CONNECTING PUBLIC AND PRIVATE RESEARCH SYSTEMS: THE DESIGN OF THE EUROPEAN INSTITUTE OF INNOVATION AND TECHNOLOGY

Keywords: innovation policy design; research and university-industry collaboration; boundary spanning organizations.

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ABSTRACT

This paper investigates which is the most suitable model to design the European Institute of Innovation and Technology (EIT), an exemplar of an organization aimed at tightly connecting the public and private research systems. We developed a theoretical model discussing the trade-offs of the several possible EIT configurations, which depend on eleven key dimensions to be considered in shaping the EIT. We carried out a survey among 312 public researchers and applied an ordered probit econometric model to examine which researchers' attributes (years and type of experience, field and orientation of research activities) may explain their preferences towards some EIT configurations. We conclude discussing the policy implications of the most critical and controversial dimensions.

INTRODUCTION

There is wide consensus that the weaknesses of the European innovation system consist in the relatively low level and concentration of investment in higher education and R&D and the poor exploitation of scientific knowledge and research results into economic activity. A key initiative to tackle these weaknesses is the creation of the European Institute of Innovation and Technology (EIT), which aims at pooling the best minds and ideas from universities, research centres and companies to reach the critical mass of excellent resources and coordinating their efforts towards the commercialization of research outcomes.

The creation of this new institute falls within the mid-term review of the Lisbon Strategy for Growth and Jobs and, more in general, within the European and national policies aiming at strengthening the integration of the three elements of the knowledge triangle: education, research and innovation. The ambitious mission of increasing the EU's capacity to transform education and research results into tangible commercial innovation opportunities by reinforcing the connection between education, research and business raises several challenging design questions: *how should organizations aimed at spanning the academia-industry boundary be designed? What should be the role of companies within education and research organizations? What approach should be adopted in performing joint research activities? Which model of governance and financing is the most appropriate to provide the adequate incentives to the various partners to bring together their resources and productively cooperate?*

This paper tries to answer to these questions through an exploratory analysis on how the EIT should be outlined. Indeed, designing the EIT represents a significant way to contribute to the debate around what are the most effective models to ensure a fruitful collaboration

between academia and business and an effective knowledge transfer among public and private research organizations. In fact, the organizational design of the EIT gathers up several critical matters, such as the focus and organization of activities in public-private partnerships (like the Knowledge and Innovation Communities – the operational level of the EIT), the geographical layout and model of resources' ownership able to ensure a noteworthy dissemination of research results, the strategic and operational role of companies within education and research institutions, the financing and governing model of hybrid organizations.

THE CONCEPTUAL MODEL

In order to investigate which model is the most appropriate to outline a boundary-spanning organization, such as the EIT, able to fruitfully integrate education, research and industrial innovation, we have developed a theoretical model that discusses the EIT possible configurations and their implications.

On the basis of both in-depth interviews with the EIT policy makers and insights from the literature on academia-industry collaborations, we have identified eleven relevant dimensions to be taken into account while shaping the EIT: the participants and their selection criteria, the target of the training activities, the type of research, the role of companies, the approach in the organization of the activities, the number and degree of specialization of the KICs, the geographical layout, the model of resources' ownership, governance and financing of the activities. Each of the relevant dimension corresponds to several possible configurations of the EIT and it is here briefly discussed in terms of underlying trade-offs and implications.

Concerning the participants in the EIT, we argue that by involving individuals or units rather than departments or entire organisations, we should expect stronger intrinsic motivation, specialization and flexibility (in terms of both individual mobility resulting in faster knowledge transfer and lower bureaucratization of the activities). On the other hand, departments or entire organizations would make available more consistent assets needed to widen the research horizons and ensure a greater parent organisation's support to individuals seconded to the EIT.

Another crucial dilemma concerns the criteria for selecting partners. Shane (2002) suggests that bridging institutions are more useful for start-ups and SMEs rather than for established organizations, which already have consistent assets required to build external linkages and manage partnerships. Selecting only excellent partners would probably allow KICs to carry out substantial projects fostering a significant shift of the technological frontier, while opting for a broad involvement of partners would probably ensure a better dissemination of best practices and research outcomes. In the former case the EIT would risk to become an elitist and self-referential institution, while in the latter it would risk having an insufficient pressure towards strategic challenges. The general trade-off between mission and diffusion approaches can be articulated into the following trade-off.

A similar trade-off between mission and diffusion approaches regards the target of the EIT training activities. Offering training at an advanced level (PhD, experts) would contribute to the creation of a new (confined) class of highly qualified professionals specialized in managing academy-business relationships, while offering training at Bachelors' and Masters' level would allow to spread some basic entrepreneurial skills to a larger number of students (and future workers).According to the Lambert Review of Business-University Collaboration (2003) and to the findings of Powell and Owen-Smith (1998), lack of

professionalism in TTOs is often a great barrier to commercialising university's intellectual property and universities find it difficult to acquire certain competences such as licensing negotiation expertise or marketing skills. The promotion of a new class of innovation professionals seems to be critical to increase the rate of scientific knowledge conversion into market innovations, the universities' understanding of business' needs and the industry' and venture capitalists' capacity to evaluate academic research.

Another trade-off regards the EIT geographical layout, between the benefits of a centralized structure (reaching critical mass, integration and coordination of resources, tacit knowledge transfer) and the need to spread changes and act at a European level (dissemination of best practices throughout Europe, attractiveness for companies, including SMEs and start-ups, stronger capacity to adapt to changes and exploit European differentiation and local specializations).

Concerning the EIT model of governance, we argue there is an important trade-off between the need for centralized control to ensure homogeneity among KICs and coherence with the strategic priorities defined by the Governing Board and the need to grant the necessary autonomy to the KICs and partners in order to ensure flexibility and effectiveness in taking operative decisions, concerning specific problems.

Concerning the model of resources' ownership, we highlight a significant trade-off between the need for the EIT to own resources to ensure focus on strategic common priorities defined by the Governing Board and the need to attract partners, especially business, and spread changes to home organisations through staff mobility.

Another interesting issue concerns the focus and the organization of research activities the EIT will carry out. As highlighted by Stokes's dynamic model of innovation (1997), research can be motivated by quest for fundamental understanding (pure basic research), by consideration of use (pure applied research) or by both (use-inspired basic research). Use-inspired basic research represents the crossroads between the bi-directional flows of knowledge between the academic and the industrial/technological world, and allows the EIT to reach a compromise between the cultures and the interests of academics and practitioners. This type of research is probably the one on which the EIT should focus to be coherent with its strategy, based on the integration of the three sides of the knowledge triangle.

Secondly, researchers can perform their activities in a more or less integrated way: they can work together on the same issue, ensuring continuous cross fertilization (inter-disciplinary approach), or work separately but exchange information to face the same common issue (multi-disciplinary approach) or work separately, facing individually different issues (disciplinary approach). Inter-disciplinary or multi-disciplinary approaches would probably best reflect the EIT fundamental concept of knowledge generation as a joint-production process and, arguably, foster the widening of the research horizons and the complementarity among different perspectives. On the other hand, a disciplinary approach would presumably imply that partners have a lower cultural and cognitive distance, which would facilitate mutual understanding, reaching consensus and goals' sharing.

Thirdly, specialization will play a key role in performing activities: researching on broad subjects through a few large KICs would sustain inter and multi-disciplinary approaches but would not help the research productivity in terms of conversion of knowledge into marketable innovations. Whilst, an EIT consisting of many specialized KICs, researching on specific subjects, would ensure more focus on generating exploitable knowledge and would take more advantage of European differentiation and local specializations.

The issues related to the focus and the organizations of the EIT activities bring about the following trade-offs:

- trade-off, regarding the type of research activities, between basic research in order to foster a long-term shifting of the technological frontier and applied research in order to attract business, generating more usable innovations;

- trade-off, regarding the organization of research activities, between inter- or multi-disciplinarity approach, to ensure cross-fertilization or at least information exchanges, and disciplinary approach, to have a lower cognitive distance and, thus, stronger mutual understanding and goals' sharing.

- trade-off, regarding the degree of specialization of the KICs, between the need for comprehensive approach, with a few large KICs researching on broad subjects, and the need for specialization to ensure research generates exploitable innovations, relying on European differentiation and local specializations.

A further critical question regards the financing model, which is implicitly related to the model of governance and the focus of the activities. In fact, pushing the KICs and their partners to raise autonomously funds to finance their activities (or even each activity independently) can force KICs to focus on short-term priorities to attract private funds, distracting partners from more strategic and ambitious objectives. Whilst, entrust the Governing Board with the task of raising funds (e.g. through the creation of a Foundation) would spare partners the weight of raising funds, leaving researchers the time to better concentrate on carrying out their activities. On the other hand, such a centralized model of financing risks leading to bureaucratization and less attractiveness for business actors (potential partners, venture capitalists, business angels...).

The last crucial dilemma is related to what should be the role of companies within the EIT. The mission of the EIT is to foster the conversion of knowledge and research results into economic activity through the integration of the three sides of the knowledge triangle. To attract business partners, the EIT model has to provide industry with the possibility to influence the strategic innovation agenda, as well as the ways in which activities have to be organized, performed and evaluated. However, the role of companies can vary from the simple funding and exploitation of the results of the activities carried on within the EIT (linear or 'end of pipe' model) to a deeper involvement, both at a strategic and operational level. Involving firms in training and research activities would foster cross-profession collaboration and changes in the academic mindset and incentive system. However, there would be a risk for loosing the visionary strategy and the long-term orientation of research. Thus, there is a trade-off related to the degree and the form of companies' involvement in the EIT:

METHODOLOGY

To investigate which is the most suitable model for the EIT, we carried out a wide-ranging survey among researchers working for Italian higher education and research institutions. We submitted a multiple-choice questionnaire with space for free-text comments. The empirical analyses highlight how the sample researchers' preferences towards the several possible EIT configurations vary depending on respondent's characteristics (age, years of work experience in universities, in research centres and in the business sector, managerial experience, field and orientation (basic versus applied) of the research activities performed). The findings deriving from the statistical analyses are interpreted in light of the theoretical model and free-text comments provided by the interviewees. To understand

more in details which are the respondents' attributes which may explain their different outlooks on the several possible configurations, we have used an Ordered Probit Econometric Model. In the analysis we have focused on the most critical and controversial dimensions, using a classical Herfindhal index to measure the degree of controversiality in the views of the interviewees.

DATA SAMPLE AND ANALYSES

We submitted the multiple-choice questionnaire to 1025 researchers working for Italian higher education and research institutions and we obtained 312 responses. The respondents' sample is heterogeneous in terms of their age, years of work experience in universities, in research centres and in the business sector, managerial experience, field and orientation (basic versus applied) of the research activities performed. One third of the respondents is working in the field of engineering and IT sciences, while both people working in the fields of life sciences and basic sciences (chemistry, mathematics, physics) account for nearly one fourth each.

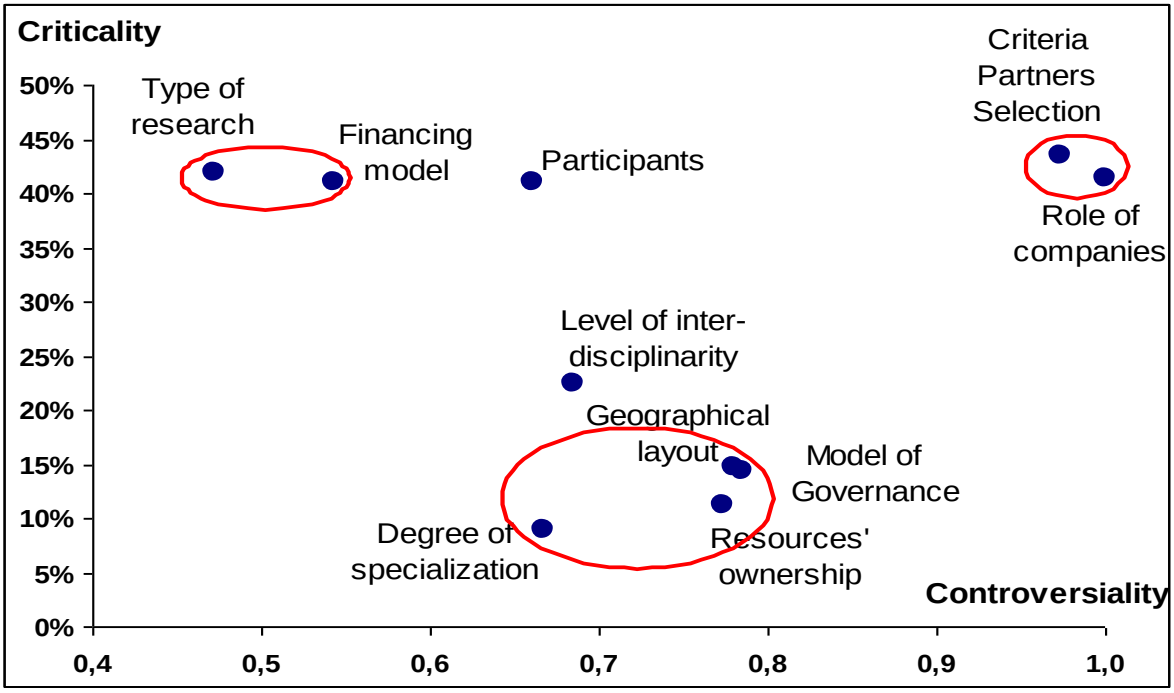
In general, respondents converge on the idea of a double-level architecture, with a Governing Board in charge of strategic decisions (priorities definition, KICs' selection, evaluation and monitoring) and several specialized KICs granted with the necessary autonomy to take effectively operative decisions. The tendency to attach great importance to the real impact of the EIT is confirmed by the clear preference of the respondents' sample for a focus on use-inspired basic research.

Most respondents, especially those performing applied research as well as those having work experience in the business sector, opt for involving single researchers or teams in many specialized KICs that focus on delivering and disseminating specific outcomes. On the contrary, people carrying out basic research tend to imagine the EIT as a large institution involving entire departments or organisations, consisting of few KICs dealing with broad subjects, limiting the business interference in the research and training activities.

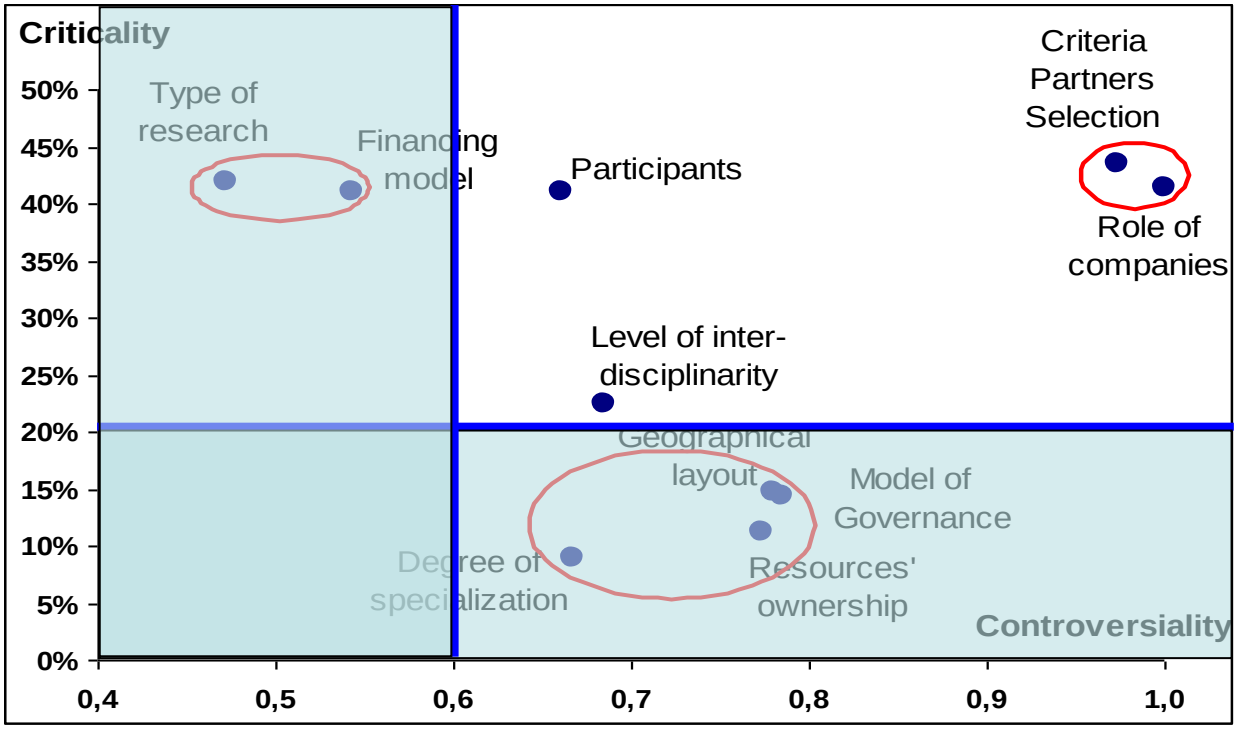
A controversial question concerns the approach to be adopted in organising the EIT activities. People carrying out basic research are in favour of a multi-disciplinary approach, while people performing applied research opt for an inter-disciplinary approach, valuing more the importance of continuous cross-fertilization. Many interviewees said the EIT should focus on training regarding how to span the boundary between academics, researchers and practitioners.

The most controversial issue concerns the role of companies within the EIT: young researchers and people having work experience in the business sector are in favour of the involvement of companies not only as financial partners but also at strategic and operational level. This option would allow companies to influence the innovation agenda and the ways in which activities are organized, performed and evaluated. However, senior academics are sceptical about increasing the business input in the education and research activities.

The following matrix provides an overview of the dimensions that have to be taken into account in designing in the EIT.



It highlights that the role of companies and the criteria for partners' selection are very critical and controversial dimension. However, also the participants in the EIT and the level of inter-disciplinarity in the activities are dimensions which deserve further analyses. To investigate which respondents' attributes may explain the degree of controversiality related to these dimensions, we applied an Ordered Probit Econometric model. The findings are discussed in the following paragraphs.



The most interesting findings deriving from the econometric analyses are here summarized:

- respondents carrying out applied researchers would focus on dissemination of the research results and flexibility involving single, but not necessarily excellent participants;
- while basic researchers and senior academics are sceptical towards the business interference in education and research, a broad involvement of partners and inter- or multi- disciplinary approaches
- respondents with experience in managing/coordinating projects would focus on pooling excellent researchers ensuring cross-fertilization and avoiding bureaucracy;
- young researchers have similar views with respondents performing applied researchers and having business experience.

The main general findings of our empirical research are the following:

- respondents strongly converge on focusing on use-inspired basic research and on the financing of the activities through the Governing Board rather pushing partners to raise funds autonomously;
- respondents tend to agree on the importance of multi- or inter-disciplinarity in performing activities and of involving single researchers or units and not entire organizations to avoid bureaucratization;
- but respondents strongly disagree on the role of companies (funding/strategic/operative) and the criteria for partners' selection.

CONCLUSIONS AND POLICY IMPLICATIONS

Our empirical research represents the first exploratory research supporting the political debate around the EIT organizational model and has lead to the identification of the most critical and controversial dimensions to be considered in designing the EIT (and similar boundary-spanning organizations). Moreover, the econometric analyses have highlighted which are the possible researchers' attributes explaining their different views on how they would like the EIT to be shaped.

This research has clarified which are strengths and the weaknesses of the different possible EIT configurations. For example, involving firms also at an operational level would probably ensure a stronger focus on generating exploitable knowledge and innovations and foster cross-profession mobility and changes in the academics' mindset and incentive system. On the other hand, there would be a risk of loosing a forward-looking strategy and a long-term orientation of research.

In terms of policy implications, public researchers seem to demand flexibility and operative autonomy (opting for single excellent individuals/teams), low bureaucracy, mobility of ideas/researchers across sectors and disciplines, and, at the same time, clear priority setting and financial support by the central Governing Board. Since the EIT will be based on networks of different stakeholders, we suggest that there is a need for an ex-ante and clear definition of partners' role, resource commitments, strategies and procedures for sharing results. The EIT role is to create the contextual conditions for cross-profession and cross-discipline collaboration in order to foster community spirit, reduction of uncertainty on the commercial value of research outcomes. In particular, the critical role of the EIT Governing Board consists in building shared vision to make partners 'voluntary' hostages of the EIT world, which means to stabilize initially the context to increase the focus on core activities (education, research and development).

The further developments of this research consist in a geographical extension of the survey at a European level and inclusion of researchers working for the private sector. Secondly, we expect to complement this empirical research with other types of analyses, such as case studies of the management of the EIT pilot projects. Finally, we argue that other attributes might be useful to explain the different levels of controversiality and criticality of the dimensions (e.g. differences across sectors in terms of tacitness of knowledge, need for critical mass or need for large infrastructures).

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