

University-Industry-Government Relations in the Abruzzo Region and the Development of a Knowledge-Based Economy

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Introduction

Because social systems are more complex than biological ones, one needs three helices instead of a double helix for the model. A Triple Helix of university-industry-government relations suggests that the three institutions carry three functions: wealth generation (in industry), normative control (governance), and systematic novelty production (in science and technology). How can the public as a fourth helix obtain access to academic knowledge for both economic and cultural advancements? How can the functionalities in these relations be improved, for example, in regions? Can synergies be generated and what can be instruments for this stimulation of social disclosure? In this paper, we report about an experiment to use ICT for this purpose.

University-industry-government

University-industry-government relations are nowadays a necessary, but not sufficient condition for the generation of synergy among dynamics leading to innovation at the regional or national level. The university became a salient partner in public-private relations when after the end of the Cold War the nature of the economic competition changed. Whereas previously (in the 19th and 20th centuries) political economies were constructed at the national levels—for example, in Italy after 1860-1870—but mainly based on the two dynamics of wealth generation (in industry) and institutional control (by government agencies), a knowledge-based economy increasingly emerged in the last decades of the 20th century after the fall of the Berlin wall and the demise of the Soviet Union. In a knowledge-based economy, globalization can be added as a perspective to the political economy, and thus the latter is gradually transformed.

The transition to a knowledge-based economy is far from complete and particularly our institutions and mindsets tend to be conservative. The political economy remains among other things the local retention mechanism of wealth from knowledge. Thus, a knowledge-based economy is composed of different subdynamics such as wealth generation on markets, normative control by governance, and innovative novelty production organized, for example, in academia. Patents, for example, can be output indicators of research institutes, but are input into the economy, and serve intellectual property protection in the case of litigation. The mixtures and synergies among the subdynamics can be different in various regions, but the third subdynamics of organized knowledge production can no longer be ignored. In advanced industrial nations,

models have to be developed that inform us how to ride reflexively the waves generated by newly emerging science-technologies (Leydesdorff, 2006).

How to represent knowledge in a region?

We are inclined to think about the relations between knowledge and the economy in the old paradigm of institution building and normative control in public-private partnership relations. From this perspective, however, knowledge production is still too much considered as a source that from the outside (globally) changes these relations by providing an external factor that should be taken into account. Knowledge does not come like manna from heaven, but has to be discursively constructed and reconstructed within the various contexts.

For example, the university can first be represented by adding a member of the administration to a round table or into a networked arrangement among the Chamber of Commerce and the local authorities. However, this university representative would be nothing more than another government agent. Knowledge flows cannot easily be represented by administration. One needs involvement and participation. But we don't know yet how to represent the knowledge bases in an institutional setting. The scholars who have access, are immersed in literature and experimentation, but operate decentralized in the various faculties and departments. Fortunately, knowledge can be represented more abstractly than in terms of representatives, namely in terms of representations.

How does one obtain access to relevant knowledge? How can knowledge be made useful for industrial and regional development, and *vice versa* economic development induce new knowledge production? How can the board of a university or a local Chamber of Commerce promote these relations at the lower levels of organization? Perhaps, it were better to send instead of an administrator, a representative of the Faculty of Engineering; yet, important developments for some other industries and faculties may originate from the Department of Economics. One can invite speakers from these different departments to a colloquium, but such an approach cannot be sufficiently interesting for most practitioners since one can expect that these presentations are too much driven from the "supply-side." How can one make "demand" the driver of university-industry-government relations, and how should the latter then be organized so that the different interests can be represented? Can ICT help us to realize such interfaces?

A possible experimentation

Different from institutional interests that can be represented by agents, knowledge flows in terms of discursive representations that can be shared. From this perspective, the relevant units of analysis are communications more than people. Of course, communications have to be carried by communicating agents, but the knowledge can be communicated from different perspectives and translated into different circles. One can consider this as "globalization" from the locally

embedded and institutional contexts; codification enables us to make knowledge available in other contexts using, for example, the Internet.

The internal perspective of active scientists is first mostly oriented towards participation in the global knowledge flows of the different specializations. Each scholar needs this embedding for the purpose of quality control and intellectual competition at the research front. The nature of this competition in science is very different from the industrial one. One speaks specialist languages in relatively small communities of experts that pursue global objectives such as the advancement of knowledge in, for example, the development of inorganic chemistry.

The investments in terms of personal and social resources to achieve such a participative position can be large in terms of competence building. One should not unnecessarily distract scholars from this long-term intellectual focus for short-term utilitarian reasons. Scholars are therefore happy to be represented in university-industry-government relations first by university officials and transfer officers who they trust to shield their work as a filter against too much external interference because these mediating agents are aware of the delicate balance among the various missions of a university. However, this is more like PR and advertisement than participation and opening up of the university to external demand.

In an initiative in the science-shop movement at the University of Amsterdam in the late-1980s all faculty members of this university were asked to fill out a questionnaire with essentially only two questions:

1. Can you, please, list a few keywords that are socially relevant for the disclosure of your research for third parties?
2. Do you have expertise from previous research that may be socially relevant? Can you, please, formulate keywords for this further disclosure to third parties?

We tested these questions at the University of Amsterdam, and found that the order in asking them matters: one first has to ask for keywords originating in the current research and only thereafter for past experiences because the formulation of the latter requires a reflexive turn to the recollection (Leydesdorff, 1988).

Filling out a questionnaire takes only a few minutes and if successful, this routine can easily be integrated into the Annual Reports of the university. In this context, each one has to fill out yearly questionnaires with the various outputs specified in terms of research articles, education, and administrative activities such as membership of committees, etc.

We found in Amsterdam that scholars in the social sciences and humanities are particularly responsive to such a request for socially relevant keywords, and the resulting answers provide a

rich spectrum of possible, albeit not always commercial, domains of possible application, whereas scholars in these disciplines have been less involved in “technology transfer.” For example, in the Amsterdam case we found that philosophers of language offered for helping to make computer-based translation services more efficient. The further development of digital humanities and the creative industry at the Internet may have made such relations to the humanities more important for future business than at that time.

An innovation support mechanism

The collected demand-side information can be organized in a similar format and then one could use a thesaurus-like technique from artificial intelligence for the matching and thus support users to move from one bench to the other by clicking from page to page. The program provides suggestions (see, for example, at <http://www.leydesdorff.net/pescara-chieti/index.htm>). Different from telephone calls by transfer officers, such an interface has a certain lightness that can invite users for exploring new possibilities.

If so wished, one can follow up with an email for further exploration or personal contact. Combinations of keywords (using a search engine) may guide the process in terms of making further selections available. Users should be encouraged to turn to the transfer office or the Chamber of Commerce for help if so wished by providing additional telephone numbers.

When the connection is made and some form of collaboration established, one may find it useful to establish a written agreement. We suggest establishing a light procedure where such an agreement can be countersigned on behalf of the university and/or the Chamber of Commerce. This external feedback may stimulate the exchange; filing these agreements provides a control mechanism that can also be evaluated. Evaluation is a cornerstone for improvements and further learning in an information-rich environment.

The filing of agreements is a precondition of later evaluation at the level of the set. The countersigning by a third party may make the informal agreement more committing even if no direct payment is involved. One can also evaluate the evolving relations in order to grant a special award to the most successful one. The Board of the Catholic University in Tilburg (in The Netherlands), for example, evaluates yearly the science-shop mediation and awards one of the departments with a PhD scholarship.

In summary, our plea is for a turn to a communication-oriented perspective on knowledge transfer and utilization. Innovation is first a matter of developing new semantics; the communicators can follow the new perspectives and try to exploit these (Leydesdorff, 1989). Different from a focus on “best practices”, knowledge-based representations enable us to focus on possible practices. In our opinion, the currently dominant forms of mediation have focused

too much on institutions. Institutions are inclined to pursue their own interests in further growing as an institution.

For example, the number of patent applications by transfer offices in the United States continuously has increased, but the number of patents granted has remained approximately the same (or even tends to decline). Similar dysfunctions have been reported about European institutional frameworks. Incubators sometimes mainly provide cheap housing to start-ups. University-industry-government circles may lock-in into conversations that develop with their own dynamics. One has to reach behind the curtains of window-dressing. A communication-oriented perspective enables us to do so by asking the scholars themselves to participate in the discourse with a socially oriented disclosure.

Surplus value for the university

University research is organized along two axes: socially one is organized in terms of historical relations that embed the research process, for example, in a city and a region. At the linking pin of individual researchers and research groups, however, scientists and their students also participate in the global development of specific specialisms. Researchers are paid primarily for reaching-out to new ideas. The intellectual dimension of the research process self-organizes in terms of discursive knowledge developing beyond control of individual agents and at the global level.

Traditionally, the university serves the region mainly with educating students who provide the next generation of human resources for further development. Research and education are long-term functions of the university. In the current configuration, organized knowledge (e.g., patents) has become an asset in the economic competition. In a knowledge-based economy, the university has a third mission in addition to research and education: one has to explore how to participate in social and economic developments.

Wealth can be generated from timely knowledge organization and thus this third mission stands orthogonal to the longer-term missions of intellectual development (e.g., Viale & Campodell'Orto, 2002). However, discourse about innovation and the development of regional innovation systems has evolved from a pipeline model in which applications follow from discovery into a new model with feedback loops that is driven by both supply and demand articulation. Interactions from the demand side can also stimulate the research process in providing new opportunities (Fagerberg *et al.*, 2005).

One of these new opportunities from social interaction is finding new sources for possible funding or access to interesting and hitherto insufficiently explored domains. However, the engagement in communication with the social surroundings can in many cases be fruitful even without financial compensation. In an evaluation of science-shop questions, for example, Zaal &

Leydesdorff (1987) found that access to new domains and data can stimulate the research process; examples of social engagement in research project could often be used in classes in order to motivate students. Another important framework is always provided by the need to organize internships and apprenticeships that in many studies are crucial for the practical orientation and developing career perspectives. Practical questions are also fruitful as possible subjects for the Master's Theses.

In summary, there is a wealth of opportunities for interactions. Institutions, however, tend to function as barriers and to focus on inward-oriented routines. ICT and the communication-oriented perspectives enable us to organize virtual windows that bring new horizons into the scope of our attention on both sides of the divide.

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