specific application. It is tacit, often uncodified and largely cumulative within firms. Based on this argument, technology is regarded as a firm's intangible assets which forms the basis of a firm's competitiveness and will generally only be released under special conditions. This intangible asset is rooted in the firm's routines and is not easy to transfer due to the gradual training process. Technology can include information that is not easily reproducible and transferable because of the higher cost associated with transferring tacit knowledge (Wahab *et al.*, 2012). Technological knowledge is not easily transferred because the technological learning process requires the recipient to assimilate and internalize the transferred technology. Technology and knowledge are inseparable because when a technological product is effectively transferred, the knowledge upon which its composition is based is also transferred (Bozeman, 2000).

The low levels of capabilities in developing country actors to use technologies may be attributed to the low levels of human skills in developing countries. As a result, fostering technology capabilities began to take on a unilateral focus on science, wherein the key issue was seen as one of creating adequate supply of scientists, researchers or engineers in developing countries. This conception of technological capabilities cemented views that technological advancement was largely dependent on the generation of scientific information, and flows from basic science in a relatively smooth progression from the laboratory to the market. Such a conceptualization of innovation put science, the initiating point of the process, as the most critical activity. A large amount of technology is already available in the public domain however, accessing these technologies and channeling them into processes of knowledge accumulation and innovation within countries is neither automatic nor costless. Using already existing technology in the public domain calls for the existence of technological capabilities amongst actors (Sampath and Roffe, 2012).

For technology transfer to be effective, it has to satisfy criteria such as economic sustainability, social acceptability and technological sustainability. The technology transferred must be affordable to the buyers at the same time the price and conditions for the technology transfer must provide incentives for the seller of the technology. Importing and mastering technology in developing countries is not as easy as earlier assumed. At an earlier stage of the debate of technology transfer to developing countries, it was assumed that the main issue to be resolved was the securing of access to new technology. It has become increasingly apparent that the mere possession of technology does not result in improved technical development or economic gain. The capacity to understand, interact with and learn from that technology is critical (UNCTAD, 1999).

The buyers must have full access to the technology once terms of the agreement have been met. Accurate balanced and comprehensive information about the technology to be transferred should be provided. The capability of the buyer for undertaking necessary information collection, monitoring and adaptation must be considered. Long-term institutional capacity building is required for the buyers in context of flexibility and capability to adapt the technology to changing circumstances and to improve the original technology transferred. It should also improve the skill and know-how of local staff. The technology should be technically sustainable, there should be improvements in training and management practices of the recipients of the technology.

## 7.0 The Trade Related Aspects of Intellectual Property Rights (TRIPS Agreement)

Before the Uruguay Round of the General Agreement for Tariffs and Trade preceding the formation of the World Trade Organisation, began in 1986, intellectual property developers in the United States made plain their dissatisfaction with the prevailing international system of intellectual property rights operated under the World Intellectual Property Organisation (WIPO) (Bainbridge, 1999; Colson, 1999). That system consisted of highly variable laws and enforcement across countries and regions. Countries with weaker regimes were said to be responsible for tens of billions of dollars in lost sales annually mostly due to counterfeiting of American trademarks which was increasing rapidly because of the proliferation of low-cost means of copying (Correa, 2005). In recent years, this system of highly variable national rights has become increasingly incompatible with the globalization of markets where firms must exploit their technical and product advantages on an international scale. Governments met with intense pressure for reform from multinational enterprises in industries like pharmaceuticals, software and recorded entertainment that are particularly attuned to multinational activity and vulnerable to imitation.

Another feature of the former system was a series of international treaties, managed primarily by WIPO, purporting to set minimum standards for intellectual property rights as guidelines for member countries. The major intellectual property treaties (the Paris Convention 1883 and the Berne Convention 1986) enjoyed wide spread international adherence although the perceived problems with these treaties were threefold (Adolf, 2001). First, some standards were weak and vaguely specified. It contained conditional clauses that exempt host countries from observing certain protection requirements, thus limiting the rights of proprietors. WIPO treaties were considered to offer only minimal standards of protection. The Paris Convention for example, essentially required only national treatment in each member's patent laws and grant of priority rights. Secondly, they provided no effective procedures for settling intellectual property rights disputes neither was a mechanism for the enforcement of intellectual property rights present). The treaties were therefore perceived as only statements of intention on the part of the signatory nations. Departures from the Paris Convention guidelines covering compulsory licences were common in national laws. Thirdly, it was difficult to negotiate the conventions rapidly and flexibly enough to handle new technologies such as integrated circuits, software and electronic databases which were straining classical conceptions of intellectual property protection. Among many developed economies, these technical advances were pushing forward changes in intellectual property rights but the WIPO conventions were seen as unable to keep up with the pace of development (Maskus, 2002; Maskus and Okediji, 2010).

The continuation of WIPO as the main multilateral forum for negotiations on intellectual property posed a dilemma for industry players, particularly in the areas of pharmaceuticals and software seeking to advance stronger, harmonized global standards of intellectual property protection and enforcement. Developing countries were also gaining new ground in the organization. Also, negotiations between developed and less developed countries over the revision of the Paris Convention for the Protection of Industrial Property (Paris Convention) were deadlocked at WIPO due to the numerical superiority of developing countries (Yu, 2004) Such considerations led developed countries to strategically move negotiations for a new far-reaching international intellectual property treaty away from WIPO to a new forum where industry would achieve more a favourable outcome (Tellez, 2009).

In the 1980s, the accelerating globalization of intellectual property use through international trade, foreign direct investment (FDI), and licensing inevitably came into conflict with these regimes; a conflict that would only worsen in the 1990s. The rising need to sell intellectual property on an international scale became increasingly at odds with existing intellectual property rights based strictly on national or territorial laws and regulations (Tellez, 2009). The priority of developed countries in the negotiations of the TRIPS Agreement in the WTO was twofold. First, to assist the national intellectual property right-holders to gain recognition and protection of their intellectual property rights in other WTO member countries to the same extent as granted in their national jurisdictions and second, to make it easier for national rights-holders to enforce their intellectual property rights in foreign markets. Although developing countries were able to introduce some safeguards and flexibilities in the TRIPS Agreement, the agreement is mainly concerned with the granting and enforcement of intellectual property rights. The TRIPS Agreement does not set out comprehensive multilateral rules to ensure that national intellectual property systems function in a manner that strikes an adequate balance between the interests of the right holders and the public interest. Rather, the exercise of flexibilities, limitations and safeguards contained or otherwise not explicitly prohibited in the TRIPS Agreement is left to national discretion (Tellez, 2009).

During the previous GATT Round, many countries both industrialized and developing became increasingly aware of the problem of counterfeiting. As a result, an attempt was made at that stage to lay down common rules for the seizure of counterfeit products by customs authorities. When the Uruguay Round started in 1986, the agenda was extended to cover general issues of intellectual property protection as well as counterfeiting. Perhaps predictably, there was a tension between the industrialized world and the developing countries about the desirability of high levels of protection for intellectual property rights. Industrialized countries saw intellectual property rights as a primary means of protecting technological development by offering investors and others the chance to get rewards for their labours. By contrast, many developing countries considered that the purpose of intellectual property was to reinforce the economic power of the Western industrialized nations. As on one hand the demand for the increased protection has arisen, so on the other has the level of suspicion and criticism of intellectual protection. Developing countries which were only beginning to exploit intellectual property for their own development have often found themselves with an inheritance of protectionist laws from colonial days. These can easily appear to be a legal pretext for foreign industry, technical and cultural to cream off scarce resources in royalty payments. Yet in the race for development, there is a real need to acquire technology from the advanced nations and there is often the strong popular demand for products bearing the allure of western prosperity (Worthy, 1998; Taubman and Watal, 2010).

During the course of the negotiations, however, a consensus emerged on the need for the need for intellectual property protection and progress was made on the proposed text on the Trade-Related Aspects of Intellectual Property. This was a major breakthrough in the international protection of intellectual protection because of its substance and because of the wide measure of international acceptance it has achieved (Worthy, 1998).

## 8.0 Technology Transfer in the TRIPS Agreement

The TRIPS Agreement introduced intellectual property rights into the international trading system and it is the most important international law governing intellectual property rights and the most far-reaching agreement so far on the protection of intellectual property (Adedeji, 2012). The Agreement sets out minimum standards of protection in all areas of intellectual property that all its signatories are obligated to maintain. Intellectual property rights under the WTO-TRIPS Agreement has been seen by many developing countries as an instrument of political and economic control by developed countries as the major producers of technology. The experience of developing countries with regard to technology transfer has been bitter. This is because lacking the negotiation skills with regard to technology transfer agreement while being desperate to acquire the technology needed for economic advancement signed technology transfer agreements that included terms that were oppressive and

unfavourable to national economic interests. These agreements contained terms of monopoly pricing, restrictive business practices such as discriminatory royalty rates, export restrictions and terms maintaining an unhealthy and unfavourable dependence on the technology supplier indefinitely. The TRIPS Agreement qualifies patent protection rights and has several references and provisions that specifically refer to technology transfer.

In its Article 7, the agreement states its objectives thus;

> *The protection and enforcement of intellectual property rights should contribute to the promotion of technological innovation and to the transfer and dissemination of technology to the mutual advantage of producers and users of technological knowledge and in a manner conducive to social and economic welfare and to a balance of rights and obligations.*

This provision (Article 7) reflects the search for a balanced approach to intellectual property rights protection in the societal interest, taking into account the interests of creators and inventors and the interests of users of technology. Intellectual property rights protection is expected to contribute not only to the promotion of technological innovation, but also to the transfer and dissemination of technology in a way that benefits all stakeholders and that respects a balance of rights and obligations (Taubman and Watal, 2010). Despite the above, it is the view of many scholars particularly in developing countries that the TRIPS Agreement reflects the technological protectionist agenda of the United States and other developed countries. At the time the Agreement was being negotiated, as well as now, developed countries account for most of the global resources spent on research and development. They also control most of the global cross-border royalties and technology licensing fees (Correa, 2005).

The primary objective of proponents of the TRIPS Agreement was to secure protection for owners of intellectual property rights which largely come from developed countries. Developing countries' concerns about the implications of stronger intellectual property rights on technology transfer received limited attention during the TRIPS negotiations (Correa, 2005). Article 7 seems to indicate that the protection and enforcement of intellectual property rights may not in itself necessarily promote technological innovation and transfer of technology, but should be implemented to ensure innovation and transfer of technology (Shashikant and Khor, 2010).

Article 8.2 which is on principles is another important provision of the TRIPS Agreement. It recognizes the need for "appropriate measures" to prevent the abuse of intellectual property rights by right holders or the resort to practices which unreasonably restrain trade or adversely affect the international transfer of technology but provided they are consistent with the provisions of the Agreement. This article acknowledges the right of WTO member States to adopt appropriate measures where the intellectual property holders resort to practices which may adversely affect the international transfer of technology.

The Article 8 furthermore, allow members to adopt provisions to "protect public health and nutrition and to promote the public interest in sectors of vital importance to their socio-economic and technological development, provided that such measures are consistent with the provisions of this Agreement." The TRIPS Agreement contains a balance of rights and obligations "providing some significant scope for Members to circumscribe intellectual property rights in the name of competing public values" (Howse, 2003).

## 9.0 The TRIPS Agreement Flexibilities

The TRIPS Agreement also has other flexibilities that have considerable impacts on the transfer of technology. TRIPS Agreement does not establish a uniform international law or uniform legal requirements. Although WTO member countries are required to comply with the minimum standards of the Agreement, they have considerable room to develop their intellectual property rights laws in a manner that is responsive to the needs and policies of the country (Adedeji, 2009). Thus developing countries may legitimately adopt regulations that ensure a balance between the minimum standards of intellectual property rights and the public good (Adedeji, 2009).

### 9.1 Exemptions from patentability

Patentability implies the boundaries created in relation to which inventions, products or processes, offer new technical solutions to a problem may be patented (Adedeji, 2009). Under the TRIPS Agreement, to qualify for a patent, an inventor must show that the invention is novel, manifests an inventive step, and is industrially applicable. Prior to the TRIPS Agreement, countries were at liberty to exclude inventions of certain areas of technology considered critical for social, economic and national development from patentability, such as the pharmaceutical and chemical sectors. Currently, under the Agreement, all WTO members are required to grant patents to all types of inventions in all fields of technology so far as they meet the basic criteria of patentability which the Agreement does not expressly define (WTO, 2000).

The Article further requires that patents shall be available and patent rights enjoyable without discrimination as to the place of invention, the field of technology and whether products are imported or locally produced. The manner in which these criteria are defined and applied, however, is a crucial determinant of the pool of knowledge that is subtracted from the public domain, which is acutely important for technology. Since the TRIPS Agreement does not define the patentability criteria (Maskus and Okediji, 2010), some policy space remains in relation to the scope of patentability in each country that can be used to facilitate the transfer of technology (Adedeji, 2009) The TRIPS Agreement allows WTO Members to determine on a case-by-case basis whether to grant a patent for an invention. Thus, countries have the right to define the criteria in any manner they deem fit. Developed countries, which tend to be generators of technology often, define the criteria loosely, thus, enabling their entities to file many extensive patents. Such application of the patentability criteria has raised concerns given the increasing rise of trivial and broad patents. If developing countries adopt similar loose criteria, the resulting effect will be an increase in the number of patents granted to foreign applicants from the developed countries which are the main beneficiaries of the patent system.

The flexibilities provided by the TRIPS Agreement allows developing countries to adopt a much stricter approach to the definition and application of the patentability criteria, thus limiting the number of patents granted on climate technologies. Without a patent, a country with some technological capability would be able to innovate on the basis of climate friendly technology through reverse engineering. However, patent issues would still arise in the case of exports where the technology is patent protected in the importing country (Shashikant and Khor, 2010). The option of strict application of patentability criteria is of limited value. In most developing countries, there is a severe lack of patent examination capacity. Many patent examination offices grant or reject patent applications on the basis of patents granted by patent offices in developed countries. Thus, even where the national patent law provides for a higher standard of patentability criteria in developing countries, in practice these standards may not be applied. In addition, strict application of patentability criteria would work only to reduce the number of patents granted, as it would avoid low quality or trivial patents. The issue of access to the patented technology would still need to be addressed.

### 9.2 Compulsory licensing

A license is a permission given by the owner of an intellectual property right to do certain specified things in respect of the subject matter of the right, for example, where the owner of a patent grants a license to another person permitting the working of the invention by that other person. Intellectual property licenses are normally contractual in nature and the licensor will usually receive royalties by way of consideration for the permission (Bainbridge, 1999). Licenses may be exclusive or non-exclusive. An exclusive license is one where the licensee has the exclusive right to do certain things to the exclusion of all others including the licensor. Several non-exclusive licenses may be granted to different persons in respect of some work or invention.

Patent law has long provided for national authorities, in certain circumstances, to override the wishes of a patent holder and to authorize a third party (or a government agency) to use, produce, import or sell the patent-protected technology. The key provision in TRIPS is Article 31, which does not use the term "compulsory licences" but rather the more general term "use without authorization of the right holder". This Article therefore covers both

compulsory licences granted to third parties for their own use, and use by or on behalf of governments without the consent of the right holder (Taubman and Watal, 2010). Compulsory licenses may be granted under the provisions of an administrative or judicial authority to a third party allowing the exploitation of a patented invention without the consent of the patentee (Adedeji, 2009). For example, a statute may give the comptroller of Patents the power to grant a compulsory license to an applicant if the patent in question is not being worked commercially. This may happen if the patent or design is not being sufficiently worked, is contrary to the public interest or because of a statutory provision. There is also the danger that the proprietor of a patent will abuse the monopoly granted to him. Patent rights may give rise to abuses rooted in the desire to ward off competition. Abusive practices include a refusal to license patented technologies, restrictive licensing, and both cluttering up the patent register and dumping patented goods in developing countries (Hutchison, 2008). It therefore facilitates competition policies to remedy anti-competitive practices and patent abuses, thus lowering the price of patented products (Hutchinson, 2008).

Compulsory licenses not only cover situations where a patent is not being worked but are also available in other circumstances such as where the demand for a product is not being met on reasonable terms. The need for compulsory licenses is likely to be at its most intense where a clear national need arises such as defence or health care. Grounds for issuing compulsory licenses could include a refusal to deal, that is, when the patent holder refuses to grant a voluntary license which was requested on reasonable commercial terms and conditions within a reasonable period of time, national emergency or other circumstances of extreme urgency. It could also be granted to remedy against anti-competitive practices when there is a lack or insufficiency of local working of the patent in the public interest, public non-commercial use (government use licenses) or for public health, security reasons, environmental reasons, and interdependent patents. It is the view of some authors that a whole hearted system will contain nothing that fetters a patentee's power to act as a monopolist if the market allows it. He will be able to hold production of his invention down to the level of maximum profit. A patent holder has the absolute right not to license or sell his patent and thus a refusal to deal is neither abusive nor anticompetitive (Pires de Carvalho, 2005).

There is no basis under TRIPS, according to this view, to compulsorily license technologies which companies refuse to deal because "there is no sounder business practice than refusing to engage in commercial deals with competitors." (Pires de Carvalho, 2005). This argument, however, runs counter to the terms of Article 8.2. A refusal to deal with a competitor on commercial terms, thus adversely affecting the international transfer of technology, is an abuse under Article 8.2 which Members may address in their legislation. Appropriate measures, provided that they are consistent with the provisions of the Agreement, may be needed to prevent the abuse of intellectual property rights by right holders or the resort to practices which unreasonably restrain trade or adversely affect the international transfer of technology (Hutchinson, 2008). Many countries have felt the urge to qualify the inventor's patent rights in the name of some other policy objective such as the local working of the invention or the satisfaction of the consumer demand. A compulsory license may then be granted which will prevent the patentee from acting as sole producer. He will be obliged instead to face direct competition subject only to a royalty or other fee on the licensee's sales assessed by an outside arbitrator under some criterion of reasonableness (Hutchinson, 2008).

Compulsory licensing can be used as a policy tool to promote transfer of climate change technology to developing countries. It is generally acknowledged as an essential legal doctrine, but no one wants to be the subject of its exercise (Cannady, 2009). The TRIPS Agreement deals with compulsory licensing in Article 31. It subjects the issuance of a compulsory license or any other use without the patentee's authorization including use by the government and their collaborators to a variety of conditions. Each instance has to be considered individually, and must be preceded by attempts at voluntary negotiations, therefore, cannot simply be conditional on a particular event occurring (Worthy, 1998). The scope and duration of the license must be confined to its purpose and must be open to review when the circumstances change. The license must be non-exclusive, non-assignable

and a predominately for supply of the domestic market, adequate remuneration must be required. Any decision, whether about authorization or remuneration must be open to judicial review. There are further conditions where a head patent is being licensed in order to permit exploitation of a subsidiary patent (Cornish and Llewelyn, 2003). Usually, compulsory licenses only permit the use of a patent but do not oblige the patentee to transfer the technological package developed to execute the invention. Hence, it is quite useful in situations where trade secrets and know-how are not important issues and entities in developing countries have some technological capacity to reverse engineer once the compulsory license is issued. However, in developing countries where firms are less technically endowed, a mechanism that does not ensure access to the required skills and know-how essential for the absorption and operation of the technology is unlikely to be very beneficial (Shashikant and Khor, 2010). The firms in these countries may not be able to use the technology as the information in the patents may not be sufficient enough to use the technology and technology that is in the form of tacit knowledge cannot be learnt from patents and the patent holder is under no obligation to transfer the technology (Srinivas, 2009). The provisions of the TRIPS Agreement although imperfect, do entitle developing countries latitude to use compulsory licenses to advance national goals, including those relating to mitigation of climate change as the Agreement does not specifically define the terms of the grant. It thus leaves room for the liberal interpretation of those provisions leaving developing countries with the policy space to achieve technology transfer (Nkomo, 2010). Provisions in United States laws, including those relating to clean air, confirm this and provide a useful example for developing countries seeking to ensure that technology is available on a fair and favourable basis to address the challenges of climate change.

Despite the theoretical availability of compulsory licensing, its use by developing countries is relatively rare because of the potential political repercussions (Cannady, 2009). There are factors specific to developing countries that discourage the use of compulsory licenses. These include pressure from the patent holder supported by their developed country governments to not issue or to abandon the compulsory license. Rather than face stiff opposition from the patent holders, including the possibility of being embroiled in expensive, protracted and unpredictable litigation and political pressures from their governments, entities in developing countries may attempt to negotiate a voluntary license, failing which they may abandon the idea of using the patented technology (Shashikant and Khor, 2010). Even if compulsory licensing could be used in the ordinary course of business, it does not function to create the science and technology infrastructure needed to use, evolve, improve and commercialize technology. Voluntary licensing of patents requires, as a practical matter, a consensual business relationship in which more than abstract rights to use patents are exchanged (Cannady, 2009).

### 9.3 Parallel imports

A patent confers a time bound monopoly for the working of an invention on the patent holder, in that the patent holder may prevent any other person from using, making, selling or importing the patented product in that country in which the patent is in force. Thus the patent not only confers the exclusive right to manufacture and work a patent in the country but also the exclusive right to import the patented product into the country (Heath, N. D).

Companies often charge lower prices for a medicine in one country than in another, taking into account a range of market factors. This means that a country with limited resources can sometimes afford more of a patented medicine by purchasing it abroad at a lower price and importing it, rather than buying it directly in its domestic market at the higher price. Many countries' patent laws determine that once a patent owner sells its goods in any country, it has no right to control the resale of those goods. In other words, the patent owner has "exhausted" its property rights in the product actually sold. It maintains the exclusive right to manufacture the product, but it cannot use its intellectual property rights to prevent resale of those units it sells. An intermediary could thus buy a patented medicine in one country at the lower price set by the company and then resell the medicine in another country at a price that is higher but still undercuts what the manufacturer is charging for its patented medicine in that country. This is called "parallel importing" (Howse, 2003).

According to Heath (N. D.), parallel imports are one of the most iridescent and enigmatic phenomena of international trade. On the one hand, they strictly follow the laws of the market; yet on the other hand, the laws of the market are not the only ones that apply to this kind of activity. While industrial producers are pressing for general barriers in order to maintain price differences of goods among various countries, consumers find such differences puzzling in a world that is increasingly heading towards international trade and the removal of trade barriers. Easy resolution of the problem is not in sight.

If products sold or imported by third parties fall within the scope of patents, trademarks or copyrights valid in this particular country, such sale or importation by third parties is generally deemed infringing. Owners of products covered by intellectual property rights have the exclusive right to put such products on the market. On the other hand, there is little doubt that once the owner of an intellectual property right has put such goods on the market either himself or with his consent, there is little he can do about further acts of commercial exploitation, such as re-sale, etc., on the domestic market (Heath, N. D.).

According to *National Phonograph Company of Australia Ltd. v. Menck,*

> *It is open to the patentee, by virtue of his statutory monopoly, to make a sale sub modo, or accompanied by restrictive conditions which would not apply in the case of ordinary chattels; ... the imposition of these conditions in the case of sale is not presumed, but, on the contrary, a sale having occurred, the presumption is that the full right of ownership was meant to be vested in the purchaser while ... the owner's rights in a patented chattel would be limited, if there is brought home to him the knowledge of conditions imposed, by the patentee or those representing the patentee, upon him at the time of sale.*

The Paris convention is silent on the issue of parallel importation and it was expected that the TRIPS Agreement would deal with the issue as it is meant to be a treaty covering all aspects of intellectual property rights but it was not to be. Although it was recognised that parallel importation would indeed fit nicely within the objective of international free trade advocated by the General Agreement on Tariffs and Trade, agreement could not be reached to allow generally for parallel importation. In order to overcome this stalemate situation, Art. 6 of the TRIPs Agreement now provide that "for the purposes of dispute settlement under this Agreement ... nothing... shall be used to address the issue of exhaustion of intellectual property rights." The dispute settlement mechanism in general allows every member to bring an action against another state if there is insufficient compliance with the principles of the WTO Agreement in general. Yet according to Article 6, whatever national stance is taken on the matter of exhaustion, no complaint can be heard in this respect. While this certainly means that no country can be put on trial for deciding for or against international exhaustion, it does not necessarily mean that the TRIPS Agreement as such would not favour either one or the other position (Heath, N. D.).

Developing countries can therefore take advantage to this to get access to much needed climate change technologies at affordable prices.

### 9.4 Article 40 of the TRIPS agreement

Article 40 of the TRIPS Agreement contains a set of rules aimed at the "control of anti-competitive practices in voluntary licensing which may in turn impede the transfer of technology (Adedeji, 2009). Art 40.1 states WTO Members recognition and agreement that "some licensing practices or conditions pertaining to intellectual property rights which restrain competition may have adverse effects on trade and may impede the transfer and dissemination of technology". Art 40.2 expressly allows WTO Members to specify "in their legislation licensing practices of conditions that may in particular cases constitute an abuse of intellectual property rights having an adverse effect on competition in the global market". Art 40.2 further provides a few examples that may be deemed restrictive. They include exclusive grant-back conditions (i.e. provisions that require the licensee to transfer back improvements on the licenses technology exclusively to the licensor,

conditions preventing challenges to validity and cohesive package licensing, requiring the licensee to acquire inputs from the licensor that the licensee does not need.

Art 40.3 provides for a consultation system between Members if it believes that a national or domicile of that other member is undertaking practices in violation of the requesting member's laws and regulations and "wishes to secure compliance with such legislation" without prejudice to any action under the law and to the full freedom of an ultimate decision of either member. Correa (2005) points out that the powers available under TRIPS Article 40 are short of what the proposed Code on Technology Transfer provided. According to Correa "Instead, while expressly allowing Members to adopt measures to control or prevent such practices, it takes pains to establish limits to national action in this field". Thus, what actions are possible under Article 8.2 is circumscribed by Article 40. It severely limits the government's capacity to take steps that prohibit anti-competitive practices in technology transfer. This raises questions about the scope of competition policy in fostering technology transfer and in prohibiting anti-competitive practices (Srinivas, 2009).

### 9.5 Article 66 of the TRIPS agreement

Article 66 delays implementation of TRIPS for the least developed countries (LDCs). This article recognizes the special needs of least developed country members and awards a special transition period for the implementation of the agreement (Adedeji, 2009). This special exemption expired at the July 1, 2013 with an exception made for pharmaceutical products. In Art 66.2 the TRIPS Agreement also establishes a specific obligation on developed countries to take measures to promote and encourage technology transfer to least developed countries. Article 66.2 provides:

> *Developed country Members shall provide incentives to enterprises and institutions in their territories for the purpose of promoting and encouraging technology transfer to least-developed country Members in order to enable them to create a sound and viable technological base*.

The nature of the technological transfer is broader here (that is, a sound and viable technological base) than in multilateral environmental agreements that concern climate change technology. States are given discretion is given in designing measures to comply with this obligation as Developed country Member governments are not obligated to carry out technology transfer themselves, but rather are to provide incentives to their "enterprises and institutions" to encourage technology flows to LDC Members (Correa, 2005). Unfortunately, Article 66.2 has not resulted in much concrete action beyond technical programs to implement intellectual property laws (Moon, 2011). Developing and least developed countries have frequently noted and raised alarm in the Council for TRIPS, the WTO body which monitor the operation of the TRIPS Agreement about the fact that developed countries' compliance with art 66.2 is not satisfactory. In a paper to the WTO's governing General Council and to the TRIPS Council, the Indian delegation stated, "there has been little effort to implement this provision, raising doubts about the effectiveness of the Agreement to facilitate technology transfer (Government of India, 2000).

Steps have been taken to reaffirm commitment of developed countries under Art 66.2 but little has changed with regard to the effective implementation of the commitments to create a sound and viable technological base in least developed countries. According to Moon 2005, based on the evidence from country reports, the picture of developed country compliance with Art 66.2 is rather weak although an improvement was noticed in country reports overtime especially after the 2003 TRIPS Council decision demanding that developed country Members submit annual reports on actions taken or planned to fulfill their commitments under Art 66.2.

### 9.6 Limited exceptions to patent rights

Article 30 recognizes that Members may allow limited exceptions to the exclusive rights conferred by a patent. This provides scope for third parties to use the patented invention without permission from the patent holder and without incurring any liability for infringement. The TRIPS agreement does not set out specific exceptions, but rather a general rule that actual exceptions under national law should respect. The rule is expressed as a set of three conditions, usually called the three-step test, which require that any exception to patent rights must be limited; not unreasonably conflict with a normal

exploitation of the patent; and not unreasonably prejudice the legitimate interests of the patent owner, taking account of the legitimate interests of third parties. The TRIPS Agreement does not define the circumstances for the use of these patents; it is up to each country to define these circumstances depending on their national policies. Limited exceptions to patent rights cover the use of the patented invention for private, non-commercial purposes and for scientific research or experimentation on the invention for commercial purposes, for example to test it or improve on it (Srinivas, 2009). This may be relevant in the climate change context as certain environmental and climate change adaptation technologies in the agricultural and medical fields will be subject to regulatory processes, such exceptions may help accelerate the diffusion of such technologies.

## 10.0 Conclusion

It should be noted by countries and firms who are dependent on technology transfer in order to meet their technological needs, that despite the intellectual property regime that is geared towards protecting inventors and owners of intellectual property, there is still room for negotiating technology transfer agreements favourable to their overall technological goals. They must however ensure that the terms of any technology transfer agreement meets the standards of full and free access to the technology and adequate training of personnel in order to ensure that the technology is fully imbibed and further innovation on the technology can be achieved to adapt it more fully to local circumstances.

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