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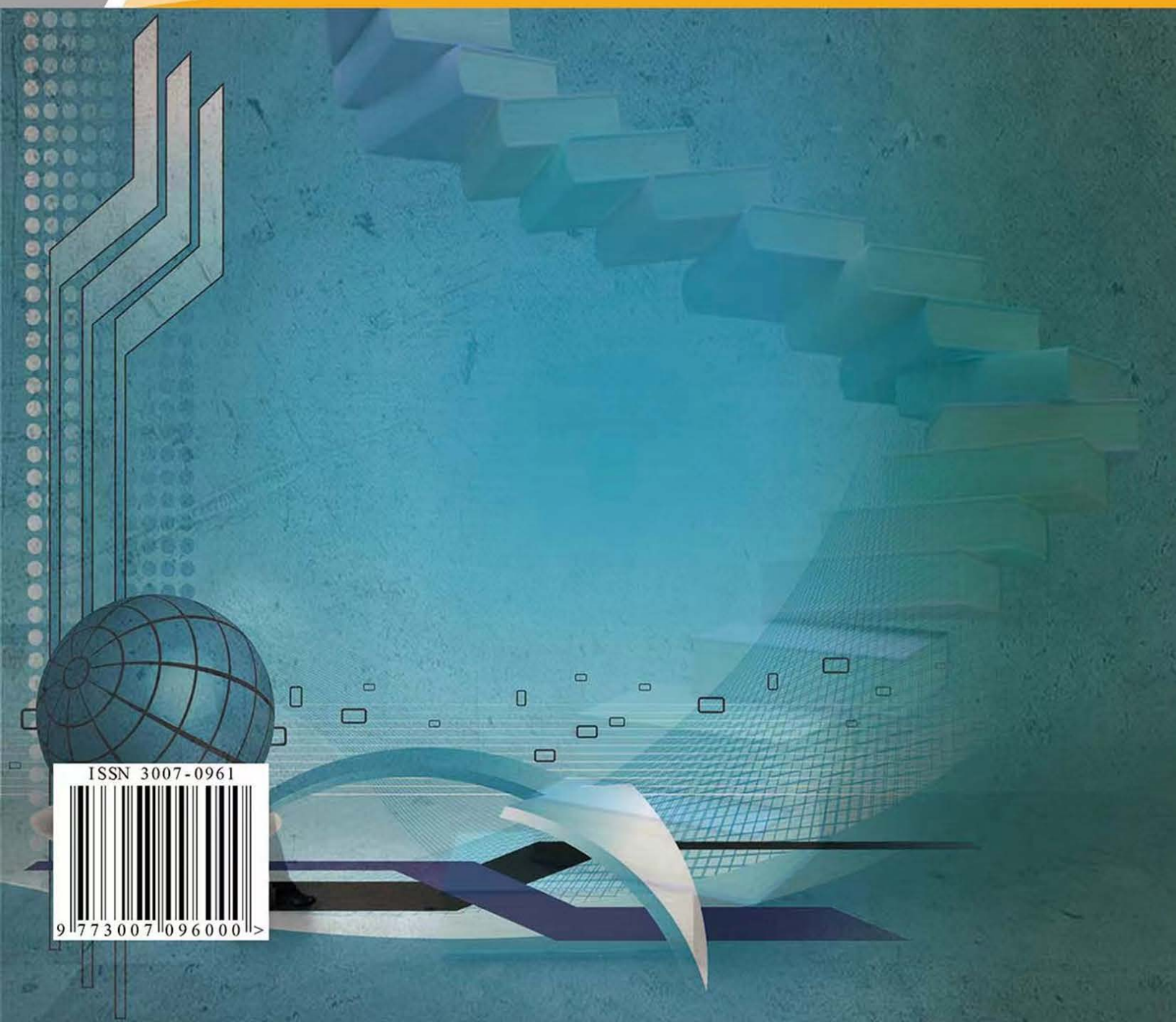

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Management model in Science, Technology and Society from the postgraduate

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ABSTRACT

This paper shows the results achieved through the analysis that forms the theoretical-methodological framework of the research, and the evaluation that characterizes the current state of postgraduate studies in Science and Technology at the University of Holguín. Through the criteria of experts (Delphi Method) and critical analysis of current teaching practice, a management model in Science-Technology-Society (CTS) with an interdisciplinary conception of integrating issues to be taught is validated and founded. In the same way, the objective lies in the design and application of a Management Model for the postgraduate course in Science-Technology-Society (CTS) in context and according to the educational demands in higher level institutions. The university must train a professional with the capacity to face the challenge of contemporary times, with suitable scientific and technological knowledge, bearer of their own values for optimal performance, as a member of society, with a projection that combines scientific-technological orientation contents towards different levels of education and in different academic institutions.

Keyword: Management; postgraduate; science; technology; society

1. Introduction

The accelerated development of Science, Technology and Innovation (STI) today has generated economic, political and social transformations for humanity, these changes have created in man a way of thinking and proceeding according to the scientific-technological activity that is developed. The Agenda 2030 for Sustainable Development‖ approved in September 2015, which includes Sustainable Development Goal 4 related to quality education. It states that: all people (...) should have access to lifelong learning opportunities that help them acquire the knowledge and skills needed to take advantage of opportunities and participate fully in society.

In recent decades there has been a growing demand from governments in both industrialized and developing countries for universities to play a more active role in contributing to economic

growth and development.

The training of professionals does not end at the conclusion of the university career and attaining the degree, but continues in a new stage according to the needs for the job he/she performs or for which he/she prepares, the needs of the development of science, technology and art, and the needs of the professional as a social being (Bernaza, 2018, p.1).

Similarly, Núñez and Alcázar (2016), propose three conceptual references that underpin the role of universities in economic and social development, namely:

(a)changes in the conception of development,

(b)representations on science, technology and innovation and their connection with territorial development.

(c)Debates on university models.

These authors emphasize that: universities have important commitments to the social and economic development of our countries; they are direct actors in local development, capable of producing, disseminating and promoting the use of knowledge and technologies of economic, social, environmental, political and cultural importance.

In this sense, the professional's performance takes place in the midst of contradictions of practice, scientific knowledge and the introduction of its scientific results in the also contradictory contemporary society, so that the development of conceptions and attitudes in the proper management of science, technology and innovation. And the corresponding reflective processes become essential objectives of their professional performance.

The existence of two great traditions: the European and the North American for the understanding of Science, Technology and Society Studies at the level of education, differences were found in terms of: style and content, these two STS traditions, due to the diversity of their perspectives and fields of work (academic research, on the one hand; politics and education, on the other), can be said to constitute complementary elements of a critical view of science and technology.

Similarly, at the STS educational level, we try to put into practice two important objectives of STS academic research: the social contextualization of expert knowledge (demystification of science, problematization of technology) and the consequent promotion of public participation in decision-making related to science and technology.

On the other hand, management models arise as a need to represent the process of organizations. Authors such as Quinn, Faerman, Thompson and McGrath (1994) define management models as the instrument that helps to represent, communicate ideas and understand the phenomena presented in the management of an institution.

Similarly, Duque (2009) points out that a management model "is a set of policies, principles, processes, behavioral guidelines, procedures and systems to achieve the expected objectives and improve the performance of the institution" (p. 39).

Management with an integrative approach, which contributes to achieve greater effectiveness in decision-making in universities. In this sense, Cuban universities are involved in

constant processes of transformation, in order to provide more and better responses to the demands of society. (Ortiz, 2014).

Currently, universities, like all institutions or organizations, are undergoing very significant transformations, which have to do with all their substantive functions, from academia to their organizational context.

For the University to face these challenges, it is necessary to implement innovative processes that have an impact on the postgraduate activity in such a way that it responds with the most current and relevant science and technology.

As the need to train and develop professionals who are attentive to reflection on science and technology increases, it is contradictory that there are shortcomings in STS training practice at the graduate level: The scientific-technological phenomenon is not analyzed in all its integrality, from the knowledge-context approach for the understanding of the interactions between science and technology in society. This affects the quality of the professional development of teachers and researchers.

2. Methodology

A mixed qualitative and quantitative research is developed, using theoretical, empirical and statistical methods. Analysis of documents to evaluate the treatment of the research problem concerning the theoretical-methodological inadequacies in the management of training in science, technology and society at the postgraduate level.

During the research process, the analysis and synthesis of information are used as theoretical methods, to penetrate into the essence of the theoretical-methodological proposal and discover its essential relations with the theoretical foundations, to reach conclusions later and, through the use of synthesis, to establish the links between them. Induction-deduction provides the integration of each component of the theoretical-methodological proposal, from its parts to the whole and vice versa, and establishes the systemic-complex for the conception of the structure and dialectical hierarchy of each component of the model.

Among the empirical methods used were: analysis of documents to evaluate the treatment of the research problem in the provisions and regulations of the Ministry of Higher Education (MES), in the context of the training of professionals, particularly postgraduates.

The questionnaire and the interview for the collection of opinions on Science, Technology and Society allow us to ascertain the variables related to the knowledge that the students involved in the course of overcoming have about science, technology and their relationship with society.

And to fulfill the objective of the study. I design a proposal of a management model for the postgraduate course in Science-Technology-Society (STS).

3. Results and discussion

For the elaboration of the model as a scientific result, the definition offered by Valle is assumed, which states it as "an abstraction of those essential characteristics of the object of study under investigation, which allows discovering and studying new relationships and qualities of that object of study with a view to the transformation of reality" (Valle, 2007,

p.139).

Modeling in postgraduate activity is essential to work on contextualized content in the fields of education, health, economics, environment, social innovation, based on a theoretical, legal and organizational framework. As well as its approaches and premises that promote scientific research, responsibility, professional ethics, gender equity, understanding and appreciation of the role of STS and its impact on the connection of knowledge-context interactions and their applications in the field of study, bearing in mind the process of socio-economic development.

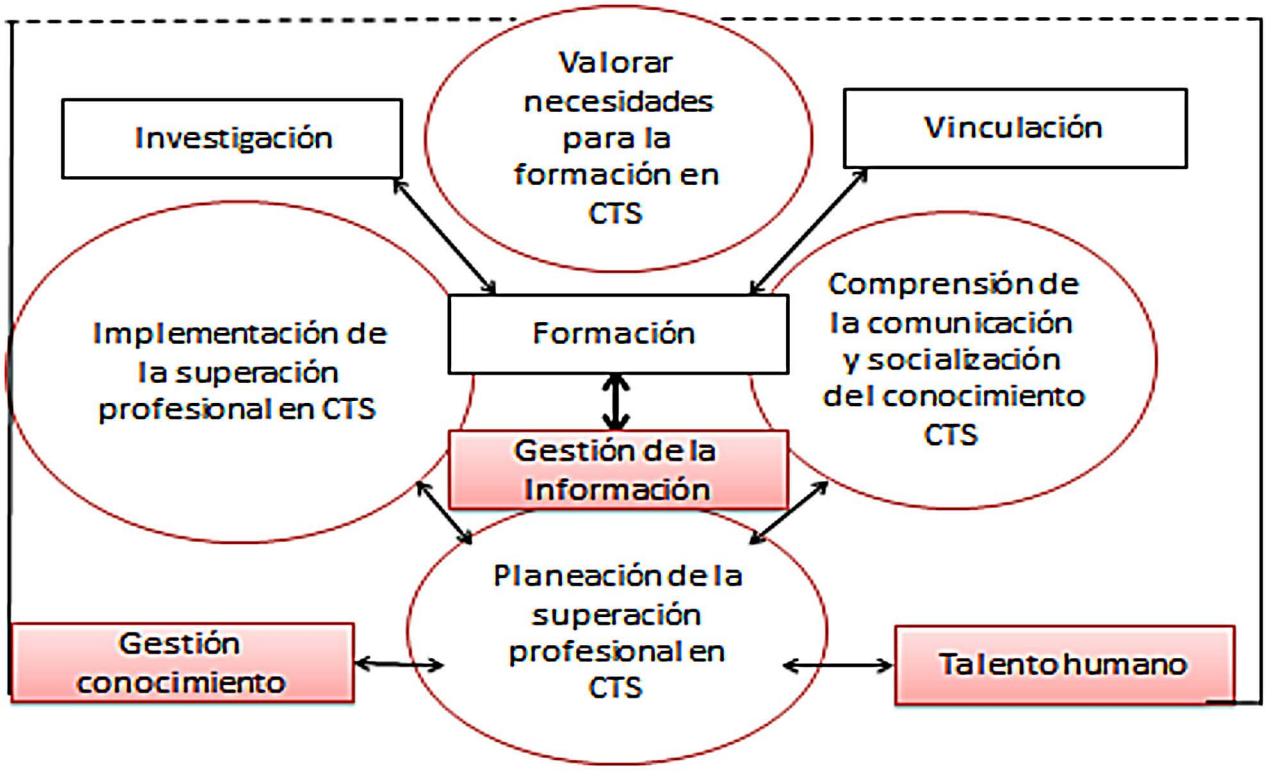
In the integration of the components of the STS graduate management model, a systemic approach was used, because it contemplates the graduate management process from planning, organization, execution and control, and also integrates and manages the components of the continuing education process.

3.1. Principles of the model

Systemic approaches because it contemplates the STS training process from the postgraduate level, considering planning, organization, execution and control; and also integrates and manages the components of the model.

By processes, because sub-processes have been determined in the management of the graduate program, based on the gathering of information with experts and the verification of its inputs and outputs Strategic, because it is part of the Strategic Plan for Institutional Development.

This strategic planning model positions the



(Source: Own elaboration)

model towards the objectives to be achieved, which will contribute to the institution's strategic objectives aligned with its institutional mission and vision.

3.2. Components of the proposed Model

In knowledge management. The contribution of knowledge management to higher education is evidenced in:

1)Programs oriented to the management of STS training for decision making.

2)Methodologies for training and management of human talent with the purpose of strengthening communication and socialization of STS knowledge among the personnel working in the organization.

3)Innovation and social technologies in knowledge management for sustainable development that enables a more accurate view of the social dimension of technological change, social actors, interests and techno-scientific trajectories. It also determines the impact of technological innovations and knowledge transfers on society and as scientific results to be implemented.

3.3. Model Validation

In the present research, the Expert Evaluation Method is used as a fundamental instrument for the theoretical validation of the proposal. This procedure uses a group of experts to analyze specific aspects related to the degree of acceptability of the proposal and to obtain suggestions for its improvement.

The experts can be internal or external specialists. There is no rigid structure for applying the Delphi method, but it is usual to follow a certain sequence. Its use generally requires considerable flexibility to meet the needs of the situation, a comparative analysis of the introduction and expansion of the new product, basing the testing on patterns of similarity. This method does not require a consensus to be reached.

The objective is rather to obtain a number of opinions that have been reduced by the application of the method, this information is then used to validate the product, based on their knowledge, research, experience, bibliographic studies, among others.

An STS training management model was designed and validated with experts, professors and students, giving results of satisfaction.

Questionnaire and in-depth interview. Designed for the collection of opinions on science, technology and innovation; also to ascertain the variables related to the knowledge that the students and teachers involved in the course have about science, technology and their relationship with society.

Allowing to calculate the Argumentation Coefficient (Ka) of each expert according to the established values (Where: Ka Argumentation Coefficient and Kc: Knowledge or Information Coefficient, ni : Value corresponding to the source of argumentation $Ka = \sum ni$ (1 to 6).

Once the values of the Knowledge Coefficient (Kc) and the Argumentation Coefficient (Ka) have been obtained, we proceed to obtain the value of the Competence Coefficient (K), which is the coefficient that actually determines which expert is taken into consideration to work in this research.

This coefficient (K) is calculated as follows: $K = 0.5 (Kc + Ka)$ Subsequently obtained results are evaluated as follows:

0.8 < K < 1.0 High Competency Coefficient

0.5 < K < 0.8 Average Competence Coefficient

K < 0.5 Low Competence Coefficient

Highly competent experts are used for consultation on the proposal; low and medium are discarded as they are close to low.

Once the expert competence process has been completed, an instrument is applied through which the experts are asked to evaluate the STS graduate management model, taking into consideration the aspects contained in the survey.

The result of individual satisfaction reflected that 86% of the teachers are clearly satisfied with the proposed model and 14% are more satisfied than dissatisfied. The group satisfaction index was 0.9318, which shows a clear satisfaction of the teachers with the proposed management model. In general terms, the responses obtained show the satisfaction of the professors with the postgraduate management model.

4. Conclusion

Finally, a management model was designed for training in Science and Technology and Innovation at the University of Holguin. This allows the improvement of graduate studies in STS, and favors the management and appropriation of knowledge from the institutional formative scenarios.

This model is based on its essential relationships and starts from theoretical, normative and organizational bases, with a strategic, systemic, process and continuous improvement approach, to comply with its principles of: integration, leadership, teamwork and improvement, through its components: knowledge management, information management, human talent management, social technology and technology transfer to achieve the objective of the postgraduate program.

Likewise, during the research, and the application of this management model in the postgraduate program, the need to train professionals in an integral conception of the approach to Science, Technology and Innovation to achieve an articulation between the demands of knowledge in context, strategic sectors of the economy, sustainable development objectives and the guiding documents of Cuba's economic and social development was also noted.

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