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CONCEPTUAL FRAMEWORK FOR ESTIMATING THE PERFORMANCE OF INTERORGANIZATIONAL COLLABORATIVE INNOVATION

Theoretical article

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Abstract

The construction of a sequential model performance based on indicators broken down by factors and variables is relevant because it provides a complete picture of the effectiveness of collaborative structures built and operated on the basis of policies induced by the organizations involved. It also provides a longitudinal analysis of the effectiveness of collaboration for innovation.

I will define the performance analysis model of collaborative innovation as a conceptual tool consisting of a set of elements and relationships between them, allowing the quantification of the expression of innovation performance as a result of interaction of several organizations. Applying such a model involves the analysis and estimation of the added value of each segment of interorganizational innovation cycle as part of the overall performance obtained by combining existing or created knowledge. From this point of view, it is necessary to develop an ontology, a common ground on which this model can be built.

CONCEPTS AND COMPLEXITY IN INTERACTIONS BETWEEN ORGANIZATIONS

The starting point in establishing the concepts and interorganizational collaborative structure placement, in reality is represented by five elements of analysis, from which we extract the necessary performance measurement data:

1. network objectives,
2. allocated resources by the organizations involved,
3. proper collaborative actions,
4. control keys and selection of collaborative innovation,
5. innovative results through the brought value.

Innovation consists essentially in the creation of new values, rather than new "things". While interorganizational collaborative innovation model describes levers and means by which objectives are achieved, a model able to analyze the way of obtaining performance involves a detailed analysis of the ways in which the network creates value for organizations involved, according to the resources allocated by these.

The projections of collaborative innovation research outline various causal relationships between the same concepts, and the assessments of networks are determined by sets of criteria. The approach of this study is not mainly focused on the causal relationships between variables, except the targeted approach based on abstraction. The total performance evaluation sequence is a product of the performance of each **sub-process**:

- Creating collaborative structure,
- Incubation of innovative ideas,
- Selection of ideas that will be implemented,
- Their market capitalization (creating financial value).

Through the financial value I assign the final desirable result of collaborative innovation regardless of the form of accession to this type of business process performance. The ways of achieving financial performance can be identified through the organizations' objectives involved in external collaboration and may take the form of economic effects (eg, business competitiveness), the effects of learning (acquisition capabilities), obtaining competitive advantages, etc.

The presumption of this sequential performance analysis model is that each process requires distinct evaluation criteria and influences differently or it may cancel the delivery of results in the subsequent sequences of the innovative cycle. For example, poor functioning of the process of incubation of innovative ideas is unlikely to induce the development of new skills for organizations through collaborative interactions. Interorganizational structures undergo a dynamic of collaborative typologies from networks outlined around weak ties (RLS), to structures of experimentation and diffusion of knowledge (REP) and finally a compression is reached in innovation structures and sharing of a common vision (RIV). An innovative cycle which ends gives knowledge to other networks (usually structured by weak links), each of them embodying specific possibilities for the skills they already have. This is the spiral model of innovation. (Serghie, 2013). Actors that work together (network nodes) in order to generate value through innovation, compose these network structures and the interactions between them can be expanded in an infinite spiral structure of branches, accessing various and multiple platforms of human knowledge. From this point of view, collaborative innovation is conceived within my research as a nonlinear evolutionary journey with interactive processes between actors with expertise in various knowledge sources involved in collaborative activities through decisions taken at organizational level or voluntarily. Sources of knowledge coming from the inside of organizations (departments of

research and development, production, sales, marketing, etc.) interact within collaborative innovation cycles with external knowledge sources (customers, suppliers, research centers, universities, etc..).

Building a model to propose the estimation of the innovation performance does not analyze causal relationships between variables, but a) defines, describes and represents a simplified form, the complex interactions and processes, b) identifies indicators for quantifying the independent variables in a sequential manner of approach and c) proposes a framework for computing a total performance. For example, the communication variable within the network is expressed as the frequency of communication between actors (network nodes) and the rate of involvement. For both operational indicators, the

presumption is that an intensive communication contributes to superior performance in terms of final financial impact.

Ontology proposes a language to represent the performance evaluation model using a set of concepts such as entities (individuals or organizations represented as nodes of the network), attributes (of individuals and organizations from which they come) communication mediums (individuals, channels) and processes (interaction, clash of ideas, selection, testing, association, etc. to market.), their definition highlighting the relationships between them. From the perspective of the conditions and processes in performance analysis approach of collaborative innovation, the researchers measured through indicators a number of variables:

Tab. 1. Conditional and process variables (reviewing literature)

Conditional Variables	Process Variables
- Previous experience of collaboration	- Absorption of external knowledge
- Motivations	- Intensity of communication
- Composition of the network (number and size partners)	- Network management
- Structure of the network (communication channels)	- Trust between partners
- Network resources (human, financial, etc.).	- Added value by exploiting innovation

Performance measurement models of interorganizational innovation based on these variables are generally deficient or propose incomplete and fragmented approaches considering only the articulation of communication channels through which information is transmitted. Malfunctions of these models are induced by the lack of a common language and a common means of representing concepts in different areas of knowledge specific to each organization. The research for innovative performance modelling, supported by the text of this research, proposes also a different view, trying to

overcome the above mentioned shortcomings by introducing the concept of "network intelligence". The framework of performance evaluation includes three categories of variables (or conditions):

a) The characteristics and structure of collaborative processes (variable content);

b) Environmental characteristics of innovation analyzed in space-time dimensions as a historical moment, but also as a way of interpreting the structure of collaborative knowledge as part of an integrated universe (context variables);

c) The financial value obtained as a result of the economic implementation and exploitation of collaborative innovation on the market.

Content Variables	Indicators	What is measured?
Non-economic motivations	Network Identity	The weight and the non-economic incentive structure and the effects induced by them: common code of ethics, common expertise, similar or complementary vision, high level of sharing common goals.
Human resources	Collaborative capability	The number and quality of the actors involved in collaborative structure
Human resources	Creative potential	The level and the quality of human resources
Financial resources	Invested funds	The quantity and quality of financial resources
Organizational Experience	Formal control mechanism	Dependent variables at the organizational level: leadership, motivation, communication and learning. The level at which they influence collaborative innovation performance at the network level.
Combining knowledge	Communication intensity	Frequency of communication, involvement and communication flow rate between different fields of knowledge.
Process dynamics	Toposenzitivity	The dynamic of interactions between actors evaluated about graphics (compared to standard course).
Economic effects	Launching innovation	Operational performance of capitalization of a collaborative innovation on the market.

As economic effects, there may also be quantified the learning effects: competence gained, the number and effectiveness of the implementation of new processes in the organization, etc.. Also, in the investment literature we encounter ways of measuring economic effects by recourse to quantification of competitiveness or financial gain, based on the evaluation criteria of investment (VAN, RIR, RIRM etc.).

Context variables	Indicators	What is measured?
Environmental structure	Diversity	The ratio between the number of different areas of knowledge accessed by the network and the number of links between nodes.
Environmental structure	Transdisciplinarity	The level of positioning the spiral model of innovation as an ecosystem of informational entropy.

Information Management	Network Intelligence	The capacity to extract the essence and develop intuitive information, effect processing, absorption capacity and dissemination to partners.

Designing the proposed model is the result of a structured survey by using iterative approaches of construction and then assessing the validity of indicators able to estimate the performance of collaborative innovation. The ontology presented in this chapter is the scaffolding on which the model will be built.

A process of quantification (through quantitative and qualitative indicators) of the independent variables listed above requires fine analysis of the factors or dependent variables that influence. The causes that induce collaborative innovation performance are based on the factors involved in incubation, selection and exploitation of innovation and the efficient combination of them (leadership, quality sub-processes etc.). Obtaining financial performance by companies in that collaboration cannot be related to the hope of an accidental discovery of solutions and the capitalization of incremental or radical innovations or accidental intake connection of knowledge between organizations. The sources to obtain the performance proposed by the model are represented by qualitative options on:

1. directing the use of resources in order to: a) an effective collaborative structure formation, b) exploiting adjacent opportunities for utility processes, services and products, and finally, c) the net investment by exploiting innovations;
2. maintaining a high level of network "liquidity" favourable to connecting ideas and collaborative activities;
3. devising a sufficiently diversified structure compatible with the full exploitation of knowledge sources;
4. increasing the quality of human resources involved in collaborative

selection, rewards, elimination, etc..

The indicator on the resources allocated involves the identification and evaluation of resources subcategories affected in the organization by the collaborative structure. For example:

1. **Human resources** – individuals (actors) involved in interactions between organizations estimated both in number and as attributes;
   - o **Social capital -** measures the intensity and amount of opportunities to connect and network expansion;
2. **Financial Resources** – critical inputs that can affect both stages of incubation of ideas, experimentation and support stages of launching and marketing innovations;
   - o **Instruments -** the possibility to have access to ICT systems and communication media for informal exchange of ideas, techniques to promote collaborative creativity.

In turn, the value obtained from the exploitation of collaborative innovation can be analyzed from many aspects:

1. Modification of the offer of goods or services by adding utility to the consumer, ie the modification of some elements from the business processes framework;
2. Development of platforms (set of methods and technologies) to enable efficient inter-organizational collaboration and continuous innovation;
3. Customised solutions etc.

For each of the indicators proposed in the model it can be performed a thorough

development of the dependent variables and implications induced by them.

References

[1] Edmondson, A., C., Staats, B., R. & Valentine, A., M. (2010), *Using What We Know: Turning Organizational Knowledge into Team Performance,* disponibil la: http://www.hbs.edu/research/pdf/11-031.pdf

[2] Hansen, Morten T. (2009). Collaboration: How Leaders Avoid the Traps, *Harvard Business Press*

[3] Loftus E. F. (1997) *Memory for a Past that Never Was*, Current Directions in Psychological Science, 6, pp. 60-65

[4] Monteiro, M. & Keating, E. (2009) *Managing misunderstandings: the role of language in interdisciplinary scientific collaboration.* Science Communication 31: 6–28.

[5] Osarenkhoe A. (2006), Customer-centric strategy: a longitudinal study of implementation of a customer relationship management solution, Int. J. Technology Marketing, Vol.1, No.2, pp.115-144.

[6] Serghie D. (2013), *Context in collaborative structure - transdisciplinarity*, Network Intelligence Studies, Vol. I, No. 2, pp. 5-12

[7] van Winkelen, C. (2010). Deriving value from inter-organizational learning collaborations. *The Learning Organization,* Vol. 17, No. 1, pp. 8-23

[8] Weisberg, Robert (2010) 'The study of creativity: from genius to cognitive science', International Journal of Cultural Policy, 16: 3, 235 — 253

[9] Wilson, Nick (2010) 'Social creativity: re-qualifying the creative economy', International Journal of Cultural Policy, 16: 3, 367 — 381

[10] Zaiț D., Spalanzani A. (2006), *Cercetarea în economie i management – Repere epistemologice i metodologice*, București, Ed. Economică, ISBN (10) 973-709-241-4