**University Technology Transfer in Argentina, Italy and Colombia and its positive impact in the regions: The role of IP in these successful processes**

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**Abstract:**

Three countries, three universities, three structures at the service of Technology Transfer. Why write about Technology Transfer? Although the principle of territoriality is well known in Intellectual Property Law, Technology Transfer Offices are the bridge that makes it possible to connect countries around the world and share the common goal of generating social and economic impact in each region through different programmes. Argentina, Colombia and Italy, countries with different cultures, social and economic development, but which ultimately have one thing in common: Universities as vehicles for Technology Transfer, promoting the growth of small businesses, or technological development and technological innovation in their respective regions. Thus, the aim of this joint work is to illustrate how legal aid in these universities is influenced by the Intellectual Property rules governing each country.

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1. **Introduction**

Argentina, Italy, and Colombia are countries that have several differences in the field of Intellectual Property (IP), as well as the context where is carried out the Technology Transfer (TT) by their different stakeholders. At first, it may seem not possible review common elements to make an analysis and show how important can be the role of IP in the TT from these countries. Nevertheless, as the World Intellectual Property Organization (WIPO) mentions in its web page, IP is an important instrument at the research and development level[[1]](#footnote-1), considering that, in the case of the Universities to whom are granted their IP Rights (IPRs), governments around the world are trying to accelerate the transformation of inventions into industrial processes and products, and to strengthen collaborative ties between universities and industry[[2]](#footnote-2).

Therefore, based in this premise we have found that this common goal is part of the different rules, laws, and guidelines of each country, as a context where the IP Policies and the TT Structures (TTS) exist[[3]](#footnote-3). For that reason, this paper will examine the Ecosystem of the TT and its four components of each country: Government, Society, Industry, and the Universities as Research Institutions[[4]](#footnote-4). In this regard, for the purpose of narrowing the scope of the research, we selected three universities of the countries in mention, focussing the analysis on their policies, structures, and TT Offices (TTO in singular and TTOs in plural), considering that is possible to access to the public information of each institution, as well as the impact that have in their respective regional level[[5]](#footnote-5). These universities are the National University of Cordoba in Argentina, the University of Bologna in Italy, and the University of Valle in Colombia.

Following this, the objective of this paper will be to answer the question: Does the IP perform an important role in the Technology Transfer of Universities located in Argentina, Italy and Colombia leading to a positive impact in the regions? Bearing in mind that the final part of it will be used to find possible common elements in the University TT between the three universities.

To make it, first is necessary a general part that starts with Chapter One’s introduction, and next Chapter Two including the main concepts in University TT, finding the Ecosystem composed by Government, Society, Industry and Research Institutions, as well as the Enabling Factors that are the IP Policies and the TT Structures. Later, Chapter Three will revise the context of the TT Structures from the scope of IP in the three countries, making emphasis on the elements that apply to the TT of the universities. Chapter Four treats how are the IP Policies regulated in the institutional level at the selected universities and deals with the role and influence of the IP in the legal services required by the TT Offices in the universities concerning the rules that govern each country.

Once defined the general part of the paper’s structure, we enter to the specific elements that concern the referred question. Thus, Chapter Five evaluates how is considered the ownership in the IP creations through these IP Policies, regarding the status of the so called “professor’s privilege” in Italy and its comparison with Argentina and Colombia. Later, Chapter Six assesses the universities as a relevant stakeholder in the TT Ecosystem, demonstrating mainly from a legal, and then eventually from an economic, political, technological, and social perspective the importance of the TTO in these institutions to enhance their role. Finally, Chapter Eight ends resuming the common elements that can be found between the University TT in the three selected institutions, TT Structures, organisation of TTO, possible opportunities of collaboration in the IP field, and the corresponding conclusions, as well as Chapter Nine includes the relevant annexes of the paper.

Nevertheless, the paper is limited to the analysis of the three institutions before mentioned and their TTO, without entering the details of other countries where some concepts may be taken into the course of this research. Besides, it will be a descriptive analysis based on the information available, rather than an empirical or quantitative document that refers to statistics or other similar data, trying as much as possible to not oversimplify the concepts. Finally, for the purpose of the topic, we will not deal with the TT as a concept that requires enter in the elements of Foreign Direct Investment into developing countries or detailed description of the possible TT agreements, due to the description of the paper will serve more an academic and research purpose for future articles that may deepen in this regard.

1. **Technology Transfer (TT) and University TT concepts**

We are aware that the definition of TT can be found in several web pages, books, and journals all around the world. As a first general definition, TT is a collective term for the mechanisms and processes that enable the development of a product, or a technology used to manufacture products from the knowledge formed in Public Research Organizations[[6]](#footnote-6). However, we may use the University TT in the sense that currently these processes include private and public universities as research organizations, following the explanation provided by Carter-Jonson, that fits perfectly in the sense that she considers it as the entrepreneurial methods that universities implement to transfer new creations made by members of the university community to the public benefit – specifically perfecting IPRs, licensing and creating start-ups[[7]](#footnote-7). Furthermore, similar as the same author explains, our research neither focus on the role of how university researchers transfer technology to the public by publishing journal articles and giving talks[[8]](#footnote-8).

Hence, the elements included in this definition composes the stakeholders of the TT Ecosystem that will be reviewed next, as well as will be expanded in the subsequent chapters where each country’s characteristics are analysed.

* 1. *Definition of Ecosystem in TT*

As a first step, is important to clarify that the term Ecosystem is considered as an innovation ecosystem. Then, taking once again the starting point of the WIPO definition in its web page, this is an interconnected network of governmental, industry, research institutions and enabling factors[[9]](#footnote-9). Therefore, in this specific context, and based in the same multilateral organization, the parties bring their resources and expertise together to collaboratively achieve innovation in the service of regional and economic development[[10]](#footnote-10). This definition can be complemented with the outputs given by Chu, in the sense that a region needs to have investment capital, human capital and innovative ideas to coalesce the ecosystem[[11]](#footnote-11).

Based on this, the key elements to understand our Ecosystem are the interconnection of the components: Government, Society, Industry and Research Institutions, as well as the fact that the parties who compose it bring resources and expertise to innovate and eventually reach not just economic, but also social and technological development in a regional scale. Nevertheless, unlike Chu, we stressed out in the Industry and Government possible partnerships as part of the investment capital, meanwhile the Research Institutions are more related to the innovative ideas, including in them the human capital, adding that the beneficiary of this result is the Society itself. Besides, the role of the Government also takes importance when as policymaking is the entity that creates and regulates the guidelines and laws at the national level, following the international framework if so, where the IPRs take place.

Now, about the notion of Society, some elements quoted by Tijsen et al can be used in this regard, considering that it is the niche where the universities contribute, delivering highly qualified workers as well as high-quality knowledge for general users, being key contributors to a municipal, regional, or national level[[12]](#footnote-12). Converging with the clarification of the same authors, the contribution that we will analyse shall be from a municipal and regional level, bearing in mind the characteristics of the mentioned universities in Chapter One. Subsequently, the Industry is the stakeholder that develops and manufactures products, and markets them, serving its shareholders, being the public benefit a by-product of it[[13]](#footnote-13). Meanwhile, the University can be considered as the key organization and supporter in the national innovation system, in particular providing knowledge[[14]](#footnote-14), that in this case, is provided to the Society. Also, in this respect can be added that is a Higher Education Institution with an official research mandate or inclusion of scientific research in its strategic objectives and plans, with one or more recognised research units and at least one regular PhD programme[[15]](#footnote-15).

Thus, the Ecosystem in TT is composed by: i) the Government who acts as partner with the private and academic institutions, as well as a policy maker of the laws and guidelines that regulates IPRs; ii) the Society as the receptor of the contributions of the universities and industries in a municipal and regional scope; iii) the Industry that develops goods and services to serve primarily its shareholders, and indirectly the Society; and iv) the University as the institution which creates knowledge, benefiting directly the Society, oriented mainly to research goals. Nevertheless, the TT Ecosystem is characterized by the intersection and interaction of these elements, altogether with the enabling factors of IP Policies and TT Structures that are going to be discussed next.

*2.2. Definition of Enabling Factors*

Taking the definition of the Cambridge Dictionary, enable means to make someone able to do something, or to make something possible[[16]](#footnote-16). Based on this, we undertake the concept brought in context by Menter, when he mentions that universities enable and foster innovation withing and beyond their academic boundaries[[17]](#footnote-17), meaning this that are necessary other elements to make possible the TT process. Therefore, is relevant to bring the notion of the “triple-helix” model retaken by Sebeok, consistent in the university-industry-government relations[[18]](#footnote-18), bearing in mind that this term emerged in the United States (US) after the Bayh-Dole Act[[19]](#footnote-19), and is applicable to the different actors of the TT Ecosystem in the sense that the said relations are part of the creation of IP Policies and IP Structures.

First, IP Policies in a national level express the intent of a country to use the intellectual property system in a defined manner to achieve a stated goal[[20]](#footnote-20). With these Policies, the Government usually takes measures to realize its objectives, being considered this the National IP strategies[[21]](#footnote-21), altogether with the Institutional IP policies, which are put in practice by the universities to address IP issues typically encountered during collaboration with external parties and commercialization of academic research, complying with the national IP Policies[[22]](#footnote-22)

Second, the TT Structures can be said that describes how is organized the TT process related to the universities, including the practices of this process that usually begins with the involvement of the Technology Transfer Offices (TTO), as well as the issues related to the IP Policies, the delimitation of the ownership of the IP created, the revenue sharing and possible dispute resolution procedures[[23]](#footnote-23). Here must be added that currently the WIPO also considers the Technology Transfer Organizations as different types of technology transfer structures[[24]](#footnote-24), where they include the Technology and Innovation Support Centres, an element that we neither aim to discuss in this research, being our aim is to analyse the TTO and its importance in the impact of the universities in its regions. Finally, is important to note that the TTO will be discussed in detail in the Chapter Six, due to first will be reviewed the context of the TT Structures, the IP Policies, and the Ownership in each university in the Chapters Three, Four and Five respectively.

1. **Context of TT Structures from the scope of IP**

Next, we will mention the current context of the TT Structures in Argentina, Italy, and Colombia from the scope of IP. Thus, in each country will be mentioned the regional framework of national IP laws, the IP policies, and the TT guidelines if applicable, where these structures are located. Then in Chapter Four we will address the IP Policies in the Universities with their respective TTOs.

*3.1. Argentinian context*

In Argentina the main national IP Law is the Nº 11.723 of 1933, which have been subject to several amendments in its multiple articles, the last on December 16th of 2020. Furthermore, also can be found a set of basic rules related to intellectual property, which can be resumed as follows: Law 21.680 of 1956 on the creation of INTA; Law 23.877 of 1990 on the Promotion of Technological Innovation; Law Nº 25.467 of 2001, which creates the National Science and Technology System (Spanish acronym SNCyT); Law Nº 20.247 of 1973 on Seeds and Phytogenetic Creations; Law Nº 24.481 of 1995 on Invention Patents and Utility Models; Law Nº 22.362 of 1980 on Trademarks and Designations; and Law Nº 24.766 of 1996 on Confidentiality.

In accordance with these laws, it can be said that the conceptual framework is the linkage and cooperation between public research institutions and the productive sector, which favours the generation, adaptation and application of knowledge and the dissemination of technological innovations.

Based on this structure, Technological Linkage within universities makes it possible to develop mechanisms that promote the association between the spaces where knowledge is generated and those who benefit from its practical use, the production sectors and the social environment that contains them.

Subsequently, in terms of related bodies with an impact on TT, the main research funding bodies are: Ministry of Science, Technology and Productive Innovation (Spanish acronym MINCYT), through the National Agency for Scientific and Technological Promotion (National Scientific and Technologic Promotion Fund, its Spanish acronym FONTAR); National Scientific and Technological Research Fund its Spanish acronym FONCyT), National Council for Scientific and Technological Research (Spanish acronym CONICET) and the national universities, which gather an important part of the researchers of the country. In addition, together with these institutions in the State, there are organisations such as the Institute of Agricultural Technology (INTA), the National Institute of Industrial Technology (Spanish acronym INTI), the National Atomic Energy Commission (Spanish acronym CNEA) and the Armed Forces Research Centre (Spanish acronym CITEFA).

In this institutional context, technical-professional development in Argentina is carried out through Technology Transfer Agreements. These are regulated by Law Nº 22.426 (modified by Law Nº 27.430 of 29/12/02017) which establishes the main criteria for all Technology Transfer Agreements that can be submitted to the National Institute of Industrial Technology INTI (Technology Transfer Register).

Furthermore, since 1990, Law Nº 23.877 on the Promotion and Encouragement of Technological Innovation has been in force. Its aim is to improve productive activity through the promotion and encouragement of research and development, technology transfer, giving priority to the task of the scientist, the technologist, and the innovative entrepreneur.

As we can see, Argentina, under the scheme of government, university, and business participation, aims to create public policy agendas for scientific and technological development. This is not only from the orbit of public institutions, but also through the connection with universities as generators of opportunities and companies as possible investors in technological developments.

At present, the draft law presented by the Argentinean National Executive Power, which proposes to approve the Science, Technology, and Innovation Plan 2030 (PNCTI acronym in Spanish), is under analysis.

The PNCTI is the instrument that defines, organises, and communicates the set of policies, strategies and instruments for all public and private actors and agents that make up the National Science, Technology, and Innovation System (SNCTI acronym in Spanish). The purpose of the programme is to promote the generation and management of knowledge for social and productive, inclusive, and sustainable innovation. In this sense, it proposes activities to all institutions, sectors, organisations and companies in the public, private and mixed scientific and technological sectors.[[25]](#footnote-25)

*3.2. Italian context*

In Italy, the main national IP law is the Industrial Property Code, Legislative Decree N° 30 of 10 February 2005[[26]](#footnote-26) that includes in its eight titles the main provisions, regulations, procedures, and other characteristics in this matter.

Concerning TT, can be said that in this country the creation of new knowledge is largely supported by universities and public research institutions. The activities of the public research system, as well as the latter's ability to exploit its results through intellectual property management, increasingly influence the competitiveness of national innovation systems and foster the growth of technology-driven enterprises.

On November 25, 2020, the European Commission adopted the "Action Plan on Intellectual Property to Support EU Recovery and Resilience," which called on member states to formulate their national policies and strategies in line with the stated goals and to make strengthening the protection and enforcement of intellectual property a priority in their efforts to ensure economic recovery.

Accepting the invitation of the European Commission, the Ministry of Education, Universities and Research (Italian acronym MIUR) and the Ministry of Health participated in the expedition of the Decree-Law No. 59 of 2021 by the Italian Government[[27]](#footnote-27), with the “Guidelines for Initiatives of the Plan complementary to the National Recovery and Resilience Plan”, that refer to two specific initiatives: Initiative A. "Research Initiatives for Innovative Technologies and Pathways in Health and Care," and Initiative B. "Innovative Health Ecosystem," with funding of 80 million euros, which aims to create clinical-transnational networks of excellence for the strengthening of national biomedical research, capable of pooling existing expertise through three macro-actions, one of which consists of the implementation of a network of technology transfer centres, thus showing how much important and fundamental is the role they play in the society.

An additional tool that contributes to facilitating pathways for the exploitation of public research results has been identified by the Guidelines in the Knowledge Share platform[[28]](#footnote-28), the largest patent platform in Italy in which the Politecnico di Torino and NETVAL are involved together with the Italian Patent and Trademark Office (Italian acronym UIBM).

The latter's reports are the most up-to-date sources in Italy on the productivity of universities in terms of exploiting research results, and it conducts an annual survey on public-private technology transfer.

NETVAL was born in 2002 following the signing of a Memorandum of Understanding whose objective should have been: 1. "to make homogeneous principles and criteria to inspire actions on patenting, spin-off establishment and technology transfer; 2. to make in perspective, homogeneous the legal instruments to be used, dictating basic rules in the matters referred to in point 1; 3. Make available useful information to strengthen opportunities for cooperation on patenting issues and patentable results also to identify conditions suitable for increasing the economic impact of research results, both through licensing and by assessing the prerequisites for spin-off creation and business incubation.

The birth of NETVAL can be traced back to a perceived need within the Universities precisely to cope with the change in the institutional mission of the Universities and to remedy the critical issues brought about by the Tremonti Law[[29]](#footnote-29) by which, as will be analysed shortly, the regime of individual ownership of university inventions was established.

Focusing now on the landscape currently described by the latest NETVAL report entitled "Raining Ideas for Revival" , the latter, despite the fact that on the one hand it still notes an insufficient number of people in research institutions, universities and the Scientific Institutes for Research, Hospitalization and Healthcare (Italian acronym IRCCS) dedicated to research enhancement and technology transfer activities, on the other hand, it highlights a promising trend toward forms of specialization and expansion of activities included in "impact" and "third mission" activities in which technology transfer is a major component.

The 18th NETVAL report also notes that among the entities that participated in the survey, the values found relative to the year 2021 show a decidedly positive picture and provides detailed information and analysis that summarizes as follows:

- Employees (full-time equivalent-ETP) of Technology Transfer Offices of universities, EPRs and IRCCSs total 505.

- The number of new patent applications was 637 in 2021, being an increasing figure compared to 2020, which should therefore also lead to an increase in the number of granted patents soon.

- There were 8,606 patents in the portfolios of universities and EPRs at the end of 2021. This is an important figure in the growth path of the TT system in Italy, which has 700 more patents than in 2020.

- The number of licenses and/or options concluded in 2021 was 235.

- Revenues from active licenses as of December 31, 2021, amounted to 6.4 million Euros for universities and EPRs, being perhaps the most important value among those presented in this year's report, with a growth over 2020 of almost 70%.

- Finally, 122 spin-off companies were established in universities and EPRs in 2021, adding to the existing ones, reaching a total of 1,930 spin-offs detected in Italy as of 2021.

Also relevant to the subject of our analysis is what emerges from the NETVAL Report regarding the 'alignment of Italian TTOs with best practices at the international level from which it is thought and hoped that processes of sharing with all others can be derived, as has been happening for some time within NETVAL.

*3.3. Colombian context*

As starting point is important to say that the general regime of IP in Colombia is ruled under the Decisions No. 351 of the year 1993 (Copyright), and No. 486 of the year 2000 (Industrial Property), issued by the Andean Community Commission from which this country is member jointly with Peru, Ecuador, and Bolivia.

Subsequently, in the Colombian context the National Government has issued three different policies, guidelines and laws about IP and TT during the years 2021, 2022 and 2023, which directly concern our topic. The first is the National Intellectual Property Policy issued by the National Council on Economic and Social Policy (CONPES in Spanish), identified as CONPES 4062, dated November 29th, 2021. Here, the National Council made a diagnostic of the different issues of IP in the country, stressing one of its points in the low capacity to generate and manage IP and its limited mechanisms and incentives.

Based on this, was stated as a strategic line connecting the supply and demand of IPRs, recommending that the Superintendence of Industry and Commerce (SIC, the Colombian IP Office) shall design and divulgate a Guide of TT for the business sector, and MINCIENCIAS shall design a Guide of TT for the stakeholders of the National System of Science and Technology[[30]](#footnote-30).

Then, the second element is the Guide for Technology Transfer originated by MINCIENCIAS in October 2022, that although defines the process of TT mainly from a contractual scope, also includes the requirement of a system (TT Ecosystem) from public and private institutions, connected to create and transfer information, knowledge, skills, and competences, bearing in mind that the IPRs right holder cannot or does not want to commercialize the technology[[31]](#footnote-31). Following this, also includes the role of the universities as the place where are created the Spin-Offs as a mean of TT, being these considered as base technology companies, following the Law No. 1838 of 2017, regulated by the Decree No. 1556 of 2022[[32]](#footnote-32).

Afterwards, the third one is the National Development Plan 2022-2026 that was approved by the Colombian Congress on May 5th, 2023[[33]](#footnote-33), under the Law No. 2294 of May 19th, 2023. This included in the article 170[[34]](#footnote-34) the possibility to the Government of transfer to third parties the IPRs of the results from Science, Technology and Innovation activities founded by public results, and in the article 171[[35]](#footnote-35) the obligation of make available to the public the results of these activities, subject to the justification of the reserved information under the applicable law of personal data (Currently the Law No. 1581 of 2012 *“Which gives the general framework for the protection of personal data”).*

1. **IP Policies in the universities and Technology Transfer Offices (TTO)**

As was explained in the definition of IP Policies, this chapter first will briefly explain the institutional element of the regulations that each university has in the IP field and its relevant issues to the topic. Furthermore, in a second part, the chapter will also address the regional context of each TTO, considering the Universities as vehicles for Technology Transfer, and IP legal services, describing how is composed each TTO in the selected universities.

In this sense, we find interesting to retake the concept of TTO given by Barclay, that can be synthetized as an established part of the academic landscape of the universities, having different focuses such as promote projects, support student inventions or offering services and engaging with industry by providing additional research capability to local companies, usually with procedures settled to deal with different matters of the IP field[[36]](#footnote-36). Following this, the role of the TTO can be complemented with the explanation provided by Papaderos and Bücken, indicating that the TTO is the structure responsible of leading the process of highlighting the relevance of the University TT inside the institution, establishing a culture/environment that supports and encourages both invention disclosures and the participation of inventor(s) in the commercialization process[[37]](#footnote-37).

Thus, the elements that are common for both authors are the role of the TTO depending of the university where is allocated, the purpose of the institution, and the possible role of commercialize the inventions, as well as the interaction of the inventors as part of the academia, with the industry, giving the necessary support to this, that has the legal element, but may converge with the TT Ecosystem.

*4.1.1. IP Policies in the National University of Cordoba - Argentina*

Under Ordinance Nº12/11[[38]](#footnote-38) the National Honourable Superior Council of the National University of Cordoba regulates the management of Intellectual Property in this institution.

In the matter of the material scope of application, Article 1º of the ordinance establishes that the assets covered by the regime are developments and results of research projects that generate patents, utility models and industrial designs, software and any development or knowledge of industrial application, susceptible to protection by any other form of protection. Later, Article 2º establishes the duties and rights of researchers, teachers, non-teaching staff, scholarship holders, students, and UNC technical staff. Subsequently, in Articles 3º to 6º of this Ordinance is established the criteria in relation to the ownership of the developments, following the guidelines of the Argentinean Patent Law Nº 24481 of 1995 issued by the Argentinian Congress. In this case, the UNC has a regime based on Institutional Ownership, which regulates the economic rights obtained by the inventor and the university and the distribution of these rights. This topic will be dealt with in detail in chapter five (Ownership in the IP Creations-) of this paper.

Regarding the transfer and assignment of rights (article 7º), ordinance Nº 12/11 allows for the exclusive and non-exclusive licensing, assignment, or transfer of intellectual property rights. In either case, the licenses must be approved by the Honourable Higher Council of the UNC.

In relation to the results obtained in research (article 9º) the Intellectual Property Office at the UNC oversees indicating to the researchers the process to follow for the protection of the developments. Besides, the confidentiality of research and development processes is regulated in articles 10º and 11º, establishing that in no case will inventions form part of files or public proceedings at the UNC. This is to protect the "novelty" of inventions.

Concerning the management of the intellectual property of the UNC, Ordinance Nº 12/11 establishes and defines the Intellectual Property Office as the enforcement authority of the regime in its article 19º. Furthermore, about copyright, the UNC provides for the right of inventors to be named as authors in the various projects. This is established by article 8º, which refers to the mention of authorship: *"Researchers, teachers, non-teaching staff, scholarship holders, technical staff and students who participate in the achievement of results that can be protected under the present regime, shall be recognised the rights of authors, as well as the right to be mentioned in any act, contract or promotion that aims to disseminate the results obtained, whatever the means used for this purpose".*

*4.1.2. TTO in National University of Cordoba*

Argentine universities emerge in this ecosystem of scientific development and innovation TTOs, created for "technological linkage". With the enactment of the Law for the Promotion and Encouragement of Innovation (Law Nº 23877), a new institution called the Technology Linkage Unit (Spanish acronym UVT) was created to fulfil the functions of developing the national innovation system through its role as an intermediary between academia and industry. These act as non-state entities constituted for the identification, selection, formulation and administration of research and development projects, technical assistance, and TT. In this way, research and development institutions are empowered to establish and contract linkage units to facilitate their relations with the productive system in technological innovation projects agreed with companies.[[39]](#footnote-39)

Today, the entire Argentinean university system has at least one TTO, which makes up a conglomerate of university TTOs. As for the way in which the process of TTO development has been structured, the study shows that these devices have been acquiring different political-hierarchical levels within the institutions. Although it is not possible to corroborate this, there seems to be a greater shift from technology transfer and linkage activities to research activities than to extension activities (in the traditional sense).

The functionality and management of TTOs operate on multiple specific dimensions that can be summarised in four main axes: formulation and management of projects with third parties, valorisation of research results, promotion of business creation, and mobilisation of people for linkage and transfer. These activities take on unique forms in each university and are codified in the regulations that govern them.

The process of incorporating TTOs into university life and their joint work with both public institutions and companies presents a high degree of heterogeneity that is expressed in many dimensions associated with the way of meaning and deploying linkage and transfer activities through a specific institutional mechanism[[40]](#footnote-40). In short, technology development in Argentina's public policy agenda is focused on developing basic capacities to fulfil management and project formulation functions and to be understood as devices for capturing resources.

Within the institutional environment of the National University of Cordoba (UNC acronym in Spanish), the Secretariat of Science and Technology (Acronym in Spanish SECYT) assists the Rector and the Superior Council of the National University of Cordoba, generating tools and means oriented to the production and linking of scientific and technological knowledge. Its main objectives are the promotion of science and technology through funding, the training of human resources and the promotion of transfer to the productive sector.[[41]](#footnote-41)

The mission of the Undersecretariat for Innovation, Technology Transfer and Linkage is to promote the continuous link between research groups of the faculties and institutes of the National University of Cordoba, the Government, and companies with innovative potential, through active participation in technology-based ventures, as well as in those that tend to solve social problems.

Furthermore, in this university, the Intellectual Property Office (Spanish acronym OPI) operates within the framework of the Undersecretariat for Innovation, Technology Transfer and Technology Linkage with the aim of managing and protecting the intangible assets generated within the UNC through the dissemination, advice, management, and linkage of developments. This office provides a permanent professional advisory service to researchers (patent and utility model management, trademark management, copyright and software management and generation of technological reports and patentability – INFOTEC as its acronym in Spanish) and to companies by providing information on the technological offer of the UNC protected by intellectual property rights but the socio-productive sector.[[42]](#footnote-42)

This Office offers services ranging from raising awareness among the university community through courses, workshops and lectures related to intellectual property and copyright, as well as IPR management. It supervises identifying intangible assets and defining protection strategies.

On the other hand, it manages IP registrations: patentability analysis and registration of patents, utility models, industrial models, and designs. It manages and registers institutional trademarks of the UNC and of different products and services developed within the university community. The OPI coordinates strategies with other institutions on issues related to IP and develops linkage and transfer instruments for technology licensing.

Subsequently, the SECYT has two sub-secretariats, the sub-secretariat for the Promotion and Development of Scientific and Technological Research and the sub-secretariat for Innovation, Transfer and Technological Linkage.[[43]](#footnote-43)

The latter was created within the framework of the Resolution of the Honourable Higher Council No. 271 of 2007 with the aim of organising the functions and activities related to technological linkage.

Besides, here can be found the Office of Technological Innovation (Acronym in Spanish OIT) that has as its objective the administration of grant funds related to technological linkages. It also specifically administers the funds designated to the intellectual property office. This office was created in 2002 and operates as a Technology Linkage Unit (Acronym in Spanish UVT), together with those management offices in the various academic units of the UNC, enabled by the Higher Council under Law 23.877 (Law on Promotion and Encouragement of Technological Innovation No. 23.877).

The objective of this Unit of Technological Linkage is to manage the financing to carry out together with the productive sector, projects of technological innovation. It was also created for the purpose of promoting research and development actions, through business programmes, prizes and competitions sponsored by the productive, public, and private sectors.

Within the orbit of the Office of Technological Innovation, the UNC Business Incubator was created with the aim of promoting the creation of technology-based companies within the University. It provides physical space and specialised services for teachers, students or graduates of the UNC who wish to develop a technology-based enterprise.

*4.2.1. IP Policies in the University of Bologna – Italy*

The Regulations on Industrial and Intellectual Property of the University of Bologna, Rectoral Decree No. 269 of April 15th, 2014[[44]](#footnote-44), pursues the aim of correctly and profitably managing IP on knowledge and, more generally, on the results of research activity, and considers such management to be a fundamental tool for the purpose of promotion but also for the appropriate valorisation of the same.

The University of Bologna, also in adherence to the principles expressed in the European Charter for Researchers, determines and implements its guidelines on industrial and intellectual property through the adoption of regulations, resolutions, guidelines, contractual models and any other act suitable for the purpose, with which Researchers are required to comply and – when IPRs belong to the University – the related management activities, including protection and enhancement activities, are carried out directly by the general administration of the University.

What is most relevant for the purposes of this paper and our analysis, is the provision of the University Regulations about ownership of industrial and intellectual property rights to Intangible Assets made or otherwise achieved by a Researcher in the performance of Research Activity. These vest in the University when the Research Activity: " a) is funded, in whole or in part, by private entities, or b) is carried out as part of specific research projects or programs funded, in whole or in part, by public entities other than the University, or c) is otherwise the subject of Restricted Research Activity, regardless of the internal or external source of funding.

Regarding allocation, the Regulations stipulate that 50% percent of the income from the exploitation activity accrues to the Researcher while 20% of the income from the exploitation activity accrues to the Structure to which the Researcher belongs at the time of filing the patent application or registration.

In the event, on the other hand, that a Researcher proceeds independently with the valorisation of an Intangible Asset whose IPRs he or she owns, that Researcher is required to pay the University 50 percent of the proceeds from the valorisation activity. However, this subject will be expanded sufficiently in section 5.2 of Chapter Five.

To achieve the goals of promoting innovation, knowledge transfer[[45]](#footnote-45) and enhancement for the benefit of individuals and society, the University of Bologna encourages the establishment of corporations, called Spin-offs and Start-ups which are regulated through the R.D. No. 1467/2020 of November 4th, 2020, *"Regulations on New Entrepreneurship Spin-offs and Start-ups"*[[46]](#footnote-46).

*4.2.2. TTO in University of Bologna*

Here is important to mention first that in Italy, among the objectives that were intended to be pursued with the preparation of the aforementioned "Action Plan on Intellectual Property to Support EU Recovery and Resilience" and the Decree-Law No. 59 of 2021 mentioned in Chapter Three, is that of valorising the outcomes of public research by promoting its patents. To do this, first and foremost, it was seen necessary to strengthen the TTOs through the development of the skills available within them, and the increase in the ability to meet and serve businesses as well as the facilitation of the absorption and development of scientific-technological knowledge in specific production sectors and local contexts.

Then, the IP protection is a tool for pursuing the goal of enhancement and it represents only the beginning of the process; it is not an end in itself. IPRs increase the opportunities to be successful in this path and to be more attractive to the industrial entity that can produce the products and services that enhance the research results. So, IPRs can be seen as the bridging tool between the two worlds of those who do research and those who are in the market and can transform research into products that will ultimately benefit the community.

Each institution has its own strategic plan and has its ultimate goal of maximizing the benefits from research and solving concrete problems in order to improve the lives of all the individuals. To pursue these goals, it is still necessary to date to actively scout departments to raise awareness of IP among researchers who are sometimes more or less knowledgeable or naive. Another tool is the relationship and collaboration with industry.

These issues, absent 20 years ago[[47]](#footnote-47), are now instead present in the strategic plans of the University of Bologna as well. In the University 2009–2012 Strategic Plan, with the support of its new Managing Director, the University set specific goals to increase licensing revenues and implement a more business-oriented approach to the set-up and management of university spin-offs[[48]](#footnote-48). University formally incorporated Knowledge Technology Transfer (KTT)[[49]](#footnote-49) policies into its 2015–2018 strategic plan, with an articulated set of actions and goals, the allocation of dedicated resources, and the full support of its top leadership.

Now, one of the principles of the 2022-2027 strategic plan is precisely to “Increase partnerships with public, private and third-sector organizations to foster local development and build on local vocations” and “Enhance and consolidate actions to encourage entrepreneurship and technological transfer”.

The University of Bologna is organized as a multicampus, which increases its complexity and richness as a generalist university, covering all aspects of disciplines and knowledge.

There are more than 6,000 researchers and 32 departments that produce inventions that can be enhanced and funded. There are 12 areas of general administration, one of which, the Innovation Area (Acronym in Italian ARIN), deals with research to increase opportunities and resources related to research activity with strategic positioning strategies at the policy and lobby level and supporting the participation of the University of Bologna and its faculty in competitive initiatives and funding at various national, EU and international levels, promoting networks and strategic partnerships.

The mission of ARIN is therefore to “Enhance the social, economic and cultural impact of the Alma Mater on the territory, developing and managing actions aimed at business creation and the relationship with the industrial sector, public engagement initiatives, social innovation and cooperation and development at the international level, also by promoting fundraising initiatives with high social impact” and for what is most relevant to our analysis within its internal organization it includes a Knowledge Transfer Office (KTO)[[50]](#footnote-50) process unit for IP protection, a KTO Process Unit for IP enhancement, and a KTO process unit dedicated to new entrepreneurship.

The main activities carried out by the KTO Process Unit for the protection of IP include: “the management of the University's IP protection strategies and preparation of related regulations and contracts; the dissemination of the culture of IP within the University; advice and support to the University's staff for the protection of IP of research results; technical-legal analyses related to the protection and management of IP; the management of the University's portfolio of IP titles; support in negotiating and drafting contractual clauses for the management of IP within the framework of commissioned and collaborative research activities and within the framework of conventions for the funding of PhDs; and support for the management of IP within the framework of European projects”.

On the other hand, with regard to the Process Unit for IP valorization, the activities managed by the latter concern: “the management of IP valorization strategies; the dissemination of IP culture within the University; advice and support to University staff for the valorization of IP of research results; the implementation of proactive strategies for the commercial valorization of University IP titles; the negotiation of agreements for the transfer of University IP titles; technical-legal advice and the drafting of technology transfer agreements”.

Besides, following the role of the KTO, and about the modalities of transfer of IPRs to the University - with the aim of fostering the valorisation of Intangible Assets achieved in the field of Research - the latter encourages the transfer of the rights attributed in their original title to Researchers in their own favour, and the transfer is always done on a voluntary basis through a form sent to the KTO, followed by the conclusion of a contract and a sharing of the proceeds as described below.

Furthermore, it is expressly provided in the Regulations that "in order to ensure the most appropriate forms of protection and enhancement of Intangible Assets realized or otherwise achieved by Researchers in the context of Research Activity, the University shall make available to Researchers the services of the KTO" from which both Researchers who have realized within the framework of the performance of Research Activities, Intangible Assets whose IPRs are due to the University, and Researchers who have transferred IPRs, in accordance with the provisions of the Regulations themselves, may benefit.

Finally, the KTO process unit for new entrepreneurship mainly deal with the management of strategies and models for the creation and development of new spin-off and startup companies and the oversight of regulations and internal procedures for accreditation of spin-off and startup companies and support for the establishment/accreditation of such companies.

*4.3.1. IP Policies in the University of Valle – Colombia*

The University of Valle is one of the largest public universities in the southwest region of Colombia, founded in October 1945 by the Valle del Cauca Assembly[[51]](#footnote-51), with its main campus located in the capital city of Cali, province of Valle del Cauca, and presence in the northern zone of the neighbour province of Cauca[[52]](#footnote-52). Following this, its current IP Policies are stated in the Agreement No. 006 of July 6th, 2012 *“That modifies and adds the Agreement 023 of 2003 of the Superior Council Intellectual Property Statute of the University of Valle”*.

Hence, it starts with the consideration number 7 of the Policy which recognizes that an adequate and correct IP Policy allows the TT, the scientific and cultural exchanges, besides the sustainable development of the country in reasonable conditions, based in the necessities of the University and the country[[53]](#footnote-53). After this, the article 1 mentions that the objective of the Agreement is to establish the policy of IPRs assignation above the different branches of IP in the University of Valle. Subsequently, it defines the IPRs based in the two branches of the Decisions 351 and 488 before mentioned, as well as the main characteristics of the IP procedures of the institution. In this regard, and following the consideration number 7, it includes in its article 24 the distribution of the economic rights of the University, mentioning the sub article 24.1[[54]](#footnote-54) the role of its TTO in the management of the university’s Research Fund, created to incentivize the development of innovation and entrepreneurship activities, as well as the procedures to protect the universities IPRs. Furthermore, the sub article 24.2[[55]](#footnote-55) with a series of rules for the economic exploitation and transfer of results of the University, aiming to incentivize de development of science, technology, and innovation activities regarding the alliance University – Company – Government.

The IP Policies also includes a series of instructions to use the university logo, the regulations of copyright in the academic text, and other elements related to the IP management. However, our main issues are the ownership, the role of the TTO and the impact of the university, that will be commented in the next chapters.

*4.3.2. TTO in University of Valle*

Based in the CONPES 4062 mentioned in Chapter Three, this document states the importance of the called Knowledge Generation Institutions (IGC in Spanish) that are the organizations which make research, oriented to the TT, knowledge, and research, such as the Research Results Transference Offices (OTRI in Spanish, usually are in the same category that TTO)[[56]](#footnote-56), and subsequently, supported by a previous WIPO study carried in Colombia in this regard in 2019, mentions that one third of the IGC surveyed do not have IP guidelines, and the ones who have guidelines are limited with different rules to distribute the benefits between the researchers, the offices (TTO) and the institutions, as well as the asymmetry of information between researchers and private sector[[57]](#footnote-57).

Furthermore, it mentions that exists a disconnection in the IP market due to the lack of knowledge of the demand in the creation and research processes, which is traduced in the number TTO (as OTRI) recognized by the Ministry of Science, Technology, and Innovation, (MINCIENCIAS in Spanish) that in the year 2020 were only two, and three in process of recognition, in a country with 377 Higher Education Institutions (HEI), likewise, a disconnection due to the lack of knowledge of the current status of the technology that can be exploited by the private sector[[58]](#footnote-58).

Following this, the Guide for Technology Transfer originated by MINCIENCIAS also updates the status of the TTO as recognized actors of the TT Ecosystem in Colombia, that in September 2022 were eight[[59]](#footnote-59), adding in the general conclusions that the TTO of the universities are key stakeholders to accompany the creators and the companies, being necessary to strengthen the research and innovation structures in the institutions to accomplish the transfer to the firms and create new business models[[60]](#footnote-60).

In this sense the TTO of the University of Valle is named OTRI, this is, Research Results Transference Office (In Spanish Oficina de Transferencia de Resultados de Investigación). This fact is important, due to the main purpose of this TTO is strengthen the relationship University, Industry, Government and Society, promoting and participating in committees’ creators of public policies, incentivizing the generation of Science and Technology skills, and managing macro projects to promote the development in strategic sectors[[61]](#footnote-61).

However, the role of this TTO goes beyond, due to the IP matters of the University are managed by it. First, as a body adscript to the Research Vice-Chancellery, oversees the evaluation of the projects developed by the University, managing the valuation and protection of the IP creations, subject to the IP Policies[[62]](#footnote-62). Besides, is part of the University’s IP Committee, that is the board in charge of evaluate the respect to the IP derived of the activity from the University staff and gives several courses and tutorials on IP to the relevant stakeholders[[63]](#footnote-63).

Finally, this TTO received on September 2021 the recognition as actor of the Science, Technology, and Innovation System in Colombia by MINCINCIENAS, meaning that, under the current IP National regulations, can continue developing the strategy of articulating the System (TT Ecosystem) from the relationship between University, Industry and Government[[64]](#footnote-64). Nonetheless, as that the IP Policy of the University includes the TTO since 2003, we will see how the relevance of the OTRI can be seen from the scope of specific programs that shows how the universities are a relevant stakeholder in the TT Ecosystem as follows.

1. **Ownership in the IP creations**

Once the IP Policies were assessed in the previous chapter, we will continue with the ownership as an element that is present in the different universities, with certain variations between the respective countries.

*5.1. IP creations, its regulation and influence in the Universities IP Policies*

As starting point, first is important to review the notion of IP creations, that can be considered as the common distinction of copyright and industrial property, regarding that although the patents are in some cases the first kind of IP used by the universities, this also may include software or trademarks. Nevertheless, Universities IP policies may have a tendency that creations, or inventions in this case, that are public funded (or federally funded quoting the case of Germany and Switzerland) remain with the universities[[65]](#footnote-65).

This takes special importance when the issue of ownership must be decided, and to assess who will own the IP as well and make all the subsequent decisions acts if it needs to be protected or transferred. Consequently, we may find that in the cases of Argentina and Colombia may be similar in the sense that normally the role of the universities will be primarily, being present since the beginning of the process as advisor in protection-related issues, also through its TTO and discussing confidential issues, what can be considered some advice on a superficial level[[66]](#footnote-66). On the other hand, the case of Italy may differ as is explained in the next sub chapter.

Afterwards, concerning ownership of IP generated in universities, professor´s privilege (explained next) indicates the case in which university professors are allowed to retain IP rights over their research results. In the contrary, in the case of institutional ownership the results of publicly founded- research is owned by the institution where the researcher works and not by the researcher. In returns of this property right, the universities are required to file for patent protection on those inventions that are patentable. Then those patented inventions may be licensed, exclusively or nonexclusively, and any resulting revenue must be shared with the inventors.[[67]](#footnote-67)

In this case the general rule works as employment law and innovation law. In the first situations, the employer is entitled to IP rights created by employee in the course their employment. The second one, apply in this case, where the University can claim the ownership of inventions created by academic staff in the course of their employment using substantially the resources of the university (time, equipment, research funds.[[68]](#footnote-68)

*5.2. Status of “professor’s privilege” in Italy*

Institutions possess the instrument of governance of TT processes through the issue of ownership of research results, which therefore turns out to be a “decisive and cross-cutting aspect” for policies that make it possible for technology to reach the market[[69]](#footnote-69).

There have been several regulatory interventions over the years in Italy regarding the ownership of inventions. The latest of these – very recent and still awaiting approval – will hopefully come into force by the summer of this year and will be the subject of specific analysis below, after a brief review of the different phases that have characterized the Italian landscape on the subject.

Originally, the rules governing the ownership regime of rights to industrial inventions earned while employed by the state were included in special legislation, external to the code, specifically in Article 34 of the Consolidated Text of Provisions Concerning the Status of State Civil Servants[[70]](#footnote-70), which reproduced article 23 of the Inventions Act[[71]](#footnote-71) for inventions of employees of private entrepreneurs, that contained a tripartition between: *business inventions, service inventions, occasional inventions of the employee.*

Regarding the *service inventions* in which research aimed at solving technical problems was provided for as the subject of the contract or employment relationship and paid for that purpose, only the authorship of the result was at the head of the employee, and the related rights of economic exploitation instead belonged to the state. For what concerns instead *business inventions*, if the invention was not provided for consideration but was always derived from the performance or fulfillment of an ongoing employment or civil service relationship, the rights still accrued to the state and the employee (except for paternity rights to the invention) was entitled to an equitable award. Finally, in the case of *occasional inventions,* the latter even disregarding any objective connection between the good achieved and the tasks performed "falls within the field of activity of the administration to which the inventor is attached". Therefore, the administration was entitled (within the period of 3 months from the date of notification of the filing of the patent application) to the right of first refusal for the exclusive and non-exclusive use of the invention or for the purchase of patents and for the purchase of patents abroad upon payment of the fee or price (to be fixed in relation to the help received by the facility to carry out the invention).

Later, with the Tremonti Law[[72]](#footnote-72) we then see in 2001 an exemption from the traditional discipline of employee inventions which states that the researcher is entitled to exclusive ownership of the rights (moral and patrimonial) except for public employer's right to share income or royalties from exploitation of the invention. The purpose of this law would have been to incentivize and encourage transformation of inventions into concrete projects and avoid arising of conflicts on ascertaining the ownership of the invention, even if, at the end, as noted by authoritative doctrine several times over time[[73]](#footnote-73), and as will be highlighted below, it ended up being an “an extravagant choice”[[74]](#footnote-74) made by an improvised legislator[[75]](#footnote-75).

According to the provisions of this new law, bodies with institutional purposes had the role of determining the maximum amount of the fee related to licenses to third parties for the use of the invention, as well as any further aspects of reciprocal relations. In each case the inventor was entitled to not less than 50% of proceeds (70% in case university or government had not so identified).

If, however, researcher did not patent or, once patented, did not then enter into technology transfer agreements with third parties, then article 24 *bis* of the Inventions Act provided that after 5 years from the issuance of the patent, the public administration would automatically acquire free non-exclusive right to exploit the invention and property rights or have them exploited by third parties, subject to the inventor's right to be recognized as the author.

Due to the many doubts and criticisms that the introduced waiver had raised, numerous attempts followed to restore the institutional tenure model. All of them unfortunately failed and article 24 *bis* of the Inventions Act was reproduced the same except for the *ex novo* addition of the last paragraph that excludes the applicability of the provisions in the case of funded research.

Now the discipline is contained in art. 65 of the Industrial Property Code, Legislative Decree N° 30 of 10 February 2005[[76]](#footnote-76), and stipulates the right of the public body or university to receive share in income or fee not exceeding 50% (para. 3) expect in case of funded research (para. 5) leaving an open interpretative problem regarding the missed specification of the ownership regime applicable in case of funded research where the special regime of academic inventions is waived which is, however, resolved by the majority in favor of membership in the Universities of the rights, which may also allow by special provisions in the research contract, that they belong to the funder.

To date, the current landscape involves the assignment by the Senate of the Republic Bill No. 26311 to the 10th Standing Committee (Industry, Commerce, Tourism) after being considered by the Council of Ministers in April 2023 which provides for the revision of the Industrial Property Code.

With this latest Decree, the goal is for a total reversal of the individual ownership regime, perceived as urgent and necessary given the major obstacles that the current system poses to efficient management of public sector technology transfer processes.

The reformed text stipulates that: *“…when the industrial invention is made in the performance or fulfillment of a contract, employment or working relationship, even if for a fixed term, with a university, including a legally recognized non-state university, a public research institution or IRCCS, as well as under an agreement between the same entities…”.*

Thus, moral rights of paternity would belong to the inventor, while property rights would belong to the home institution and to the researcher only in case of inaction since the institution must file the patent application within 6 months of the communication of the invention. The inventor has an obligation to disclose the subject matter of the invention to the relevant facility with the burden on both parties to save the novelty of the invention.

The reform then stipulates that the entities to which it refers, namely universities, including legally recognized non-state universities, public research institutions, or IRCCS, “*shall regulate:(a) the modalities of application of the provisions of this article to subjects who are eligible to participate in research activities, complete students of degree programs for the inventive results achieved within the scope of laboratory activities or in degree paths; (b) relations with inventors and rewards related to the activity inventiveness; c) relations with funders of research that produces patentable inventions, regulated by contractual agreements drawn up taking into account the provisions of paragraph 5 below; (d) any other aspects related to the best forms of exploitation of inventions.*

The University regulations could then provide for an exception to the general rules and give the right to the patent directly to the author, and should regulate, from time to time, by contract, with these figures the management of intellectual property rights if interested in economic exploitation of the results.

Lastly,invention made in the performance of research activity financed, in whole or in part, by another entity are governed by the contractual agreements between the parties drawn up considering the Guidelines, which identify the principles and specific criteria for the regulation of contractual relations.

At present, therefore, Italy represents an emblematic case of how a long experience, not without its difficulties[[77]](#footnote-77), has finally led to an awareness and a push toward a decision that many consider suitable for a more efficient and successful valorization and protection of the results of research in universities.

While for a long time, in fact, it was mistakenly believed and asserted that the low number of patents for university inventions was caused by the institutional tenure system, empirical analyses have shown otherwise and have traced this low production to the equally low amount of state resources available to public research and university institutions[[78]](#footnote-78).

Even if – as previously mentioned while describing the policies of the University of Bologna – with the aim of fostering the valorisation of Intangible Assets achieved in the field of Research, the University has always encouraged the transfer of the rights attributed in their original title to Researchers in their own favour, with a transfer done on a voluntary basis, and nor should it be ruled out that there is an unfortunately widespread phenomenon whereby numerous inventions go undeclared by researcher, the abolishment of the rule of Professor’s Privilege represents a highly incentive prospect for better synergy with the business world as well. In fact, one of the reasons for the reduction in corporate funding for university research, after a path of dedication to technology transfer activities had begun since the 1990s, can be seen as the adoption of the individual ownership model.

A greater self-financing capacity of public research institutions and universities, accompanied by the choice to abandon the individual ownership model has than allowed to align with the rest of the international legislations[[79]](#footnote-79).

The Italian experience can show how the low motivation of the researcher to bear the costs of patenting, promotion, and commercialization as well as his weak communication skills with the industrial sector inevitably represent a brake on innovation and a great penalization of the technology transfer system since it is not very functional in the pursuit of its primary objectives[[80]](#footnote-80).

*5.3. Comparison of the “professor’s privilege” with Argentina and Colombia*

* *Argentina*

As mentioned in chapter four, Argentina has a regime in which the ownership of the intellectual rights of inventions belongs to the University Institution. This is in line with Argentina's patent and utility model legislation Law Nº 24481.[[81]](#footnote-81)

At this point, the article 10º (a) of this law states that inventions developed under an employment relationship belong to the employer: *"Those made by the worker during the course of his contract or employment or service relationship with the employer, which have as their total or partial object the carrying out of inventive activities, shall belong to the employer".*

In any case, in paragraphs (b) and (c) of the same article, the Argentinean legislation recognises that it is necessary to provide incentives to the researcher and therefore proposes a complementary remuneration and royalty payments. This is regulated in:

*b) "The worker, author of the invention in the previous case (art. 10 (a), shall be entitled to supplementary remuneration for its realisation, if his personal contribution to the invention and the importance of the same for the company and the employer clearly exceeds the explicit or implicit content of his contract or employment relationship".*

*c) "Where the employer assumes ownership of an invention or reserves the right to exploit it, the worker shall be entitled to fair financial compensation, fixed in relation to the industrial and commercial importance of the invention, taking into account the value of the means or knowledge provided by the company and the worker's own contributions; in the event that the employer grants a licence to third parties, the invention may claim from the holder of the patent of invention the payment of up to fifty per cent (50%) of the royalties received by the latter".*

As can be seen, the Argentinean legislation in this sense is clear: the owner and holder of the inventions is always the employer, but at the same time it recognises that for there to be a motivation for development, incentives must be given to the staff.

The article 3º of the Ordinance Nº 12/11[[82]](#footnote-82)of National Honourable Superior Council of the National University of Cordoba establishes the criteria in relation to the ownership of the developments in IPRs: *"Three options shall be allowed with respect to the ownership of property covered by this regulation*:

*1)The Intellectual Property shall belong to the UNC, unless otherwise agreed, provided that the creations are obtained by the authors during the course of an activity at the UNC, which has the total or partial purpose of carrying out activities of creation of intellectual property and that they have been carried out with contributions from the UNC through the payment of salaries, scholarships, contracts, employment or service relationship and/or with the support of UNC subsidies or exchange activities or through the use of goods or means provided by the UNC.”*

*2)When the results have been obtained with the concurrent support of the UNC and other public and/or private institutions, such results may be jointly owned as established at the time of entering into the corresponding agreement”.*

*3)The results may be the exclusive property of third parties, when they are the result of actions carried out by virtue of specific agreements in which this has been established and which have the specific approval of the Honourable Higher Council of the University".*

In this sense, the UNC adopts this legislation, adapts it, and proposes three options in relation to the economic rights that fall on inventions:

- Exclusive rights of the UNC

- Co-ownership with other institutions

- Exclusivity of third parties

Still within the scope of the UNC's economic rights, article 6º of the legislation analysed establishes the method of internal distribution of the benefits obtained by the UNC. In line with Argentinean legislation, the ownership of the developments is in the hands of the UNC. This institution takes the maximum suggested by the law and distributes it to the inventors. The remaining fifty percent (50%) is distributed within the institution to favour the protection of intangibles.

The distribution of the earnings received for the exploitation of the IPR is distributed fifty percent (50%) to the authors, twenty-five percent (25%) to the academic unit, ten percent (10%) to the Fund for the Management of Intellectual Property and fifteen percent (15%) to the National University of Cordoba.

* *Colombia*

For the case of Colombia, the University of Valle includes various articles regarding the ownership of IP creations mainly developed by the professors, students, and workers, bearing in mind that the concept of *“professor’s privilege”* doesn´t really exists in the national legislation. In this sense, Morales et al mentions that in the PI processes of the universities, the relevant factors are not only the ones related with the Research and Development (R&D) results and the new knowledge generated, but the ones that involve directly the final beneficiary’s participation since the beginning, because are more likely to generate a new context and develop a complete TT process[[83]](#footnote-83).

Following this line, regarding the IP in the Colombian universities, Betancur and González indicates that the IP Policies give the guidelines in the cases where these institutions consider that the ownership of the IP should be determined different to the law presumptions[[84]](#footnote-84). Therefore, the authors mention as main law presumptions[[85]](#footnote-85), first, the articles 4 and 91 of the Law 23 of 1982 about who can be considered an author of Copyright, and the presumption of ownership by the public entities in the works created by its employees during their labour, respectively; and second, they refer to the article 28 of the Law 1450 of 2011 as the IP in works done under contract or labour law by a contractor or a employee, where the second is considered the initial right holder, presuming that the economic rights have been transferred to the contracting party or employer, requiring a written contract to do so. Nevertheless, from our view and for the purposes of the paper, the articles 29 and 30 of the Law 1450 also should be considered due to the first stress the requirement of a written contract to transfer industrial property rights, meanwhile the second allows the transfer of economic rights through written contracts, registering them in the National Copyright Register (RNDA as its acronym in Spanish), and considering as a non-existent clause the indetermined general transfer of an author’s IP production.

However, contrasting Morales et al with Betancur and González[[86]](#footnote-86), we can find that besides involving the direct beneficiary since the beginning, a complete TT process also includes a starting act with the economics rights cession, funding obligations of the university and obligations of the staff who will develop the research. With this argument, the main characteristics of ownership in the IP Policy of the University of Valle[[87]](#footnote-87) will be explained as follows.

Our first element is the Article 17 that includes the economic rights for the University as a rule, of the inventions, utility models, industrial designs, layout designs, trademarks, obtentions of vegetable varieties, software and works created by its professors, students, administrative staff, and contractors; it is relevant to say that the item b of this Article expressly mentions that in the case of professors hired by specific lectures, will be applied the presumption of the article 28 of the Law 1450 mentioned above. Second, the Article 18 states that in the cooperation agreements with public or private third parties must be included a clause of ownership of the economic rights of IP creations, being also an obligation for the University to supervise the respect of the moral rights of the staff who participates in the work or project. Subsequently, the Article 19 continues with the moral rights of the authors, meanwhile the Article 20 has the exception (to say, the other side of the Article 17) with three specific and certain cases where the economic rights correspond to the professors, staff or students of the University only in three cases: i) where this are developed out of their academic or labour functions and responsibilities with the University, and this does not conflict with its interests; ii) when the University renounce expressly to the ownership of the economic rights; iii) when it is result of a thesis without University’s external founding. Besides, the paragraph of this Article mandates that the visitor professors or students, national or international, who participate in works or research projects will be covered by this Policy, mentioning that the creation was made with the support of the University of Valle. Then, Article 20 gives to the staff the freedom to use their IP creations with third parties whenever are out of their legal and constitutional obligations with using resources and facilities of the University.

Yet, we also found a second group of articles that complement the regarding the distribution of the economic rights, such as Article 24.1 and 24.2 previously mentioned, as well as the Articles 25 and 26 that obligates to subscribe the IP Agreement, considered the previous document where is explained the work or research project, rights, obligations, autonomy, supervisor, confidentiality, among the most relevant elements for this field.

Finally, the mentioned freedom of Article 20 is regulated in the patent field, with the Articles 29, 30, 31 and 32 that requires to the patent inventors to inform the University any new possible patentable creation to the IP Committee, if the Committee considers this is not patentable, the University allows the creators to continue the registration process before the national IP Office, still holding the 50% of the ownership, bearing the creators with all the administrative costs, and reporting the subsequently intention to transfer of their ownership to third parties, subject to the University approval. Besides, the Article 33 gives to the inventor the right of an economic recognition in their salary as inventors or creators. It is relevant to say that the advisor body of the University is the IP Committee, adscript to the Research Vice-Chancellery, in charge of the correct execution of the IP Policy, following the Article 50, and to who belongs the TTO named in the institution OTRI.

As concluding remarks in the chapter, we can say that the Colombian context is more like the Argentinian one in some elements, such as the rule of ownership of the University as the first right holder of the economic rights, considering in the scope of IPRs, respecting the moral rights of the professors. Is not possible to find a professor’s privilege, rather an institutional privilege, where the exceptions are limited, even if the patent field, where the University conserves the ownership of the 50% of economic rights in an invention allegedly considered as non-patentable. Now we may review the role of the TTOs inside each institution.

1. **Universities as a relevant stakeholder**

We may see how through different programmes the universities impact positively their region, not only from a legal perspective, but including also small businesses, technological development, and technological innovation.

Briefly, it can be said that these factors are connected in the sense that can exist many types of innovation-related actions that are relevant for productivity and growth, adopting and not necessarily inventing new technologies, diffusing novel management practices, generating complementarities between key enabling technologies and traditional sectors, as well as developing social innovations[[88]](#footnote-88). We also consider that is very to understand how to build better connections between the scientific specialisations of universities and the economic specialisation of the concerned regions[[89]](#footnote-89), that in this case, the seconds means the requirements of the regions where the universities are located.

*6.1. Impact of the National University of Cordoba in its region*

If we look at the points analysed so far, we can affirm that the UNC has an institutional team oriented towards the joint operation of the Intellectual Property Office and the Technological Linkage Unit for the development projects created within the framework of the Institution. At present, within the orbit of the Undersecretariat for Innovation, Technology Transfer and Linkage, the Knowledge Valorisation Programme operates (“Programa de Valorización del Conocimiento” in Spanish).

It is a plan for the identification, valorisation and transfer of knowledge generated within the framework of UNC research groups, financed by the SEYCT and the main national Research, Development, and Innovation (R&D&I) promotion agencies.

This programme was created with the aim of identifying, valuing, and transferring results generated within the framework of research projects to the socio-productive sector. To achieve this purpose, the Knowledge Valorisation Programme offers different activities:

 - Analysis of the potential for transferring research results generated within the framework of a line of work to the socio-productive sector. This includes a Technological report oriented to know the state of the art and the degree of novelty of a particular development, and a Market Opportunity Report (IOM as its Spanish Acronym) oriented to know the adopting market of a particular technology and its characteristics.

 - Development of a Technology Charter for scientific and technological developments.

 - Linkage with companies and governmental entities to generate the transfer of research results.

 - Advice on funding and formulation of projects aimed at linking and technology transfer of research results.

 - Trend analysis, panoramic analysis, and information support through Technology Watch.[[90]](#footnote-90)

This is a clear example of how the UNC functions as a vehicle for technology transfer, offering this programme with an impact mainly in the region, but also with great importance on a national scale. In its institutional structure, working together with the State and companies that collaborate with the university sector, the development of projects is not only an objective of the institution but also functions as an integral part of the agenda of scientific and technological development activities in the country.

*6.2. Impact of the University of Bologna in its region*

A case of successful technology transfer from the University of Bologna (UniBo) concerns the output of research conducted by a Professor from the Department of Biomedical and Neuromotor Sciences, who invented a combination protein for the treatment of CDKL5 disorder, also known as "atypical Rett syndrome." The latter consists of a rare neurodevelopmental disorder due to a deficiency or alteration in brain cells of the eponymous CDKL5 protein; the deficiency or alteration of the protein triggers the disorder, which mainly affects girls in the first few months of life, resulting in progressive neurological disorders such as severe or very severe mental retardation and loss of neuromotor abilities.

Early research began in 2009, and the first results began to be glimpsed in 2013. Thanks to the research, a way was found to make up for the lack of the CDKL5 protein in the sick people's bodies through the docking of a portion of the viral protein TATk to the protein in word. The TATk-CDKL5 combination made it possible to cross the barrier of the central nervous system, thus allowing the CDKL5 protein to reach the brain to treat its disorders. Indeed, it had been found that due to a self-defense barrier in the central nervous system, the protein could not cross that barrier even when synthesized and injected into the body.

The first contacts between the researchers and the Office of Technology Transfer began in 2013, and news of the research conducted by UniBo spread through the network of national and international associations of parents of children with CDKL5 syndrome. On Feb. 4, 2014, the father of a child with the disease decided to establish an LLC "MiaMed" to seek investment and funding to develop the technology, which was still at a preclinical development stage, and an Option agreement was entered into between the university and the newly established start-up to pay for due diligence and "professional" prior art with an American firm.

The strategy of exploitation of the research results included the granting by the University (patent owner) of an exclusive license option to MiaMed for the use of the patent and MiaMed's commitment to fund a research and development contract to the inventor's department for the continued development and testing of the patented technology.

MiaMed exercised the option to license the patent application to protect the invention which provided for the coverage of the costs, patent and fee-based, in terms of royalty and milestone payments and the acquisition by the University of Bologna, through the incubator of the University of Bologna “Almacube”[[91]](#footnote-91) of a percentage of MiaMed's shares in the company at the first round of investment. Following this, at the end of February 2014, the prior-art patent (PCT + US) was then filed, 100% owned by UNIBO (to date granted with an extension in 60 countries).

The startup found funding that could be used to advance the preclinical development of this new technology within the Researcher's laboratories, and in 2016 the startup was acquired by an American multinational company in biotech “Amicus Therapeutics” which became the beneficiary of the patent license for increasing fees as the technology development and commercialization goals were achieved.

From the perspective of IP exploitation, the case study is emblematic because it represents a winning strategy; in fact, to get a multinational company willing to invest millions of euros, several elements are required. The latter concern not only the existence of an interesting technology but also and above all a path of protection and exploitation of the same, which in the case in point included: obtaining a patent, the creation of a start-up used to find financing for the development of the technology, exploitation through a spin-off company and, finally, the acquisition by the multinational company capable of bringing this new technology to the market.

If the professor at the head of the team had not protected at the patent level but had proceeded to publish her invention, the multinational would never have been interested in investing, since IP is a tool that allows those doing business to make more profit and have a competitive advantage.

The impact of this case can be seen on several levels: social, economic, and institutional. It has seen the creation of a potential improvement in the living conditions of children with the syndrome, which affects about 750 children a year. In addition, the case has generated greater entrepreneurial awareness in the enhancement of academic research through business creation and patent protection.

*6.3. Impact of the University of Valle in its region*

For the case of the University of Valle we can find the recent case related with the COVID-19 pandemic, with the critical situation between March and April 2020 where the health workers were exposed to the virus due to the lack of protection devices or Protective Personal Equipment (PPE), adding to this the continuous peaks of the pandemic in the province of Valle del Cauca, especially in those related with the public hospitals of the Province. Based on this, the University launched in May 2020 the technologies of free use for Covid-19 technologies developed by its researchers[[92]](#footnote-92), which included the device called (3.) Col-Univalle face shield II. Thus, as mentions in the COVID-19 technologies license, this was done with the aim to give solutions susceptible of evaluation and real application in benefit of the public health and the improvement of the of the society’s welfare[[93]](#footnote-93). Furthermore, is a free license limited to the duration of the COVID-19 Pandemic declared by the World Health Organization (WHO), stating that the purpose of the free license is to make research or industrial initiatives and thus seek fast solutions related with that Pandemic[[94]](#footnote-94), reserving the University all the economics, copyright and industrial property rights concerning the technological package, conserving the ownership of them[[95]](#footnote-95).

Then, in May 2021 we can find how the University of Valle researcher Mauricio Quintero-Angel briefly explains the usefulness in making face shields for the containment of COVID-19[[96]](#footnote-96), focusing on the importance of creating a device “do-it-yourself” inspired in the origami techniques that the end-user can make for personal use rather than commercial production, such as was the case of the Col-Univalle face shield II[[97]](#footnote-97), and based in the use by the health staff, mentioning some final recommendations for cleaning it with neutral detergent and warm water, and mechanical action to remove any visible soling, using clean water and then the air drying[[98]](#footnote-98).

And finally, in the year 2022 we can find how through the partnership with the technological company BALABS SAS (Industry) and the Government represented by the public entity National Learning Service (SENA as the Spanish acronym), the University of Valle obtained two inventions before the Colombian IP Office consisting one in the Industrial Design *“Face mask”* with the File Reference No. NC2021/0008975 dated February 15th2022, and one in the Utility Model Patent *“Breathing Complete Face Shield”* with the File Reference No. NC2021/0008958 dated May 27th, 2022.

Tracking the public files of the two mentioned inventions, we can extract the following elements concerning the TT framework described during the paper. First, the inventions have elements of those that were part of the free license, considering the origami concept of the pliable face mask and the whole structure of the face shield, which were added with more features of the researchers[[99]](#footnote-99). Second, the transfer of the inventions was made in the context of the Project No. 77523 financed by the MINCIENCIAS to develop Personal Protective Equipment; therefore, the researchers agreed to sign on June 28th, 2021 the transfer the rights related with the initial ownership in their condition of inventors, as well as the priority rights, protection and assignment above the creations without territory limitation, together with any other economic right related with the transfer agreement[[100]](#footnote-100). Third, the transfer was made to the three entities mentioned in the partnership, these are the University of Valle, SENA, and BALABS SAS however, the document of the partnership is not available for public consultation when this research is written. Fourth, the role of the TTO (OTRI) can be seen all around the previous steps, when the COVID-19 inventions were presented in their web page as part of the University’s IP free use, and most important, when the legal documents were signed by the rector, giving the authorization to an external lawyer to present the Industrial Design and Patent requests before the IP Office[[101]](#footnote-101), even including the TTO’s mail as the institution´s official mail.

Thus, we can see how the University and its TTO managed the IP as a strategy to register an Industrial Design and a Utility Model Patent, allowing in a first moment to do a sort of Open Innovation when used internal and external ideas to advance in their technology[[102]](#footnote-102), translated this in how the developments from year 2020 to 2021 were included to be part of the research that ended granting the inventions in year 2022. This practice permits to say that the University is managing properly the knowledge flows, working with collaborative partners through its TTO, and commercialize the research results in the final stage[[103]](#footnote-103).

Nevertheless, still can be found the issue if based on the conditions from the free license mentioned in the year 2020, the end of the Pandemic was declared recently on May 5th, 2023, by the WHO[[104]](#footnote-104), can be said that after this date the University may start to request royalties or fees for the use of the mentioned inventions that where free since May 2020. It is also important to note that in the last Management Inform of the Research Vice-Chancellery available online, in the year 2021, were included, concerning the TTO, the Project 33421 to strengthen the management of TT with a scope regional, national, and international, as well as the purposes for the year 2022 increase the license agreements to commercialize the new creations[[105]](#footnote-105). The fact that the Inform of the year 2022 is not available online is a limitation for the research, that for the purposes of the common elements will consider the information available online as was indicated in the introductory chapter.

1. **Common elements in University TT in the three universities**

In the closing chapter of this research, we want to bring the reflections proposed by Ocampo in his book Global Governance and Development, regarding the elements of a possible international cooperation, stressing that the technological progress is highly concentrated in the developed countries, with an imperfect diffusion in the developing countries[[106]](#footnote-106). Is also relevant to take the argument of Huggins et al, when mentions that the effective engage in (TT) forms part of the capabilities of the TTOs, and thus, the general status of a university will be significantly associated within wider university-industry networks, considering the generation of networks within a more international context[[107]](#footnote-107). In this sense, we will show through this chapter the comparison of the use of IP, the ownership, impact, TTO role in each university, as well as good practices and practices to improve. Besides, we will describe possible opportunities of collaboration.

* 1. *Comparison of the use of IP and TT structures*

We propose the following table[[108]](#footnote-108) to synthesize the main features involving the ownership, TTO and TT Structures in each university, using the concepts mentioned in their impact as part of the previous chapter:

Table No. 1 - Comparison of the use of IP and TT structures

|  |  |  |  |
| --- | --- | --- | --- |
| **Universities / Characteristics** | **National University of Cordoba** | **University of Bologna** | **University of Valle** |
| **IP Ownership** | Regime based on Institutional Ownership | Researcher entitled to exclusive ownership of rights (moral and patrimonial)  | Presumption of ownership for the University within a written contract |
| **Regional impact** | Knowledge Valorisation Program | Combination protein for the treatment of CDKL5 | COVID19 Technology Package |
| **TTO Role** | Provide a Market Opportunity Report (IOM) for the researchers, oriented to know the adapting market of a particular technology and its characteristics | Spread the research through national and international associations, seeking funding and licensing it to an American firm. | Develop an IP strategy based in Open Innovation, to conclude in the register of an Industrial Design and a Utility Model Patent in partnership with industry and government. |
| **Good practices** | IOM as tool for enter in the market new creations / University ownership of IP creations | Internationalization of the IP creations | Open Innovation process / University ownership of IP creations |
| **Practices to improve** | Commercialization mainly international | More efficient and successful valorisation and protection of the results of research at institutional level | Commercialization national and international level |

*7.2. Possible opportunities of collaboration between universities in programs on the IP Field*

TT acts as an element of knowledge export around the world. Where the ultimate purpose is to create technological innovation development projects not only with regional or national impact, but also to explore this mechanism or process as an export asset around the world. As we have been analysing, universities function as vehicles for these research, development, and innovation projects. They are an essential part not only in academic exchange but also from the point of view of economic development. It is all a chain of acts that lead to realisations that start as academic projects and have their impact as commercial elements. Consequently, although the public policies of each country will ensure the internal progress of each region, it is certain that the development plans and their consequent planning agendas serve as connections and global growth.

The final product generated from innovation and human intellect can be analysed as an export product. Government, academia, and industry acting together through the Enabling Factors to achieve a valuable impact on society.

Argentina and Colombia, Latin American countries, and Italy as a member country of the European Union. One might think that if we start from the economic, social, and cultural scenarios of each region it would not be feasible to find common elements. But this is where the important value of TT lies: as a common element and growth factor in all three countries. Three spheres that offer technological innovation development, but which in turn can be considered as export assets. The positive, from their intangibility and their character of international use, allows us to consider them as another way for the growth and expansion of each region.

Three Public Universities, with an institutional organigramme established by Ordinances of the Superior Councils. The three institutions with their TTOs or units have a common element: to offer services to society and to the community part of the institution for the development of technological projects at national level, with the support of the state and in search of transfer abroad.

In Argentina, the University of Cordoba provides a market opportunity report for the researchers, helping them to know which market is useful for a particular technology and its characteristics. In Italy, the University of Bologna spreads the research through national and international associations, seeking funding and offers licensing it to an American firm. And in Colombia, the University of Valle develops an IP strategy based in Open Innovation, to conclude in the register of an Industrial Design and Utility Model Patent in partnership with industry and government.

In this scenario, as WIPO explains[[109]](#footnote-109), universities are the factories of the knowledge economy. IP provides another mechanism for universities to disseminate the knowledge they generate and for this knowledge to be used in the economic sector.

Besides, in this context WIPO provides advice, support, and resources to help universities and public research institutions around the world to leverage their IP and continue to stimulate the innovation that moves society forward. Such was the recent case published in the WIPO Magazine on February 2023[[110]](#footnote-110), where WIPO provided to each staff member of the TTO (OLIE in Spanish) from a Colombian academic institution, complementary IP training on technology transfer and IP commercialization, as well as this institution launched its new IP and Technology Transfer Policy on February 2022, among other features. This is important because shows the role of the WIPO supporting the TT from universities to business and public users, creating innovation ecosystems in academic institutions[[111]](#footnote-111), meaning, the TT Ecosystems in a global scale, offering ready access to information on good practices and practical tools via the WIPO website on IP and TT[[112]](#footnote-112). In other words, the services mentioned here are available for the three institutions described in the paper to be used and share the information related to commercialization, valorisation, and internationalization of their IP creations.

Furthermore, through the various proposals, as well as the PATENTSCOPE programme, ARDI (Research for Information), ASPI (Expert Patent Information) [[113]](#footnote-113), among others, WIPO's purpose as an international forum rightly focuses on collaboration between member countries. IP as a matter of international cooperation is one of the purposes of its agenda, not only in its role as an organisation that supports and collaborates in various development projects but also as a method of executing its IP purposes, bringing people together through universities, governments, and industry to shape the future of this matter around the world.

1. **Conclusions**

In conclusion, although we are looking at three universities in three countries with diverse social, cultural, and economic developments, there is one major common element: the transfer of IPRs. Each university with its own structure, with its own specialised TTOs, is looking for ways to carry it out and execute it through its own programmes. What is transnational and positive is the purpose of social, economic, and cultural development through IP. How each country can collaborate with another and build commercial links around the world in the transfer of technology as an intangible transaction asset.

In this sense, we also can find how the National University of Cordoba (UNC) has given a first step, following the paper published by Aisa, Talbot-Wright, and Negro-Hang on February 1st, 2023. These authors explained the experience of the “Academy-Industry Meetings (AIM)” and the trainings given to the UNC staff, exchanging good practices among professors and staff of the TTOs to foster the development of innovation skills in these institutions[[114]](#footnote-114). For the authors, this was a first successful pilot, that allowed the UNC articulate linkages with the productive sector, institutionalizing the regional TT Ecosystem, and thus keep working with other stakeholders from the national and international level, changing the scope of the university not just as a knowledge “provider” but an intermediary that allows to exchange the value and social capital[[115]](#footnote-115).

However, it is important to note that although the European experience is more advanced versus the Latin American countries, the University of Bologna also can learn how the Open Innovation from the University of Valle and the Market Opportunity Report from the National University of Cordoba are used to improve the IP creations, as well as the exchange of the TTOs staff good practices regarding ownership and protection of the IPRs. On the other hand, the international experience of the University of Bologna is a key factor that has been noted by international entities as the Organization for Economic Cooperation and Development (OECD) when assessed the innovation in the Italian universities or Higher Education Institutions (HEIs) in the year 2019. Here we can find how is stated that few HEIs have developed and implemented an integrated strategy concerning internationalisation which goes beyond education, such was the case of the University of Bologna, where the internationalisation strategy clearly emphasises the role of the university as a channel to open the door to new foreign markets to local SMEs[[116]](#footnote-116), as was the case described from the Combination protein for the treatment of CDKL5.

Whether the international forum to converge these experiences between the three universities should be the WIPO by specificity, can also be considered the European Union from which Italy is a member. The elements are given to continue working in an international level, where the academic institutions through the University TT are creating programs that impact positively their regions, the TT Ecosystems, and the context where their TT Structures are allocated using the Enabling Factors to do so. Is just a matter of connect the dots between them.

Thus, we consider that the next stage for the growth of these countries is collaborating with projects in a way to foster innovation, development, and the consequent educational growth of societies, which is ultimately where a country's growth comes from. In this sense, we could also see how the WIPO is committed to addressing these policy challenges related to IP, innovation, and creativity.

1. **Annexes**

Annex No. 1 – Diagram with analysis of TT[[117]](#footnote-117)



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1. See WIPO, 2023a. [↑](#footnote-ref-1)
2. See WIPO, 2023b. [↑](#footnote-ref-2)
3. See Argentina Ministry of Science, Technology and Productive Innovation, 2016; Italy NETVAL, 2021; and Colombia National Council on Economic and Social Policy (CONPES), 2021. [↑](#footnote-ref-3)
4. See WIPO, 2023a. [↑](#footnote-ref-4)
5. See Tijssen, Edwards, & Jonkers, 2021, pp. 15-16. [↑](#footnote-ref-5)
6. See WIPO, 2012, p. 3. [↑](#footnote-ref-6)
7. See Carter-Johnson, 2020, p. 4. [↑](#footnote-ref-7)
8. Ibid. [↑](#footnote-ref-8)
9. See WIPO, 2023a. [↑](#footnote-ref-9)
10. Ibid. [↑](#footnote-ref-10)
11. See Chu, 2013, p. 65. [↑](#footnote-ref-11)
12. See Tijssen, Edwards, & Jonkers, 2021, p. 3. [↑](#footnote-ref-12)
13. See WIPO, 2012, pp. 3-4. [↑](#footnote-ref-13)
14. See Lehman, 2015, p. 212. [↑](#footnote-ref-14)
15. See Tijssen, Edwards, & Jonkers, 2021, p. 3. [↑](#footnote-ref-15)
16. See Cambridge University Press & Assesment, 2023. [↑](#footnote-ref-16)
17. See Menter, 2023, p. 4. [↑](#footnote-ref-17)
18. See Sebeok, 2020, p. 49. [↑](#footnote-ref-18)
19. The Bayh-Dole Act can be resumed as follows: *“Enacted on December 12, 1980, the Bayh-Dole Act (P.L. 96-517, Patent and Trademark Act Amendments of 1980) created a uniform patent policy among the many federal agencies that fund research, enabling small businesses and non-profit organizations, including universities, to retain title to inventions made under federally-funded research programs. This legislation was co-sponsored by Senators Birch Bayh (D-IN) and Robert Dole (R-KS).The Bayh-Dole Act was especially instrumental in encouraging universities to participate in technology transfer activities”*. Definition taken from the Association of University Technology Managers – AUTM web page: <https://autm.net/about-tech-transfer/advocacy/legislation/bayh-dole-act>. Accessed on June 8th, 2023. [↑](#footnote-ref-19)
20. See WIPO, 2023c. [↑](#footnote-ref-20)
21. Ibid. [↑](#footnote-ref-21)
22. See WIPO, 2023c. [↑](#footnote-ref-22)
23. See Carter-Johnson, 2020, pp. 27, 33. [↑](#footnote-ref-23)
24. See WIPO, 2023a. [↑](#footnote-ref-24)
25. See Ministry of Science, Technology and Innovation, 2020. [↑](#footnote-ref-25)
26. See Italian Government, 2005. [↑](#footnote-ref-26)
27. See Italian Government, 2021. [↑](#footnote-ref-27)
28. A digital platform for scouting patented technologies from the world of public research that includes the patent portfolios of 70 research centers, universities and IRCCS, with a critical mass of more than 1,300 technologies (80 percent of which were filed from 2016 onward). [↑](#footnote-ref-28)
29. See Mazza, Quattrone, & Riccaboni, 2008, p. 73. [↑](#footnote-ref-29)
30. See National Council on Economic and Social Policy (CONPES), 2021, pp. 44, 58, 61. [↑](#footnote-ref-30)
31. See Ministry of Science, Technology and Innovation, 2022, p. 19. [↑](#footnote-ref-31)
32. See Ministry of Science, Technology and Innovation, 2022, pp. 36-37. [↑](#footnote-ref-32)
33. Congreso aprueba el Plan Nacional de Desarrollo, “Colombia, potencia mundial de la vida” [Congress approves the National Development Plan, “Colombia, world life power”]. National Planning Department. May 5th, 2023. <https://www.dnp.gov.co/Prensa_/Noticias/Paginas/congreso-aprueba-el-plan-nacional-de-desarrollo-colombia-potencia-mundial-de-la-vida.aspx>. Accessed on June 20th,2023. [↑](#footnote-ref-33)
34. See Colombian Congress, 2023. [↑](#footnote-ref-34)
35. Ibid. [↑](#footnote-ref-35)
36. See Barclay, 2012, pp. 67, 69. [↑](#footnote-ref-36)
37. See Papaderos & Bücken, 2023, p. 307. [↑](#footnote-ref-37)
38. See National University of Cordoba - Honourable Superior Council, 2011. [↑](#footnote-ref-38)
39. See Codner D. , 2022, p. 5. [↑](#footnote-ref-39)
40. See Codner, Becerra, & Díaz, 2012, pp. 165, 169. [↑](#footnote-ref-40)
41. See Talbot-Wright, 2018, p.28-29. [↑](#footnote-ref-41)
42. See National University of Cordoba, 2019a. [↑](#footnote-ref-42)
43. See Talbot-Wright, 2018, p.30. [↑](#footnote-ref-43)
44. See University of Bologna, 2014. [↑](#footnote-ref-44)
45. Still, the concept is TT, clarification that will be done in Chapter Six. [↑](#footnote-ref-45)
46. See University of Bologna, 2020. [↑](#footnote-ref-46)
47. See Baldini, Fini, Grimaldi, & Sobrero, 2014, pp. 27-53, where they underline how the University of Bologna between the late 1990s and early 2000s, set an example for many other Italian universities that soon follow its path, thanks to the work and the initiatives of some of its faculty members, thus pioneering several initiatives in the area of TT. [↑](#footnote-ref-47)
48. See Sala & Sobrero, 2021, p. 889. [↑](#footnote-ref-48)
49. We are aware of the scope given to the concept of TT, however, for the special case of the University of Bologna, its TTO is denominated as Knowledge Transfer Office (KTO) with its respective process units, as well as its general functions are mentioned as Knowledge Technology Transfer (KTT) instead of TT. See university´s webpage: <https://www.unibo.it/it/ateneo/organizzazione/amministrazione-generale/3211/3304>. In this regard, is necessary that the reader continues with the line given in the concepts of Chapters One and Two, bearing in mind that for this paper KTO is the TTO, and the KTT is our TT concept. We may apologize for this clarification. [↑](#footnote-ref-49)
50. Ibid. See footnote 49. [↑](#footnote-ref-50)
51. Information taken from the University of Valle web site (Spanish): <https://www.univalle.edu.co/resena-historica-75-aniversario/sintesis-de-una-historia-brillante>. Accessed on June 21st, 2023. [↑](#footnote-ref-51)
52. Information taken from the University of Valle web site (Spanish): <https://www.univalle.edu.co/la-universidad/acerca-de-univalle/ubicacion>. Accessed on June 21st, 2023. [↑](#footnote-ref-52)
53. See University of Valle, 2012, pp. 3-4. [↑](#footnote-ref-53)
54. See University of Valle, 2012, p. 15. [↑](#footnote-ref-54)
55. See University of Valle, 2012, p. 16. [↑](#footnote-ref-55)
56. See National Council on Economic and Social Policy (CONPES), 2021, p. 26. [↑](#footnote-ref-56)
57. Ibid. [↑](#footnote-ref-57)
58. See National Council on Economic and Social Policy (CONPES), 2021, pp. 27-28. [↑](#footnote-ref-58)
59. See Ministry of Science, Technology and Innovation, 2022, p. 47. [↑](#footnote-ref-59)
60. See Ministry of Science, Technology and Innovation, 2022, p. 56. [↑](#footnote-ref-60)
61. See OTRI web page: <https://otri.univalle.edu.co/>. Accessed on June 23rd, 2023. [↑](#footnote-ref-61)
62. See IP – OTRI web page: <https://otri.univalle.edu.co/propiedad-intelectual>. Accessed on June 23rd, 2023. [↑](#footnote-ref-62)
63. Ibid. [↑](#footnote-ref-63)
64. See University of Valle web page: <https://www.univalle.edu.co/lo-que-pasa-en-la-u/otri-de-univalle-obtiene-reconocimiento-de-minciencias>. Accessed on June 23rd, 2023. [↑](#footnote-ref-64)
65. See Fink, Arbter, & Wagner, 2023, p. 326. [↑](#footnote-ref-65)
66. See Fink, Arbter, & Wagner, 2023, p. 332. [↑](#footnote-ref-66)
67. See Ioannidis, Mega, & Moeykens, 2010, p. 203. [↑](#footnote-ref-67)
68. See Hamano, 2017, p. 10. [↑](#footnote-ref-68)
69. See Granieri, 2010, p.14. [↑](#footnote-ref-69)
70. See Act Jan. 10, 1957 No. 22. [↑](#footnote-ref-70)
71. See Royal Decree June 29 1939, No. 1127. [↑](#footnote-ref-71)
72. See L. No. 383 of 2001, new art. 24 bis R.D. June 29, 1939 No. 1127. [↑](#footnote-ref-72)
73. See Granieri, 2005, pp. 29 ss; Libertini, 2006, pp. 49 ss; Arezzo, 2013, pp. 149 ss; Del Re C. , 2016, pp. 279-ss; Sena, 2001, pp. 243-ss; Conti, Granieri, & Piccaluga, 2011, p. 25. [↑](#footnote-ref-73)
74. See Remotti, 2021, p. 923. [↑](#footnote-ref-74)
75. See Granieri, 2010, p. 29. [↑](#footnote-ref-75)
76. See Italian Government, 2005. [↑](#footnote-ref-76)
77. See Granieri, 2010, p. 14: “Regulations, designed and written by legislators, have an impact on the market and, because of this, presuppose a conscious use of the benefits they can ensure, but also the failures they can produce”. [↑](#footnote-ref-77)
78. See Cavaliere, 2023, p. 46. [↑](#footnote-ref-78)
79. See Lissoni, 2012, p. 197. [↑](#footnote-ref-79)
80. See Cavaliere, 2023, p. 56, which refers to what the CRUI (Conference of Italian University Chancellors) pointed out about the loss of interest in funding applied research by reducing the number of patented inventions because all patenting expenses (normally borne by universities when the patent is adequately protected internationally) burdened researchers. [↑](#footnote-ref-80)
81. See Argentinian Congress, 1995. [↑](#footnote-ref-81)
82. See National University of Cordoba - Honourable Superior Council, 2011. [↑](#footnote-ref-82)
83. See Morales Rubiano, Sanabria Rangel, & Plata Pacheco, 2014, p. 62. [↑](#footnote-ref-83)
84. See Betancur Monsalve & González Sánchez, 2016, p. 67. [↑](#footnote-ref-84)
85. See Betancur Monsalve & González Sánchez, 2016, pp. 66-67. [↑](#footnote-ref-85)
86. See Betancur Monsalve & González Sánchez, 2016, p. 67. [↑](#footnote-ref-86)
87. See University of Valle, 2012. [↑](#footnote-ref-87)
88. See Tijssen, Edwards, & Jonkers, 2021, p. xiv. [↑](#footnote-ref-88)
89. Ibid. [↑](#footnote-ref-89)
90. See National University of Cordoba, 2019b. [↑](#footnote-ref-90)
91. Almacube is the incubator and innovation hub for the birth of new businesses for students, graduates, faculty, and researchers that offers incubation programs for nascent startups and spin-offs. [↑](#footnote-ref-91)
92. See University of Valle web page: <http://viceinvestigaciones.univalle.edu.co/facultades-sedes>. Accessed July 6th, 2023. [↑](#footnote-ref-92)
93. See University of Valle, 2020, p. 1. [↑](#footnote-ref-93)
94. See University of Valle, 2020, p. 2. [↑](#footnote-ref-94)
95. See University of Valle, 2020, p. 3. [↑](#footnote-ref-95)
96. See Quintero-Angel, 2021, p. 1. [↑](#footnote-ref-96)
97. See Quintero-Angel, 2021, pp. 1, 3. [↑](#footnote-ref-97)
98. See Quintero-Angel, 2021, p. 9. [↑](#footnote-ref-98)
99. See File Reference No. NC2021/0008975 and File Reference No. NC2021/0008958 available in the Superintendence of Industry and Commerce (SIC) Colombian IP Office. [↑](#footnote-ref-99)
100. See Transfer Agreement p. 2 in the File Reference No. NC2021/0008975 and File Reference No. NC2021/0008958 available in the Superintendence of Industry and Commerce (SIC) Colombian IP Office. [↑](#footnote-ref-100)
101. See Lawyer’s authorization in the File Reference No. NC2021/0008975 and File Reference No. NC2021/0008958 available in the Superintendence of Industry and Commerce (SIC) Colombian IP Office. [↑](#footnote-ref-101)
102. See Huggins, Prokop, & Thompson, 2020, p. 719. [↑](#footnote-ref-102)
103. See Huggins, Prokop, & Thompson, 2020, pp. 719, 724. [↑](#footnote-ref-103)
104. See WHO webpage: <https://news.un.org/en/story/2023/05/1136367>. Accessed July 6th, 2023. [↑](#footnote-ref-104)
105. See University of Valle, 2021, pp. 115, 119. [↑](#footnote-ref-105)
106. See Ocampo, 2015, p. 36. [↑](#footnote-ref-106)
107. See Huggins, Prokop, & Thompson, 2020, pp. 725, 746. [↑](#footnote-ref-107)
108. Own elaboration, based in the elements discussed in the paper. [↑](#footnote-ref-108)
109. See WIPO, 2023a. [↑](#footnote-ref-109)
110. See WIPO, 2023d. [↑](#footnote-ref-110)
111. Ibid. [↑](#footnote-ref-111)
112. Ibid. [↑](#footnote-ref-112)
113. See WIPO Patent information services: <https://www.wipo.int/patents/en/technology/>. Accessed on July 28th, 2023. [↑](#footnote-ref-113)
114. See Aisa, Talbot-Wright, & Negro-Hang, 2023, pp. 62-63. [↑](#footnote-ref-114)
115. See Aisa, Talbot-Wright, & Negro-Hang, 2023, pp. 68-69. [↑](#footnote-ref-115)
116. See OECD/EU, 2019, p. 63. [↑](#footnote-ref-116)
117. Diagram based on the WIPO web page TT Section, recently updated in the year 2023: <https://www.wipo.int/patents/en/#technology>. Accessed on July 5th, 2023. [↑](#footnote-ref-117)