
Gestionar la innovación en el vínculo universidad-empresa.***Desafíos para la formación directiva******Managing innovation in the university-industry link.******Challenges for management training*****Sandra Roget Albertí****Rosa María Reyes Bravo**

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Recibido: 11 de febrero de 2023

Aceptado: 27 de septiembre de 2023

RESUMEN: El presente artículo tiene como objetivo caracterizar la gestión de la innovación de las entidades objeto de estudio, se utiliza como método el estudio de casos. Los resultados revelan que la gestión de la innovación se connota positivamente por los directivos de dichas entidades, cuentan con estructuras para su desarrollo, pero no procedimientos detallados y la dinámica de sus desempeños manifiestan problemas que indican la necesidad de mejorar la preparación y formación académica para desarrollar competencias comunicativas, motivar y ejercer las funciones directivas de planificación, organización y control de la introducción sistemática de resultados científicos.

Palabras clave: Gestión de la innovación; Formación de directivos; Competencias comunicativas.

ABSTRACT: The aim of this article is to characterize the innovation management of the entities under study, using the case study method. The results reveal that the innovation management is positively connoted by the managers of these entities, they have structures for its development, but not detailed procedures and the dynamics of their performances manifest problems that indicate the need to improve the preparation and academic training to develop communicative competences, motivate and exercise the managerial functions of planning, organization and control of the systematic introduction of scientific results.

Keywords: Innovation management; Managers training; Communicative competencies.

Introduction

Innovation management has become a necessity for the economic and social development of the

country, from the relevance given to science and technology in all programmatic documents of the Cuban nation, concretized in the National Plan for Economic and Social Development until 2030 (PNDES 2030): Vision of the Nation, Axes and Strategic Sectors, and with full backing in the Constitution of the Republic of Cuba (2019), which has induced transformations in the Strategic Project of the Ministry of Higher Education (MES 2022-2026), to respond to the demands of the different sectors of society. After the necessary diagnosis of university management, this document includes among the guidelines for change: "Transformations in the preparation and training of cadres aimed at changing their mentality with a focus on innovation and preparing them to behave as promoters aware of the connection between STI and the problems of development that each sector and territory must face" (MES, 2022, p. 36).

Consequently, the MES (2022, p. 46) has proposed among its strategic objectives (SO) until 2026:

SO, 3- Strengthen the link between Higher Education and companies producing goods and services, extending organizational forms that encourage the application of the results of science, technology and innovation, with an impact on the Strategic Sectors for development.

SO, 4- To impact scientific and technological development, as a pillar of the governance system based on science and innovation, the application of the results and the satisfaction of the needs for training, postgraduate and doctoral education of professionals, in correspondence with the demands of local, territorial and national sustainable development.

SO, 5- Improve the preparation and improvement of State and Government cadres and reserves, with emphasis on the local level, oriented towards the transformation of management and modes of action with a focus on innovation.

Correspondingly, the MES sectoral research project "Innovation management in universities in southeastern Cuba. Science, socio-productive practice and territorial development", coordinated by the University of Oriente, carried out a diagnosis of innovation management in this university and in companies in two of the country's strategic sectors in Santiago de Cuba: food production and the pharmaceutical, biotechnological and biomedical sector; having identified as a problem the insufficient culture of innovation management and knowledge transfer in these universities, as well as in companies in strategic sectors, for the systematic introduction of scientific results in socio-productive practice, which contribute to territorial development.

Among its specific manifestations are problems in the university-business link, such as: resistance on the part of company managers to undertake innovative management in the link with the university; seeking the link with the university because of indications from higher levels and not because of the need to produce transformations in their companies to promote development on the basis of science and innovation; delay in communicating their problem banks in the face of demands for joint projects with the university; lack of knowledge of the new CITMA regulations and standards for science and innovation management; pragmatic-empirical and urgent tendency in the search for solutions to business problems; little openness to scientific outlets through R&D&I projects; resistance to the introduction of relevant scientific results (products or services) produced by the universities to jointly promote development; lack of understanding of the role of the teaching units as a space for business development in the short, medium and long term; unspecific, general or ambiguous demand for improvement of workers by human resources specialists in companies; and little strategic projection of postgraduate studies as a way to develop human potential in companies.

In order to solve the problem in the research project in question, we addressed four aspects in order to achieve an interactive innovation management system. These are: 1°. Capacity building for actors in the academic and productive spheres, on issues related to innovation management, territorial development plans, public policies, technology transfer and entrepreneurship, among others. 2°. The strengthening of the existing interface structures in the universities of the south-eastern region, the purpose of which is the transfer of knowledge that generates income for this concept. 3°. The development of absorptive capacities in companies in order to introduce the scientific results generated in the University and in their interactions. 4°. The design of joint projects between the University and the Company in response to the demands of the latter, aimed at innovation and commercialization of goods and services.

The first aspect referred to is the starting point for the analysis presented here, considering that the management of innovation is one of the functions of the management, of the cadres of governments, of companies, of the knowledge sector and of the institutions of public administration (Díaz Canel, 2022), constituting a relevant process that must promote the improvement of results, but which contains an important subjective component in its efficacy.

Several scholars have referred to knowledge management, its relationship with innovation and its value for the management of a company. Danneels (2002), Navarro (2018) and Trejo (2018) refer that organizational innovation needs more than the presence of knowledge or the capacity itself to generate potential innovation, of competitiveness, strategy and adaptability in the organization, managed from management structures of the company with interdisciplinary approaches and practices. Likewise, Corahua and García (2022) refer to the need to develop in the university context quality education, scientific contributions, technology transfer and extension, to train managers in the competences of change management, organizational innovation, new ideas, creativity, adoption of new approaches and methodologies.

As a professional competence, managing innovation constitutes an integrative process of intrinsically motivated knowledge, skills, attitudes and values, which takes place in a cooperative, collaborative, discursive, reflexive and communicative community of practice that generates its own resolution model, its innovation system and allows for a socially conditioned, motivated and sustainable solution to a problem; an innovation, based on the complex conceptual relationship between work, learning and innovation (Díaz-Canel and Fernández 2020).

It must be understood that innovation is a social process, which is nurtured by the interactions (a key word) between various actors, including universities, governments and the productive sector, in an important regulatory context that facilitates it.

Innovation management is closely linked to the mission of universities. This has been ratified by Díaz-Canel and García (2020), when they state that Higher Education is defined by its transformative territorial social responsibility, by responding to the Sustainable Development Goals in an integrated way, by being a co-creator of knowledge and innovation; for which it requires the integration of training, research and social linkage in order to fulfil its mission.

In our research we approach innovation management from a transdisciplinary perspective (knowledge emerging from the transcendence of disciplinary boundaries) and interactive, as it is substantive to the relationship between actors (University and socio-productive sector) to transfer knowledge. The results must contribute to the integrated management of scientific knowledge and its impact on local development.

Faced with the specific questions: What aspects distinguish the management of innovation in companies in strategic sectors? How do their managers manage science, technology and innovation

(STI) in the link with universities, for the development of their corporate purpose? We set ourselves the objective: To characterize the innovation management process of companies in strategic sectors participating in the project and of the University. We present here a summary of the analysis of the university-company pair, materialized in two companies belonging to the BioCubaFarma business group in Santiago de Cuba, taking into account the advances of this sector in the country and its link with one of the key processes of the Universidad de Oriente: postgraduate studies.

As specific objectives, we set out to explore the conceptions of the innovation management process, the structural-functional conditions created in these entities for its development, the problems that distinguish the process and the competences that managers recognise as necessary in their performance, with a view to designing a training system that will make it possible to overcome the current shortcomings.

Development

In order to achieve the proposed objectives, the qualitative research methodology was used, due to its flexible and adaptable character to the nature of the object and the work dynamics that occur in the management activity.

As a methodological strategy, the case study was used to study in depth the characteristics of the relationships of the subjects of the management process. In-depth interviews and text reading were used to collect information (Olabuénaga, 2007). The former was applied to key informant managers of the Universidad de Oriente and of two BioCubaFarma companies in Santiago de Cuba; the latter was applied basically to the documents of the postgraduate activity of the Universidad de Oriente, as they are an expression of knowledge management in the university-business link, as well as being able to explain the conditions for the formation of competences in innovation management.

With regard to university documents, the postgraduate plans for 2019, 2020 and 2021 were analyzed, as they are the most recent and closest to the research, and because they belong to a period of strategic planning for the country, Ministry and University that should reflect the strategic development needs of the country and territory.

The central category object of the research was innovation management and for its characterization three dimensions were defined: conceptual, structural-functional and socio-dynamic.

For both the questioning and the analysis of the results, some indicators of the process were identified in the content analysis (including the bibliography for consultation):

Indicators of the conceptual dimension:

- (a) Concepts and/or terms used by interviewees to describe the process of innovation management and knowledge transfer.
- b) Understanding of the innovation management process in relation to the local and national socio-economic context.

Indicators of the structural - functional dimension:

- (a) Structure and organization for innovation management.
- b) Role of the actors involved in the management process.
- c) Procedures for innovation management.
- d) Resources or inputs for innovation management.

Indicators of the socio-dynamic dimension:

- a) Existing problems in the interactions of the process: social, institutional, personal, professional preparation or training and in the university-business link.
- b) Assessment of the innovation management process.

For the processing of the information, the contents were coded into three types of categories:

- General categories: informants' data, to identify the status-role-information relationship.
- Common categories: those specific to management sciences and knowledge management.
- Special categories: those that can be arrived at after processing the information and that do not fit into the preceding categories.

The intentional sampling led us to the selection of eleven (11) subjects who have an important participation and role in the management of business innovation and in the university environment, especially related to the formative and operative component of this process.

Five (5) subjects participated in the two companies in the biotechnological-pharmaceutical sector in Santiago de Cuba: a deputy director, two development directors, a head of the research and

marketing department and a head of the production department. Of the total, 4 are women (80%), which points to favorable conditions for the promotion of women to management positions in this sector, as well as the development of their innovative potential. The information provided by these actors in the selected business sector is relevant to the role they play and the scientific training they have, and they show experience in research processes, all of which favors the understanding of the innovation management process.

In the case of the Universidad de Oriente, six (6) subjects participated: the Director of Postgraduate Studies, the Director of Science, Technology and Innovation, the Head of the Department of Training and Improvement of State and Government Staff, the Coordinator of the Master's Degree in Management, a professor from the faculty, as well as the Head of the Department of Commercialization and Transfer of Knowledge. Of these, 100% have higher education, 4 are managers (66.6%); of the latter 3 are women (75%), which also indicates favorable conditions for the promotion of women to management positions in the sector, an aspect relevant to their and the institution's innovative potential. Of the six participants from the university, five (5) are Dr. C. in some branch of knowledge (83.3%) and one is a Master of Science, who is in the process of doctoral training, which places them in better conditions for the understanding and management of innovation. Two have training and degrees in pedagogical sciences, two in economics, one in natural sciences and one in social sciences, which facilitates a multidisciplinary perspective in the vision and understanding of the management of university processes, including their probable innovative character. All the interviewees from the Universidad de Oriente have potential roles for innovation management, although only one manages the process directly, linked to the traditional perspective of research. Of the 4 managers interviewed, 3 have extensive management experience (75% with more than 5 years in the position). The roles and functions of the interviewees, their scientific-professional preparation and their experience in management positions validate the relevance of the information provided and also favor the understanding of the innovation management process.

Conceptual dimension of innovation management.

The university's stakeholders conceive of a close relationship between innovation management, knowledge management and its transfer, with the education, training and training of staff, which corresponds to the formative and scientific nature of the institution and the culture of the

organization, specifically its basic assumptions and shared values. They qualify the process of innovation management and knowledge transfer as "indispensable" and binding in the mutual relations between universities and companies, in order to produce science and innovation in every field. They comment on Decree 33/2021 of the Republic of Cuba on territorial development strategies, as a government policy that includes the university-business link, which also aims to solve the problems of business practice, through reference processes.

To define the skills and competences necessary for innovation management as a managerial process, they use socio-psychological categories such as participation, communication and motivation, also linked to the functions of planning, organization and control of the application of scientific results, to promote innovation and science management in institutions.

They understand innovation management as a process proper to the activity and functions of managers, their main responsibility at the present time, and innovation as a space for the participation of all members of the organization, which connotes positively the shared vision of this process.

However, in the understanding of this process in relation to the socio-economic context, the subjects of the university omit the role that also corresponds to the teaching staff and the teaching departments as the basic link where the university's mission and vision are developed, in the formation of skills and competences for the management of innovation. It should be borne in mind that the basic preparation for entrepreneurship and innovative spirit must take place in the teaching-learning process, for which teachers are also responsible. Finally, they recognize the need for a link between the different institutions, specifically the University, the Government and companies, in order to integrate theory and practice in innovative training and to solve the problems that arise.

As for the subjects of the business sector participating in the research, they consider that innovation management must be integrated into the processes that they manage, and the link between the university and the companies is also indispensable for innovation in the organization, mainly through the management of human potential, related to training and improvement in innovation issues, and through integration in research projects.

They understand the management of innovation as an opportunity to respond to the bank of problems of the companies, an issue that can be facilitated by the link with the University, given the possibility of transferring knowledge and making demands. It is significant the reference to the

fact that compliance with government policies on this link is a complex process, which is explained further on in the socio-dynamic dimension. They also consider that the management of innovation in the companies is the main responsibility of the managers and they value innovation as a space for the participation of all the members of the organization, which constitutes a positive element in the understanding of this process.

In the companies studied, the conception prevails that communication and participation are inherent to the management of innovation, because both favor the motivation and contribution of the members of the organization to the solution of problems, the positive work climate, the culture and organizational development, as well as the establishment of the necessary alliances with other institutions that are essential for this.

They also recognize the importance of developing managerial competences that enable them to understand and put into practice in the exercise of business management, participation in organizational processes, internal and external communication of the company and the ability to motivate, as key elements of management in general and specifically of the innovation management process.

Structural - functional dimension of innovation management:

From 2016 to mid-2022, the Universidad de Oriente had a Department of Results Transfer and Commercialization (DTRC) in its structure, which favored alliances with different social actors, including companies, to promote knowledge transfer and the development of innovation. To this end, it liaised with the Directorate of Science, Technology and Innovation (hereinafter, DCTI), the Directorate of Postgraduate Studies (DEPG), the thirteen (13) faculties and eight (8) Municipal University Centres (CUM), responding to the training and research demands of the business sector, as well as to requests received from outside. However, these internal working relationships lack procedures for innovation management. The DTRC had an interdisciplinary composition: a social communicator, a psychologist, two accounting and finance specialists and a lawyer, who provided advice and support to the teams formed by requests for innovation and knowledge transfer processes. Among other functions, they had to plan, organise, monitor and control the collection of income derived from the university-business link and with foreign universities; and they were responsible for the policy and strategy for the intellectual property of scientific results and their commercialization.

Although the science, technology and innovation (ST&I) entities of the UO have their own structures for research, development and innovation, the university structures of the UO also maintain close working links with them, both in scientific research and in undergraduate and postgraduate academic training.

Since July 2022, and under the protection of the country's regulatory and economic transformations, the Science and Technology Interface Society of the University of Oriente, CINTRO S.A., has been constituted, with the University of Oriente and the University of Guantánamo as shareholders. This new structure functions as an interface to connect the needs of the business sector with the results and potential of the university, the construction of solutions based on science and technology, as instruments for innovation, although it must assume a more leading role due to its business nature.

The Universidad de Oriente, by social and state mandate, must guarantee the training and preparation of managers and specialists of the companies and the government in the province of Santiago de Cuba, at the same time as it is responsible for the professional improvement and postgraduate academic training of its graduates in the central-eastern region, on the basis of the model of continuous training. For this reason, its structure also includes a Directorate of Training and Improvement of State and Government Staff, responsible for planning, organizing, executing and controlling the aforementioned task, as well as advising the activities that each Teaching Department manages with the directors of institutions and companies related to the profile of their careers. On the other hand, all university teaching areas carry out research projects, which support the science-postgraduate relationship in training and contribute to innovation and knowledge transfer.

From the reading and analysis of the UO's postgraduate plans between 2019 and 2022, five (5) Doctoral Programmes were identified (Biotechnology; Basic Sciences; Eng. Chemistry; Economic, Accounting and Financial Sciences; and Sociology), four (4) master's programmes (out of a total of 30), four (4) diploma courses and eighteen (18) postgraduate courses, with objectives, contents and opportunities for the improvement of the aforementioned managers of BioCubaFarma companies, the latter two specifically related to innovation management. The postgraduate plans analyzed show that the relationship between scientific knowledge and business demand (and vice versa) is not always dialectic or dynamic, since in the absence of real, specific and concrete

demands from these companies for training in innovation management, the postgraduate courses offered and planned denote stagnation or traditionalisation in their conception and deployment. At the same time, no substantive modifications are revealed in the contents of the academic programmes in question to promote a change of perspective in the enrolled students; essentially, the inclusion of compulsory, optional or free credits in the doctoral and master's programmes directly linked to innovation management, although they are linked to R&D, is not apparent.

Of the Master's programmes, one (1) is focused on management of the management itself (Master's in Management), in which the management of innovation is included but in a limited way and not integrated with the rest of the business processes; the other three (3) are aimed at the management of technological processes related to this strategic sector (Master's in Biotechnology, Pharmaceutical Services and Chemical Process Engineering), but their optional credits do not offer direct content, nor do they promote explicit skills for the management of innovation.

In relation to the Diplomas, especially those of a national nature (Administration and strategic management and Business management) have contents relating to innovation and an objective referring to its management, reiterating contents relating to management of management in the four programmes analyzed, to local development in three and to business management in one; and in all few contents related to the specificities of the activity of science, technology and innovation. The diploma programme for managers most favored in the treatment of innovation management in the systems of objectives, contents and skills is "Strategic management of development", which includes a line of research for the development of the dissertation on "Innovation management for local development". In relation to postgraduate courses for managers, only four (4) with specific objectives and contents related to science and innovation management, ten (10) with objectives and contents related to the managerial process (skills and competences) and leadership, and three (3) focused on local development management.

In summary, the postgraduate plans analyzed show that not all the potential for developing skills and competences for innovation management in the different areas of knowledge is used, and that the systems of objectives, contents and skills do not fully favor conceptual and attitudinal change for a culture of innovation management in the business and academic sector. In this sense, few resources or didactic inputs are used for innovation management in academic research training.

In relation to the companies studied, the existence of Research and Development (R&D) and Innovation Departments in one of them is a strength for the management structure. In the case of one of the companies studied, this structure has the category of Research Unit, with a staff of sixteen (16) workers, including seven categorized researchers. In the other company studied, the Research and Development Department is in charge of research design, although the managers keep the call open to other departments, and as a result, product and organizational innovations are developed - not always as a result of research.

Despite this, innovation management will always be limited if the functioning of the R&D structures is supported by only 5% of workers dedicated to research, compared to 30% of administrative staff, as is the case in one of the companies, which also necessarily has 60% of workers in production, and 5% in the area of quality. The companies studied have some R&D projects of their own and only one of them had opened its research - up to the time of closing this diagnosis - to the participation of university professors and students, which also constitutes a brake on innovation management. The structure of both companies promotes the integration of work teams, horizontal communication and hierarchical decision-making processes related to innovation, although they do not have their own procedures for innovation management. They allocate financial resources to this process, although limited by budgetary possibilities. The link with the University is scarcely used to access other sources of funding for inputs to the innovation process.

Socio-dynamic dimension of innovation management:

As a problem in the process of innovation management in the case studies, the insufficient integration between universities and companies to establish strategic alliances through joint laboratories is expressed:

- ✓ establishing strategic alliances through joint laboratories
- ✓ elaborate joint R&D&I projects
- ✓ define innovation projects that contribute to solving their problem banks and to mutual scientific development.
- ✓ plan, organize and control the carrying out of master's and doctoral research in the university's academic programmes, as well as to introduce their results in the company.

Other problems identified by company managers are as follows:

- ✓ Shortcomings in the preparation of managers to fulfil their functions in the innovation management process, as knowledge of the ISO standards that regulate the activity is not sufficient.
- ✓ Lack of knowledge of the ways in which the transfer of knowledge ensures the introduction of scientific results and operates as a vehicle for innovation to solve the company's problems.
- ✓ Difficulties in communication and negotiation between universities and companies to harmonize and satisfy R&D&I interests, and to request training and services to favor this process.

As a positive aspect, the shared assessment (basic assumption) that innovation should be a participative and interactive process between its key actors stands out.

Conclusions

The innovation management process between the university and the selected case study companies is characterized by insufficient interaction and ineffective links, although they share a positive connotation of this process in its conceptual dimension, understanding it as a participatory, interactive and integrating management process of the social actors involved, which requires developing communicative and motivational competences, associated with the functions of planning, organization and control of the application of scientific results, in order to promote innovation in the institutions. However, the omission of university teaching staff and teaching departments as key agents in the training of competences for innovation management is evidence of limitations in the understanding of the university vision and mission with respect to the economic and social context, which restricts the performance of the university in its training role for innovation.

The companies and universities studied have structures for innovation management, although they are not used to their full potential, due to the lack of their own procedures and didactic resources in the training sphere, as well as the stagnation or rationalization of postgraduate figures that prepare managers and specialists from the companies and the university itself in these subjects.

The insufficient integration between universities and companies affects the possibilities of establishing strategic alliances for the design of R&D&I projects and the creation of joint laboratories, and gives rise to a series of problems that characterize the socio-dynamic dimension of innovation management in these entities. All of which is counterproductive with the positive conception of innovation management expressed by the managers, showing the need to improve the training and development of competences to narrow the gaps between the understanding and management practice of innovation in the university-business link, of skills and competences for joint work, conflict resolution, the transaction of visions, experiences and motivations.

Bibliographic references

- Zuloaga, L. (2021). Aprendizaje a lo largo de la vida. Reflexiones de la pandemia. Experiencia peruana educación no formal. *Educación*, 27(2), 175-199.
- Asamblea Nacional del Poder Popular. (2019). *Constitución de la República de Cuba*. <https://www.gacetaoficial.gob.cu/es/gaceta-oficial-no-5-extraordinaria-de-2019>
- Programa de Naciones Unidas para el Desarrollo (PNUD) en Cuba (2019). Plan Nacional de Desarrollo Económico y Social hasta el 2030 (PNDES 2030).
- Consejo de Estado (2016). Lineamientos de la Política Económica y Social del Partido y la Revolución para el período 2016-2021. Editorial Política.
- Corahua, F; García M. (2022). Formación de los directivos académicos en gestión y gobernabilidad de la institución universitaria. *EduSol*, 22(81)
- Díaz-Canel Bermúdez, M. M.; Fernández A. (2020). Gestión de gobierno, educación superior, ciencia, innovación y desarrollo local. *Retos de la Dirección* 2020; 14(2): 5-32.
- Díaz-Canel Bermúdez, M. M. & García L. (2020). Educación superior, innovación y gestión de gobierno para el desarrollo 2012-2020. *Ingeniería Industrial/ISSN 1815-5936/Vol. XLI/No. 3/septiembre-diciembre/2020/413*.
- Díaz-Canel Bermúdez, M. (2022). Gestión de Gobierno basada en ciencia e innovación: avances y desafíos. *Anales de la Academia de Ciencias de Cuba*, 12(2), e1235.
- Danneels, E. (2002). The Dynamics of Product Innovations and Firm. Competences. *Strategic Management Journal*, 12(23), 1095-1121.

- Ministerio de Educación Superior. (2022). Proyecto Estratégico del Ministerio de Educación Superior 2022 – 2026. 70
- Navarro, A. (2018). Conceptos para entender la innovación organizacional. *Revista de comunicación de la SEECI*. No 45. ISSN 1576-3420.
- Ruiz Olabuénaga, J.I. (2007): Metodología de la investigación cualitativa. 4ta edición, Universidad de Deusto, Bilbao.
- Trejo Berumen, K. S., Gámez, A. E., Conesa Cegarra, F., Ángeles Villa, M., Ivanova Boncheva, A., & Beltrán Morales, L. F. (2018). El sistema nacional de innovación de México. Una comparación con España y Estados Unidos de América. *Acta Universitaria*, 28(1), 87–98. <https://doi.org/10.15174/au.2018.1430>