Line 3

Innovation: Towards Competitive Efficiency and Regional Development

Abstract

Bearing in mind that innovation is a substantial part of opportunities and competitive advantages, the chapters of this line present the results of research on the subject matter of competitiveness and innovation, and productive chains prioritized for the departments of Cauca and Nariño as a contribution to regional transformation and development. This is considered an exercise of connectivity among stakeholders and establishment of dialog that builds trust and enables collaborative work in activities or projects of science, technology and innovation, with the understanding that the regions who venture into the culture of innovation and competitiveness are capable of facing safely and effectively the challenges posed by globalization. In this context, the University-Company-State relationship is seen as a considerable potential for learning and a fundamental condition for future progress.

Each of the chapters that make up this line revolves around innovation as a sustainable competitive advantage and is presented under the scheme of research results, where the importance, objectives, methodology, results and discussion of research are highlighted. These texts recommend that, for making innovative processes viable, interrelationships between the public and private sectors and joint work between researchers and businesspeople are necessary for achieving the proposed goals.

Keywords: competitiveness, regional development, innovation, research, University-Company-State relationship.

Línea 3

Innovación: hacia la eficacia competitiva y el desarrollo regional

Resumen

Considerando que la innovación hace parte sustancial de las oportunidades y ventajas competitivas, en los capítulos de esta línea se presentan los resultados de investigaciones en el tema objeto sobre competitividad e innovación, sobre cadenas productivas priorizadas para la zona de los departamentos de Cauca y Nariño, como aporte a la transformación y desarrollo regional. Este se considera un ejercicio de conectividad de actores y de construcción de diálogos para generar confianza y permitir el trabajo colaborativo en actividades o proyectos de ciencia, tecnología e innovación, en el entendido de que las regiones que incursionan en la cultura de la innovación y la competitividad son capaces de afrontar con seguridad y eficazmente los retos que impone la globalización. En este contexto, se plantea la relación Universidad–Empresa–Estado, como una capacidad notable de aprendizaje y una condición fundamental para proyectarse al futuro.

Cada uno de los capítulos que conforman esta línea se presenta bajo el esquema de resultados de investigación, donde se destaca su importancia, objetivos, metodología, resultados y discusión, siendo la innovación el tema central, como ventaja competitiva sostenible. Para hacer viables los procesos innovadores, se precisa la interrelación del sector público y privado y el trabajo mancomunado entre investigadores y empresarios, para el logro de las metas propuestas.

Palabras clave: competitividad, desarrollo regional, innovación, investigación, relación Universidad-Empresa-Estado.

Chapter 11 / **Capítulo 11**

Creation and Innovation: A Strategy for Regional Competitiveness

Creación e innovación: estrategia de competitividad regional

Isabel Hernández Arteaga and Sara María Luna

Abstract

This chapter is the result of research-based reflection on the relationship between creation and innovation, and the part this plays in regional progress. It is the university's responsibility to train creative and innovative professionals, that is, professionals competent in identifying, linking, and integrating ideas and concepts, with unique and revolutionary results; this requires creative ideas that later are turned into useful products, services, methods, strategies, and techniques. Training such professionals demands flexible thinking, ranging from divergent to convergent.

For education, innovation is a challenge, a problem that cuts across all levels of the system; it implies a complete transformation of the prevailing ideas and attitudes of our culture. In education, innovation is a recent concept; it appears in policies of Science, Technology, and Innovation, as a generator of added value to provide leverage for reaching economic, technological, and social development goals. Meanwhile, the company with high levels of competitiveness invests in innovation to propose solutions for the problems that, through their multiple organizational systems, humans face in their evolution.

Technology is considered the origin of innovations, and it creates a productive structure with greater added value, while human talent is the force that coordinates the knowledge economy.

Keywords: creation, competitiveness, innovation, divergent thinking.

Resumen

Este capítulo es resultado de la reflexión investigativa sobre la relación entre creación e innovación y su implicación en el avance regional. La responsabilidad de la universidad es formar profesionales creativos e innovadores, es decir, competentes en la asociación, relación e integración de ideas y conceptos, cuyos resultados sean únicos y revolucionarios; requieren ideas creativas que se convierten en productos, servicios, métodos, estrategias y técnicas de utilidad. Formar este tipo de profesionales demanda flexibilidad de pensamientos desde lo divergente hasta lo convergente.

Para la educación es un reto la innovación, un problema que atraviesa todos sus niveles; supone transformar de raíz concepciones y actitudes que prevalecen en la cultura. En educación, la innovación es reciente; se encuentra en la política de Ciencia, Tecnología e Innovación, como generador de valor agregado para apalancar metas de desarrollo económico, tecnológico y social. Por su parte, la empresa con niveles altos de competitividad invierte en innovación para proponer soluciones a los problemas que, a través de sus múltiples sistemas organizativos, se plantea la humanidad en su evolución.

La tecnología se considera el origen de innovaciones, y genera una estructura productiva con mayor valor agregado, siendo el talento humano la fuerza que acopla la economía del conocimiento.

Palabras clave: creación, competitividad, innovación, pensamiento divergente.

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Creativity and innovation

Knowledge, reason, balance, restraint, and wisdom are some of the concepts that must be developed to transfer ideas from the realm of the creative imagination to the real world, where they can be realized and implemented. This transfer involves creating and generating new ideas and concepts, or new associations between existing ideas and concepts, usually directed at producing new and original solutions and outcomes. The difference between creativity and innovation is that the former usually refers to the act of producing new ideas, approaches, and actions, while the latter is understood as the process of generating and applying those creative ideas in a specific and definite context.

Creativity is also known as "inventiveness." Galeano (2002) considers this to be a constructive type of imagination that accordingly requires both divergent and convergent thinking to facilitate the act of invention. He believes that creativity also manifests as ingenuity: the ability to find novel solutions and, above all, the will to change and transform that which currently exists. Creativity is therefore a mental attitude and a technique of thinking. Innovation, meanwhile, can be seen in the successful application of attitude and thought, translated into new ideas that become useful tools and increase productivity.

Being creative is related to the ability to make associations and establish relationships, combinations, and integration between ideas and concepts in ways that are unusual, dissimilar, different, or unique, with revolutionary results. To be an innovator, one must take a creative idea and transform or convert it into a useful product, service, method, strategy, or technique. This is why creativity should not be compared to an ability; it is more than that: it is the full use of intelligence.

On this subject, Scarone (2005) writes that innovators are people who are capable of handling chaotic and difficult situations for long periods without making decisions, but also without wavering, quitting, or giving in, as their commitment and dream are long-term matters. Innovators put maximum effort into the thought process, bringing together concepts that often seem contrary and giving the impression that they are solving apparently impossible problems. Innovators generally have a way with words, that is, they are excellent speakers, and they are flexible thinkers, capable of redefining their ideas and assessing their actions. They practice both divergent and convergent thinking and are highly original.

Indeed, for Varela (2010), creativity requires and demands divergent thinking to generate multiple options; innovation, on the other hand, relies on convergent thinking, that is, the ability to discard irrelevant and unnecessary ideas through a process of analysis. For this reason, innovation is associated with a practical mindset.

Creativity is an aid in decision-making where there is a broad range of options for solving the problems of an organization or work team; innovation, on the other hand, is a solution in itself, a change or transformation with the end goal of improving, updating, or optimizing an event, phenomenon, or concrete situation. Creativity therefore implies the creation of novel and useful ideas; innovation, meanwhile, looks to apply these ideas in the real world. In general, creativity is dynamic and enterprising, a process on the move that carries with it its origin and goal; it could be said that it encompasses aptitudes, strengths, and talents that appear with different degrees of quality and intensity in varying circumstances and contexts of life.

Creation and innovation are two terms, and at the same time two concepts which are intimately related; in fact, in scientific discourse they are used almost interchangeably, although they do not have exactly the same meaning. Warner (2012) defines creativity as a mental process that allows ideas to be generated, and innovation as the real-world application of these ideas put into practice to efficiently and effectively achieve the objectives, goals and intentions of the organization. This, then, is not a case of synonyms. In fact, the *raison d'être* of creativity is to "generate ideas," and the focus provided by innovation is to "implement ideas." The divide between these two concepts can be seen in two elements that should form part of the ideas: newness and usefulness. Without these characteristics, ideas arise, appear, are not valued or recognized, and disappear; they do not move from the realm of the imagination to the field of implementation.

Experts in this field use the term *applied creativity* to refer to innovation. Ordóñez (2010) specifies that this type of creativity occurs when its contribution is recognized and incorporated into the system, or rather, into the organization, where it links with other applied ideas and affects the environment, generating equally novel responses.

One thing that is certain is that creativity and innovation have fascinated and attracted people since the beginning of human history. According to Varela (2010), these concepts have always connoted something mysterious, irrational, intuitive, magic, and superhuman; the author points out the interesting fact that humans have always placed a very high value on this characteristic. Creativity and innovation are associated with a special human power that solves the largest and most difficult problems, and also generates spectacular ideas and products, opening new intellectual frontiers; together they have the power to transform dying organizations into strong and lively ones, and to make regions productive and competitive.

Creativity and innovation in education

In today's world, everything in the field of education is undergoing a transformation. One of the reasons for this is that the school has ceased to be the center of knowledge, resulting in an opening up of educational horizons and boundaries. This has changed the roles and responsibilities of students and teachers, who have chosen to move towards work methods that are more collaborative and which require permanent accompaniment from the teacher, integrating new tools, activities, spaces, and ways of learning. In this context, new abilities are needed to teach students how to learn, and to promote a spirit of creation and innovation; digital tools foster the creativity and ingenuity of those involved in education.

If we assume that human beings are creative by nature, at what level or moment of education was this ability lost or diluted? More to the point, does the education system in its entirety not stimulate these necessary skills and abilities in order to make use of them? Education and innovation are two terms that, when stated together, represent a current challenge.

Educational reforms allude to creativity and innovation, but, sadly, these reforms have been "more of the same." The issue of encouraging creativity and innovation from an educational perspective cuts across all levels of teaching, as it involves a radical transformation of traditional concepts and attitudes that are deeply rooted in the culture. It requires teachers to look at students differently, abandoning the easy way of using what, until now, have been irreplaceable conventional classes, and, the most difficult challenge, subverting certain power relationships among members of the educative community. In higher education, this change entails understanding and putting into practice the idea that the university's function relates to students learning how to be, how to learn, and how to do things in a particular context and situation that require them to provide innovative solutions in solving real problems.

These reflections raise various concerns and questions. Varela (2010), for example, shows that a large part of the problem with competitiveness in Colombia relates back to the efficiency of the education system, and that all those involved in the process, such as students, teachers, directors, the State, the private sector, and civil society, have a great responsibility in this regard, as decisions are urgently required with respect to public policy on the quality and relevance of education. In the Colombian education system, the culture of innovation is new; it is beginning to take root through policies on science, technology, and innovation.

The transition of schools towards this new paradigm is occurring slowly and with difficulty. In the view of Bernal (2009), study and analysis have begun on some of the barriers and major challenges posed by the transformation of

teaching and learning processes aimed at instilling the ability to innovate. Mainly through the introduction of Information and Communications Technology (ICT), an educational model is being coordinated for new generations, starting with the possibilities offered by new tools, resources, and services in the evolving framework of technology.

Pineda (1999) states that learning is a very personal matter and occurs within the individual, who is the only one capable of activating it. The learning process is primarily controlled by the subject who learns, not by the teacher. People learn when they become personally involved in the learning process. Pineda therefore conceives of education as a process of developing potential more than a process of transmitting information. He points out that to educate is to facilitate meaningful lessons about what the students need—preparing them for life rather than for exams. Learning must be a bridge between school and life, where life calls for competent, creative, and innovative professionals.

The university professor of the 21st century has been slow to face the uncertainty and complexity, the newness and ambiguity, and the link between knowledge and practical problems which are meaningful for the student, generating their interest in innovation. This perspective identifies three types of knowledge: what I have, what I can obtain, and what we can construct. The task of the teacher, as the student's facilitator and guide, is to use the first type of knowledge to obtain the second, with the aim of making the third possible; that is, using what the student has to obtain what is needed, and then constructing knowledge. Pineda (1999) maintains that the education system must gradually change its approach; otherwise, it will be doomed to perpetuate the problems that affect today's society, and, furthermore, professionals will not have the abilities they need to be competitive and enterprising. Thus, education will become a silent partner of the culture of poverty.

Today, an innovative teaching-learning model is required that responds to the needs of the members of the education system and society in general. This process must seek to achieve basic objectives through creativity and diversity, and with interactive and motivating methodologies that stimulate students and develop new knowledge, skills, and attitudes that are essential in a world that is constantly changing. Learning should be a process that prepares people to face new situations, making use of their liberty in a gradual integration with society.

Vogliotti and Macchiarola (2002) point to teachers as the key figures in encouraging innovation. They depend on their initiative, creativity, their vision of reality, and their ability to relate and integrate in order to be innovative teachers who promote meaningful learning. For this to result in innovation, the teaching process must focus on knowing what is going to be taught, introducing active and

integrative methodologies, and improving the use of available resources to create a learning environment based on trust and participation, where there is room for critical, creative, reflexive, and innovative thought. This requires strategies such as: promoting teamwork; creating an atmosphere that is participative, motivating, and creative; fostering strategies for adapting to changes that arise; undertaking innovative projects to improve educational practice; building confident personalities in students; favoring meaningful learning; encouraging integration with the community and society; using new technology; conducting permanent self-reflection about educational practice; fostering capabilities of self-criticism and self-assessment; encouraging knowledge about the environment and contextualizing knowledge; converting the classroom into a space for research and experimentation; modeling communicative attitudes; using prior knowledge as a starting point for developing critical, creative, and innovative thought; and imbuing the curriculum with innovation and creativity.

In their methodological proposal for training innovators, Aponte, Ancona, and Segura (1998) define innovation as:

> A specific tool, a means by which businesspeople exploit change in order to have a different business. Innovation may be considered a discipline that can be learned and practiced; accordingly, innovative businesspeople should consciously investigate the sources of innovation, the changes, and the signs of opportunities in order for it to be successful. […] Innovative businesspeople need to learn the systematic practice of innovation, understood as a search for changes that is organized and has an objective, and as the systematic analysis of opportunities that these changes may offer for social and economic innovation (p. 125).

Therefore, all of society should prioritize the training of creative and innovative abilities for professionals to help bring about sought-after social changes. In terms of comprehensive training and acquiring abilities based on innovation and creativity, the authors identified seven representative aspects of a comprehensive profile: adaptability, self-control, entrepreneurial spirit, sociability, imagination, practice, and critical analysis.

Consequently, the training of innovators involves molding individuals with high adaptability, an open and flexible mind, self-control, independence, and self-confidence, as well as the spirit to face new challenges. These professionals must be sociable, instilled with values, imaginative but also practical, with the ability to analyze and synthesize—in other words, people with comprehensive training who maximize the potential of their attitudes and abilities.

Redero (2008) states that this training is part of the substantive functions of the university: teaching, research, and social extension as they relate to a complete person; the curriculum as it relates to the real world; and theory as it relates to practice and the application of interdisciplinary knowledge to a problem, as required by the needs of the environment.

Creativity and innovation in a business context

According to Goleman, Ray, and Kaufman (2000), creativity as a basis for innovation allows organizations to develop processes to be competitive or improve their level of competitiveness; therefore, as Sabbagh and Ast (2011) state, creativity as a basis for innovation currently represents an element of interest for businesspeople, as does the potential of a human being not only to generate ideas, but also to envision how they will be put into action, with the aim of creating innovative products, processes, or services.

Thus, creativity should not be subject to the boundaries and limits that organizations generally impose through their rules. Creativity is flexible and requires freedom of expression, intellectual production, an atmosphere of trust and teamwork, management of time and space, excellent interpersonal relationships, and a general good mood in the undertaking of activities. Only in settings of freedom is it possible to open markets of ideas and niches of innovation.

These difficulties that organizations experience in opening themselves to creativity and allowing innovation are, according to Fernández (2012), related to: the absence of a structured knowledge management system; the lack of explicit recognition and valuing of the work done by the individuals and groups; the poor use of communication channels; and the absence of a positive organizational climate in which people enjoy what they do. Here, to "enjoy what they do" means that they enjoy their work and production, renewing and widening the range of products in the market; implementing new production, supply, and distribution methods; and introducing changes to administration, organizational work, work conditions, and employee skills.

Pulido (1999) asserts that if a company envisions a future with high levels of competitiveness, it must invest in promoting creativity and innovation. This is the complex process of creating, developing, and transforming available additional knowledge into new, varied, and novel solutions to the problems that, in their multiple organizational systems, humans face in their evolution, through the process of successfully creating, producing, assimilating, and exploiting the newness in both economic and social terms. Varela (2010) analyzes "creativity within various reference frameworks: as a process, a product, and a concept of human

characteristics" (p.34). Generally, and from a business perspective, creativity is seen in terms of originality, productivity, and competitiveness.

In order for competitiveness to develop, the capacity to create and innovate is needed. Aponte, Ancona, and Segura (1998) maintain, therefore, that innovation is considered one of the tools that businesspeople have for planning, organizing, and controlling change; moreover, it is the ability to produce ideas—that is, creativity—then implement them successfully. Creativity has meaning when it occurs through innovation or is utilized for some undertaking. The authors point out that the aim of society today is to guarantee adequate levels of quality of life for people, and this requires innovation, creativity, and business competitiveness, with people at the center; thus, every society should ensure that it has people capable of creating and undertaking processes of change.

Consequently, innovative thought in an organization is not content with the status quo; the challenge is to transform and manage knowledge in an original way to put it at the disposal of development, well-being, and decent living in humanity, creating value through iterative processes of improvement and rejecting routine action and thought. Pulido (1999) complements this idea by stating that "innovation is the driving force of non-routine change" (p. 9); it is an opportunity to change things for the better and develop the future.

Innovation requires a high degree of imagination and represents a relatively major departure from the established way of doing things, thereby fundamentally creating new abilities. On this topic, Flaherty (2002), referring back to Peter Drucker, understands innovation as the specific tool of innovative businesspeople; as a means for exploiting change; as an opportunity for a different business; as an envisioning of success in the short, medium, and long term; and as the act of endowing resources with new capacity to produce wealth.

For Porter (1990), innovation is a key element of competitiveness. He points out that companies create competitive advantage by discovering new and better ways of competing in a sector and then transferring them to the market, which is ultimately an act of innovation. He asserts that the competitiveness of a region depends on the capability of industry to innovate and improve.

Until recently, innovation did not have its own identity within the field of administration; according to Veiga (2001), it was considered a by-product of creativity, organizational change, and technological progress. Now, however, the term is gradually gaining importance as companies seek to develop and maintain competitiveness. As it is defined, the concept of innovation transcends its own meaning. Griol Barres (2009), from the *Fundación Globalidad y Microeconomía*, understands innovation as an untrodden path created using available knowledge

to reach a reasonable goal, or at least try; it is only considered innovation if the path imagined is new.

Innovation is also a key factor in measuring and evaluating increased productivity in the company, as well as in the region and the country; accordingly, it is vital to fully understand its origins and patterns in order to put forward and implement appropriate and contextualized public and institutional policy and, in turn, measure the effects on the company and—as Minor and Rai (2009) state—on the environment, as well as the challenges that can lead to economic growth in the medium and long term to improve the well-being of the population.

The innovator stands out by giving flight to his or her intelligence, gaining invaluable ground on competitors, whose resistance to change provides the innovator with an advantage.

Science, technology and innovation

Freeman, Clark, and Soete (1982) describe innovation as the process of integrating existing technology and inventions to create or improve a product, process, or system. In relation to this, the idea of science, technology, and innovation as a source of economic and social development has been analyzed using various approaches: academic, social, political, cultural, economic, and development-based, among others, finding a direct link between a region or country's level of development and the capacity for scientific, technological, and innovation-related research. This, in turn, translates into technological products, processes, and services with high added value that circulate in the market. Ogle (2007) points out that it is now increasingly common for governments of different countries to focus on steadfastly promoting science, technology, and innovation as generators of added value to leverage goals of economic, technological, and social development.

The dizzying rise of technology, information, and communication in distinct fields of knowledge presents a series of opportunities and challenges to society and the production structure. This requires adaptation to new technologies in industry, agriculture, health, the environment, energy, education, and other sectors, in order to take firm steps forward in terms of development and well-being, closing the so-called digital and technological gap that separates the country from the knowledge economy.

The science, technology, and innovation triad is transforming the landscape and atmosphere of the business sector. Traditional companies are facing an ultimatum and are being invited to innovate their entire structure to facilitate involvement in globalized markets. Technology in itself strengthens the creation of knowledge management companies. Implementing technological research and development

initiates a radical technological and organizational change in the company, which will certainly continue in the foreseeable future. The advance of technology demands moving at an extremely rapid pace to develop competitive advantages in the market and the knowledge economy.

Developing countries have adverse conditions for assimilating science, technology, and innovation, and results are far from those hoped for. According to the Organization of American States (OEI) (2012), this is understandable due to the low intensity of implementing technological research and innovation, the incipient development of applied research, and low levels of technology transfer. There is also a glaring lack of involvement in networks and communities of science, technology, and innovation at the international level. To overcome these difficulties, which prevent the flow of development, progress must be made in processes of applied research, technology transfer, and national and international positioning and visibility.

Conclusions

Creativity is a constructive and productive behavior that is always based on reality. It is related to producing something new and valuable, as well as the ability to find new and better ways of doing things. Its attributes include: originality, novelty, appropriateness, relevance, transformation, and spontaneity. Innovation, meanwhile, is a tool that businesspeople use to take advantage of change for a new and innovative business; it has become a systematic activity with a defined, planned, and organized purpose, such as the systematic analysis of opportunities for social and economic innovation.

Innovation in the educational sector depends on the way in which its stakeholders interpret the changes in terms of individual, collective and practice-related conceptual representations. It is a process with many dimensions, involving political, economic, ideological, cultural, and psychological factors and affecting different contextual levels. Training innovators requires meaningful innovation in the classroom setting, in content, in teaching methodology, and in assessment; in other words, a change from those who manage and carry out education, which is basically a change in its underlying theories.

Technology is a permanent source of innovation that can take new production structures to sectors of greater technological added value, considering human talent to be a productive force of the highest levels of knowledge, abilities, and skills that coordinate easily and effectively with the knowledge economy; this allows access to financing from diverse sources and also assures investment performance and a

structure of technology transfer from centers of excellence that facilitate learning, progress, and consolidation of this developing culture and practice.

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