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Maturity model of transdisciplinary knowledge management

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ABSTRACT

In this article a maturity model for the management of transdisciplinary knowledge is presented, although research nowadays is transdisciplinary the different maturity models proposed in the literature are oriented towards interdisciplinary knowledge management, and, at most, they are oriented toward multidisciplinary knowledge management. The objective is proposing an evolutionary model which accepts knowledge as intensely active and dynamic and evolving in maturity from the early stages of research. But this is possible only if the research team adopt a clear, clean and joint process of disciplinary integration and transdisciplinary integration of the produced and discovered knowledge. In this way, the results of research will have a greater influence on society and they also will be adopted by society.

1. Introduction

Promoted as an adequate scientific answer to significant socials problems, transdisciplinary research has a long history of scientific-academic discourse. However, despite his growing support and popularity it is still far from become established academically and scientifically as a field having large support in universities and research institutions. One of the reasons is that an accepted universal definition has not been promulgated until now. As a consequence, the quality standards that researches, software administrations and financial backers could meet are still insufficient (Serna & Serna, 2013). Therefore, it remains in the rhetoric field, and those who consider it seriously and perform integration efforts have the risk of be marginalized. It is necessary to find common principles and subjects in the discourse of the transdisciplinary research; identifying the characteristics of a comparative framework; presenting conceptual models that can be used for the scientific policy in order to characterize the different types and their demands related to integration; and defining maturity models to manage the emerging transdisciplinary knowledge.

In that sense, an international group of scientists warned that the future of science depends on the funding of the transdisciplinary scientific collaboration (Vasbinder, Nanyang, & Arthur, 2010). They argue that science based on outdated methods that preserve and reinforce the disciplinarity, does not properly understand the ways in which the complex technological developments of this age interconnect themselves and influence society. Expressions like this remember us that in spite of many years of debate inside science and scientific policy, the new cultures and practices of transdisciplinary scientific collaboration are not yet established. Based on this and other perspectives at first sight it seems that transdisciplinarity is a concept hard to reach, in fact we do not already have a definition universally accepted even after half a century of intense academic discourse. However, when the concept or ideas are not defined correctly we must face the risk that superficial interpretation prevails; and the latent danger is that the true challenges of the transdisciplinary research become underestimated and that people who consider them seriously become marginalized. Besides being unable to identify a consensus about which constitutes transdisciplinarity some crucial issues remain controversial:

1) Still there is no agreement about whether transdisciplinary research is a new and different type of production of knowledge. In that sense, Zierhofer and Burger (2007), analyzed some projects reported like being of transdisciplinary research, and they did not found a single plan that allowed classify them as such based on an epistemological or methodological perspective; therefore they concluded that according to this point of view they do not appear to be new and different types of production of knowledge. Emphasizing that transdisciplinarity do not has a critical evaluation of new knowledge, which is constitutive for the production of scientific knowledge, Maasen and Lieven (2006) argue that transdisciplinary scenarios are useful for mutual learning, but not for joint research. In the field of the necessary discussions to help the positioning of transdisciplinarity, these and others arguments deserve a careful

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consideration. Because denying the transdisciplinary the status of irrefutable mode of production of knowledge can, on the one hand, seriously deteriorate the necessary attempts for establishing it inside academy, and on the other hand, placing it outside academy would be prejudicial to the efforts made for defining widely accepted quality criteria for transdisciplinary research. The latter is a fundamental tool for the management of transdisciplinary knowledge and for the expectations of involved people, which can contribute to the progress of the work in concrete social and scientific problems.

2) If transdisciplinarity is a new mode for managing scientific knowledge is a recurrent subject in the discourse. In this sense, Nowotny, Scott, and Gibbons (2001) affirm that transdisciplinary research not only must produce true knowledge, but also socially robust knowledge. Answering to this, Maasen and Lieven (2006) argument that this is related to what mainly an individual researcher does in order to produce quality results by reconciling different standards and disciplinary approaches, but having different extra-scientific requirements. From a perspective of individualization of responsibilities, this authors warn that transdisciplinarity is a new way of knowledge management that involves procedures of social responsibility. This critique emphasizes the fact that, because this new relation science-society, the functions and responsibilities of scientists change radically. However, this changes still have neither been discussed enough in literature, nor even are reflected suitably in research practice, and there is not a model of maturity that allow the management of produced knowledge.

In summary, the transdisciplinarity is the research approach best adapted to face the complex problems that scientific development itself produce continuously, and, in fact, it is mainly related to the relation scientific-society. Besides, it is interventionist, because methodically structures, organizes and place the social discourse of a specific predicament. In this model and, in addition to their traditional tasks, a special role is assigned to science: the transdisciplinary research must manage and differentiate the different types of knowledge, because they clarify the way in which knowledge is produced and how is related to the web of complex interconnections. Essentially, the transdisciplinarity is both critical and self-reflective, because it examines not only the systematic way for producing and using knowledge, but also the different actors that support it. Besides, it methodically challenges how science itself deals with the resistance between searching of the true and the increasing demand for result of utility.

This paper has two objectives: on the one hand analyzing how transdisciplinarity knowledge is produced, disseminated and used, and on the other hand proposing a model of maturity for managing it. Besides, this article is derived from a necessity identified in different researches performed by the author with people of different disciplines, but in which a true teamwork has not been accomplished, without subordination and power. The proposed model of maturity for managing transdisciplinary knowledge has been thoroughly validated in a transdisciplinary-multinational research, in which the author participates successfully.

2. Transdisciplinarity

The fact that the meaning of transdisciplinary is still a debate does not imply that could not be found contributions that intensify the discussion, on the contrary, an analysis of the definitions proposed until now reveals several trends (Pohl & Hadorn, 2007):

1) The definition usually progresses from interdisciplinarity passing through multidisciplinarity until transdisciplinarity. It is a progression because for each *x* disciplinarity it goes beyond than the last in a scientific aspect, and it can be part of the rhetoric definition instead of an objective necessity (Klein, 1990). Jantsch (1970) considers this progression as the degree of coordination between education system and innovation, with all the system spinning around a general objective called progress or ecological balance. For Rosenfield (1992), this progression is found in a shared conceptual framework share, where interdisciplinarity means that researchers of different disciplines use their respective methods, techniques and capabilities for facing a particular problem. In such a case transdisciplinarity is a force which encourages to people representing different disciplines to transcend their conceptual, theoretical, and methodological individual orientations with the objective of developing a common research approach, based on common conceptual framework. Lawrence (2004) sees the progression in the bodies of knowledge and the social groups involved. For this author interdisciplinarity implies a joint mixture of disciplines, while transdisciplinarity implies the fusion between the disciplinary knowledge and the know-how of lay people. Therefore, while this definitions share the idea of a progression until transdisciplinarity, they differ in the principal characteristic of this progress.
2) The definition only describes a series of characteristics of transdisciplinarity, it describes that transdisciplinarity focuses in subjects of social relevance, that it transcends and integrates disciplinary paradigms, that it turns research into participatory, and that it searches the unity of knowledge beyond disciplines. According to the importance of this characteristics different definitions are structured (Cerrosen & Pong, 2012). For example, the research is transdisciplinary if it transcends and integrates disciplinary paradigms in order to deal with socially relevant questions (not academically). This type of research is necessary because the processes of specialization of knowledge production are driven by internal scientific-disciplinary interests (Boleros, 2013), that progressively move away from social problems and needs. Brewer (1999) opines that this is like the world have problems, but the universities have departments. The production of academic knowledge, organized from a disciplinary perspective, must be re-organized and re-evaluated from the perspective of relevant social questions (Jantsch, 1970; Rosenfield, 1992; Mittelstrass, 1993).

Transdisciplinarity means widening the above concept including non-academic actors through a participative research. In this sense, Gibbons et al. (1994) and Nowotny, Scott, and Gibbons (2001) identify a new type of production of knowledge, that complements the traditional linear model in which science proposes, society disposes (Guston & Sarewitz, 2002). This model is developed within the context of the application of knowledge, which is opposite to the traditional academic ivory tower. The process of production of knowledge includes the interested parties from science, society, private and public sectors. In the American context, the function of participatory research is not commonly attributed to transdisciplinarity, therefore Stokols (2006) calls this mode of production of knowledge as one of transdisciplinary action research, representing a participatory approach. At the end, the research becomes transdisciplinary when includes a search of unity of knowledge, which is not a purpose itself. The main objective consist in reorganize the academic knowledge whit the purpose that it become useful to deal with socially relevant subjects. However, the knowledge is neither re-organized nor re-evaluated in a pragmatic and eclectic way, instead of this with the development of a comprehensive or perspective point of view that goes beyond all discipline. Based on this point of view is that socially relevant subjects are structured, ana-