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Measuring interdisciplinarity within the bio-related scientific areas

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Research problem

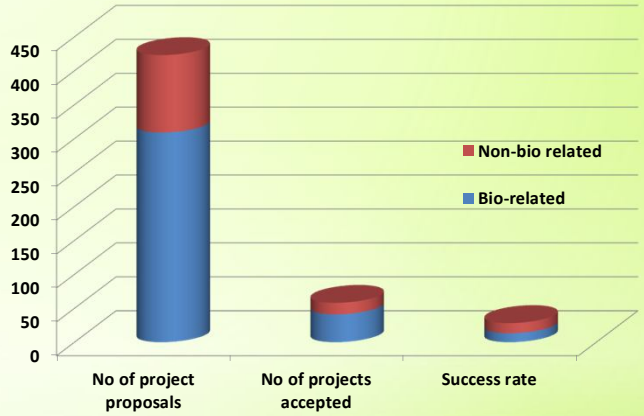
The question, how to define and operationalize interdisciplinarity, is crucial in many contexts. For instance, according to scientists and research institutions, the interdisciplinarity convergence of nanoscale science with modern biology and medicine is a trend that might be reflected in science organization [1,2]. Thus the bionanoscience represents changing interdisciplinarity characteristics in relation to distinct co-evolutionary dynamics in research, science and society [3,4,5]. Interdisciplinarity, multidisciplinarity or transdisciplinarity refers to increasing level of various interactions between traditional scientific disciplines [6]. Case of the interdisciplinarity within biosciences, with reference to the scientific disciplines origin and successes achieved, is presented here.

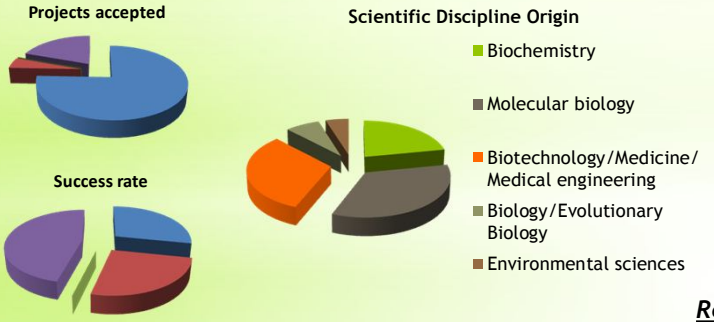
Research data

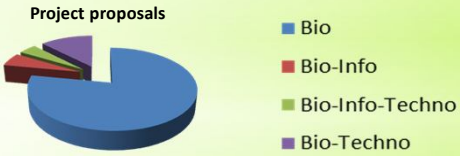
Databases processed for the case study analyses are prepared on basis of data available from the Foundation for Polish Science (FPS) website, concerning the PARENT/BRIDGE Grant Programme and from the Scopus bibliometric resources. The PARENT/BRIDGE Grant Programme, within the bio-, info- and techno- thematic areas is co-financed from the Priority Axis 1. Research and development of new technologies, Measure 1.2 Improvement of human potential of science" OP IE 2007-2013.

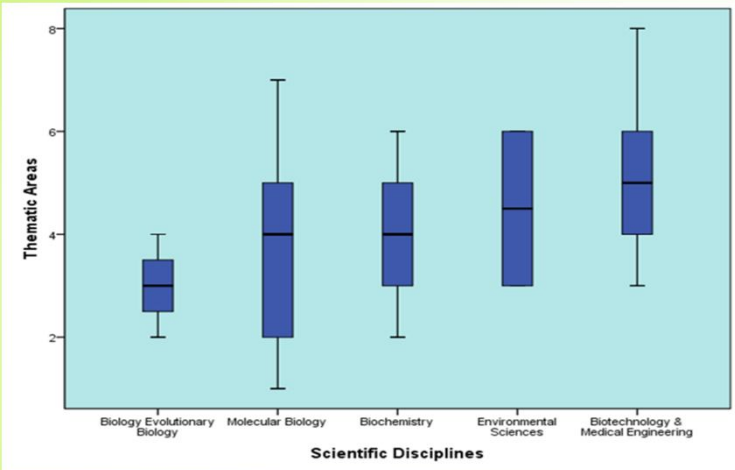
Analyses

Interdisciplinarity is observed from two different perspective. One aspect concentrates on the multi-scientific areas covered by particular research projects accepted, other perspective analyses experience and knowledge of individual leading researchers (G 1-5). In particular, analyses concentrate on data referring to bibliometrics, i.e. publications, citations, together with the h-index of particular leading researchers (G6). Statistic analyses and correlation measures, both in terms of linear or non-linear correlations between pairs of independent variables (G7) are conducted.









Results discussion

The great number of research projects in the bio-related thematic areas in comparison to non-bio research, might suggest its expected higher commercial potential in the future. However this result needs to be proved in other cases.

Appreciated levels of interdisciplinarity in life and engineering sciences among successful researchers is suggested between 3-6 disciplines of specialization. Higher number of scientific disciplines indicated in experience may lead to fragmentation of research projects performed or lower significance of research results obtained. At the same time number of indicated thematic areas below three suggests inexperience of scientists and may lower success rate of research projects performed.

It is visible that smart specialization in interdisciplinarity of research fields matters. Results obtained for the initial case study might suggest, that experience in enumerated background fields may effect in greater multidisciplinarity of projects (η^2=0.194). Some scientific disciplines are more interdisciplinarity prone.

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