An innovative partnership for the development of nanotechnology in a developing country.

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ABSTRACT

In a developing country like Colombia, it is essential to create network strategies to articulate actors and resources to allow the creation of projects and initiatives that achieve a high impact in the society. With the aim of generating a sustainable economy based on knowledge and technology it is necessery the stimulation of innovation ecosystems to enable the flow of information and add dynamism to the cooperation between academia, business, society and the state.

Ruta N Business and Innovation Center is promoting and marking milestones in methodologies for the generation of innovation ecosystems in Medellin through a strategy of promoting the culture of innovation and entrepreneurship. Its objective is to connect the society, the academic community and the productive sector to develop projects towards real and an innovative business. In this scenario, nanotechnology has taken the center area in the field of the local ecosystem with a so called Regional Innovation Initiative (IRI) on Nanotechnology. This iniatiative helps converging and networking betwwen various stakeholders and has resulted in the the recent creation of a National Nanotechnology Center.

Hatch Indisa[1] has seen the opportunity to be part of this regional ecosystem of innovation and entrepreneurship, and it has found the way to contribute to the execution of technological development and innovation projects through applied engineering. In this way the company is linked with local initiatives of the IRI of nanotechnology and has attained in a short time capabilities to offer services and carry on technological development projects in nanotechnology with different local universities.

This report points out the most relevant aspects of the collaborative work developed and sets out the goals and possibilities that are open for the region and for the company as the National Nanotechnology Center becomes a reality.

Keywords: Nanotechnology; Innovation Ecosystem; cooperation projects strategy; university, state, alliances, Medellin, Colombia, National Center for Nanotechnology .

1 INTRODUCTION

The economies of Latin America show recent positive trends in economic growth and financial markets with average percentages of GDP projected for 2018 for Latin America and the Caribbean of 1.9% where Colombia stands out with 3% (International Monetary Fund, 2017). The country is also in a process of political and social transition towards a more peaceful environment, as a result of negotiations with insurgent groups. This transition is localy known as the post-conflict.

Schumpeter in his book "Business Cycles" mentions that innovation is a key factor for development and economic growth (Schumpeter, 1939). In this sense, through national strategies and policies focused on stimulating investigation projects, technological development and innovation Colombia is making efforts to improve its human capital, and increase the prosperity based on science and technology.

According to the OCyT[2] reports for Colombia, the evolution of the percentage of GDP in investments in scientific and technological activities (ACTI) grew from 0.3% in 2002 to 0.5% in 2015, reaching 1.82% in 2017 in the city of Medellin (Ruta N, 2017) due to the social dynamics and regional policies of the innovation ecosystem stimulated by the Ruta N Corporation.

There are different elements that allow processes of innovation, ranging from research, through development, production, legal processes, certifications, business models, financing, entrepreneurship, advertising to marketing, among others. In the words of Walrave B. “to managing their own technological and commercial challenges, an innovating venture needs also to consider how to align the different and often diverse actors supplying the complementary offerings towards accomplishing an integrated value proposition” (Bob Walrave, 2017)

[1] HATCH INDISA S.A. is Projects engineering company from Medellín Colombia,.

[2] Colombian Observatory of Science and Technology:

Recent research considers the advantages for enterprises of having innovation programs and being part of ecosystems and highlights the importance of networking and the mechanisms of stimulation and collaboration. (Gomes, Salerno, Phaal, & Probert, 2018) It is through collaborative work how companies have a higher growth rate and a higher probability of success.

There are well known models of innovation ecosystems in many places, as in United States (Silicon Valley), Israel, Ireland, Taiwan, Singapore, among others; they have served as examples to cities like Medellin to adapt methodologies of ecosystem implementation. Socio-economic dynamics, such as innovation ecosystems, have shown a positive impact in Latin America, where the movement of motivated entrepreneurs with an early entrepreneurial activity indicator between 36% and 14%; nevertheless, it is necessary to reinforce the culture of investment in Science, Technology and Innovation, where the greatest exponent is Brazil with 1.1% of GDP in investment for 2010. (Gabriel Hidalgo, 2014)

In Colombia, Medellín (Chosen as The Innovative City of the year 2012)[3] is a pioneer city in innovation topics , it has built a unique innovation ecosystem-based in a cultural and cooperative approach including state, academic, social, and industrial stakeholders, by means of Ruta N, which is a non-profit corporation supported by the city mayor's office and some important state companies. Ruta N aims to be the innovation and business center of the city, developing programs to facilitate economic development, intensive businesses in science, technology, and innovation, in an inclusive and sustainable way.

2 THE REGIONAL INNOVATION NANOTECHNOLOGY INICIATIVE

In 2011, as a result of the previous study carried out by Empresas Públicas de Medellín (EPM), through its former Center for Research and Innovation in Energy (CIIEN) together with some local major universities (University of Antioquia, Universidad Pontificia Bolivariana, National University, Technological Institute Metropolitan (ITM)), an innovation initiative (IRI) on nanotechnology was created. Initially, it was directed towards establishing a National Energy Nanotechnology Center (CNNe) in Colombia (Pulido, 2011).

Subsequently, as a result of the work and vision of the collaborating universities and a group of intersted companies, a National Platform in Nanotechnology was developed and the CNNe initiative evolved into an even more inclusive figure, in which EPM also allowed the participation of other companies and educational institutions. That was how the initiative migrated to a transversal vision of support for industrial development in the region through the new National Nanotechnology Center (CN2) project. (Martínez, et all, 2013)

Ruta N as the responsible for promoting innovation in the city, welcomed the initiative and defined Nanotechnology as a strategic area of work, which led to the creation of the so-called IRI Nano (Regional Innovation Initiative on nanotechnology) which has been working hand in hand with universities, companies, state institutions and interested individuals. (Posada & Mojica, 2014.) This initiative is characterized as an open public platform where participants have shown high commitments towards regional development.

As working methods, subgroups called the Steering Committee, The Committee of Collaborative Networks and The committee of Norms have been created to help designing and developing activities, strategies and planning; develop relationship and communication; and carry activities related to standardization and regional policies. These groups are working supported by a Ruta N team and contributions from corporate allies. With this methodology and commitment, it has been able to consolidate various events for the divulgation of nanotechnology for academic, industrial and general public. Exmaples are the so called Nanoday; an itinerant educative chair serving the community, Committee 243 of ICONTEC[4], and a colombian sister organization wich is part of the ISO international standard systema has been formed. Also, several multiple projects have been structured and presented to entities that offer economical support based on national distribution of royalties, national science entities and international funding.

2.1 National Nanotechnology Center strategy (CN2)

After several years and interactions supported by scientific and technological centers from the USA and Europe, after sectoral studies and formulation of business models, finally it has been resolved to establish the CENTRO NACIONAL DE NANOTECNOLOGÍA (National Nanotechnology Center), resulting from the described cooperative efforts around the development of Nano technology.

[3] In 2012, Medellin was the winner of the City of the Year, organized by The Wall Street Journal and Citigroup http://online.wsj.com/ad/cityoftheyear

[4] ICONTEC is the Colombian Institute of Technical Standards and Certification
See Comité 243 de Nanotecnología
http://www.icontec.org/Ser/Nor/Paginas/CTN/Ct243.aspx

The CN2 began its functions at the end of 2017 in an initial phase in which, through a window open to possible customers and needs, it articulates the capacities and services of the members of the center, thereby providing a wide capacity of offerings to support research projects and development with high quality standards.

In its initial stage, the CN2 is beginning to commercialize technological services, training seminars and strategic surveillance studies, specialized counsulting supported by the university laboratories and research gropus and also with some technical and scientific personnel assigned to the center. It offers its potential for capability development in nanotechnology for industrial and academic sectors in the areas of Nano Additives, bio-Nanotechnology and energy[5]. Currently the team led by Ruta N is doing activities to generate awareness in the region and is looking for new projects that can provide continuity to making use of the local capacities. Within the strategy of the Center, there is a second phase in which the panorama will be extended to new technological development services and international projects where an alliance with MIT (Massachussets, USA) Nano has already been advanced.

3 HATCH INDISA IN THE ECOSYSTEM

Hatch Indisa is a project engineering company from Colombia, which is part of the international HATCH group. The company understood the convenience of working in nanotechnology, taking advantage of the local initiatives and has been allied with the IRI since 2013. This has allowed it, in a very short time, to develop various projects, in collaboration with local universities, focused on industrial applications and in finding new opportunities for expanding its design and manufacturing capacities.

In its participation in the local nano ecosystem, Hatch Indisa identified that it can offer its expertise in engineering projects in industry and its proximity to research to help close gaps in the processes of technological development of both the companies and universities, directing the projects towards industrial production and sustainability. This is how the company is promoting its engineering services focused on innovation through diagnostic studies (need-opportunity), ideation processes, project formulation, feasibility studies (technical-economic), scaling processes (prototype - pilot plant - industrial plant), project executions and presentation to investment funds.

Hatch Indisa has generated an important alliance with the University of Antioquia, a center of excellence in nanotechnological research, with which it is developing reactors for continuous synthesis of nanoparticles and nanotubes and catalytic systems for the elimination of volatile organic compounds (VOC's) and pollutants (Gallego, Posada, & Mojica, 2016). In the same way, it has been working with another prestigious local university, EAFIT, on nanostructured filtration systems. In the process of developing these projects, the company has established a research group recognized by COLCIENCIAS, the state entity that promotes science in the country. With all this, the company has had access to funds that support science, technology and innovation, granted by various entities, in addition to COLCIENCIAS and has developed advanced education programs in science and research for several of its project engineers. All this has generated a greater spirit of innovation throughout the company, which has 350 people in its Colombia office.

In the realtivelly short period of five years, Hatch Indisa has executed one project, has three projects in execution, a project to start and three projects in formulation as well as alliances and contact with some of the most prestigious universities in the country, three engineers in postgraduate training, and a team of engineers from various disciplines with knowledge in nanotechnology and innovation with which the new line of business in nanotechnology projects.

4 ASPECTS OF ECOSYSTEMS

"When we think of innovation ecosystems we must not force individual innovations, but we must design and shape the favorable environment that cultivates such innovations so that they are born and thrive"[6].

As implied in the words of Dr. Quintero, actually the director for innovation of ANDI, the National Asoociation of Industries, one of the main challenges of an ecosystem is to achieve an environment conducive to innovation and the collaborative participation of the community. One of the greatest challenges in the initiatives of a community is to achieve continuity in the the objectives without losing enthusiasm. The initiatives of all types must have management policies, with principles that guide action and with a certain methodological and conceptual clarity, that is, with an aligned and operative belief system that generates coherent and effective actions (Posada, 2017). In this sense, it is essential to declare the founding principles to have a common long-term vision, and maintain a continuous and clear communication with the community. Activities such as participating in congresses, writing books and celebrating foundational acts become important.

[5] See: Centro Nacional de Nanotecnología http://centronacionaldenanotecnologia.com/#nosotros

[6] Juan Camilo Quintero former Director of RutaN

It is imperative to create projects constantly that have challenging, real and achievable objectives that benefit the different actors to achieve a commitment from the parties, all this having progressive and demonstrable achievements. This is how the attention of the interested parties can be maintained and reach a sense of unity, the results in synergistic associations that optimize business work. This gives strength and shared knowledge The united way is the way to sustainability.

The participation of the industrial sector is essential to provide realism to the projects and a business vision that gives sustainability to the initiative. The creation of alliances, together with the latent needs or opportunities, gives a horizon of tranquility. The results must be evaluated generously, with a long-term vision, with an integral vision, with projection capacity and social and community commitment. The investment of companies in innovation ecosystems opens up a world of possibilities and new realities that can manifest themselves in new business and innovation.

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