Interdisciplinary Research in Action. The Case of the University "Constantin Brancoveanu" of Piteşti

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Abstract:
This paper positions interdisciplinarity as an integral feature of contemporary scientific research, stressing its role and the necessity to overcome possible barriers related to organizational and institutional constraints, team integration imperatives or disciplinary boundaries. At the same time, the study makes an inventory of European and Romanian opportunities in interdisciplinary research, especially under the 7th Framework Programme for Research. As a case study, the paper introduces the interdisciplinary project carried out by Constantin Brancoveanu University in Pitesti to draw Pitesti City Development Strategy for 2007-2013. All disciplines involved are presented through their interactions in the project, with a special attention given to repeated and constant attractions between specializations. The final conclusion is that Management plays a core role in any type of interdisciplinary project, acting as facilitator of teams' integration. Therefore, interdisciplinarity could work only where the practice of collaboration is nourished by the leader of the team, using specialized managerial integration tools.

Keywords: interdisciplinarity, team integration, research projects

JEL Codes: A1, O3, Y8, Z1

1. Introduction: Interdisciplinarity vs. trans-, cross-, pluri- and multi-disciplinarity

Interdisciplinary thinking is rapidly becoming an integral feature of research as a result of four powerful "drivers": the inherent complexity of nature and society, the desire to explore problems and questions that are not confined to a single discipline, the need to solve societal problems, and the power of new technologies.
(Stehr N., Weingart P., 2000)

The roots of the "interdisciplinary" concept lie in a number of ideas that resonate throughout the modern discourse: the ideas of a unified science, general knowledge, synthesis and the integration of knowledge. In the XXth century, interdisciplinarity was reinforced by the demand of universities to renew themselves; in respect to this, OECD called an international conference on interdisciplinarity and presented its own definition over it in 1972: "Interdisciplinary – an adjective describing interaction among two or more different disciplines. This interaction may range from simple communication of ideas to the mutual integration of organizing, concepts, methodology, procedures, epistemology, terminology, data and organization of research and education in a fairly large field. An interdisciplinary group consists of persons trained in different field of knowledge – disciplines – with different concepts, methods and data and terms organized into a common effort on a common problem with continuous intercommunication among the participants from different disciplines" (apud. Lattuca R. Lisa, 2001).

To Romanian professor George Văideanu we should recognize the merit of distinguishing between related concepts, in a paper published under UNESCO in 1985: ■ Transdisciplinarity is a state of complete balance of influence between all relevant participating disciplines at the highest possible level of coordination. ■ Interdisciplinary is somewhat weaker than transdisciplinarity in coordination or cross-communication. The

balance of influence, however, of the respective disciplines, is upheld. The overall impact of the quantitative and qualitative elements in not strong enough to establish a new discipline. ■ Cross-disciplinarity deviates from interdisciplinarity in both the qualitative and quantitative senses. One discipline dominates the others and is the one that establishes all important premises. ■ Pluri-disciplinarity is characterized by the fact that communication takes places between various disciplines, but the contact may be weaker or more sporadic than in cross-disciplinarity. ■ Multi-disciplinarity is the least developed form of interdisciplinarity. The communication between disciplines is reduced to a maximum. Projects are often complementary to each other. To conclude, interdisciplinarity is a form of cooperation between disciplines to solve problems that can be solved only through the convergence and prudent combination of different points of views. It implies a certain amount of integration between different areas of knowledge and between different approaches and the development of a common language so as to enable conceptual and methodological exchanges to take place" (Văideanu G., 1985).

Although interdisciplinarity is somewhat weaker than transdisciplinarity in coordination or cross-communication, its level of complexity is also very high because equilibrium between disciplines should be maintained on a continuous basis. On the other hand, any interdisciplinary project should find a common language that all participants should be able to use. The task of the manager of an interdisciplinary project is doubled by the obligation to create harmony between participants in the team. That is why specialists recommend **the identification of possible barriers** as the starting point in any interdisciplinary research project (Birnbaum M., Rossini F., Baldwin D., 1990): i. **„disciplinary" barriers (**participants in interdisciplinay teams have, in most of the cases, a disciplinary affiliation, they tend to protect against possible „rivals". This unilateral specialisation leads to the difficulty of finding a common language and to fear of the unknown), ii**. organizational and institutional barriers (**institutions are often disciplinarily organised, so they allocate their resources consequently; at the same time, the reward system used especially in Universities is focused on individual performance and the commitment to an interdisciplinary project depends strongly on this system); iii**. resource barriers (**time and resources devoted to facilitating research projects are diverted from existing activities: starting a new program, providing new seed funds, or creating a new center often means closing or reducing an effort in another area); iv. **other barriers** (results evaluation is often problematic, because we cannot talk yet about interdisicplinary evaluators; in the same time, there are very few scientific journals/reviews focused on interdisiciplinarity, so the dissemination of results can be also problematic); v. **team integration**: *one of the reasons why I think interdisciplinarity is always fighting an uphill struggle is because it is not only multi-vocal, it's not only less certain, but it has a softer feel about it. People who have a narrow disciplinary focus are able to say things they think with great confidence. What can interdisciplinary people say with great confidence* **(**Amey M., Brown D., 2004).

2. The European Union's Approach to Interdisciplinary Research

The 7th Framework Programme for Research (FP7), covering the period 2007 to 2013, comprises all research-related EU initiatives under a common roof, playing a crucial role in reaching the goals of growth, competitiveness and employment. It works along with a new Competitiveness and Innovation Framework Programme (CIP), Education and Training programmes, and Structural and Cohesion Funds for regional

convergence and competitiveness. The broad objectives of FP7 have been grouped into four categories: Cooperation, Ideas, People and Capacities. The specific programme '**Ideas'** aims to reinforce excellence, dynamism and creativity in European research and improve the attractiveness of Europe for the best researchers in "**frontier research**". In terms of the document, "frontier research pursues questions irrespective of established disciplinary boundaries. It may well involve multi-, inter- or trans-disciplinary research that brings together researchers from different disciplinary backgrounds, with different theoretical and conceptual approaches, techniques, methodologies and instrumentation, perhaps even different goals and motivations".

The **European Research Council (ERC)** is the first European funding body set up to support investigator-driven frontier research. Its main aim is to stimulate scientific excellence by supporting and encouraging the very best, truly creative scientists, scholars and engineers to be adventurous and take risks in their research. The scientists are encouraged to go beyond established frontiers of knowledge and the boundaries of disciplines. In 2009, in a review of its activity, ERC found *it had succeeded beyond expectations in attracting outstanding scientists across Europe and abroad*; at the same time, it also found fundamental problems related to rules and practices regarding the governance, administration and operations of the ERC that are not adapted to the nature of modern "frontier" science management.

3. The Romanian Case

The public funding of the Romanian research & development showed radical changes starting with 2005, together with the first substantial increase in the GDP share assigned to that field. The CEEX Research of excellence programme launched in 2005 by the National Authority for Scientific Research has contributed to direct public expenditures for research towards developing the Romanian Research Area. In the CEEX programme, the priorities of the public R&D funding were those from FP7, and the projects focused on the creation of powerful consortia, **the promotion of interdisciplinary research**, the development of human resources, the international promotion of the Romanian research, development and innovation (RDI) system, and the reinforcement and the development of infrastructures for conformity evaluation and certification. With the RDI strategy for the period 2007-2013, Romania intends to reach the European average for the basic indicators describing the structure and performance of the RDI system. The National Plan for Research, Development and Innovation takes into account the significance of fundamental research for knowledge development and the training of highly skilled human resources and emphasizes the excellence, the interdisciplinarity and the international visibility. Complex research in frontier areas and the participation to international excellence research networks are sustained through the programme **Ideas**. There are several basic research areas of special interest, with potential in Romania namely: biology, genetics and medicine; chemistry, environment and material sciences; mathematics; physics and technological physics; geology and atmosphere physics. While concentrating the investments in these fields, the Strategy will also support new areas, where Romanian research teams already cooperate at the international level. Social sciences are concerned, too. There are also other important ways of acting interdisciplinary in research, one of them being presenting in the case study below.

4. "Constantin Brâncoveanu" University's Case

A vision of interdisciplinarity may begin with simple steps and behaviours that nourish the practice of collaboration.
(The National Academies Press, 2004**)**

With regard to scientific research conducted at the Constantin Brâncoveanu University from Pitesti, we can say that efforts are made to promote interdisciplinarity. This approach becomes visible in the projects developed by the University in the past, but also in the proposals for future scientific actions. The University seeks to create joint teams to develop large projects in various areas and with mix-impacts: economic, social, technical or environmental. This intention is supported by the fact that the University offers a wide range of studies and employs experts in various scientific fields, who are able to undertake interdisciplinary projects. So far, such large projects have targeted various development strategies such as **Braila City Development Strategy** and **Pitesti City Development Strategy**.

- Both strategies were targeted to identify opportunities for development of the two municipalities in the European context and were conducted following similar stages:
- Establishment of multidisciplinary project teams, to allow full coverage of specific project areas;
- Running the SWOT analysis, to lay the basis of a scientific approach;
- Identifying areas of intervention and developing multifaceted researches from which to propose strategies for sectoral development;
- Identifying possible and feasible socio-economic funding sources;
- Building partnerships aimed at implementing the strategies developed.

In order to illustrate the interdisciplinary character of this kind of research, we propose for analysis **Pitesti City Development Strategy** for 2007-2013.

Sustainable development, a new type of post – industrial development, has been argued worldwide for over 30 years (Stockholm Conference on the Environment in 1972). On the other hand, the reference moment is represented by the United Nations Conference on Development and Environment held in Rio de Janeiro in 1992. At that time, an official document – Agenda 21 – mentioned for the first time the name and the concept of sustainable development. Now the sustainability gets a new dimension – social, economic, ecological, moral and spiritual development, care for the new generation. Sustainable development cannot be done without investments. The role of an investment is that of intensifying the capacity of an economic, social and cultural sector or field. A fundamental investment on efficiency – based criteria reflects the application of a fundamental economic principle that contemporary economy should take into account: the minimax principle (minimum consumption of resources with maximum results).

National statistics place Pitesti and the neighboring areas among the most attractive economic, social and investment – related places. Located in a transit region, Pitesti was firstly developed as a market town, and then it became one of the largest cities in the country.

The large development of Pitesti also implies a local economic development promoted by the regional authorities. This attracted and will attract investors by the facilities it offers: urban infrastructure, social services, secondary and higher education, environment protection, etc. Sustainable economic development will have effects upon the entire local community: public and private sector, and all community.

The final findings of this research have resulted in a more than 600 pages project, including Annexes. The research was done in a relatively short period (considering the amplitude), demonstrating an excellent teamwork engagement. The project team was composed of a total of 39 researchers, eight typewriters and IT specialists and 19 students that worked mainly as interviewers and for data processing.

Regarding the internal structure (see Table no. 1), the team was composed of a general manager, three deputy managers and seven team-managers, all with scientific backgrounds in one of the following disciplines: management, finance - analysis, statistics, law, environment, social sciences, marketing, integration and global issues, economic theory, computer planning and urbanism.

Table no. 1. Team structure and specialization

<table>
<tr><td colspan="7">PROJECT MANAGER
-management-</td></tr>
<tr><td colspan="2">DEPUTY MANAGER 1
-integration and global issues-</td><td colspan="2">DEPUTY MANAGER 2
-finance - analysis-</td><td colspan="3">DEPUTY MANAGER 3
-statistics-</td></tr>
<tr><td>Manager Team 1
-environment-</td><td>Manager Team 2
-marketing-</td><td>Manager Team 3
-management</td><td>Manager Team 4
- law-</td><td>Manager Team 5
- social sciences-</td><td>Manager Team 6
-social sciences-</td><td>Manager Team 7
-management</td></tr>
<tr><td colspan="5">Management</td><td colspan="2">5</td></tr>
<tr><td colspan="5">Finance – analysis</td><td colspan="2">6</td></tr>
<tr><td colspan="5">Statistics</td><td colspan="2">6</td></tr>
<tr><td colspan="5">Law</td><td colspan="2">2</td></tr>
<tr><td colspan="5">Environment</td><td colspan="2">3</td></tr>
<tr><td colspan="5">Social sciences</td><td colspan="2">7</td></tr>
<tr><td colspan="5">Marketing</td><td colspan="2">2</td></tr>
<tr><td colspan="5">Integration and global issues</td><td colspan="2">3</td></tr>
<tr><td colspan="5">Economic theory</td><td colspan="2">2</td></tr>
<tr><td colspan="5">Informatics</td><td colspan="2">2</td></tr>
<tr><td colspan="5">Urbanism</td><td colspan="2">1</td></tr>
<tr><td colspan="5">TOTAL</td><td colspan="2">39</td></tr>
</table>

Research report - *Pitesti City Development Strategy,* "Constantin Brancoveanu" University, 2008.

The research was aimed at following directions:
• **SWOT analysis** - with a multidisciplinary team in the areas of management, statistics, finance - analysis;
• **Strategic development programs** - with a multidisciplinary team composed of specialists in management, social sciences, integration, economic theory, urbanism;
• **Urban development –** with a team specialized in law, social sciences, environment, marketing, urban planning;
• **Metropolitan development –** with specialists in management, integration, urban planning, law, environment;
• **Development and economic competition –** with specialists in finance, management, marketing;

• **Human resource development** - with a multidisciplinary team in the areas of social sciences, statistics, integration;
• **Finance and banking** - with specialists in finance and banking analysis, economic theory, computer science.

Table no. 2. Number of occurrences in the project. Team's multidisciplinarity

Discipline	Number of occurrences
Management	5
Finances – analysis	3
Statistics	3
Law	2
Environment	2
Social sciences	3
Marketing	2
Integration and global issues	3
Economic theory	2
Informatics	1
Urbanism	3

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Regarding the interaction between disciplines, conclusions are the following (see Table no. 3):

- Management has interacted with most of disciplines, forming a neural centre. Through all disciplines in discussion, management is the one with the widest vision of enabling all teams involved; it interacted less with Informatics, due to the strict specialization of the last one;
- Social sciences, urbanism and integration & global issues also have a high capacity for involvement of teams, demonstrating the interdisciplinary character of such specializations;
- The set of specialties with the lowest interaction consists of specialization with technical character, such as informatics and statistics; for their technicality, these disciplines were less involved in this type of research;
- Economic specializations with a high financial character (finance, accounting analysis) had also a lower interaction, as compared to general economics.

The effects of research conducted for drawing Pitesti City Development Strategy had not ceased to appear. University researchers have proposed a strategy that began to be implemented. Today, there are visible progresses in the systematic city planning, playgrounds disposal, drainage and asphalting, extending the metropolitan area, achieving an ecological landfill, traffic flow etc. There are also some sectoral funding programs identified, concerning human resources development, environment, transportation and administrative capacity.

With regard to interdisciplinary research, authors of this study reached the following conclusions:
• Interdisciplinary research is possible and it generates maximum effects, especially in complex projects;
• A number of specializations polarize the rest of disciplines;

• Technical disciplines allow a lower polarization, but are essential to the achievement of certain projects;
• Sectoral Operational Programs allow the formation of homogeneous multidisciplinary teams;
• Development strategies allow the formation of complex teams, but the effects are maximum if teams' formal leader is a management specialist;
• Depending on the type of project or research, interdisciplinary teams can be created to meet requirements.

5. Conclusions and discussions

Interdisciplinarity is the core element in moving scientific research forward, to innovation, development and progress. Internal conditions of interdisciplinary research projects include both team members and leaders and impose certain ideal characteristics: flexibility, patience, a wilingness to learn, sesivity toward and tolerance of others and, most importantly, the ability to subordinate individual interest to a common objective. Interdisciplinary skills include knowing what information to seek, participating effectively in collaborative work, acquiring a working knowledge of the language, concepts, information and analytical skills pertinent to the problem, collating the contribution of individual experts, establishing the adaptability of pertinent materials, and knowing how to confirm or disconfirm the proposed solution. The case study in Constantin Brancoveanu University proves interdisciplinarity can work where the participants subordinate their personal disciplinary knowledge to the general objectives of the project. Technical, general and specialized disciplines work better under the coordination of a management specialist, a leader able to catalyze all efforts in a unique, one-way and targeted direction.

Table no. 3. Interactions between disciplines

Disciplines	Manage-ment	Finances - analysis	Statistics	Law	Environ-ment	Social sciences
Management	X	+	+	+	+	+
Finances - analysis	+	X	+	-	-	-
Statistics	+	+	X	-	-	+
Law	+	-	-	X	+	+
Environment	+	-	-	+	X	+
Social sciences	+	-	+	+	+	X
Marketing	+	+	-	+	+	+
Integration and global issues	+	-	+	+	+	+
Economic theory	+	+	-	-	-	+
Informatics	-	+	-	-	-	-
Urbanism	+	-	-	+	+	+
TOTAL	9+ 1-	5 + 5 -	4 + 6 -	6 + 4 -	6 + 4-	8 + 2-

Table no. 3. Interactions between disciplines (*continued*)

Disciplines	Marketing	Integration and global issues	Economic theory	Informatics	Urbanism
Management	+	+	+	-	+
Finances - analysis	+	-	+	+	-
Statistics	-	+	-	-	-
Law	+	+	-	-	+
Environment	+	+	-	-	+
Social sciences	+	+	+	-	+
Marketing	X	-	-	-	+
Integration and global issues	-	X	+	-	+
Economic theory	-	+	X	+	+
Informatics	-	-	+	X	-
Urbanism	+	+	+	-	X
TOTAL	6 + 4 -	7 + 3-	6 + 4-	2 + 8 -	7 + 3 -

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