

The Role of the University and its relationship University-Industry-State and Impact on Regional Innovation Projects: Case Study Universidad Tecnológica de Bolívar (Colombia)

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Abstract

This paper presents an analysis and experience of University-Industry Committee-state of Cartagena de Indias in Colombia and its address from the university to impact the generation of innovative knowledge in the research and contribution to a regional knowledge-based society in Colombia.

The way research is the only case study explanatory (CUE), we consider it appropriate to achieve the objectives set and respond to our research topic. For the selection and development of this methodology we rely on Bonache Perez (1999), and we consider the following aspects:

- Cases explain part of the fieldwork to induce hypotheses to explain organizational phenomena. In this work the research problem involves different areas, organizations and establishing its causes to explain its theoretical development.
- This still widely used in literature from the organization.

The way research is conducted for this work by applying the following steps CUE: Theoretical background and / or preliminary theoretical model to establish the unit of analysis only, application of techniques of data collection, data analysis and model induced.

The theoretical framework is given by different changes that are happening in higher education ranging from: the commitment to the generation of knowledge supported by new information technologies and communications, changing the way we see education, democratization of education, quality of education and the emergence of a new century university.

Moreover, the University as a knowledge-generating character is highlighted by the OECD, five functions in the era of knowledge which are: development of training capacities, knowledge creation, generation of innovation, a space for public discussion.

Here is the case of a university located in Cartagena de Indias and its successful articulation with the productive environment in the context of university-industry-state.

Introduction

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The way research is the only case study explanatory (CUE), we consider it appropriate to achieve the objectives set and respond to our research topic. For the selection and development of this methodology we rely on Bonache Perez (1999), and we consider the following aspects. The cases explain some of the fieldwork to induce hypotheses to explain organizational phenomena and is being used for organizational studies as discussed in this work.

This work allows us to analyze the effectiveness of this strategy, because a high percentage of identified opportunities materialize in research projects can be financed by the companies

themselves or supported by the universities for funding from external funding. A University for Social Development, Human, and Regional Business, which allows through its various academic programs to its academic community participation in specific programs to support social development and the pursuit of an Entrepreneurial University stronger every day.

#### 1. Entrepreneurial University

The theoretical framework is given by different changes that are happening in higher education ranging from: the commitment to the generation of knowledge supported by new information technologies and communications, changing the way we see education, democratization of education, quality of education and the emergence of a new twenty-first century university. It is now common knowledge that employment is concentrated increasingly in new and small businesses, also has shown that countries with higher industrial dynamics with respect to the creation of larger firms tend to reductions in unemployment.

The new business initiatives help to foster economic and social cohesion in countries and regions lagging development contributing to stimulate the economy and employment generation. The entrepreneurial spirit that drives productivity and the creation or the orientation of existing companies compel others to react by improving the competitiveness of the environment. Entrepreneurship improves a person's potential, having a job is not just a way to make money. In a decision of this type are being considered other criteria, such as security, the level of independence, the variety of tasks to be performed, and the interest of work. The entrepreneur in addition to material that often fades into the background choose to become entrepreneurs as a means to perform (freedom, independence and challenges). For those who do not find a job that satisfies them, the decision to become entrepreneurs can be derived partly or entirely from economic necessity, becoming entrepreneurs can enjoy the prospect of improvement. Entrepreneurship is important in society and that entrepreneurs are the engines of the market economy and achievements contribute to society wealth, employment and a variety of choices for consumers. For best entrepreneurship is necessary to take into account the following aspects. Develop a business education at all levels, an education that encourages risk and innovation capacity in individuals who can generate an entrepreneurial capacity at the end that individual if their employer does not become at least develop an entrepreneurial attitude.

- a. Develop programs of government decrees are not merely time but programs that are coordinated by people capable of fulfilling their commitments and set in such programs.
- b. Encouraging the entrepreneurial class geared towards young people which must have patience and know route, finding in them new ideas that will route the existing companies or to accommodate new businesses.
- c. Establish risk capital funds that enable public and private financing of new ideas and sharing the risk with the ideas of entrepreneurs.
- d. Create public or private business organizations that support the development of attitudes, skills and knowledge of entrepreneurship.
- e. The family plays a major factor in encouraging such capacity building and support employers in training the young. Many times the young company received a good education at school or university and that work is truncated due to the shortsightedness of many family members still in training are a way to earn a living and not a way to improve the quality of life. Slashing to hamper and ideas of future employers (Arraut, 2008).

University Relations - Company - State have become a catalyst for innovation processes that occurred in the regions, allowing them to raise their levels of technological development and improving their competitiveness.

The Local Innovation System in the city of Cartagena is adapted to the environment model defined

by Fernandez De Lucio (2001), which includes relations between the scientific, technological, productive and Finance, supported by structures Interface (EDI), formed as a driving unit of the elements of the environment, fostering relationships between them.

In current competitive conditions can not conceive of a university away from the production sector, nor to small and medium enterprises to operate independently without developing strong bonds of cooperation to enable it to benefit from the synergy resulting from joint work. As part of a regional environment is of vital importance for developing a better way knowledge is organized by universities to businesses. Questions are arising about how to apply?, What is the best strategy to use, how to facilitate the universities and industry work together in a regional environment?. To answer these questions posed the following overall goal derived from the analysis before us is: Establish projects for technological development and innovation in Cartagena, Bolivar, incorporating research, through a link between the university and companies.

Accompanying the education sector to the productive, allowing a transfer of knowledge to impact the levels of competitiveness of the latter. However, for college is the opportunity to develop research projects and innovation, expanding its offering science and technology. Universities have challenges to meet global, national and regional, in this framework, the University of Technology has established itself as Northern particular:

- Globally, the requirement of the development of research, innovation, quality, internationalization processes, diversification in the form of financing and coverage across all levels.
- Nationally there are some challenges that are interfaced with the global context but in turn requires a more in line with the reality of the country that he bet on a National Competitiveness with a policy that seeks a vision of the country by 2019.
- At the regional level, there are requirements brought about by local opportunities based on Agendas Regional Science and Technology, Regional Competitiveness Plan Bolivar which articulate with the needs of education and study which the University is no stranger.

The dynamics of the relationships between universities, the productive sector and the environment is developed through the promotion of applied research projects, focused on solving real technological needs of enterprises, with a commitment to encourage entrepreneurship, innovation, creativity and associativity to improve productivity with high levels of competitiveness and social responsibility.

On the other hand, the University in his capacity as a generator of knowledge is highlighted by the OECD, five functions in the era of knowledge which are: development of training capacities, knowledge creation, generation of innovation, a space for public discussion .

On this point the relationship between innovation and return the company developed thoughts in an article published in 2006 written by a group of teachers in my college. At that time we asked the question: How can companies increase their capacity for innovation?. Now for this test would have to include in the context of Entrepreneurial University the following question: How Business and the University increase its innovative capacity?.

This relationship between the university and the company articulated by innovation has led to different approaches through the ages, but in recent years has resulted in a very important concept that Professor Henry Etzkowitz called "Triple Helix Model"

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These joint processes have been important in the development of different regions in the world.

This has allowed territories of different countries to cite examples PAXIS program, the joint achievement of different European regions under two basic objectives: The transfer of knowledge

generated in local and regional areas of excellence and enjoy an instrument for cooperation and knowledge exchange and learning between European regions.

A total of 22 regions that have worked on this project have generated thematic networks as a means to gain and share knowledge for the creation of new companies and university spin-off.

Another important case of the joint show in the search model and the innovative capacity of the company and the university is the case in the region of Torino in Italy. There developed in the Italian region Piedmonte the Technology District of Foothills with the development of a regional model based on knowledge. The model of development based on the joint University-Industry-State has been a process over 20 years aimed to happen in a context "Stationary" to an effective alliance in the "Knowledge Society." The steady background has to do with the following aspects that marked its beginnings in the relationship such as: joint evolutionary processes with discontinuities and long periods of stability, the roles of the University-Industry-completely separate States, exchange of experience among actors based on individual initiatives of people, very implicit alliance between a minority group of people, among others. After all these years, the model now has some characteristics and processes that route to the needs of today's society, the process today is characterized by the following: The transdisciplinarity and interdisciplinarity characteristic of the joint University-Industry-State The regional environment is no longer approached from a geographic perspective but from the growth of business and competition, reduced response times in the triangle University-Industry-State.

Finally, on this model of development that has had an interesting development since the 80s to start a point-like relationship (Each actor in the role) part of the university working for the industry, given the 90 partnership (Partnership ), the University works with the Company, and in the New Millennium (Alliance) and Business University working together in a collaborative framework in a favorable environment for the Government and the public and private financial agencies. Innovation and entrepreneurship with the new paradigm of open innovation are reaching an important opportunity to be exploited from the perspective of generating the attitude towards entrepreneurship.

The main strategy being used by major companies located among the fifty most innovative in the world highlights the attraction of new ideas from abroad relying on the endless opportunities afforded by the Internet world. Examples are: Google, Procter & Gamble, 3M, among others. The writer Jeff Howe and editor Mark Robinson in the magazine Wired, coined the term crowdsourcing. This is one of the pillars underpinning open innovation, crowdsourcing means offering in short problems and give rewards to those who find the solution, all enhanced by the ability of networking that the Internet can offer. Based on a model where thousands of volunteers working towards solving the problem, governed by the principle of self-organization. The crowdsourcing is one of the many applications of open innovation, allowing anyone to participate in the innovation process, ie the replacement of the old areas of R & D for New Development Networks. This new area is known as C & D (Link & Development), and is certainly, from my point of view the great new challenge for companies in the coming years. This new form which results in the assembly of Web pages or links on your web pages capturing ideas through this medium is the ideal opportunity very little explored in our environment. It is therefore necessary to create an information system that allows our students to obtain information about the possibilities through the web.

For example recently a group of Chilean companies (IO Group Chile-Canada) convinced of the importance of innovation and taking into account the need for companies to take proactive employees, created a new system to channel the ideas of the workers themselves generate a systematic process to convert the ideas of workers in innovative projects. The main objective of this portal of ideas is to add value to the ideas of what the company's employees and the general public, making these processes are transformed into internal development, and creating new business opportunities. With these same workers are more committed to their jobs, because they feel more integrated into the company, as partners and not

just employees. Moreover external people involved with ideas have a chance to become a strategic alliance to win a new employer or money for the negotiation of that idea. The model is very simple is a unique platform for each company, free access for their workers and the general public, where in four stages may suggest ideas: Registration of ideas, project profile, project innovation, and implementation and post evaluation. This business also achieved a network of leaders generate innovation, open spaces for workers dare to suggest ideas and being part of personal development.

Over time, they were born examples that challenged the traditional closed innovation. One is that of Intel. Gordon Moore and Robert Noyce founded this company in 1968. Then, Moore noted that on average the number of circuits containing a computer chip doubles every 18 months, which made Moore's Law, which has been fulfilled so far. The amazing thing is that Intel has achieved this goal mainly with developments outside the company. Another recent example is Apple's popular iPod, which has revolutionized the way people listen to music in the world. The development of the product since it was planned until he won the first prototype took Apple four months, and he used developments in the environment and had brought them together to create a valuable product. What explains this success?

Professor Chesbrough in his book identified the factors that eroded the old paradigm of Closed Innovation. The most powerful of them is that today are talented people everywhere and in all companies. Today 50% of U.S. doctorates are in people who belong to a different nationality. Moreover, the high mobility of talented people from companies that took great strength in the past two decades began to falter recruitment scheme for life in the R & D.

The Corporate University in the words of Juan Mulet "is one that is committed to participate as a direct agent in the economic development of their regional or national environment. On the one hand, and most obviously, try to transform their research skills in industrial property rights in tradable goods or other benefits for economic development, with the aim of increasing university funds or the status of its professionals.

There are five elements, according to Clark (1998), on the issue of entrepreneurial university based on the technology commercialization process of university resources that constitute an irreducible minimum of the transformation of universities: First, a stronger central direction, second an expanded development periphery, diversification of funding third, fourth and a fifth core academic stimulated integrated an innovative culture. The five elements identified, obtained primarily through research comments, become a widespread way of university transformation rate, which is built on research and strongly encourages the institution of science and learning orbits increasingly competitive . In scenarios even more turbulent, universities can be strengthened as they develop problem-solving abilities, built around a flexible approach. For the university to respond to all this required reorganizing constantly.

We conclude that there are different actions or strategies that entrepreneurial universities may apply for a better business environment in context.

Business First of all a University should be able to meet the needs of regional and national economy, developing high level skills for work, play a more active role in job creation and the processes of welfare and prosperity of its context; concrete results to the region so it can be seen as a useful entity. To do this, must be related to the productive sector, government sector and the society it serves.

The research is important to note the various actions ranging from: Set creation process of spin-and spin out, developing processes to produce marketable patents, processes generating copyright and adaptation and technology transfer.

Universidad Tecnológica de Bolívar promotes the transfer of knowledge through joint research in

cutting-edge consulting firms and promotes through its faculty in institutions of the environment. These experiences are published and serve as academic material that can renew the teaching profession.

## 2. Research Methodology

The way research is the only case study explanatory (CUE), we consider it appropriate to achieve the objectives set and respond to our research topic. For the selection and development of this methodology we rely on Bonache Perez (1999), and we consider the following aspects:

- Explain cases part of the fieldwork to induce hypotheses to explain organizational phenomena. In this work the research problem involves different areas, organizations and establishing its causes to explain its theoretical development.
- This still widely used in literature from the organization. In the case before us is how its organizational structure from how it organizes the Technological University of Bolivar in the city of Cartagena de Indias.

The way research is conducted for this work by applying the following steps CUE: Theoretical background and / or preliminary theoretical model to establish the unit of analysis only, application of techniques of data collection, data analysis and model induced.

## 3. Results

The results of this work are presented in the first two aspects has to do with the formation of competition to create an environment for entrepreneurship among students and the second with the ability to connect the university and the regional productive sector through internships mechanism teacher researchers in enterprises.

Skills for business creation is determined by To successfully implement a system that supports and educates while training in entrepreneurship to business creation, the Center for Entrepreneurship at the Technological University of Bolivar has been implemented from this year a system information that allows him to articulate the different themes to strengthen the entrepreneurial skills of students from the Universidad Tecnológica de Bolívar.

This system relies on the facilities provided by the Information Technologies and Communication Technologies (ICTs) and taking into account the open innovation model developed or being applied by the companies through crowdsourcing.

According to Varela (2008) which proposes a model-based business development skills, we considered that these activities in the classroom promoted three major powers related to entrepreneurship education. The main skills developed in entrepreneurship education in the articulation of this strategy in the classroom there are three well: Building business networks, this activity allows the student or give the opportunity to create, maintain and build relationships with people and organizations in order to achieve their business goals, another aspect is the competition for making decisions and that helps you to analyze various possible alternatives in order to determine the way forward, and also allowing the development of guidance action taking into account the student puts forth effort and courage and dedication to the activity, this competition would be articulated with the ability to risk for the student in the activity.

To make this system work is necessary to establish the following strategies:

- a. Create a database of crowdsourcing models that exist nationally and internationally, aimed at promoting the generation of ideas to meet needs and coordinate with the themes of entrepreneurship subjects taught at the Tecnológica de Bolívar.
- b. Report by all means available in the University's academic community so that information reaches the greatest number of people. This has a multiplier effect for all

students who are at the moment with subjects of entrepreneurship or do not know and because they are motivated to participate.

- c. Articulate the information in the database with the themes established in the subjects of entrepreneurship to business creation. This is accomplished by placing activities of the class having to do with competitions or programs in entrepreneurship.
- d. Coordinate the participation of business plans in the various competitions that companies apply in open innovation model.
- e. Establish clear rules of engagement and participation of students in these activities.

The model is developed in four stages which are explained below:

a. Define. In this first stage, the Center for Entrepreneurship in a dynamic project defines participation in local events, national and international according to its surveillance system and strategies aimed towards fulfilling the mission of the university. This defines the form of participation, the form and date of participation.

b. Structure. Defined the first phase projects are structured for students who are at the base of Entrepreneurship Center project of the University. At this stage it is possible to route and take elements to be applied in teaching at that time. We carried out a process map which includes events in which they will participate and explore the form of participation. Here in the latter is important for the University making any kind of rapprochement with these events especially for the case of nationals. If they are open innovation strategies of a company through some kind of contest to capture ideas simply decide participation.

c. Apply. At this stage, facilitates and supports the participation of student projects. It is important to clarify that it always seeks to generate a massive turnout, which has been allowed thanks to having a steady flow of projects attracting venture start-ups to generate a project basis.

d. Learn. In this last stage is achieved by learning entrepreneurs who fail to assimilate Futuro on business management concepts needed in their training as future entrepreneurs. In addition, a strengthening of the initial business since participation only helps improve them so they can also train with international advisers who make a good transfer will allow us to improve the business plans. The skills learned are mainly three: Learning, Ability and Motivation Risk.

The second aspect is related to the participation model This section shows the participation model based on key elements found to facilitate the coordination of the Faculty of Engineering with regional development in this case we focus on the department of Bolívar. The key elements are made up of concrete actions based on the experience of this unique case and present allows us to generalize the model. The following are the elements:

- a. Leadership and management commitment.
- b. Aligning regional development and articulation of regional development.
- c. Developing a Communication Plan. It communicates to teachers and students the need to respond to gambling productive.
- d. General structure. There are areas in the organizational structure to coordinate all activities for regional development management (Directorate of Research and Innovation and Business Development Division).

e. Management process of regional development. There is a procedure for the care of research and consultancy projects that allow linking through college in various regional committees example is: Committee on University-Industry-State-Plastic Petrochemical Cluster, Regional Competitiveness Commission, Bureau of Entrepreneurship, among others. Then we have established how they are channeled research projects and / or consultancy. It was also awarded the best annual program within the university.

f. Culture of participation in projects. Participation is encouraged reclaiming linking teachers participating in the projects.

g. Measurement of Regional Development. Each one of gambling products and objects (vectors) are measured to improve strategic actions and directing activities.

#### 4. Conclusions

The support processes of spin-offs and spin-out of new enterprises based on research results and supported by new technologies is a strategy that allow the technology through its Center for Entrepreneurship University, promote the creation of a culture towards entrepreneurship; behavior change of teachers, students and administrators of the creation of a business curriculum through assignments that promote and encourage entrepreneurship among students in undergraduate and postgraduate studies, the generation and participation of students in competitions local, national and international leadership motivate and drive business in the university community.

From teaching a curriculum in innovative educational offerings to promote a university with a twenty-first century education model that seeks to enable students to access, analyze, process and communicate information, using technology tools through its virtual platform SAVIO, working with people from different cultural backgrounds and commitment to continuous learning and self directed.

One strategy that has generated effective in developing research projects and support business is the paid research in business, which drives the identification of opportunities for innovation in enterprises by encouraging teachers relationship between university researchers - company and solving a specific problem which owns the company, generating a transfer of knowledge such that leads to a cycle of continuous improvement both university-business relations and mutual learning.

This work allows us to analyze the effectiveness of this strategy, because a high percentage of identified opportunities materialize in research projects can be financed by the companies themselves or supported by the universities for funding from external funding.

Are all the above findings in the investigation and presented as part of this written work.

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