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GADGET: A cooperative project approach to developing university-industry linkages via the triple helix approach

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Abstract

The knowledge-based economy is widely acknowledged both in policy and practice as a 21st century reality. Rigid, traditional fact-based education no longer satisfies our changing economies and societies, nor does basic research satisfy the needs and demands of industry, and there is an evident mismatch of industry needs against the offerings of both teaching and research. There is a lack of communication and coherence from both sides, with government and policy actors additionally often playing the role of rule-maker, but not facilitator. To combat such a mismatch, it is fundamental to articulate a triple helix of actors within the knowledge triangle, bringing into line graduates' skills, industry demands, research offerings and innovation. The GADGET project, financed by the Lifelong Learning Programme of the European Commission, examines through an analytical, implementation and exploitation methodology these mismatches, proposing specific improvement schemes and policy influence. Due to the importance of energy and environment – also in line with current European policy – the action focuses on this specific sector and improving linkages between actors in this field. This pilot action is anticipated to be replicable across disciplines, industries and regions using a transferable methodology. This paper is intended to explain briefly the approach and methodology, as well as provide some preliminary results of the GADGET identification phase, currently in its final stages at the time of drafting.

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Keywords: GADGET; triple helix; university-industry cooperation; research; innovation; supply; demand

1. The GADGET concept background and the triple helix

Enhancing linkages between academia and industry for more efficient and professional knowledge transfer, as well as the generation of growth and jobs, forms an integral part of current European Union policies and objectives. In a determined attempt to address the traditional low performance of European universities and PROs in terms of knowledge transfer and innovation [1] as well as produce a more adequately qualified labour force, these policies crystallize in a series of initiatives; in particular, Education and Training 2020, Europe 2020 Strategy and its Flagships initiatives for Smart Growth (Innovation Union and Youth on the Move) and Inclusive Growth (Agenda for New Skills and Jobs) which concerns itself with developing an economy based on knowledge and innovation, as well as improving the situation of youth and other vulnerable groups to achieve the goal of having 75% of persons between 20 and 64 employed by 2020 [2]. The document particularly underlines the importance of re-building Europe following recent economic crisis via job-creation and innovation, whilst also underlining the importance of the energy sector as a key target for 2020.

Against this evolving background, both undergraduate students and companies' staff need to acquire critical skills and knowledge for carrying out professional activities to fulfill the current demands of society. Transnational issues and aspects are increasingly important, as well as a business-oriented approach. Although much effort is dedicated by Member States and European Union institutions to tend bridges between education and business to stimulate training and competitiveness, there is still much left to be done for these initiatives to reach their potential.

Since the Commission Recommendation 2008/416/EC [3], EU universities still find difficulties in managing and transferring their knowledge and R&D results in an optimum way; turning research results into tangible outputs is still a challenge for most of them; the integration of business needs and perspectives, intellectual property and knowledge transfer matters in undergraduate studies is still insufficient, students' lack of training on skills and abilities which are needed for current employment demands; and finally, internal procedures at PROs and firms as knowledge management and innovation objectives are concerned can still be improved in many ways. While aspects for improvement are clear at the general level, the situation turns more challenging when innovative industries are targeted. Due to the increasing importance of energy efficiency for future societies at the medium term, GADGET (a Lifelong Learning Programme project funded by the European Commission) focuses on environment and energy solutions, a sector which needs specialised teams to understand technical and business concepts and implications in quickly evolving scenarios and legal frameworks.

The "Triple Helix" approach is a recognised and workable approach to generating linkages and cohesion between the worlds of university and industry. The Stanford University "Triple Helix Research Group" defines this thesis as "the potential for innovation and economic development in a Knowledge Society lies in a more prominent role for the university and the hybridisation of elements from University, industry and Government to generate new institutional and social formats for the production, transfer and application of knowledge" [4]. In lay terms, this means bringing together all relevant actors within the knowledge triangle in an attempt to bring research priorities in line with industry needs, as well as complying with national and supra-national objectives and policies. At the same time, teaching and learning must be adequate for industry needs in terms of skills, capacities and knowledge. The Triple Helix Approach by Stanford University and the Triple Helix Association [5] also proposes three steps:

- a more prominent and inclusive role for the University / research organisation, on equal terms as Government and Industry in the knowledge society;

- a movement towards cooperation and integrated relationships between the three actors including the expected result that innovation policy be as a direct result of such interaction, rather than dictated by policy-makers;
- and, all three actors must modify their traditional roles, participating actively in the functional roles of the other, so-called "innovation in innovation" [6].

Within this framework, GADGET is designed to stimulate linkages, in particular in university-provided training for updating employee skills, the skills of future graduates, and the participation of industry in research and teaching. It will provide a means for adapting university experience to the needs of the labour market to boost regional economic development and to enhance the employability of graduates. These distinct linkages clearly fall in line with the above-cited steps and concepts. However, in GADGET, the helix has been modified to include University-Industry-Intermediary, with a secondary focus on policy-makers. This was the case to be able to reach a larger target group of SMEs via the contacts of the intermediary (business associations, chambers of commerce, etc.). Such multipliers enhance the outreach of the action, as well as providing vital insight into their clients' needs.

GADGET will conduct a pilot action on good practice between industry needs, training and exploitation of results in the field of environment and energy solutions in three countries, Austria, United Kingdom and Spain. These countries have been selected in order to form a knowledge transfer axis covering regions of Europe which have a rich entrepreneurial tissue in the industrial sector addressed. To gain an insight into the real needs and possibilities between the academic and private actors in the different countries, GADGET gathers 9 partners of different nature, which are articulated as triple helixes of knowledge and practice in each country. There will be one triple helix per country, composed of one HEI, one business intermediary (Chamber of Commerce) and one SME. This multifaceted and complementary structure will help understand and integrate the necessities and expectations of local and regional companies with the expectations and capacities of their HEIs. Also of importance, experience gained will be easily translated to other public-private partnerships from geographical areas and countries of similar innovation profiles.

2. **Methodology of the** GADGET project

GADGET – "Good Practice Pilot Action for Innovative Industries: Education, Training and Exploitation", is a 2-year long pilot project running from October 2012 – September 2014 and funded under the European Commission's Lifelong Learning Programme under the Erasmus strand [7]. It focuses on an innovative industry sector critical for the sustainable development of future societies – that of "environment and energy solutions" - with a genuine pro-competitive approach in terms of structure and training. This pilot action will serve as a tentative model to be replicated by other higher education institutions (HEIs).

The general objective of the project is to **conduct a pilot action in three countries (Spain, Austria and the United Kingdom) for good practice for industry needs, training and exploitation of results in upcoming areas of environmental and energy industrie**s. Within this general objective, a series of specific objectives seek to provide concrete and attainable actions and solutions.

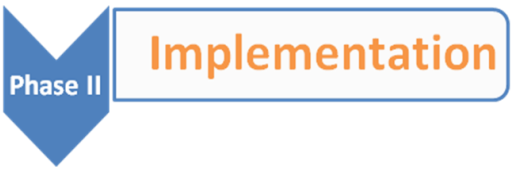
The composition of the consortium from different sectors (university – industry – business intermediary) enables GADGET to address three major identified challenges, which are:

i) mismatch of curriculum and the labour market,
ii) shortage of university-industry cooperation, and
iii) competence and skills enhancement of working adults in the environment and energy industries.

The project has been divided into three co-related phases as shown in the diagram below.
Phase 1: Identification - determining weaknesses, current processes, knowledge gaps and good practices;
Phase 2: Implementation - setting in motion specific collaboration schemes; and
Phase 3: Exploitation - transferring good practice to relevant stakeholders.

GADGET is intended as a pilot action. This means that it will test the hypothesis and, if sucessful, will serve as a tentative model to be replicated by other HEIs who can clearly follow the adopted methodology. GADGET has been constructed around a sound methodological base: **Analysis leads to conclusions, conclusions to action, and action to results.**

Phase 1: Benchmarking will be carried out through distributing surveys to HEIs, SMEs and intermediaries. The data collected from a minimum of 150 SMEs, 12 intermediaries and 12 HEIs will be analysed and compared among the participated countries.
The questionnaires are to examine the existing linkage between university and industry and its cooperation mode, training needs for current working adults, desirable quality of future graduates, research and technical needs exist within industry and the focus of HEIs. Subsequently, three country reports and one comparison will be drawn and presented in both written and interactive means.



Phase 2: The identified results in phase I from both supply (university) and demand (industry) sides will be transformed into three schemes and implemented targeting the universities, students and working adults: *Industry-orientated Lifelong Learning Training Scheme:* courses on identified topic (s) will be conducted for working adults according to the evaluation from the employers in Phase I. *Interdepartmental Scheme:* dialogue and communications will be spurred and as a result, new cooperation opportunities will be determined. *Invited Professor Scheme:* industry representatives will be invited to deliver guest lectures to helps students to understand the real situation of the labour market in the field and state of the art, and at the same time, it will facilitate the communication between university professors and the business world.

Phase 3: In the final phase, the philosophy, methodology applied and results of GADGET will be widely disseminated to other HEIs in the three countries. Relevant stakeholders will be spotted and be informed project information on a regular basis, thanks to the three-monthly newsletters. In addition, six “cafés” will be organised as an informal networking platform for researchers, SMEs and professors. Student’s involvement will not be ignored as they are also the primary target of GADGET. Finally, a conference will take place in Brussels with prominent speakers in the environment and energy sectors to share their successful stories on university-industry cooperation.

The working methodology and obtained results will be transformed to a handy and practical toolkit on the GADGET portal. Policy makers, top management, industry representatives or students can find the most

relevant and appropriate information in this one-stop shop to facilitate the replication of GADGET. Moreover, courses conducted in the Phase III will be available on the portal for wider outreach and impact.

The target groups of the project can be identified as three-fold to echo the triple helix approach utilised:
1) European HEIS (institutions, students, researchers);
2) Industry actors (intermediaries and especially SMES - in this case in the energy and environmental sectors), and
3) To a lesser extent, policy makers.

The project will reach out to these target groups during the project life via the intended activities, which contain a high-expected participation, and also through the identification of other relevant stakeholders with multiplier effects, such as industry intermediaries (Chambers of Commerce, associations) and HEI actors (university associations, such as EUA). The use of intermediaries and multipliers will be vital to reach the project's intended stakeholders, and this will be promoted via a stakeholder identification exercise. The project's activities are clearly beneficial and geared towards the development strategies of the intended target groups, and this will be a key message when communicating with target groups. SMEs, intermediaries and HEIs form part of the consortium, and external entities form part of the activities via, for example, the analysis, collaboration schemes and as recipients of intended results. Policy-makers will be interested in the project results, in particular the supply vs. demand reports and results of the pilot schemes.

Again, echoing the proposed items by the Triple Helix Research Group, the results and expected impact for HEIs include a greater cohesion with the needs of innovative industries, and enhanced employability for graduates. By gaining such cohesion, HEIs can offer a better service to the community, which assists to accomplish one of the main objectives of an HEI. For the industry sector, the project will have a large-scale impact in that it will ensure the re-training of existing staff to meet specifically identified needs, the provision of better-prepared graduates and the opportunity to work with researchers to provide answers to their innovation needs. For all, enhanced dialogue and cohesion is the biggest impact. Policy makers will have specific results to influence future actions. In such a sense, in line with accepted theory, we promote:

a) equal roles for the three actors proposed (plus government) to determine cooperation schemes, findings on needs and requirements;
b) movement towards cooperation and integrated relationships via joint definition of priorities and dialogue, plus joint research into gaps of supply vs. demand, in an attempt to influence policy-making and generate good practice; and
c) the inclusion of all actors into the traditional roles of others (e.g. industry actors teaching guest lectures).

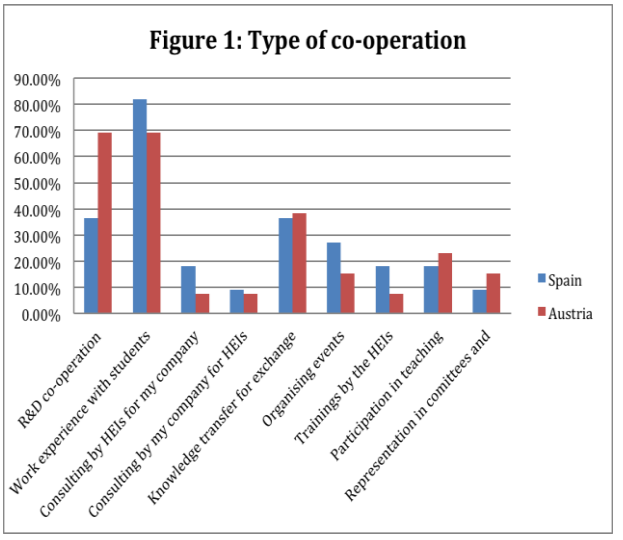
The intended change to be generated by GADGET is to provide a set of replicable activities, which will show the way to enhancing linkages between enterprise and education, in specific or generalised sectors. In the institutions targeted, the change will be tangible in that sustainable activities and linkages will be created assisting to bring together the worlds of education and work. On a European level, the project will provide an example of a three-tiered and cooperative approach to creating linkages, which is transferable in contexts and amongst sectors thanks to the national vs. European elements included and a methodology which is applicable in all contexts and industrial sectors.

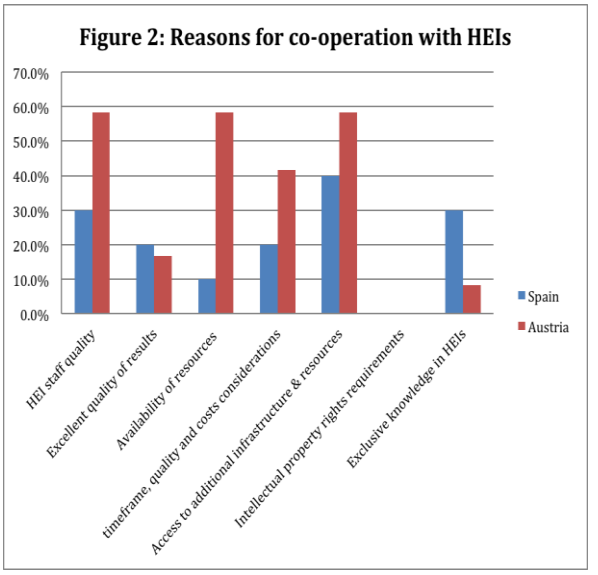
3. Preliminary Findings of the GADGET Identification Phase

The GADGET project is currently heading towards the end of phase 1 (Identification). In this section, we are going to introduce the preliminary data gathered from Spain and Austria. At the time of drafting, data from the third component (United Kingdom) was still being processed. Since GADGET is in its start-up stage, the findings discussed below do not represent the final results. However, the highlighted results suggested strengths and weaknesses of current curriculum, and university-industry cooperation modes in both countries.

As described earlier, the questionnaires are to examine the existing linkages between university and industry and its cooperation mode, training needs for current working adults, desirable quality of future graduates, research and technical needs exist within industry and the focus of HEIs. The target audience of this analysis is 50 SMEs, 4 universities and 4 intermediaries in each participated country. Questionnaires were sent out through target mailing to the environment and energy sectors or departments in the universities.

The majority of the responded SMEs, 11 in Spain and 17 in Austria, have a similar scale in size and annual revenue. Among these two groups, they also share the same percentage, 60%, of cooperation history with HEIs. As shown in figure 1, the most common cooperation modes between SMEs and HEIs are student placement, R&D cooperation and knowledge transfer for exchange in both countries. Despite of the similarity on the cooperation type, the driving force for the linkage varies.





Both Spanish and Austrian enterprises believed that the staff quality and access gained to additional infrastructure and resources in HEIs were on top of the list while considering the bi-sector cooperation. However, the difference lay on the availability of resources and exclusive knowledge in HEIs. Almost 60% of Austrian SMEs were attracted by the availability of resources in HEIs, whereas, there was less than 10% Austrian SMEs indicated that the knowledge exclusiveness attracted them to approach HEIs. On the contrary, only 10% of Spanish SMEs agreed attractiveness of resources availability whilst 30% of them revealed that exclusive knowledge in HEIs was an important factor. Coincidently, none of them approached HEIs for intellectual property rights' issue.

Most of the collaboration was established through direct contacts, which means that either companies approach HEIs or vice versa. Recommendations or response to tender were relatively rare. The satisfaction of university-industry cooperation varies a lot from Spain to Austria. In Austria, there was no negative data for degree of satisfaction but not all HEIs in Austria would like to intensify the cooperation with companies in the energy or environment sector. In contrast, it showed that the university-industry cooperation left dissatisfaction to the Spanish HEIs only, especially when SMEs provided consultancy service.

In the survey, we also looked at how the current employers evaluate graduates' work performance and competence according to their observation. In our targeted sectors, Spanish SMEs were satisfied with graduates' competency in engineering and technological skills, which were rated very important by all respondents. Nevertheless, the Austrian counterparts, 64%, considered entrepreneurial competency was more important than the hard skills and the majority of them were happy with the performance of the graduates.

On the other hand, both countries agreed that communications skills were the second crucial element in workplace and that there were rooms for improvement. The data suggested that Spanish graduates were not very well-prepared in entrepreneurship, innovation management and foreign language proficiency. Meanwhile, Austrians were not satisfied with graduates' leadership competency, project management and entrepreneurship.

According to the preliminary results, it showed that the enterprises in the two countries had a slightly different

focuses on graduates' competencies. For instance, the driving force to establish collaborative relationship in Spain valued so-called "hard" skills, whilst in Austria, the emphasis was placed on entrepreneurial competence. The similarities and differences found in the survey will assist to largely improve the mismatch and lack of communication in the university-industry cooperation. The final results become a base for the second phase for implementation of GADGET [8].

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