

SCIENTIFIC ASSOCIATIONS AND THE CUBAN ACADEMY OF SCIENCES: SYNERGIES FOR DEVELOPMENT

Asociaciones científicas y academia de ciencias de Cuba: sinergias para el desarrollo

Danays D. Perera López:¹ Academy of Sciences of Cuba

danays@academiaciencias.cu

Hilda Saladrigas Medina. University of Havana. Cuba

saladrigas@fcom.uh.cu

Yailuma Leyva Maestre. University of Havana. Cuba

yailuma@fcom.uh.cu

Manuel P. Linares Herrera: Academy of Sciences of Cuba

linares@academiaciencias.cu

ABSTRACT

Scientific associations together with other organizations: universities, research-developing companies, public administrations and museums are creating important spaces for learning and communicating science. Academies and scientific societies, at world level, offer a particularly appropriate frame for the presentation and debate of the social responsibilities of those communities. The impacts of their actions for communication and scientific dissemination corroborate the reach they could have in the development of a scientific culture, but building this knowledge with an integrative approach. Lack of dialogue among different instances of knowledge, a topic broadly approached in the specialized literature, does not occur only between "academic knowledge" and "popular knowledge", but in the relationships among those organizations that produce scientific communication. This problem is present in the talkative interactions that are developed among the scientific associations, assisted by the Academy of Sciences of Cuba. The objective of the thesis Scientific Associations: a dialogue of knowledge for development, a piece of research developed at the 14th Edition of the Master's Degree in Communication Sciences, is to develop a first diagnosis and present a proposed solution to this problem, by using the tools provided by communication. The results of this piece of research are presented.

¹**Danays D. Perera López.** Master's Degree in Communication Sciences. Main Specialist Group Attention to Scientific Societies of the Secretariat of the Academy of Sciences of Cuba.
danays@academiaciencias.cu

KEYWORDS

Scientific associations - Scientific communication - Dialogue of knowledge - Scientific culture - Development.

RESUMEN

Las asociaciones científicas junto a otras organizaciones: universidades, empresas que desarrollan investigación, administraciones públicas, museos, están creando un gigantesco espacio de aprendizaje y comunicación de la ciencia. Las academias y las asociaciones científicas, a nivel mundial, ofrecen un marco particularmente apropiado para la presentación y debate de las responsabilidades sociales de esas comunidades. Los impactos de sus acciones de comunicación y divulgación científica, corroboran el alcance que pudieran tener en el desarrollo de una cultura científica, pero construyendo estos saberes con un enfoque integrador. La falta de diálogo entre distintos saberes, tópico ampliamente abordado en la literatura especializada, no se da, únicamente, entre los “saberes académicos” y los “saberes populares”, sino en las relaciones entre aquellas organizaciones que producen comunicación científica. Esta problemática está presente en las interacciones comunicativas que se desarrollan entre las asociaciones científicas, atendidas por la Academia de Ciencias de Cuba. Realizar un primer diagnóstico y presentar una propuesta de solución a esta problemática, a partir de las herramientas que brinda la disciplina de la comunicación, es el objetivo de la propuesta investigativa. Asociaciones científicas: diálogo de saberes para el desarrollo, investigación que se desarrolla en la XIV Edición de la Maestría en Ciencias de la Comunicación. Se presentan resultados de la investigación.

PALABRAS CLAVE

Asociaciones científicas - Comunicación científica - Diálogo de saberes - Cultura científica - Desarrollo.

ASSOCIAÇÕES CIENTÍFICAS E ACADEMIA DE CIÊNCIAS DE CUBA: SINERGIAS PARA O DESENVOLVIMENTO

RESUMO

As associações científicas junto a outras organizações: universidades, empresas que desenvolvem investigações, administrações públicas, museus, estão criando um gigantesco espaço de aprendizagem e comunicação da ciência. As academias e associações científicas, a nível mundial, oferecem um marco particularmente apropriado para a apresentação e debate das responsabilidades sociais dessas comunidades. Os impactos de suas ações de comunicação e divulgação científica confirmam o alcance que puderam ter no desenvolvimento de uma cultura científica, mas construindo esses conhecimentos com enfoque integrador. A falta de dialogo entre distintos saberes, tópico amplamente abordado na literatura especializada, não se dá unicamente entre os saberes acadêmicos e os saberes populares, senão as relações entre aquelas organizações que produzem comunicação científica. Esta problemática esta presente nas interações comunicativas que se desenvolvem entre associações científicas, atendidas pela Academia de Ciências de Cuba. Realizar um

primeiro diagnóstico e apresentar uma proposta de solução a esta problemática, a partir das ferramentas que brindam a disciplina da comunicação, é o objetivo da proposta investigativa. Associações científicas: dialogo de saberes para desenvolvimento, investigação que se desenvolve na XIV Edição da Maestria em Ciências da Comunicação. Se apresentam resultados da investigação.

PALAVRAS CHAVE

Associações Científicas - Comunicação Científica - Diálogo de saberes - Cultura científica - Desenvolvimento.

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1. INTRODUCTION

The Dictionary (2012) of the Royal Academy of the Spanish Language defines an association as the "set of associates for the same purpose and, where appropriate, a legal person they have formulated. A figure that consists, as many say, of what is only applicable to several", while it defines associate as "the person who is part of an association ". Buonocore (1976), in the Dictionary of Librarianship, identifies it as: "an entity composed of a group of associates or partners for the pursuit of an end in a stable, non-profit manner and with democratic management". Those associations recognized as scientists, in addition to complying with the aforementioned characteristics, are recognized as such not only for the social objectives they pursue, but also for the scientific communication and dissemination activities they develop and the fields of science around which their associates are grouped.

The Cuban Academy of Sciences, the successor of the Royal Academy of Medical, Physical and Natural Sciences of Havana, is not an exception among the organizations that make scientific communication, and this context is enriched by the interdependent relations that it maintains with national and international scientific associations.

According to Díaz Velis (2011), the scientific-technical revolution that is currently being witnessed, and of which scientific information and information and communication technologies are an important part, requires that professionals from any branch of science be endowed with the skills and abilities in the use of scientific information in all its supports, especially the colossal Internet. These new circumstances demand an obligatory reflection on the role that these civil society organizations must assume regarding dissemination and scientific collaboration,

since new ways must be used to develop the activities of science, technology and innovation.

In Cuba, scientific associations must contribute to the development of research and the application of the achievements of science and technology, and promote the dissemination of the main scientific-technical achievements, the introduction of advanced technologies and new methods in their field of specialty. The communicative practices of the scientific associations, as can be seen in many of the consulted articles and documents, affect the formation of values, the development of new knowledge, as well as local development. Their projects, scientific events and other actions are aimed at disseminating the best results in the branches of social, technical, natural and exact, biomedical and agrarian sciences with impacts at national and international level.

1.1 Scientific communication and dissemination: academies and scientific societies.

Several authors see scientific communication as "the study of how academicians, in any field, use and disseminate information, through formal and informal channels" (Russell, 2001); the "process of presentation, distribution and reception of the scientific information of society" (Gutiérrez, 2004). Or "... science risks its recognition and social continuity, for which reason it must show that its project is not only valid and efficient at the epistemic and technical level but also contributes reliably to the fulfillment of social and political, equally validated objectives." (Cortassa, 2011).

Communication contributes to the institution of a genuine public sphere of science, inclusive of civil society, where what is genuine presupposes a deeper sense of democratization. It implies that the plural interests and points of view of its members are somehow represented in the discussions on research policies; but, above all, it demands the construction of a space in which all the participants - experts, governments, citizens, institutions- get involved in a non-exclusive dialogue open to the examination of reasons and arguments, until mutually acceptable agreements are reached.

Scientific associations, assisted by the Cuban Academy of Sciences, through their projects, scientific events and other communicative products, communicate and disseminate the best results of science in such diverse fields of knowledge as social sciences, technical sciences, natural and exact sciences, biomedical and agrarian sciences, with impacts at the national and international levels, and they are not alien, therefore, to the changes that take place in science, both at the national and international levels and the main trait of which, according to Garcia and Pérez (2008) "... is the overflow of disciplines in the search for solutions to the approach of problems ... from inter- and trans-disciplinary approaches". In a scenario where, continue the authors, "... science, technology and innovation are determining factors of politics, economy, the environment and society ...", these organizations of civil society can and should contribute to the search for solutions and resources to enhance these factors, but it is necessary to do so in a planned manner, and as a consequence of the study of the communicative context in which these actors of civil society develop.

Coincidentally, Agustín Lage Dávila lets us see the challenge ahead, and in which we see, as an essential part due to their contribution from the organized civil society, all scientific associations in the country:

We are going to need a society (not one or another specialized institution, but a whole society) able to arm itself with a scientific culture and use it in everyday decisions, study the world, reason with data, design alternatives with testable hypotheses, evaluate the impact of the decisions, reject improvisation, the capricious decision, pseudo-science, imitation without criticism and superficiality (Ravelo, 2015)

The debate on the importance of science and, therefore, of scientific communication as a way to increase the culture of our peoples is not only a Cuban issue, but a global one. The deficit in scientific culture is a social problem that has repercussions at the level of citizenship. A scientifically and technologically cultured people has a greater capacity to understand the world, to express opinions and to make decisions allowing it to interact and intervene. (Docarmo, 2015)

Though this is true, we must not overlook the fact that, in order to raise the level of literacy in the population's sciences, in order to promote greater appreciation and appraisal and, as an end, the increase of their support and participation, theoretical, elaborated approaches must be avoided in order to explain the communicational process in terms of the passage of information from the scientist to a lacking receiver. Identifying the problem of the gap between science and society in terms of a deficit in knowledge is an optimistic way of conceiving the situation: verifying the magnitude of the problem - the initial level of scientific illiteracy - it is about applying the necessary corrections - increasing and improving the dissemination practices - and periodically evaluating the progression they generate until the desired levels are reached. (Corina Cortassa, 2012).

Scientific communication can also be defined as the process of presentation, distribution and reception of scientific information in society.

In essence, these approaches are distinguished by an interactive conception of the process of social communication and appropriation of science, summarized in the formula "Model of the Three Ds", aimed at detecting and promoting more favorable conditions for horizontal dialogue, discussion and debate between experts and publics.²

According to López Cerezo (2011), one of the main priorities of the region is to strengthen the science and technology systems of countries, not only through greater national efforts but also through cooperation.

That being said, we must add that science and technology do not end in the laboratory. They have continuity in the company, in the school and in society. Without interest for science in the population, without opportunities for learning in the media, without significant presence of sciences in formal education, without appreciation for the scientific profession, without consumption of scientific information, without an adequate level of literacy in science among citizens, etc.,

² Miller, S. (2001). *Public Understanding of Science at the Crossroads*, 10, 115-120, cited by Corina Cortassa (2012)

without these elements a system of science and technology tends to continuous weakening.

More than ten years of research in the field of scientific communication show that the "deficit model" ³ does not lead to an understanding of "comprehension" by the public but evidences the ideological operation it involves, as it characterizes scientists as "specialists" and non-scientists as "laymen" (which recalls the ancestral differentiation between "wise" and "ignorant"), forgetting perhaps that understanding of science crucially depends on the social environment in which knowledge becomes operational.

It is important to look for channels and build a communication management system that, although they will not eradicate those gaps, according to Polino (2003) "... facilitate approaches between the scientific-technological system and society ...", taking into account, in addition, that there are already qualitative and quantitative studies on communication, perception and scientific culture in our region.

According to Carmelo Polino, science communication occurs in several contexts. A first context based on the scientific field, which would be communication among peers to disseminate, within the scientific community, the results of research. This communicative context requires a highly specialized language that is part of the organizational culture of science. Even, depending on the sciences, this language varies, depending - of course - on the field or discipline that is disseminated.

1.2 Background of research.

The background of this piece of research lies, first, in the results of two meetings conducted with the participation of more than 25 scientific associations: Forum Scientific societies and the development of sciences in Cuba, and the Workshop Local development, territory and integration of societies, held in November 2011 and October 2012, respectively, which demonstrated the existence of an identified problem.

Their results point to the ignorance of the existence and performance, in the same territory, of various associations that do not even know each other, a reality that moves away from the essential integration and collaboration among these organizations.

The importance of participation, understood as an aware and committed process of building, the need to develop projects, using specific methodologies, synergies, involving governments from their needs, make available the technical studies they need, contribute effectively, create management groups from the diagnosis of problems to the proposed solution, act with enthusiasm, publish and disseminate the results.

Last but not least was the general consensus that considers Local Development as a process that includes actors, structures and levels of organization connected to each

³ According to the Anglo-Saxon tradition of studies on public communication of science, this approach was defined as "deficit model": scientific knowledge is a recognizable body of encoded information and, in this regard, one can measure how much of that information and individual has built and establish its degree of comprehension deficits.

other, the purpose of which is to achieve the progress of that territory and each individual resident there, reinforcing its autonomy. (López, 2012).

The possibility of consulting national and foreign authors on issues related to the problem being studied constitutes another background leading to the validation of the proposed study.

The main motivation of the researcher was to build, collaboratively, and through the application of the scientific method, a solution for the change of the studied problematic situation.

2. OBJECTIVES

The main objective of this article is to appraise the proposed design and the implementation of a scientific-communication-managing system among the scientific associations and between them and the Cuban Academy of Sciences. To achieve this, the existing literature on the topics of dialogues of knowledge, communication and scientific dissemination and the impacts of associations on development were assessed. A diagnosis was made to the current state of relations among the scientific associations, assisted by the Cuban Academy of Sciences, as well as to validate the dialogue of knowledge as a method for communicative production, with an integrating approach of several scientific disciplines.

3. METHODOLOGY

This is a piece of research on communication, with a qualitative perspective, which allows us to approach the object of study, bringing, at each step of the research process, the experiences and knowledge of those who participated. All this with a comprehensive view of the troublesome situation and the meanings given by the presidents of associations, and other key informants, to the importance of maintaining a dialogue between the different fields of scientific knowledge, around which professionals and stakeholders in their disciplines are associated.

Because of the need to find a solution to the problem of lack of synergies among scientific associations, assisted by the Cuban Academy of Sciences, from an integrative approach, a consensus reached by the references themselves⁴ that motivated this piece of research, it is considered that the study coincides with the assumptions of qualitative research, since it allows us to understand how and why the problem manifests itself and to build a solution with elements of action - collaborative research.

It is an applied piece of research, so that its proposal will have a high practical value and a methodological value to other organizations with similar problems at national and international levels, and lay the foundation for the future design of a program for communication and scientific culture, which is non-existent in Cuba, with national scope.

⁴ A term that comes from the methodology of Carlos Núñez, designed for strategic planning in communication, is used.

3.1 Category of analysis and making variables operational.

The category of analysis, was built from concepts obtained from the consulted literature, overdialogue of knowledge, communication and scientific dissemination, fundamentally, of Iberian American authors from the last 5 to 7 years: The dialogue of knowledge is a method enabling scientific communication among scientific associations, assisted by the Cuban Academy of Sciences.

To measure the variables, the following indicators were designed:

- A. Scientific communication
 - Classification of communicative actions.
 - Conceptualization of scientific communication and dissemination.
 - Types of communicative and informative products that are designed.
 - Impact of the actions of scientific communication and dissemination.
- B. Dialogue of knowledge
 - State of the art of the dialogue of knowledge
 - Importance granted to dialogue with other organizations.
 - Considerations on the design of a communicative product to achieve synergies with other organizations.

3.2 Methods and techniques

Considering that it is typical of this approach, the collaborative research - action method was selected for the type of design that is proposed. The fundamental features and essential relations of the object, which are accessible to sensory perception, are studied. Surveys, interviews and a focus group were applied, as well as the author's experience in the participant observation of the object of study and her knowledge of it.

The techniques are bibliographic search, survey of experts, semi-structured interview and a focus group, to seek consensus and build the communicative product that we propose as an output of research.

An exploratory survey was conducted with experts, in order to initiate a diagnosis and to know the concepts of respondents about communication, scientific dissemination and interdisciplinary dialogue, to identify main actions and / or products of scientific communication and dissemination, as well as to know the current state of art of synergies with other similar organizations.

The semi-structured interview was used in the search for information that would allow us to deepen the level of conceptualization on the subject by the interviewees, and their knowledge as to the way to put it into practice in Cuban companies and organizations, in order to deepen the diagnosis and validate the proposal. Questionnaires to experts outside the country were also applied, via e-mail, because of the importance of counting on their experience in the subject.

Two focus groups with a composition of less than 10 people were applied, focusing on reaching a consensus on the design of the communicative product and validating the dialogue of knowledge as a method for its design.

The fieldwork was designed by adapting the methodology of ScD Irene Trelles for the design and management of communication systems, in pursuit of the diagnosis, design, implementation of a communicative product, with an integrating approach of several disciplines, and a moment of evaluation of the product and of the whole process, with support from the aforementioned action-collaborative research.

The observation units selected for this piece of research ⁵, are scientific associations, assisted by the Cuban Academy of Sciences, in its role as a link between them and the Ministry of Science, Technology and Environment as the State Authority of Relations.

4. RESULTS AND DISCUSSION.

4.1 Exploratory phase.

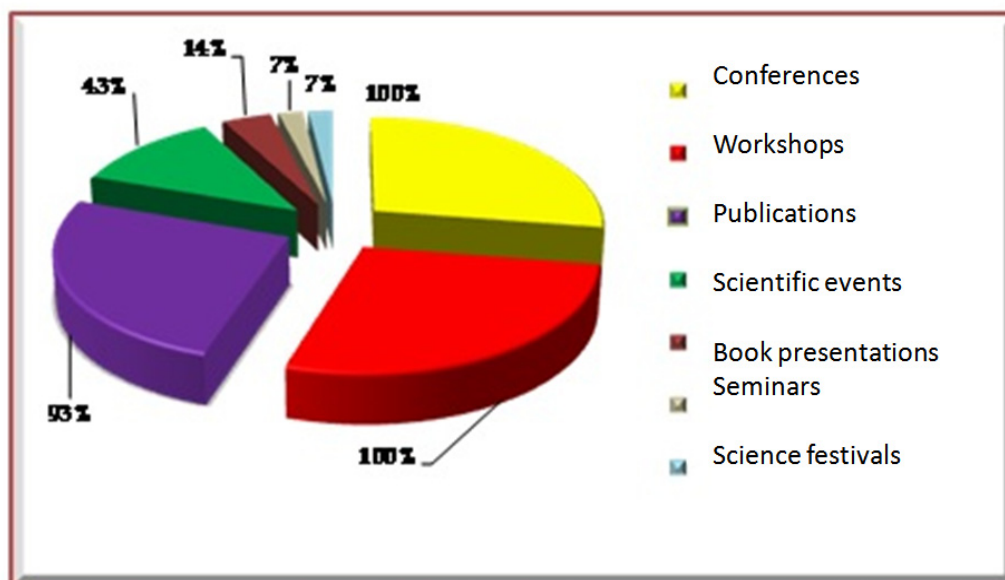
Fourteen exploratory surveys were applied to managers of scientific associations, assisted by the Cuban Academy of Sciences. The final results and valuations, by indicators, are:

- Classification of communicative actions. In order to measure this indicator, the reports, minutes and other documents of the associations were searched. Although the activities of associations are not conceptualized as communication or dissemination, their programs, the audiences for which they were designed, their communication channels and flows, the codes used and the contents of their messages confirm that their actions, outside of the scenarios that address the internal life of the scientific associations - more administrative - are, conceptually, actions that are planned and implemented classified as scientific communication and scientific dissemination.
- Conceptualization of communication and scientific dissemination. Unifying the individual concepts provided by the respondents, the following conceptualizations about scientific communication and dissemination are constructed:
 - "Scientific communication is the interactivity of two or more subjects in the scientific plane, which can lead to an ontological - linguistic commitment. It is a bi- or multi-directional process, which allows the presentation and publication of scientific results and is accepted as that process of exchange, which occurs in the academic sphere, using a two-way channel that privileges dialogue."
 - "Scientific dissemination is a process in which dialogue is not essential, so it is unidirectional. This is more associated with scientific journalism and therefore with the way that makes it possible to bring scientific knowledge to society. "
- Scientific communication and dissemination actions that are designed. In Graph 1 we can see that communication actions more represented in the scientific work of the associations are scientific conferences and events. Although, to a lesser extent, the Festivals of Science, book presentations and

⁵ In this case, universe and sample coincide.

seminars aimed at other audiences with whom these organizations are related are still important because of their impact on the dissemination and popularization of science.

Graph 1. Scientific communication and dissemination actions



Source: Master's thesis of the author

Actions classified as scientific communication are conferences, workshops, seminars, symposia and scientific conferences on topics of interest to the scientific community as well as collaborations in designing strategies and methodologies for local development and international cooperation projects and exchanges with other countries. Those recognized as having a high impact are: International Workshop: New Political Science, International Congress on Chemistry, Chemical and Biochemical Engineering, CUBASOLAR International Workshop, the Iberian - American Workshop on Teaching of University Physics and Central American and Caribbean Course of Physics and Congress of the Cuban Society of Soil Science.

The topics these actions address show how science acts according to development from various fields of knowledge: energy-related education, culture and information for sustainability; Energy sovereignty, the environment and sustainable local development; Conservation, Use and Soil Management; Industrial, engineering and environmental chemistry; Education and history of chemistry; Communication, culture and political socialization; Public policies for human development and the environment; Relations among physics, Sustainable Development and Energy.

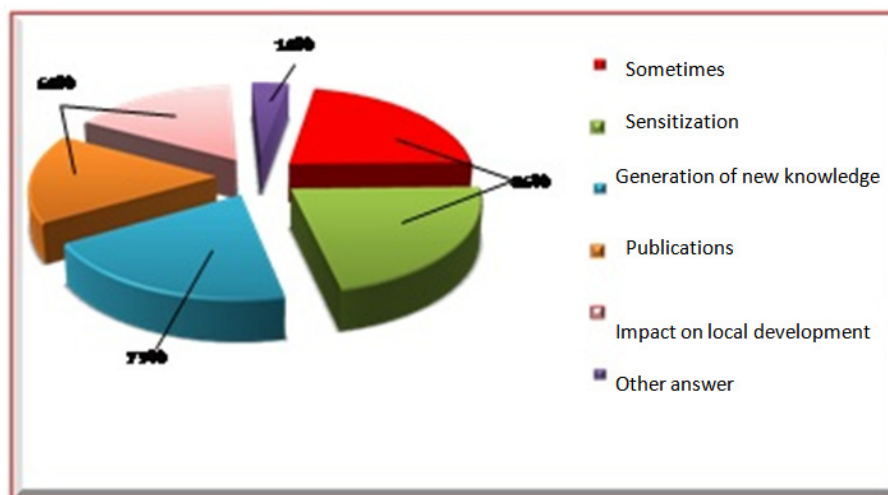
The actions classified as scientific dissemination, and which are present in the associations, are electronic and printed bulletins, scientific and informative journals, book presentations, science festivals, conferences for the general public, participation in informative and disseminating spaces of the Cuban mass media, fundamentally.

The same as for the design of the scientific communication actions, dissemination is done without an intention of synergies among these civil society

organizations or in order to allow dialogue among their satellites. A negative result that is appreciated, besides, is the little use of Information and Communication Technologies and the social networks existing in the country to publicize its main scientific results. A consequence of the lack of synergy and strategic communicative projection is the little use that is made to pages and existing sites in the country, such as the one of the Cuban Academy of Sciences Cuba, its journal *Anales*⁶, pages or sites other associations, which could, as a result of a communication strategy, serve as informative spaces and discussion forums among these organizations of the Cuban civil society.

— Impacts of actions of scientific communication and dissemination. As can be seen in Graph 2, the greatest impacts take place in training, awareness-raising and generation of new knowledge, followed by the publication of the scientific knowledge these organizations manage and its impact on local development.

Graph 2. Impacts of communication actions.



Source: Master's thesis of the author

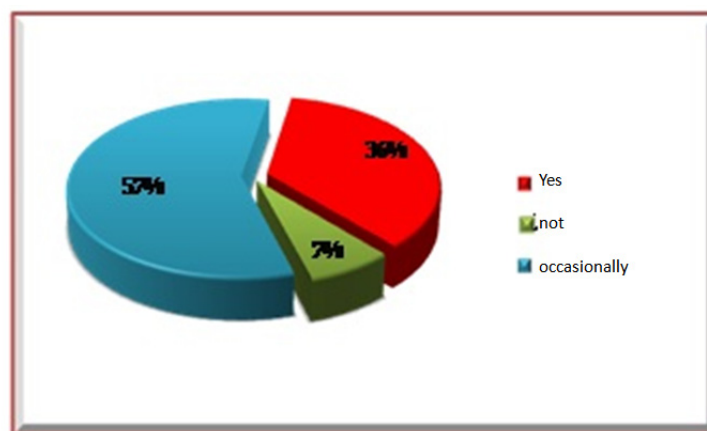
Other impacts of interest, which contribute to the axes of development, are the strengthening of collaboration rights and scientific exchanges with experts from other countries; the influence on changing the energy policy of the country and the impact on the modification of plans and programs for degree courses in science.

— Current state of the dialogue of knowledge. As shown in Graph 3, most people seek synergies with other associations only sometimes, confirming the problem being researched. These actions do not respond to policies, strategies or communication plans of the associations that organize them, but to random circumstances that favor them (professional training of the one who designs them, proposed objectives for communication action, personal relationships with experts from other organizations, etc.)⁷

⁶ Scientific multidisciplinary journal, with sections that could make the results of the scientific work of the Cuban scientific associations visible.

⁷ Parenthetically, note by the lead author, as a result of participant observation in the scientific activities of associations, for more than six years.

Graph 3. State of the synergies among associations for the development of scientific communication and dissemination actions.

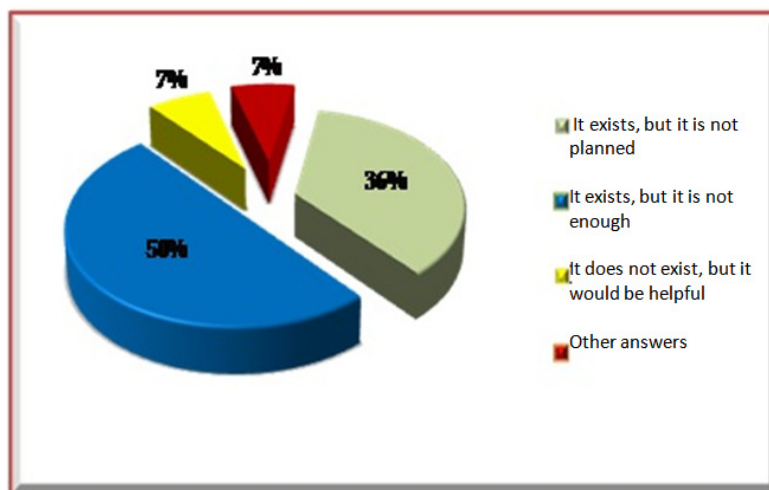


Source: Master's thesis of the author

On the other hand (Graph 4), 86% claim to have some level of existence of synergies, but it is not enough and, more importantly, it is not planned.

The rest of respondents affirm that there are no synergies, but all recognize that an opening to other disciplines would be important. Some of the considerations expressed by the respondents argue that "It would be very helpful to have these dialogues with other organizations in charge of related disciplines" (Osvaldo Balmaseda, Association of Linguists of Cuba) and even, that they have it within their work guidelines in order to "... Continue to strengthen and expand relations with related national institutions at all levels, and in particular with those with which we have centrally signed collaboration agreements." (Luis Bérriez, President of CUBASOLAR).

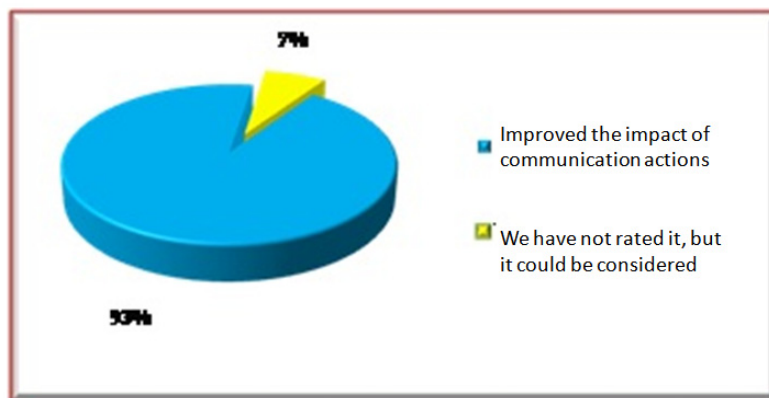
Graph 4. Assessment of the existence of synergies with other disciplines.



Source: Master's thesis of the author

— Importance attached to dialogue with other organizations. (Graph 5) All respondents recognize, affirmative or as a possibility, that organizing their scientific communication and dissemination actions with the participation of other disciplines would be important for the impact that could be reached. These considerations confirm the consensus of the Local Development Workshop ⁸, an exercise in which not only the scientific associations we take as a sample for this piece of research but also other civil organizations and state entities took part.

Graph 5. Assessment of the impacts of synergy with other disciplines.



Source: Master's thesis of the author

It is important to point out that none of the respondents denied the impact an integrative approach could have on the outcome of their communicative actions.

Although expected, this result is essential to be taken into account for future planning and implementation of scientific communication actions.

On the other hand, the scientific communication and dissemination actions that could be designed with a focus on a dialogue of knowledge were identified, namely:

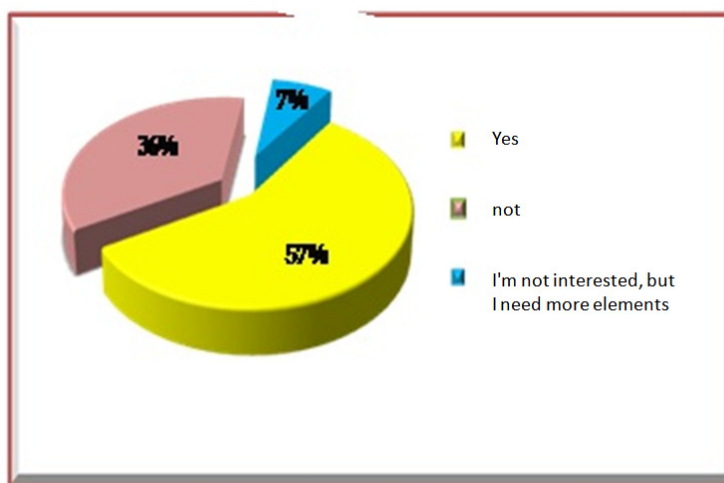
⁸ These results are part of the background justifying applied research for deepening the diagnosis of the current situation and finding a solution.

- Conduction of projects on some topics of mutual interest.
- Talks and dialogues in any place and opportunity as appropriate.
- Events we conduct.
- Environmental festivals, press actions and other communication initiatives.
- Interactive and participatory processes.

To the question of which organizations could enrich the inter-, trans- and multi-disciplinary approaches in the scientific communication and / or dissemination actions each organization take, respondents pointed not only to those scientific associations that are assisted by the Cuban Academy of Sciences in its role of link with the Authority of Relations but also to other associations, civil organizations and state entities. The diversity of the selection, in itself, shows the multidisciplinary nature that could be achieved in a process of design and implementation of a communication management system among these organizations, and even, for an exercise of deepening the actual diagnosis of the current state of the relations among the organizations that make communication and / or scientific dissemination.

- Considerations on the design of a communicative product to achieve synergies with other organizations. The negative answer to this question (see Graph 6) did not result from a posture against the proposal but, in the words of the respondent, because he did not feel "... trained to do it. However, we would be willing to participate if a specialist directs the action" (Luis Bérriz, President of CUBASOLAR). The remaining respondents (92.9%), although some expressed a similar need for knowledge, are in favor of designing a communication management system among scientific associations, as well as being involved in the process.

Graph 6. Assessment of being an actor in designing a scientific communication management system.



Source: Master's Thesis of the author

This first phase ended with the views expressed by respondents about the importance they attach to the future design of a scientific communication management system among the actors identified above. The criteria, in themselves, constitute a validation of the proposal: "Undoubtedly, coordinated work on issues of scientific communication in our country [...] could mean a quantitative and qualitative increase in positive results"; "Developing a strategy is necessary and we should stop developing isolated actions that do not complement one another"; "I would allow the information to be published to be displayed in a coherent, orderly way, [...] avoiding fragmentation of knowledge, [...] Achieving a more balanced dialogue"; "It is essential and very necessary to achieve increased visibility and impact of our communicative actions"; "I think it's important to create a methodology; [...] a jointly reached "way of working" to allow us to have the support of the social sciences to better fulfill our mission of making the contributions made by our members to the development of Cuban science visible." ⁹

4.2 Deepening phase.

By applying semi-structured questionnaires, developing interviews and two focus groups with key informants selected for their experience in assisting scientific associations since they are either in charge of one of these organizations or directly related to the Cuban Academy of Sciences, we could know what role these organizations play and could play in the development of a scientific culture with an integrative approach and examine the need to design policies and strategies that promote opportunities for meetings among said associations and with the Cuban Academy of Sciences ¹⁰.

4.2.1 Role of scientific associations in the development of a scientific culture in the country.

Assessments made by key informants, some of whom are members of the Cuban Academy of Sciences and specialists who have worked with scientific associations for over ten years, point to the role of scientific associations in the formation of the scientific culture in our country: "... even without a communication strategy, when synergies have been achieved, the impact on the development of scientific culture is evident and there are examples such as the design and delivery of several awards and national recognition..." (ScD Daisy Rivero Alvisa); "... they can not only develop a scientific culture but in fact they do it, through workshops for citizen participation, involvement in local programs, such as those on transformation of the neighborhood and Local Development Programs, as well as contests for youth and students on issues related to national scientific events "(BSc Pastora Lopez Duran).

⁹ quotations, taken from the exploratory survey.

¹⁰ Not only in its role as a link between the Ministry of Science, Technology and Environment and twenty scientific associations but in the fulfillment of its powers, with all scientific associations in the country.

UNESCO recognizes three areas of education since 1976: formal, non-formal and informal. It is in the second where scientific associations mostly act. It is in that space where they could pay tribute to "... disseminate the scientific method for the sake of this greater scientific culture we want for everyone ..." (ScD Lilliam Alvarez Diaz)

Developing a scientific culture, however, cannot be done without communication, seen as interaction of knowledge, not only among scientific associations but also with governmental institutions. While searching the documentation of scientific associations, the results of collaborative projects, etc. we found dissimilar examples of the impacts on training, on the formation of new knowledge and on raising awareness of actors, to achieve dialogue of knowledge. Three examples illustrate this statement:

- The Cuban Multidisciplinary Society for the Study of Sexuality has designed and held five consensuses of chronic diseases and sexuality, with outputs in publications and proposals for modification of curricula of medical disciplines, avoiding the purely "public health professional" vision prevailing in those studies. It also has a fixed space for the general public on issues of sexuality, population, right to health, gender, among others, which has support not only from other associations but also from state and government entities.
- The Cuban Society for the Promotion of Renewable Energy Sources and Environmental Respect, CUBASOLAR, with the involvement of stakeholders and decision makers from dissimilar territories has succeeded in training communities and forming values such as self-sufficiency and autonomy of a population. It importantly influenced the change in energy policy in the country.
- The Cuban Society of Botany, in collaboration with other social and youth organizations, has developed three major science festivals for children, adolescents and youth.¹¹

Importantly, all these achievements have been obtained without a communication policy or strategy, which makes us think of how much their impacts would be enhanced with a view from communication policies and strategies.

ScD Lilliam Alvarez Diaz, when describing the current state of the art, points out that this does not only happen among scientific associations but also between them and the Cuban Academy of Sciences and she recognizes the importance of these organizations as the "complement" to the Academy. In scientific societies "... there are also academicians, ie it is a set with a subset". These statements are pointing in the right direction: there is neither a political nor a communication strategy aimed at developing the capacities and potentialities, in the field of scientific communication, of the scientific associations, which are assisted by the Cuban Academy of Sciences.

4.2.2 Substantiation of the need for a policy or strategy .

¹¹ There is documentary, printed, digital, audio visual and photographic evidence that can be consulted by readers interested in the subject.

Making reference to the legal framework regulating the functions and powers of the Cuban Academy of Sciences, ScD Lilliam Álvarez points out that "thus, in all the functions of this Decree Law and the functions of the Cuban Academy of Sciences, there is an undeniable need for the participation of scientific societies". She adds that there is still no strategy or policy allowing dialogue and synergies among these organizations, designed and implemented from the Cuban Academy of Sciences, that may drive these meetings. For her part, ScD Lidia Turner Martí exemplifies what could be done because "we have never had a section of the Cuban Academy of Sciences, for example the Section of Academicians of Natural and Exact Sciences, meet the societies of natural and exact sciences; the Section of social sciences meet the scientific societies of social sciences... ". Coincidentally, Pastor Lopez Durán ¹², points out in his questionnaire: "So that there can be greater synergy among scientific societies, taking into account the contribution they make to knowledge and science literacy among citizens, the Cuban Academy of Sciences has to design a policy to facilitate opportunities for dialogue. "

Discussions in focus groups let us know there is ignorance of associations to one another; lack of synergies among associations, as a result of the above; insufficient communication of the results of the scientific work of these organizations; nonexistence of a working method for matching associations in exercises such as the one that is developed; scientific communication actions only towards the "inside" of associations with their own public as well as absence of a communication strategy to ensure the integration of knowledge from these organizations.

4.3 Planning a communicative product.

For this stage there was a workshop in which participants were able to validate the dialogue of knowledge in the context of scientific communication and dissemination as a means of communication production, evaluate the exercise as positive and reach a consensus that it is valid to develop a working method allowing communication among associations since the diagnostic phase of a specific situation or issue, planning and implementing a solution.

The Panel "Scientific associations and communication: experiences and projections" was designed, as well as its communication objectives, and all participants agreed on the associations that should compose said Panel. It was exhibited at the 2nd International Symposium on Scientific Information Societies, within the 1st Convention on Science, Technology and Innovation. It demonstrated the possibility to seek synergies among these organizations as well as a dialogue based on each discipline respecting the others.

In the exercise, which coincides with our position, there was consensus to recognize that associations, due to their own scientific nature, are a strength for the

¹² Both are Academicians of Merit of the Cuban Academy of Sciences.¹¹Both are Academicians of Merit of the Cuban Academy of Sciences.

design and implementation of a communication management system ¹³, applying the scientific method to change the current state of relations among these organizations and to make them be seen as a social actor really supporting the government in any of the territories where they act.

4.4 Final proposal.

Finally, as part of the study, strategic principles to guide management of scientific communication among scientific associations and between these organizations and the Cuban Academy of Sciences are proposed, based on the dialogue of their knowledge.

1st Scientific communication will be understood as a mechanism to disseminate the scientific information managed and generated by scientific associations, in the non-formal spaces where their communicative practices take place.

2nd The dialogue of knowledge among scientific associations should be built as a process in which meanings are constructed, with no discipline underestimating the others, from an integrative approach and away from positivistic conceptions.

3rd The dialogue of knowledge will have an inter-, trans- or multi-disciplinary approach, depending on the objectives of the scientific communication actions that are designed.

4th The dialogue of knowledge should have, as a communication model, a process-based approach encouraging real participation of all actors.

5th As the basis of scientific communication, the dialogue of knowledge is recognized as not disregarding the relations among research institutions, academicians and other state and / or government entities.

6th The dialogue of knowledge is an ontological position, based on respect and practice of horizontal and democratic relations among scientific associations, and between them and other organizations they interact with.

7th The dialogue of knowledge will be also understood as a space where solutions to previously identified problems are diagnosed, planned, designed and evaluated.

8th The dialogue of knowledge will be the foundation for the design of measures to promote local development and scientific culture in the country.

5. CONCLUSIONS

The bibliographic search on the variables scientific communication and dialogue of knowledge had as a guiding thread a critique of the Anglo-Saxon concept of "deficit model" to describe its influence on the design and implementation of scientific communication actions, which becomes exclusive when it does not express its scope to the entire society. Being vital for development, science and its results,

¹³ It makes reference to the proposed communication management model by Dr. Irene Trelles in her doctoral thesis. *Theoretical-methodological Bases for a proposed communication management model in organizations* (2002)

seen as an essential component of the cultural heritage of a nation, it should not be exclusive to the academia, instead, it should be communicated, by way of both formal and informal ways, to achieve the expected impact of scientific associations on development.

The communication model on which this piece of research was based had a focus on processes, resulting in knowledge of the current state of the relations among scientific associations and the search for a solution transforming that reality, with a multidisciplinary approach. This allowed us to conduct an exploratory diagnosis with the help of those key actors for the expected change, read: the scientific associations themselves, assisted by the Cuban Academy of Sciences, pose the issue under study.

We managed to build and validate the concept of dialogue of knowledge, as the channel to foster communication practices, not only among scientific associations (which was the initial goal) but also between them and the Cuban Academy of Sciences, seen as a process in which meanings are constructed with no discipline underestimating the others, from an integrative approach, not seen as a sum of knowledge but instead to strengthen integration in terms of diagnosis, design and evaluation of communicative strategies and products contributing to the development of a scientific culture.

The Panel: Scientific associations: communication, experiences and projections, was designed and implemented as an applied solution, which was included in the Scientific Program of the 2nd International Symposium of Scientific Information Societies and for which two communication objectives were designed:

The proposed design and implementation of a management system of scientific communication among scientific associations and between them and the Cuban Academy of Sciences was considered positive, while it is essential to achieve increased visibility and impact of its scientific communication and dissemination actions.

Eight strategic principles that should underlie the design of future models of scientific communication management among scientific associations assisted by the Cuban Academy of Sciences are proposed.

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AUTHORS

Danays D. Perera López : Master of Communication Sciences. Specialty Communication for Development, from the Faculty of Social Communication, University of Havana. Excellence Edition. She graduated in Defectology, specialization in Pedagogy for the Deaf and works as Senior Specialist in the Group for Assisting Scientific Societies of the Secretariat of the Cuban Academy of Sciences. <https://www.linkedin.com/in/msc-danays-Perera-1%20C3%B3pez-639984b7/>

Hilda Medina Saladrigas: Bachelor's Degree in Marxist-Leninist Philosophy (1988) from the University of Oriente. Master (2003) and PhD in Communication at the School of Communication at the University of Havana (2005). Professor (2009). Researcher of media and public opinion since 1988 and professor since 1999. She has done work in research centers and at the School of Communication at the University of Havana, Cuba and at universities in Spain, Mexico, Venezuela, Ecuador, Dominican Republic, Haiti and Angola . <https://scholar.google.es/citations?user=u7mFNqwAAAAJ&hl=es&cstart=0&pagesize=20>

Yailuma Leyva Maestre : Master 's Degree in Social Studies of Science and Technology. University of Salamanca. Spain (2009). Bachelor's Degree in Social Communication. Faculty of Communication at the University of Havana. July 2016. Head of Department. Professor of Social Communication. Faculty of Communication at the University of Havana. Recent publications : "Women in Development. Systematizing an experience." *Caminos Journal. Cuban Journal of Socio-theological thought*. No. 80-81 / 2016. *Women in development: methodological guide for training in infocommunicative experiences for female entrepreneurship* ". Havana: Universitaria Publishing House, 2 016. " Institutional communication in universities:

perspective from the institutional communication department of the University of Havana" (co-author).

<https://www.linkedin.com/in/yailuma-leyva-maestre-49008682>

P. Linares Manuel Herrera. Engineer in Geodesy and Cartography, Master of Communication. Associate Professor at the Faculty of Communication at the University of Havana, he teaches the subject Management and Language of the printed medium. Senior Specialist in the Group for Science Heritage at the Cuban Academy of Sciences. Editor of Scientific publications. Member of the organizing and scientific committee of the International Interdisciplinary Congress on Communication, Innovation and Development organized by the Complutense University of Madrid and the Iberian American Society of Communication Studies (SEECI).

<https://orcid.org/0000-0002-1174-2750>