

# THE NEW MISSION OF THE UNIVERSITY. CONTEXTUALIZATION AND RESULTS: THE CASES OF THREE COLOMBIAN PUBLIC UNIVERSITIES

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## Abstract

The objective of this article is to evince the evolution of universities' missions, which have evolved from the traditional role of teaching towards research and innovation aiming at transferring knowledge and, in some cases to the creation of university enterprises (spin offs). Likewise, it explains the factors that have allowed the changes in the missions of three Colombian public academic institutions: Universidad Nacional de Colombia, Universidad de Antioquia and Universidad del Valle.

The information presented is the result of the search, organization, compilation and bibliographic analysis of national and international data bases, university's web sites, government institutions and enterprises and innovation centers.

The final conclusion is that the universities in the world and in Colombia are evolving to respond to new world challenges of economic, educational and cultural nature; and although Colombian academic institutions do not stand out in the international and Latin American context, new dynamics have derived in patent management and spin off enterprises.

**Key Words:** innovation, spin off, research, patents, university.

## Introduction

The current economic situation of the world, in globalization's context, is driving companies to become more competitive and innovative. In this regard, American theorist Henry William Chesbrough and Spanish author Francesco D. Sandulli manifest that "companies are more and more aware that they lack the necessary resources to successfully compete in more complex environments, and that they do not have the capacity of developing resources themselves" (Sandulli and Chesbrough, 2009, p. 15). In that sense, they refer to the convenience of organizations implementing open innovation projects (Melese, Lin, Chang and Cohen, 2009), in which companies must and should use ideas, internal and external, to look for paths to move forward in the markets. Thus, "valuable ideas take place and may be commercialized from inside or outside the company" (Chesbrough, 2003, p. 40). Open innovation also allows generating new breakthroughs, new empirical and theoretical developments, and openness to new corporate experiences (West *et al.*, 2014). The aforementioned proves the great relevance of relationships between universities and enterprises, in order to encourage and promote new ideas and initiatives.

Prahalad and Krishnan (2008), on the other hand, show that companies are accessing global networks that enable them to tap into existing knowledge and to develop their own innovation activities. These networks represent new means to adapt to competitive contexts avoiding elevated fixed cost, to compensate risk and to achieve innovative success (Janeiro, Proença and Gonçalves, 2013). It is also said that these networks facilitate the exploitation of “capacities to initiate, sustain and use relationships with different external partners” (Walter, Auer and Ritter, 2006, p. 546).

Economic, social, educational and cultural changes lead to the internationalization of education and knowledge; which has encouraged Colombian universities, especially public universities, to implement projects aimed at facing new challenges or academic revolutions.

Based on the aforementioned, and to highlight its mission of training, universities are motivated to expose their academic programs to national and international assessment; by contributing to the mission of extension, they facilitate exchange and application of knowledge in different areas; and their research mission manages knowledge production to be translated into development and innovation. Which is why it is valid to acknowledge that academic institutions have been transformed to respond to new world challenges, such as the new mission of the university.

The cases in this document illustrate how three Colombian universities have changed and updated their missions to respond at international level to the changes subsequent academic revolutions, showing a conceptual framework that includes the most relevant definitions and concepts of the topics, as well as the internal and external factors that facilitate the universities to respond to the new challenges, with a description of the results associated to the new missions of the universities.

## **1. Conceptual Framework**

### **1.1 Concepts of Innovation, Spin Off, Patents**

#### *1.1.1 The Concept of Innovation*

Of the different meanings and typologies of innovation, the definition proposed by the Oslo Manual is selected, it states: “innovation is the introduction of a product (good or service) or a process that is new or significantly improved, or the introduction of a commercialization or organization method applied to the business practices, to the organization of work or to external relationships” (OECD, 1997, p. 32). The third edition of said Manual explains that innovation is a continuous process by which companies

constantly introduce changes to its products and processes, acquire new knowledge that plays a key role in economic progress. Therefore, innovation is systemic and complex (OECD, 2005).

So far in this century, the concept of innovation has gained great relevance in the academic and entrepreneurial spheres, and more remarkably in the university-enterprise-government relationship due to its impact on productive and service sectors. This is how institutions and organizations, motivated by greater market positioning, permanently promote innovation activities to obtain products, processes, commercialization and organization methods that are 'new or significantly improved'. To this regard, it is important to highlight the open innovation typology of the concept, since it is largely responsible for the spin offs.

## 1.2 Spin Off

A spin off is an entrepreneurial initiative developed in diverse organizations, whether academic, industrial or corporate, and is characterized by basing its activity on exploiting new processes, products or services from acquired knowledge. Its "importance resides in the development of new technologies, creation of quality jobs, capacity to generate top added value to the economic activity and the contribution to regional development" (Universidad de Granada, 2015, p. 1).

According to Colciencias (the Administrative Department of Science, Technology and Innovation) "a spin off is an enterprise that emerged from creativity, research and technological development, its origin is academic and corporate and universities have a share in it" (Colciencias, 2016, p. 12). Meaning that these companies are driven by research activities and are based on technology.

Ruta N, a corporation created by the Office of the Mayor of Medellin, UNE and EPM (Empresas Publicas de Medellin), states that a spin off is:

An organization with its own legal structure... a business model in which an enterprise originates from one that is already structured. Usually, the new enterprise stems from a university or a research center that intends to contribute to the entrepreneurial sphere by transferring knowledge through innovative products" (Ruta N Medellin, Centro de innovacion y negocios, 2015).

There are multiple definitions of university spin offs, however, the one proposed by Nestor Raul Ospina Sanchez (2012), based on McQueen and Wallmark (1982) and Raday (2008) may be highlighted:

A university spin off has three basic aspects. The first is that the enterprise's founders must be part of the university or in related areas; secondly, the enterprise must be based on ideas or technologies developed within the university; and lastly, knowledge transfer takes place through the direct link between the spin off and the universities, avoiding intermediaries.

University spin off enterprises, created with the support of a university by some of its members, have captured rising attention in the last two decades by political and higher education stakeholders, particularly in the United States and Europe. These initiatives implied a direct commitment of public resources to encourage the development of university spin offs (Ortin-Angel and Vendrell-Herrero, 2014). For this purpose, authors such as Geuna *et al.*, in 2003, Lockett *et al.*, in 2005, and Mustar and Wright, in 2010, opened research lines aimed at identifying and evaluating specific factors that facilitate the success and development of university spin offs. "This rising interest proves that higher education institutions' enterprise capacities are only used internally, and that they may generate wealth and competitiveness for the economy" (Ortin-Angel and Vendrell-Herrero, 2014).

In that sense, some Colombian institutions of higher education, such as Universidad Nacional de Colombia, Universidad de Antioquia and Universidad del Valle are steering their missions towards the generation of innovative initiatives, for instance, university spin offs.

### 1.3 Patents

The Oslo Manual defines a patent as a "right to the property of an invention, which is granted by the national patent office. A patent grants exclusive rights (for a specific time) for its owner to exploit a patented invention" (OECD, 2005, p. 22).

It is considered a successful result, since by becoming an invention, it incorporates management processes associated to the innovation. Although plentiful academic and scientific literature addresses the topic, currently, there are four types of innovation: product, process, organizational and commercial (Gonzalez-Gelvez and Jaime, 2013).

### 1.4 The Three Public Universities Under Study

#### 1.4.1 *Universidad Nacional de Colombia*

Founded in 1867, Universidad Nacional de Colombia is an autonomous university entity of national order, connected with the Ministry of National Education, and with a special system with the object of higher education and research (Colombia. Office of the President

Panorama. Volumen XI. Número 20. Enero - junio 2017

of the Republic, 1993). This institution is of public nature, and its mission expresses that it contributes to the construction and to the meaning of the Nation's project, it studies and enriches the country's cultural, natural and environmental heritage. It acts as advisor to the country in the scientific, technological, cultural and artistic spheres (Universidad Nacional, 2015). Its objective contemplates participating in enterprises, mixed corporations or other organizational forms to comply with the University's objectives and functions (Universidad Nacional de Colombia. Office of the Secretary General, 2005).

Universidad Nacional is present at national level with branches in Bogota, Medellin, Manizales, Palmira, Amazonia, Orinoquia, Caribe (in San Andres Island) and in Tumaco.

#### *1.4.2 Universidad de Antioquia*

Universidad de Antioquia is a higher education institution founded in 1878. It is an autonomous university entity. It is governed by Article 69 in the Political Constitution of Colombia, by the General Law of Higher Education or Law 3 of 1992, as well as by other legal provisions applicable to its special system. In terms of the University's affiliation, the High Council of Universidad de Antioquia (2011) manifests it is:

Connected to the Ministry of National Education in what pertains to the policies and planning of the educational sector and the National System of Science and Technology; it has a legal status and academic, administrative, financial and budgetary autonomy, as well as own and independent governance, income and equity.

Universidad de Antioquia has branches throughout the Department, as follows: Medellin, Bajo Cauca, Magdalena Medio, Nordeste, Norte, Occidente, Oriente, Suroeste, Uraba.

#### *1.4.3 Universidad del Valle*

Universidad del Valle is a state higher education institution founded in 1945, dedicated to higher education academic training and research, with a service vocation aimed at the development of its surroundings. Its mission is to instruct at the higher education level by generating and disseminating knowledge in the science, culture, art, technical, technology and humanities spheres, with autonomy and social service vocation. Due to its nature as state institution, it undertakes non-transferrable commitments in terms of the construction of a just and democratic society (Universidad del Valle. High Council, 2009). This university formulates its own challenges, for instance, "expanding knowledge within society as an expression of the increasing significance of science and technology for the achievement of economic, social, political and cultural development in the modern world" (Universidad del Valle. High Council, 2002, paragraph 10).

Universidad del Valle is based in Cali, the capital of the Department of Valle del Cauca, one of the most industrially developed regions in Colombia, notorious for its export capacity of sugar cane (Universidad del Valle, 2002).

## 2 Changes in the Universities' Missions

Article 19 of Law 30 of 1992 considers universities to be “the institutions that credit their performance with a universality criterion in the following activities: scientific or technological research, academic training in professions or disciplines and production, development and dissemination of knowledge and the national and universal culture” (Colombia. Congress of the Republic, 1992, p. 3).

Brown and Duguid believe that universities are “drivers of knowledge diffusion , since they may exercise a solid influence on the regional innovation ecosystems by creating interactions with local companies or economic players”, as quoted in (Janeiro *et al.*, 2013, p. 2018).

### 2.1 The Two Academic Revolutions

Academic revolutions refer to the moments that have fostered significant changes in the missions of universities.

Henry Etzkowitz, in his article on research groups as almost companies: The Invention of the Entrepreneurial University, states that Storr (1952), Metzger (1955), Veysey (1965) and Jencks and Reisman (1968) propose that the first academic revolution took place in the 19<sup>th</sup> Century, transforming research into a function of universities, aside from the traditional task of teaching (Etzkowitz, 2003).

Traditional academic tasks were redefined and extended to comply with the requirements of the recently-appeared functions. Therefore, in the “first academic revolution” teaching was disrupted by research, since it was expanded to include the methodologies to acquire new knowledge, and the repercussion and reinterpretation of existing knowledge (Etzkowitz, Webster, Gebhardt and Terra, 2000).

The second academic revolution anticipates transforming universities into teaching, research and economic development enterprises. Although, until recently, most academic scientists and universities dedicated to research refrained from commercializing the results of successful research, this stance is shifting mostly due to pressure on the universities to more visibly contribute to economic development, new opportunities to acquire personal wealth, and to the demands of globalization and neoliberalism dynamics.

Panorama. Volumen XI. Número 20. Enero - junio 2017

Currently, technology transfer has been accepted as a function of research universities (Henry Etzkowitz, 2003).

In this revolution, universities embed into innovation systems, seeking interactions that foster acceptance of the secondary effects generated by connecting research with application and commercialization, in time to assume roles to catalyze and encourage socioeconomic development. In that sense, creation, acquisition, dissemination and usage processes are at the core of these functions (Youtie and Shapira, 2008).

## 2.2. The Entrepreneurial University

Consequent to the fact that knowledge is becoming more relevant and prominent in the generation of innovation, the university (fulfilling its role as producer and disseminator of knowledge) has an important role as facilitator and promoter of industrial innovation, since it becomes a supplier of human capital and a pool of new enterprises (Etzkowitz *et al.*, 2000). Thus, the advancement of the entrepreneurial university favors the university-enterprise-government triad. The industry's needs, the funding endorsement provided by the state and the knowledge generated in the universities, stimulate the creation of spin-offs. This triad reminds us that as several factors of science, technology and its products are dependent on the context, for instance, the development of countries and enterprises (Ospina, 2012).

## **3. Internal and External Factors that Facilitate Colombian Public Universities to Respond to its New Mission**

The following are the internal and external factors of three Colombian public universities: Universidad Nacional de Colombia, Universidad de Antioquia and Universidad del Valle, that positively influence the capacity of these academic institutions to transform into modern, competitive and international universities. This information is collected following a bibliographic review of websites, institutional outlines and national data bases, among others.

### 3.1 Internal Factors

#### 3.1.1 Creation of New Regulation and Declaration of Policies and Programs in Institutional Outlines



From the beginning of the 21<sup>st</sup> Century, the aforementioned Colombian universities have generated new regulations associated with intellectual property. Table 1 illustrates these new regulations per institution.

Table 1. Regulations regarding intellectual property in three universities.

Institution	Regulation	
Universidad Nacional de Colombia	Agreement 035 of the Academic Council of December 3 <sup>rd</sup> , 2003 (Universidad Nacional de Colombia. Academic Council, 2003).	By which the Regulation regarding Intellectual Property of Universidad Nacional de Colombia is issued.
Universidad de Antioquia	President's Office Resolution 21231 of August 5 <sup>th</sup> , 2005 (Universidad de Antioquia, 2005).	By which the Bylaws regarding Intellectual Property are issued and the President's Office Resolution 20096 of December 13 <sup>th</sup> , 2004 is repealed.
Universidad el Valle	Agreement of the High Council No. 023 of March 18 <sup>th</sup> , 2003 (Universidad del Valle. High Council, 2003).	By which the Bylaws regarding Intellectual Property of Universidad del Valle are issued.

Source: compiled by the authors.

Additionally, the institutional guidelines in which the reference and action frameworks of public entities are represented, have incorporated programs oriented towards knowledge and innovation management, which proves the existence of internal dynamics within the academic institution and community to achieve a transformation of the universities' missions.

The specific objectives of Universidad Nacional de Colombia include: strengthening the capacity to develop research and social dissemination of knowledge, and to organically and functionally articulate it with the national and international systems of science, technology and innovation. Also, promoting a culture of innovation, technological management and artistic creation, and the associated management processes of intellectual property (Universidad Nacional de Colombia, 2013).

Universidad de Antioquia defined science, technology and innovation development as one of its strategic topics to be executed in the 2006-2016 development plan (Universidad de Antioquia, 2006).

Likewise, Universidad del Valle adopted a consolidation strategy of the institution as a university based on research driven by the policy of promoting, supporting and strengthening responsible generation, dissemination, appropriation and transfer of scientific and technological knowledge as support, quality reference and pertinence of the training processes and of effective articulation between the university and its surroundings (Universidad del Valle, 2012).

### 3.1.2 Existence of Research Groups

The configuration of research groups within the universities' research structure is critical to accomplish the objectives and to transfer of results to society. Table 2 presents the total of research groups of the universities that are the object of this study and its classification in the categories defined by Colciencias.

Table 2. Research groups in three Colombian public universities.

Classification of research groups	Institution		
	Universidad Nacional de Colombia	Universidad de Antioquia	Universidad del Valle
A1	95	60	28
A	109	38	39
B	130	63	29
C	169	76	54
D	33	14	8
Unclassified	35	16	0
Total	571	267	158

Source: Colciencias, 2017.

### 3.1.3 Creation of Infrastructure

The universities have created and launched units such as: Technological Management Unit in the branches of Universidad Nacional; Transfer Unit in Universidad de Antioquia and Research Result Transfer Office – OTRI (for tis Spanish acronym), in Universidad del Valle.

### 3.2 External Factors

After World War II, the governance and the industry's funding directed at university research was widely extended, providing basic and applied sciences to technological

development (Youtie and Shapira, 2008). This practice generated new institutional dynamics associated with creating bonds and networks to bring universities closer to the industry and the government. Etzkowitz and Leydesdorff's "Triple Helix" model exposes the importance of hybrid organizations to encourage innovation in the university, industry and governmental players' interface (Youtie and Shapira, 2008).

To accomplish the existence of bonds, networks and interactions between universities and other external institutions, the existence of factors to integrate and facilitate the right environment in society to manage research and thus knowledge transfer is imperative. This is how Colombian universities (to acknowledge and contribute to the solution of actual problems from their knowledge areas) are interacting with the industry, governmental entities, innovation and research centers, among other institutions, through networks, associations and advice.

The following are some external factors that push the results of academic institutions.

### 3.2.1 Existence of National Regulations

On January 23<sup>rd</sup>, 2009, the Congress of the Republic of Colombia passed Law 1286 to strengthen the National System of Science and Technology and Colciencias, in order to successfully develop a productive model based on science, technology and innovation to provide added value to our economy's products and services, and to promote productive development and a new national industry (Congress of the Republic of Colombia, 2009).

### 3.2.2 Existence of National System of Innovation (Sistema Nacional de Innovación – SIN)

It is an open system in which policies, strategies, programs, methodologies and mechanisms to manage, promote, fund and disseminate scientific research and technological innovation converge, as well as public, private or mixed organizations that undertake or promote the development of scientific, technological and innovation activities (Colciencias, 2015).

It comes together to integrate scientific, technological and innovation activities so that enterprises, the government and the academia may interact to pursue Law 1286 of 2009. Its objectives include "promoting and assessing the strategic alliance between university-enterprise, to jointly develop science, technology and innovation in strategic sectors for the economic and social development of the country" (Congress of the Republic of Colombia, 2009, p. 9).

### 3.2.3 Structuring the Regional System of Innovation

Panorama. Volumen XI. Número 20. Enero - junio 2017

The convergence of several public and private institutions that work to promote innovation in certain strategic sectors of the city is called a Regional System of Innovation (SRI, for its Spanish acronym).

Its main objective is to boost relationships between different stakeholders and sectors, which is why universities and its research groups, interface players, technological development centers, public institutions, as well as large and small enterprises may take part in it, since the SRI is a conjunction and a smart conversation between these stakeholders, it is needed in order to quickly obtain innovation in these different strategic sectors (Ruta N, Medellín, 2015).

### 3.2.4 University-Enterprise-Government Committee

Antioquia's University-Enterprise-Government Committee (CUEE, for its Spanish acronym) is a strategic alliance that facilitates bringing will and knowledge together between entrepreneurs, university directors, guilds, and local and regional government to propose joint working agendas in topics of Research, Development and Innovation (I+D+i). It intends to build productivity and competitiveness in enterprises through a dialog of these three development agents. Its mission is to create dialog and agreement spaces, motivating entrepreneurship, innovation and clustering to fuel regional economic and social progress. Participants include 11 important higher education institutions, 21 enterprises, 7 technological development centers, Andi, Acopi and Comfenalco, as well as the Education Secretaries of Antioquia and Medellín, among others (Universidad de Antioquia, 2015).

The influential higher education institutions in the region (Department of Antioquia) include Universidad Nacional de Colombia, Medellín Branch and Universidad de Antioquia.

## 4. Universities' Results Associated to the New Mission

Researching the production of Colombian patents in national and international patents offices and data bases, it is found that Colombia has recently progressed in "Science, Technology and Innovation investment" (CT+I), especially in terms of overall awareness regarding its importance for the country's development and economy's competitiveness. However, specialists coincide affirming that Colombia's technological gap compared to developed countries is still excessive (Sanchez-Torres, Medina and Leon, 2007, p. 254). Consequently, "comparing the Colombian performance with that of other countries, it is observed that regional nations such as Brazil, Mexico and Argentina almost quintuple Colombian production. And comparing international patents with countries such as Taiwan, Singapore or Korea (which had a similar development to Colombia in the 1950's), it is clear that the levels are extremely meager" (Sanchez-Torres *et al.*, 2007, p. 256).

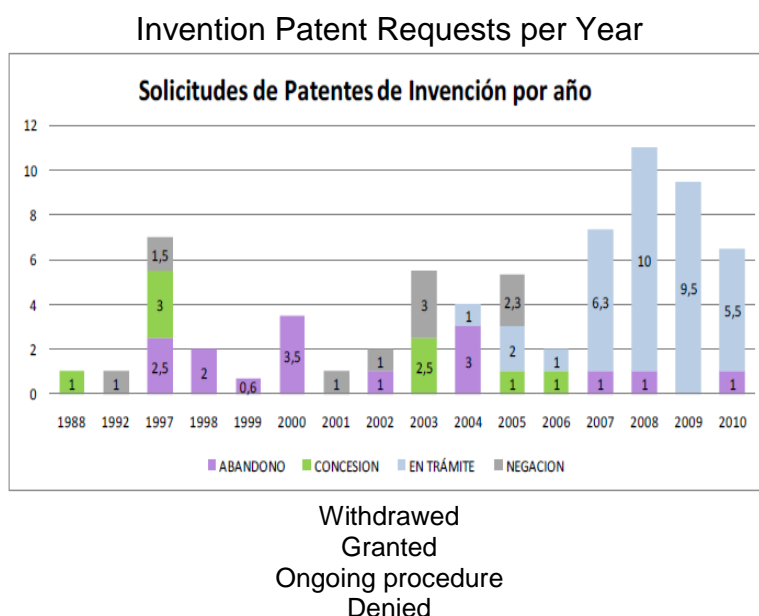
Panorama. Volumen XI. Número 20. Enero - junio 2017

Universidad Nacional de Colombia is the leader in the country in terms of patents “with over 40 patents, 11 of which are of public knowledge and usage, Universidad Nacional de Colombia (U.N.) ranks first in inventions of educational institutions” (Agencia de Noticias UN, 2016, paragraph 1).

The following are the results related to university patents and spin offs in the three Colombian public universities that are the case study of this document.

## 4.1 Patents

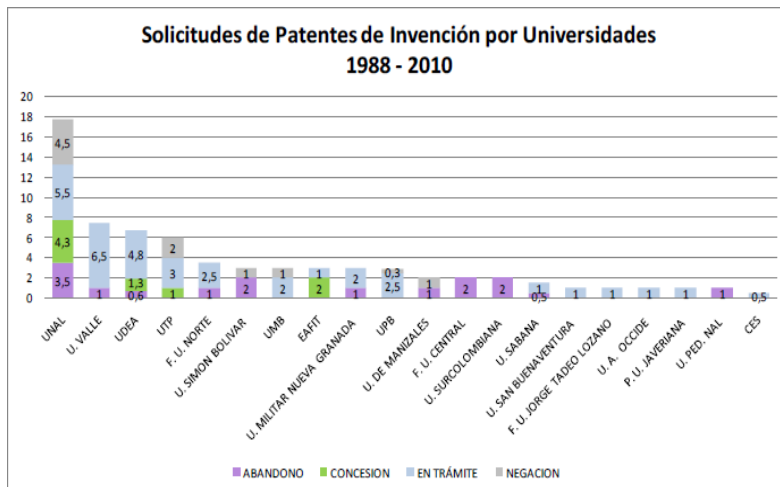
Gonzalez and Jaime (2013), using the patent data base of the Superintendence of Industry and Trade in Colombia from 1970 to 2010 as source of information, refer to the information shown in Graphs 1, 2, 3 and 4, which allows understanding the overall patent procedure landscape conducted by universities in Colombia. The share of universities, governmental and research institutions is highlighted; jointly, they accounted for 7.7% of the total requests of patents submitted in the Patent Cooperation Treaty – PCT, (Universidad Nacional de Colombia, 2013).



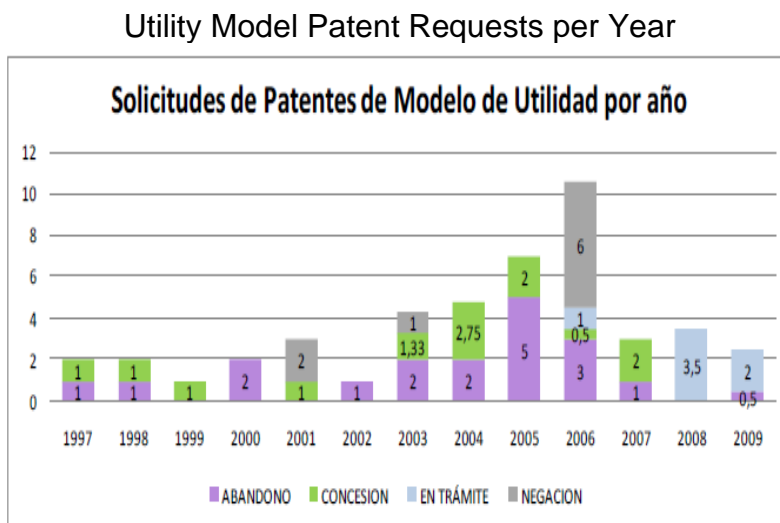
Graph 1. Behavior of invention patents per year. Source: Gonzalez and Jaime, 2013.

## Invention Patent Requests per University

Panorama. Volumen XI. Número 20. Enero - junio 2017

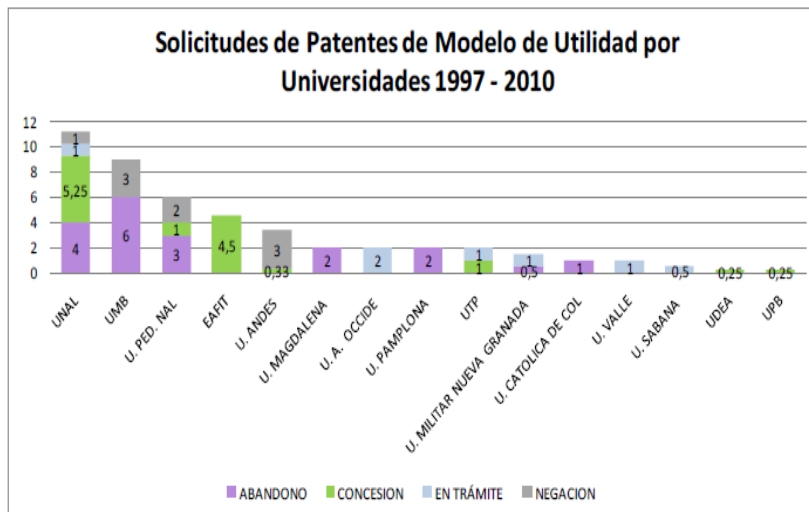


Graph 2. Behavior of invention patents per university. Source: Gonzalez and Jaime, 2013.



Withdrawed  
 Granted  
 Ongoing procedure  
 Denied

Graph 3. Behavior of utility model patents as per the year submitted. Source: Gonzalez and Jaime, 2013.



Graph 4. Behavior of utility model patents submitted by universities between 1997 and 2010. Source: Gonzalez and Jaime, 2013.

As Graph 1 shows, there is a notorious lack of management associated to patents between 1970 and 1997. The amount of ongoing procedures of patents means that the time to be granted an invention patent is extensive. In Colombia, the average time to manage an invention patent is of 3 years.

Graph 2 evidences that the universities with the most extensive management of invention patents are, in order: Universidad Nacional de Colombia, Universidad del Valle and Universidad de Antioquia.

## 4.2 University Spin Offs

### 4.2.1 Existence of university spin offs in Universidad Nacional de Colombia and in Universidad de Antioquia.

Universidad de Antioquia has “successful” experiences with spin offs, some cases include the enterprise Conocimiento y Servicios de Ingenieria S.A.S. (CONOSER), BIOINNCO and SUMICOL. Also with Grupo Coloides of Universidad de Antioquia, Nacional de Chocolates and SUMICOL.

Table 3 illustrates university spin off enterprises created in Universidad de Antioquia and Universidad Nacional de Colombia, as well as their stage of development.

Table 3. New university spin offs in Universidad de Antioquia and Universidad Nacional de Colombia

Name of the spin off	University of origin	Stage of the spin off <sup>1</sup>
Delta climatico	Universidad de Antioquia	Started
Orquideas in vitro	Universidad de Antioquia	Pre
Optilink	Universidad Nacional de Colombia	Pre
Biorefing	Universidad Nacional de Colombia	Pre
Insoftware	Universidad Nacional de Colombia	Pre
Consultancy in portfolio management	Universidad Nacional de Colombia	Pre
Monitoring, management and control of vehicular traffic	Universidad Nacional de Colombia	Pre
Enterprise of mining solutions. Risk detection and reduction	Universidad Nacional de Colombia	Pre
Genetic improvement and biotechnology Center	Universidad Nacional de Colombia - Politecnico Jaime Isaza Cadavid	Pre

Source: Ospina (2012).

#### 4.2.2 Progress in Creating University Spin Offs in Universidad del Valle

Recently, Universidad del Valle was granted a technological patent applied to the agricultural industry, which will determine the soil's energetic back-up to conduct segmented fertilization, implying 30% of cost savings. Knowledge transfer will take place through a new enterprise that provides analysis services and fertilization plans.

<sup>1</sup> La clasificación de las etapas parciales del proceso de *spin off* es similar a un proceso general de emprendimiento, pues incluye las fases de *pre spin off*, inicio de las *spin off* y posterior *spin off* (Ospina, 2012).



Panorama. Volumen XI. Número 20. Enero - junio 2017

Daniel Ruiz, professional at the Research Results' Transfer Office in Univalle, explains that this educational center has been conducting connected work that includes "research, identification of results, evaluation, protection, promotion and transfer". Regarding the latter, the university is working in 2 fronts: spin off (creation of a technology-based enterprise) and licensing (providing the knowledge to a third party). Currently, there are 7 technology-based projects approved by Colciencias with seed capital in areas of health, food and environmental technologies. 6 prototypes are being developed for licensing (Camara de Comercio de Cali, 2012).

## **Conclusions**

Universities are evolving in order to respond to the new world challenges of economic, educational and cultural nature. These changes have brought new dynamics, which in turn have prompted universities to economic development and working productivity contexts. Colombian academic institutions have not been unaware of the change and are currently promoting research management associated to results that are commercially transferable.

The presence of internal and external factors in the universities favors the environment to promote research and knowledge management. Yet, results show there is a lot to be done.

Although the current results are still emerging, it can be said that Colombian universities are getting prepared to face the challenges proposed by academic revolutions with more maturity.

In Colombia, public universities have had significant leadership in patent management and in the creation of university spin offs.

Universidad Nacional de Colombia, Universidad de Antioquia and Universidad del Valle are fulfilling the missions that have been assigned to them, but they are also building capacities to evolve and to respond to international parameters, driving social transformation and perhaps economic transformation as well.

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