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Importance of Regulation in the Brazilian Intellectual Property Legal System and the Consequences of the Delay for the Development of the Country

Importância da Regulamentação no Sistema Jurídico Brasileiro da Propriedade Intelectual e as Consequências do Atraso Para o Desenvolvimento do País

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***Abstract*—** *Intellectual property rights have their roots in the Paris Conventions (1883) and Bern (1883) and will materialize in contemporary society through TRIPS. Brazil, as a signatory country to these international agreements, sought to adapt its domestic System of knowledge protection. However, it was a relatively tardy measure, considering that implementation took place, in the late 1970s, through the Industrial Property Law (Law nº 9279/1996), which had a high cost to the country in terms of development. As if the time delay were not enough, the protection of knowledge in Brazil was born out of date, considering the advance of patent rights on biotechnology. By denying patents on genetic and modified material, the country opened its borders to patent applications requirements from developed nations, based on TRIPS. Thus, from the dialectical method combined with the hypothetical-deductive method, this work seeks to investigate the intellectual property rights of Brazil, having international treaties and national legislation as references. The results show that the country paid dearly for the negligence in protecting its knowledge, which placed it in the rear of scientific and technological development, and resulting in the expansion of the technological domain of developed nations in Brazilian territory.*

***Resumo*—** *Os direitos de propriedade intelectual têm sua origem nas Conveções de Paris (1883) e Berna (1883) e vão se concretizar na sociedade contemporânea pelo TRIPS. O Brasil, como país signatário desses acordos internacionais procurou adequar seu Sistema doméstico de proteção do conhecimento. Entretanto, o viés temporal foi relativamente tardio, considerando que a*

implementação se deu tardiamente, na década de 1970, por meio da Lei de Propriedade Industrial (Lei nº 9.279/1996), o que custou caro ao País em termos de desenvolvimento. Como se não bastasse o atraso temporal, a proteção do conhecimento no Brasil já nasceu desatualizada, considerando-se o avanço dos direitos de patentes sobre a biotecnologia. Ao negar as patentes sobre o material genético e modificado, o País abriu suas fronteiras aos pedidos de patentes das nações desenvolvidas, com base no TRIPS. Deste modo, a partir do método dialético combinado com o hipotético-dedutivo, busca-se neste trabalho investigar os direitos de propriedade intelectual do Brasil, tendo como referenciais os tratados internacionais e a legislação nacional. Os resultados apontam que o País pagou caro pela negligência na proteção do seu conhecimento, o que o colocou na retaguarda do desenvolvimento científico e tecnológico, e que resultou na ampliação do domínio tecnológico das nações desenvolvidas em território brasileiro.

I. INTRODUCTION

This article aims to present the knowledge protection superstructure in Brazil. The country took a long time to define its Intellectual Property Policy, doing so only in the 1970s. Previous rules were specific, such as the Medeiros and Albuquerque Law, which dealt with copyright. It was only in 1996 that a law regulating patent rights was enacted, a matter regulated by the Brazilian Industrial Property Law (Law No. 9.279/1996), and, later, the Copyright and Related Rights Law (Law No. 9.610/98), even though the country adhered to the Paris Convention in 1884, and it was ratified in 1975.

On the other hand, by guaranteeing the legal security of protection of intellectual property rights, it did not prioritize domestic patents, not imposing an innovative attitude on Education and Research Institutions in Brazil. Teaching prevailed and the intellectual property only became a strategic issue in the 2000s, with the enactment of Law No. 13.243/16, for the consolidation of innovation in the scope of national Research and Development (BRASIL, 2016b).

To achieve the proposed objectives, the Dialectical Method of Aristotle, Socrates (399 BC) and Plato (427-347 BC) was adopted, combined with the Hypothetical-Deductive Method (Karl Popper, 1935), involving propositions from the areas of Legal and Economic Sciences. The investigative technique was based on national and international legislation and doctrine, mainly within the scope of the World Trade Organization (WTO), via Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS).

For better understanding, this work has been divided into Sections and subsections. Section 1 is conceptual, addressing aspects of knowledge protection and its insertion in the legal system (Section 1); the direct relationship that exists between private property and intellectual property (Section 2); intellectual property as a right (Section 3); and, intellectual property and access to genetic heritage (Section 4).

Section 2 is more pragmatic, as it presents the legal definitions and patenting processes adopted by the National Institute of Intellectual Property (INPI) on invention patents (Section 1); Utility Model patents (Section 2); Industrial Design patents (Section 3); and, Entitlement and Licensing (Section 4).

Thus, it is believed that this work can be important in the activities of the professor/researcher in the identification and patenting of the inventive activities developed within the scope of their actions, as well as for society in general.

II. MAIN INTERNATIONAL KNOWLEDGE PROTECTION AGREEMENTS TO WHICH BRAZIL IS A SIGNATORY

The main international agreements for the protection of knowledge that regulate intellectual property to which Brazil is a signatory, are: Berne Convention (Copyright), 1886; Paris Convention (Industrial Property), 1883; Rome Convention (Rights of Interpreters), 1961, and the Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPS), 1994. These agreements guide the formation of internal legislation in signatory countries, such as Brazil (TAFFOREAU, MONNERIE, AND KPOLO, 2015).

The management instance on a global level is the World Intellectual Property Organization (WIPO, 2019), which deals with administrative issues, and the WTO,

responsible for applying sanctions in case of non-compliance. In Brazil, the governmental body for protecting knowledge is the Ministry of Industry, Foreign Trade and Services, and the management body is the INPI. It is the Ministry´s responsibility to receive the patent deposit and manage the search services for precedence, anteriority. In this scope, the consequences of these multilateral agreements in the Brazilian legal system will be verified, as well as their particularities.

III. PROTECTION OF KNOWLEDGE IN THE BRAZILIAN LEGAL SYSTEM

In Brazil and in countries governed by the Principle of the Democratic Rule of Law, the protection of knowledge is an area of law that protects intellectual creations, providing their holders with economic rights. Therefore, it is a matter of the Economic Law sector, here understood by Souza (1977), apud Del Masso (2013, p. 28) as being:

> [...] the branch of law that has as its object the regulation of economic policy and as subject the agent who participates in it. As such, it is a set of economic norms that ensure the defense and harmony of individual and collective interests, in accordance with the ideology adopted in the legal order. For that, it uses the principle of economy.

Economy, taken as a principle here, refers to the legal valuation of the economic. Its function is to enable applicators of Economic Law "stop reasoning only legally to achieve the effects of a rule created or applied to comply with the precepts of the economic order" (SOUZA, 1977, apud DEL MASSO, 2013, p. 28).

When dealing with the matter, Bagnoli (2009) understands that Economic Law came to consolidate economic power, understood by him as:

> [...] the manifestation of power conditioned to the economic factor that subordinates those who do not hold the economic element. The manifestation of economic power is a difficult one to have its domination perceived, in which the dominant and the dominated are related forming something unique, while remaining distinct, each one having one face of the same coin. (BAGNOLI, 2009, p. 28).

For the author, this "coin" maintains its balance thanks to the action of the State, which regulates and distributes justice (BOBBIO, 1987) in a balanced way.

> The absence of the State in the economic domain to inspect and regulate the free initiative of economic agents in defense of competition, or the relationship established between public and private power, imply the increase of capitalist monopolies, 'conquered in the market by virtue of power of property'. The relationship between economic power and law leads legal scholars to think of ways to control economic power. Therefore, it is necessary to understand the factors that transformed society and the States and the relationship between Law and Economy (BAGNOLI, 2009, p. 35; no emphasis in the original).

According to the author, both Law and Economics have a profound "imbrication" with Social Sciences, which is why the complexity of these relationships that involve Law and Power should be considered, and understanding them is one of the great challenges of legal-political reflection. From the emergence of the Modern State, the role of Law underwent profound transformations, ceased to be a political reference to be consolidated in a positive [1]way, with the guarantee of legal security consolidated by Napoleon's Civil Code of 1808 (BORGES, 2008). In the Modern Era, this relationship between the Modern State and the relationship between Law and Economics became mediated. The Law came to figure as an "instrument of government" (BAGNOLI, 2009).

From the perspective of a Law as an *instrument of government*, the greatest good to be protected is *free*

[1] Positive Law is embodied in the rules and principles that regulate people's behavior through coercion" (MORAES, G.P. Course of Constitutional Law. 6. ed. São Paulo: Atlas, 2014. p. 4).

enterprise, which was the genesis of the French Revolution. In Borges' (2008) understanding, this freedom was only possible due to the "positivization" of rights, notably the 19th century Civil Code, which guaranteed the much-desired legal security of relationships between peers, giving rise to the economic gains that sedimented the society of the Modern Era and its developments remain until contemporaneity.

As can be seen, the struggle of modern Law was to guarantee private property, understood in it: land, things that are on the land and under it, among them improvements and natural resources that may exist such as: water, mineral resources, forests, wild animals, among others.

From this legal framework, Law underwent a bifurcation to make room for Private Law. So, from the Modern Era, there is a classic division of Public Law and Private Law. The Absolutist (Public) State was taken away by the Liberal (Private) State. It was up to the State to establish the general rules of Public Law so that society could develop through free initiative. The norms of this development were contained in the Modern Constitution and the Civil Code of Napoleon. State guarantees plus the strength of capitalism produced the world that exists until today (BORGES, 2008).

From this new scenario of freedoms and opportunities, there was a need to establish rules that could govern economic growth, inflation, unemployment. From this social melting pot emerges Economic Science and the concept of *market*, defined as "a group of buyers and suppliers of a product or service and the institution or arrangement through which they meet to carry out the transaction" (HUBBARD & O'BRIEN, 2010, p. 106).

In this group is the figure of the *entrepreneur*, understood here as "someone who operates a business, bringing together the factors of production – labor, capital and natural resources – to produce goods and services". A large part of the responsibility of a country's Economic System is entrusted to the entrepreneur. It is up to him to decide what to produce, based on the *belief* that there is a *market* (consumers) that is willing to purchase the products that are produced by him (HUBBARD & O'BRIEN, 2010, p. 108-110).

According to HUBBARD & O'BRIEN (2010), the entire Economic System is structured on private rights, which must be guaranteed by the State, namely: the right to private property and the right to the protection of private property.

IV. PRIVATE PROPERTY AS AN INDUCTOR OF INTELLECTUAL PROPERTY IN BRAZIL

In a *economy of market*, "the government does not restrict how companies produce or supply products and services or how they employ the factors of production, but the absence of government intervention is not enough for a market system to work properly". The government must secure *property rights* for the Market System to function. Furthermore, it is the role of the state to solve the conflicts that arise from this System, offering a Judiciary System that can guarantee the fulfillment of contractual agreements, thus enabling the harmony of the society under the law. This relationship is called the *legal environment* (HUBBARD & O'BRIEN, 2010, p. 110).

In the Brazilian Legal System, the right to private property was guaranteed since the Constitutional Charter of 1824, in article 179, XXII (BRASIL, 2017). It remained in the constitutions of 1891, 1934, 1937, 1946, 1967 and 1988. In the Federal Constitution of 1988 it is guaranteed in article 5th, *caput* and item. XXII; the right to hereditary property, in items XXX and XXXI, of article 5th; and intellectual property rights, which include copyright and industrial property rights, provided for in items XXVII and XXIX, of the same article 5th (MORAES, 2014).

Private property also finds legal protection in the Brazilian Civil Code (Law No. 10.406, of January 10, 2002), by establishing in article 1228 that "the owner has the right to use, enjoy and dispose of the thing, and the right to repossess it from the someone that unfairly possesses or detains it" (BRASIL, 2017). In the United States of America, private property is protected by the 5th Amendment (Federal Government) and the 14th Amendment (State governments). Under the 5th Amendment, the US Federal Government guarantees not to dispose of life, liberty, or property without due process. The 14th Amendment extends the same rights to the state level (HUBBARD & O'BRIEN, 2010).

It can be inferred that *private property*, legally, is understood "as the right to use, enjoy and dispose of tangible property, being na object or real state, and claim it from someone that unfairly own it or hold it" (ARIMATÉIA, 2003, apud MORAES, 2014, p. 581). According to the author, this understanding unfolds in two dimensions: the economic (or internal) and the legal (or external). The economic (or internal) dimension comprises the "right to use the thing according to its economic destination (use), to obtain its fruits from it (enjoyment) and to alienate, transform or destroy it (disposition)". As for the legal (or external) dimension, it safeguards "the right to remove another person from the sphere of ownership of the

owner (exclusion) and to pursue the thing wherever it is found, being able to recover it from the hands of those who unfairly possess it or detain (sequel)" (PEREIRA, 1951, apud MORAES, 2014, p. 581)).

V. RIGHT TO INTELLECTUAL PROPERTY IN BRAZIL

Intellectual property is formed by a set of rights that people or companies hold and guarantee the "exclusive use of their properties, including the right to buy or sell them". It is important to clarify that this property can be tangible or intangible, such as a process or an idea (books, films, software, etc.), in addition to innovative production methods. In contemporary democratic countries, intellectual property rights are very important for several reasons, such as: national sovereignty, wealth generation, food production, among many others. One of the legal instruments to protect **intellectual property rights** is the *patent*. Through it, the Federal Government guarantees the exclusive right o fone to get the profits that come from one´s idea. (HUBBARD & O'BRIEN, 2010; not highlighted in the original).

Legally, intellectual property is "delimited as rights resulting from human intelligence, containing the copyright as well as the industrial property right". The copyright "is verified by the use, publication and reproduction of works of literary, artistic or scientific nature, over which the author has moral and patrimonial rights". Therefore, "they carry the right to claim, at any time, the authorship of the work, to have their name, pseudonym or sign indicated or advertised, as being the author..." (ASCENÇÃO, 1980, *apud* MORAES, 2014, p. 582-583).

On a global level, intellectual property is governed by the Convention Establishing the World Intellectual Property Organization. In the document there is no exact definition of the term, but it points out what its applications are:

> Literary artistic and scientific works; performances of performing artists, phonograms, and broadcasts; inventions in all fields of human endeavor; scientific discoveries; industrial designs; trademarks, service marks, and commercial names and designations; protection against unfair competition; and "all other rights resulting from intellectual activity in the industrial, scientific, literary or artistic fields. (CONVENTION ESTABLISHING THE WORLD INTELLECTUAL PROPERTY ORGANIZATION, Article 2, § viii, 1967)

The World Intellectual Property Organization (WIPO) is the administrator, since 1967, of the Berne Convention (WIPO, 1967). This Convention, signed in 1886 (WIPO, 1886), in the city of Bern (Germany) was the first international agreement between sovereign nations that protected copyright. Later, in 1896, the agreement was revised in Paris, and in Berlin, in 1908. In 1914, again in Bern, there was a complement to the agreement. In 1928, the agreement was revised in Rome, then in Brussels (1948), in Stockholm (1967) and, in 1971, again in Paris. Almost all signatory countries are members of the WTO, which regulates aspects of intellectual property that must be complied with, including by countries that are not members of the Organization. In Brazil, the convention became effective May 6, 1975, through Decree No. 75.699.

In Brazilian territory, the INPI is the federal agency, linked to the Ministry of Industry, Foreign Trade and Services, created in 1970, responsible for the Brazilian System of Concession and Guarantee of Intellectual Property Rights for Industry. Among the services provided by this institution are: the registration of trademarks, industrial designs, geographical indications, computer programs and topographies, geographical indications, computer programs and circuit topographies, the granting of patents and the registration of contracts of franchise and the different modalities of technology transfer (INPI, 2021).

In relation to industrial property rights, they envision the protection of production in the industrial domain, as well as the fairness of commercial competition (CERQUEIRA, apud MORAES, 2014; WIPO, 2021). Its protection "is effective by the granting of patents for inventions or utility models and registrations of industrial designs and trademarks, notwithstanding the prevention and repression of false indications of origin…". Legal support is Law No. 9,279/1996, articles 2nd, 6th, 94th, 122nd, 176th and 191st (STF, *apud* MORAES, 2014).

VI. INTELLECTUAL PROPERTY AND ACCESS TO BRAZILIAN GENETIC HERITAGE

The main definitions and procedures regarding access to knowledge from Brazilian biodiversity, which is regulated by Decree No. 8772/2016, are presented below.

This Decree considers as part of the genetic heritage existing in the national territory, for legal purposes, the microorganism that has been isolated from substrates of the national territory, the territorial sea, the exclusive economic zone or the continental shelf (art. 1st, §1st of Decree No. 8772/2016) and article 20th of the Federal Constitution of 1988.

Decree 8.772/2016, art. 3rd, § 2nd regulates, firstly, the steps of proof of access to knowledge. In the case of **scientific research**, proof must be provided by the following means: publication of an article in a scientific journal; communication at scientific events; filing a patent application; research conclusion report with a public development agency or entity - Genetic Heritage Management Council (CGEN); or, publication of course conclusion papers, master's degree thesis, doctoral degree thesis. In the case of **technological development**, proof of access to genetic heritage must be through: filing a patent application; record of a new seedling ready to be harvested; product registration with public agencies; or, proof of product marketing (BRASIL, 2016a).

Regarding access to indigenous knowledge, traditional communities and farmers, article 16th of Decree No. 8772/16 establishes the following procedures: first, clarify the indigenous population, traditional community or traditional farmer on: a) the social, cultural and environmental impacts that come from the execution of the activity involving access to associated traditional knowledge; b) the rights and responsibilities of each of the parties in carrying out the activity and its results; and, c) the right of the indigenous population, traditional community and traditional farmer to **refuse** access to associated traditional knowledge. This "refusal" is embodied in the Principle of Legality, provided for in article 5th of the Federal Constitution of 1988, which guarantees that "No one will be obliged to do anything, except by force of law" (BRASIL, 2016a)

To manage access to genetic heritage, the CGEN was created, with a deliberative, normative, consulting and appealing character, operating through a Plenary, Thematic Chambers, Sectorial Chambers and Executive Secretariat. It is competent to: coordinate the design and implementation of policies for managing access to genetic heritage and associated traditional knowledge and benefit-sharing; establish technical standards; guidelines and criteria for drawing up and complying with the benefit-sharing agreement, among others (Articles 4th and 6th of Law No. 8772/2016).

Regarding the sharing of benefits, the law established the following: for indigenous populations, traditional communities and traditional farmers, an agreement must be signed between the parties (Article 24th of Law No. 13.123/2015 and Article 48th of Decree 8.772/16); and, for the National Fund for Benefit Sharing (FNRB), the percentage is 1% of the net revenue from the sale of the product resulting from access to genetic heritage (Article 48th of Decree 8772/16) (BRASIL, 2016a).

The commercialization of products built on the Brazilian genetic heritage generates billions of profits for the industry, almost always from foreign capital. Sharing the profits with the local populations and communities that paved the way for this economic wealth is the least that can be done. However, the percentage of 1% is considered little in relation to the economic potential of the sector. Regarding the authorization of free negotiation between the parties for access to genetic heritage, it is still early for an analysis, but judging by the economic power of the pharmaceutical and cosmetic industry, this negotiation will very likely consolidate what has always been there: exploitation of the most poor, whether people or countries (SACCARO JÚNIOR, 2011).

According to Antunes (2012, p. 446) "the main international document to establish legal frameworks for the development of economic activities related to biological diversity is the Convention on Biological Diversity (CBD)". It was signed, including by Brazil, during the United Nations Conference on Environment and Development (UNCED), which took place in Rio de Janeiro in 1992. Approval was made via the National Congress, through Legislative Decree No. 2, of 3 of 3 February 1994; and, the enactment was given by Decree No. 2.159, of March 16, 1998.

For the author, it is a *key document* to guarantee the protection of ecosystems and promote sustainable development. He points out that the CBD has been little studied by Brazilian researchers. International scientific production on the subject is significantly greater, demonstrating that Brazilian scholars have devoted little time to investigating this agreement, which is of fundamental importance for Brazilian biological diversity. The explanation, according to him, lies in the preservationist approach that is given when it comes to Brazilian biodiversity. The spirit of the CBD is conservationist, not preservationist, he emphasizes (BRASIL, 1994).

Also, for Antunes (2012, p. 447), the problematic point of the CBD is linked to access to traditional knowledge associated with Brazilian biological biodiversity. The theme has drawn the attention of international organizations such as WIPO and the WTO, mainly in relation to the conflicts between the United States of America (USA) and Brazil, in relation to the Agreement

on Trade Related Aspects of Intellectual Property Rights (TRIPS) about this access to knowledge (INPI, 2021).

The main conflict refers to articles 27th and 28th of the TRIPS Agreement, which recognizes the patenting of any invention, product or process, in all technological sectors in Brazilian territory. However, the Intellectual Property Law (Law No. 9,279/96 authorizes the "compulsory license" in cases of national emergency or public interest. The US accuses Brazil of non-compliance with the TRIPS Agreement, to which both are signatories. The Brazilian government withdraws from Law No. 9,279/96 the authorization of the "compulsory license." The conflict ended up at the WTO, and later, in 2001, Brazil and the USA signed an agreement ending the conflict. In this agreement, Brazil agrees to announce in advance its intention to adopt patent infringement via a "compulsory license" in cases of national emergency or public interest (WIPO, 2017).

This was just one specific conflict between Brazil and the USA. Other points, on a global level, demand attention. The tensions about biological diversity and intellectual property are situated in a twofold aspect: "the loss of flora and fauna diversity (i); and, the loss of cultural diversity" (ii) (ANTUNES, 2012, p. 440). To get an idea of this cultural impact, the different indigenous peoples and their language can be mentioned. There are currently about 217 Brazilian ethnic groups and 170 languages. This entire linguistic culture has been gradually compromised by the possibility of scarcity of biodiversity, the result of constant deforestation and occupation of the natural *habitats* of these peoples.

Other critical points regarding intellectual property on biological diversity have been highlighted by scientists such as Vandana Shiva, Indian scientist. For her, genetic patenting has formed new colonies. Natural elements such as land, forests, rivers, oceans and atmosphere have been colonized by those rich countries that have scientific knowledge. The result of this colonization process is the pollution and depletion of developing countries that are home to this mega biological diversity. The same concern has been the subject of studies by the American scientist Jeremy Rifkin. According to him, the theme is one of the greatest challenges facing humanity, as it leads to questioning the values of biodiversity: intrinsic or utilitarian (FIFKIN, 1999, apud ANTUNES, 2012).

The legal basis that deals with Genetically Modified Organisms (GMOs) is in the Federal Constitution of 1988, article 225th, paragraph 1, II and V, which delegates to the Government the responsibility for the conservation of the country's diversity and genetic heritage and the inspection of research and manipulation of genetic material (FIORILLO, 2021). The infra-constitutional legislation unfolds into: Law nº 8.974, of January 5, 1995 (Biosafety Law); Law No. 9,456, of April 28, 1997 (Protection of New Seedlings); Law No. 11.105, of March 24, 2005; (Biosafety Standards); and, Law No. 11.794, of October 8, 2008 (Regulates the scientific use of animals in national territory) (ANTUNES, 2012).

According to Fiorillo (2021, p. 499-500), the genetic heritage, seen here from the legal perspective, is "the information of genetic origin contained in samples of the whole or part of a plant, fungal, microbial or animal specimen, in the form of molecules and substances derived from the metabolism of these living beings and extracts obtained from these living or dead organisms". The research and manipulation of genetic material has become a legal reality in Brazil since the Federal Constitution of 1988, when it establishes in its article 218th, § 2nd that "technological research will be predominantly focused on solving Brazilian problems and the development of the national and regional productive system" (BRASIL, 2012).

However, this scientific and technological development has not yet been consolidated in Brazil. This is due to the complex global protection system that interferes with the national system, due to the TRIPS Agreement. Although the country is one of the greatest holders of global biodiversity as it is home to two important biomes, Pantanal and Amazon (among others), the fragile scientific and technological base makes it hostage to foreign knowledge, which reflects on patent indicators, mainly in the areas of biotechnology and pharmaceuticals, as shown in table 1.

Table 1 – Patents filed by the United States of America and Brazil, by area of knowledge, in the period 2011-2015, in percentages (%).

KNOWLEDGE AREA	PERCENTAGENS (%)	
	USA	BRAZIL
Biotechnology	3,92	----
Pharmaceuticals	6,21	4,27
Medical technology	8,15	5,71

Source: WIPO (2020).

As one can see, even though Brazil is a mega-diverse country, the scientific and technological domain in biologically-based areas still belongs to the United States of America (USA), a country with few biological resources. It is clear that it is not enough just to harbor natural resources to have control over them. It is of fundamental importance to master technology for the development of products based on natural resources.

This delay in biotechnology and pharmaceutical research is due not only to the lack of basic research infrastructure in Brazilian Universities and Research Centers, but also to the archaic knowledge protection system, as Article 10th of the Industrial Property Law, Law No. 9,279/96 expressly prohibits the patenting of biological materials found in nature (BRASIL, 1996). However, under the TRIPS Agreement, Brazil is forced to accept the deposit of patents from the foreign industry, even for genetically modified organisms. This national legislative barrier makes the country hostage to the international technological domain.

VII. TYPES OF PATENTS OF THE BRAZILIAN LEGAL ORDINANCE

Brazilian legislation allows entrepreneurs to protect industrial property in three ways: patents for inventions, based on the originality of the inventive step; utility model patents, resulting from the functional improvement of the object; and the industrial design patent, based on the functional and aesthetic improvement of the object. The most traditional ways of protecting knowledge in Brazil and its process flows are presented here, in accordance with Law No. 9,279/96 (Industrial Property Law).

7.1 INVENTION PATENTS

An Invention Patent is a title of privilege granted in relation to an invention (product or process) that meets the requirements of novelty, inventive activity and industrial application. A patent represents a technical solution (invention) to a problem, which the inventor requires exclusivity, as a result of his efforts (intelligence, time and money). This invention can be a new industrial product (compound, composition, object, device, device, etc.) and/or a new industrial activity (process, method, etc.)

In order to be able to exclude third parties from the commercial exploitation of his invention, the inventor reveals the proposed solution to society, by means of filing the patente application with the INPI. From the deposito f the application, at the end of an analysis process, the inventor receives a temporary title (Patent Letter), which is valid for 20 years from the date of deposit. After this period, the knowledge becomes public domain. The patent is governed by the principle of territoriality, that is, it only has value in the countries where it is granted. For example, if an inventor files his application with the INPI, in Brazil, it will only be valid in Brazilian territory. However, if he filed with the Japan Patent Office, the range would extend to Japan and so on.

Fig.1. 3B Scientific Scissors Utility Model Patent for Kinesiotherapy.

Source: https://www.3bscientific.com.br

7. 2 UTILITY MODEL PATENTS

Utility Models (UM) patents protect the inventive act that results in the functional improvement of an object of practical use, or part of it, that is susceptible to industrial application. In this modality, the protection is of 15 years, counting from the date of deposit. The object must be three-dimensional (instrument, utensil and tool) and possible for industrial application. In this way, the processes are excluded from protection via the Utility Model patent.

It is of fundamental importance to differentiate the Invention patent from the Utility Model patent. As with the Invention, the Utility Model patent is also the result of the author's effort, however, the object already exists and the effort was only to improve it, such as a square-handled tool, it can be improved by developing it with a round handle. The improvement will be functional, as the tool already existed, however, it will be more comfortable to handle it or, even defining other functions for the same object, such as gardening, medicine, as shown in the Picture 1.

Kinesiotherapy is a technique that uses bandages to treat muscle injuries, especially in high-performance athletes. Common scissors were used to cut the bandage tapes used in the treatment. However, they were not effective for cutting the numerous ribbons, as the ribbons contain glue that accumulated on the blades, compromising the work of professionals in this area. So 3B Scientific's engineering department developed scissors made of stainless carbon steel, coated with black carbon fluorine resin, which prevents the scissors from retaining the gum on the tape.

In this case, the patent was for Utility Model and also for Industrial Design, because, in addition to improving the object's performance, an ergometric handle was developed that improves its functionality, providing more comfort in its handling. It is evident that a patent for invention does not fit here, as the object scissors was invented a long time ago..

7.3 INDUSTRIAL DESIGN PATENT

Another patent, still in the field of Industrial Property, is Industrial Design, whose purpose is to protect the ornamental and aesthetic aspect of the product. The term of protection is 10 years, which can be renewed for three more periods of five years. The total protection can reach 25 years. Process flow is more simplified.

7.4 PATENT OWNERSHIP AND LICENSING

According to article 6th of the LPI, the author is guaranteed the right to patent an invention or utility model, which may be requested in his own name, by their heirs or successors, by the assignee, or by anyone to whom the law or the employment contract or provision of services to determine that it belongs to the ownership (§ 6th).

In the case of an invention or utility model developed jointly by two or more people, the patent may be applied for by all or any of them, by means of a power of attorney from the others. If two or more authors independently carry out the same invention or utility model, the right to obtain a patent will be assured to the one who proves the earliest deposit, regardless of the dates of invention or creation.

In the case of an employee, according to article 88th of the LPI, the rights belong exclusively to the employer, when arising from the nature of the services for which the employee was hired.

Exceptions are provided for in articles 90th and 91st of the LPI. According to article 90th, if the employee is not hired for research and development and does not use the employer's resources, such as means, equipment, facilities, etc., the patent belongs exclusively to him. However, if the employee is not hired for research and development, but used the employer's resources to carry out the invention or utility model, the division must be equal parts. However, the employer has exclusive rights to an exploration license, subject to fair remuneration to the employee.

As for licensing, it is an authorization granted by the patent holder to one or more companies to manufacture and sell the product protected by the patent. The instrument is the contract between the parties. It stipulates terms, conditions, fines and royalties (between 1% to 5% of net sales related to the sale of the product).

It is important that universities that carry out research are aligned with the commercial objectives of companies, as this synergy leverages economic and financial resources for both parties. It is important to remember that the joint ownership of a company with a university allows the preference of that company in the commercial exploitation of research results, thus preventing the university from having to seek partnerships in an unknown universe of companies. This strategy is good for both parties as it saves time and resources.

There are four types of licenses: Non-Exclusive License, Exclusive License, Patent License and Cross License.

Non-Exclusive License: is the most common of them. It happens when the rights assigned to the license can be assigned to others and not just one person or company. Example: software.

Exclusive License: it happens when the applicant for the license is a single entity, holder of the license rights. For

example: a soft drink company holds the exclusive right to market its products on a certain beach, or pedestrian party, or event, excluding other competitors in that specific geographic market.

Patent License: is a licensing agreement, signed by the author/inventor/innovator and a natural or legal person, granting rights to commercially exploit a patent. The contract is intermediated by INPI.

Cross License: it is characterized by the crossing of two licenses in an agreement. It is applied when each of the parties to the agreement wishes to obtain certain rights relating to the other party's property. A simple example for better understanding: a cell phone company and a software company. Both depend on each other to expand their markets. The benefit is mutual between them.

However, for this complex system of protection to result in economic assets for national companies and for the country, national technological mastery (domestic patents) is necessary, which must be greater than foreign knowledge (foreign patents) and, still, knowledge spillover, that is, the export of knowledge. This strategy is what makes a country really sovereign and economically independent (BRASIL, 1996).

Brazil presents a certain leadership among other developing countries, such as Argentina and Mexico, as shown in table 2. This leadership can be identified by the number of domestic and foreign patents and by the spillover of knowledge, in the period from 2010 to 2019. Brazil presented a growing picture of domestic patents in relation to the other countries analyzed (Argentina and Mexico). In 2010, there were 314 domestic patents in Brazil and in 2019 there was a jump to 906, while Argentina had only 211 in 2010 and ended 2019 with 165. Mexico had 229 in 2010, ending 2019 with 438 domestic patents. However, foreign domain is greater in the three countries analyzed. Although Brazil closed 2019 with 906 domestic patents, it held 10,041 foreign patents in the same year. Argentina and Mexico have similar numbers of foreign knowledge domain in national territory. When analyzing the knowledge spillover, the three countries had lower numbers than foreign patents (Table 2).

Table 2 – Number of domestic, foreign and patents exported by Brazil, Argentina and Mexico, in the period 2010 to 2019.

YEAR	DOMESTIC PATENTS			FOREIGN PATENTS			PATENTS EXPORTED		
	BRA	AR	MEX	BRA	AR	MEX	BRA	AR	MEX
2010	314	211	229	2,937	1.155	9,170	492	104	195
2011	380	224	245	3.059	1,067	11.240	567	112	233
2012	365	208	290	2,465	724	12.068	662	146	381
2013	385	228	312	2,587	1.069	10,056	856	182	514
2014	374	265	305	2.375	1,095	9.514	940	142	478
2015	460	214	410	2,951	1.345	8,928	924	161	487
2016	533	201	423	3.662	1,678	8.229	932	176	527
2017	714	176	407	4,736	2.126	8,103	914	178	689
2018	1.066	129	457	8,900	1.396	8,464	910	161	712
2019	906	165	438	10.041	2,012	8.264	947	203	707

Source: WIPO (2019)

On the other hand, the developed countries analyzed, USA, Germany and France, present a totally different picture, demonstrating the refinement of their protection system, as well as their scientific and technological superiority in terms of domain and predominance of domestic patents over external knowledge (patents foreign companies). This solid knowledge base enables economic gains through knowledge spillover, as shown in table 3.

Table 3 – Number of domestic, foreign and exported patents from the USA, Germany and France, in the period 2010 to 2019.

YEAR	DOMESTIC PATENTS			FOREIGN PATENTS			PATENTS EXPORTED		
	USA	GER	FRA	USA	GER	FRA	USA	ALE	FRA
2010	107,792	74,401	24,278	111.822	12,198	1,832	83,083	99,425	41,527
2011	108.626	73,216	24,287	115,879	12,458	2,099	93.443	102,579	42,985
2012	121,026	73,905	24,442	132.129	14,720	2,092	108,091	109,761	45,855
2013	133.593	73,929	24,538	144,242	15,814	2,196	110.569	110,686	46,633
2014	144,621	73,826	25,116	156.057	17,811	2,033	110,033	105,817	47,288
2015	140.969	72,217	25,085	157,438	19,509	1,994	116.100	103,342	47,567
2016	143,723	73,574	24,714	159.326	19,419	2,012	133,367	103,753	46,914
2017	150.949	73,345	25,040	167,880	19,927	1,832	134.808	103,061	46,044
2018	144,413	73,333	24,741	163.346	21,281	1,919	144,667	106,758	44,404
2019	167,115	73,448	24,334	187,315	20,802	1,766	142.529	104,911	43,055

Fonte: WIPO (2019)

Analyzing table 3, one can see a technological superiority of the analyzed countries (USA, Germany and France) in relation to developing countries (table 2). Although Brazil leads the countries in table 2, with 906 domestic patents in 2019, the US ended the year with 167,115 patents, Germany with 73,448 and France with 24,334. These three countries still demonstrate technological superiority in relation to the number of foreign patents they harbor in their territories. Germany, in 2019, had 73,448 domestic patents and only 20,802 foreign patents in its territory, and exported 104,911 patents to other countries. France held in the same year, 24,334 domestic patents and only 1,766 foreign patents, exporting 43,055 patents to other countries. This technological superiority results in an increase in GDP and, consequently, more investments in development, thus forming a constant cycle of scientific, technological and economic development.

VIII. CONCLUSION

Intellectual property rights enable the economic development of a country. Brazil, despite having adhered to the global system of protection, via the Paris, Berne Convention and the TRIPS Agreement, took a long time to consolidate its domestic system of protection and, when it did, it was still very traditional, legitimizing an archaic system of protection. While the world develops its scientific and technological potential, through investments in infrastructure of qualified personnel, solid research base in public and private universities, as well as a more adherent legislative system, Brazil is still slipping on a traditional path that does not allow the full development of biotechnology. Even housing two of the biomes that reflect the Nation's biological wealth, such as the Pantanal and the Amazon, the country is still hostage to foreign knowledge, resulting in a delay in economic development.

Bringing the Brazilian nation to a rich and powerful place, necessarily entails expanding and reforming its investment system in research, development and its legislation to which it could translate what is most significant in these areas in the world and that could be as a mirror for national development. This involves patents.

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