

# Barriers and Incentives for setting-up Industrial Ph.D. in Greece

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**Abstract.** Higher education, and its links with research and innovation, plays a crucial role in individual and societal advancement. Higher Education Institutes (HEIs) provides the highly skilled human capital that contemporary Europe needs to create jobs, economic growth and prosperity. However, in meeting the increased demand for industrial workers and cross-cutting researchers, higher education training methodology must be better aligned with the needs of the knowledge-intensive labour market and in particular with the requirements of small and medium-sized enterprises. GIENAHS Alliance intends to contribute to the strengthening of the "knowledge triangle", linking education, research and innovation, improving at the same time, the quality of teaching and learning, the future mobility of students and staff and cross-border cooperation. Based on our experiences from the GIENAHS project we present the current key aspects emerged in Greece that can help Greek SMEs to develop their internal skills to face innovation in a more structured and systematic way and, on other side, the Greek HEIs to understand industrial practice for improving their interaction with SMEs.

**Keywords:** HEIs, SMEs, Industrial research.

## 1 Introduction

Higher education, and its links with research and innovation, plays a crucial role in individual and societal advancement, and in providing the highly skilled human capital that Europe needs to create jobs, economic growth and prosperity.<sup>1</sup>

However, in meeting the increased demand for industrial workers and cross-cutting researchers, higher education training must be better aligned with the needs of the knowledge-intensive labour market and in particular with the requirements of small and medium-sized enterprises that often are not able to keep pace with multidimensional

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<sup>1</sup> [https://ec.europa.eu/education/policies/higher-education/about-higher-education-policy\\_en](https://ec.europa.eu/education/policies/higher-education/about-higher-education-policy_en)

innovation. SMEs are the backbone of Europe's economy and represent 99% of all businesses in the EU but only 22% of them participate in European programmes and are really oriented towards innovation.

The main obstacles to innovation encountered by SMEs are:

- low internal competences and skills for innovation (limited capacity of: innovative thinking, strategic approach to technological innovation, designing innovation roadmaps, leading research considering the entire SME innovation cycle, from idea generation to marketing);
- lack of experience of effective interaction with HEIs or research centres;
- innovation through co-operation might be too risky.

The main obstacles encountered by HEIs in the interaction with SMEs are:

- mistrust of SMEs towards HEIs: often HEIs produce technical and scientific results as “potential technologies”, with a long-term orientation, that qualify them only in the scientific field, without significant economic impacts on SME’s growth and competitiveness in short or medium term;
- no systematic interaction with SMEs: universities prefer to interact with large companies, that are better structured and have an easier access to finance;
- researchers are less motivated to conduct research in SMEs: they consider the experience in large companies more challenging and generally prefer the academic career.

Therefore, a more structured focus of HEIs on SMEs is still missing, as well as a better MATCH between SMEs and HEI is still required. A better interaction between SMEs and HEIs can promote SME oriented training paths for researchers that can see thus a genuine career prospect within SMEs. Therefore, the main purpose behind the GIENAHS project [1] ([www.gienahs.eu](http://www.gienahs.eu)) is to upgrade current methods and tools of interaction HEIs/SMEs and to develop and test a European standard for a joint (SME+HEIs) designing industrial PhD paths “SMEs oriented” focused on key aspects enabling innovation capacity in SME,.

## 1.1 Project Description

GIENAHS intends to take up the challenge of contributing to the growth of innovation culture in European SMEs (Small and Medium Enterprises) by developing a modern and common European standard for interaction between HEIs (Higher Education Institutes) and SMEs through a new approach for a dynamic and stronger collaboration between HEIs and SMEs. The new approach will be tested through the joint design of a first industrial PhD path for SMEs, along with a proposal of harmonization of Industrial PhD disciplines in Europe, to concretely promote the mobility of researchers.

The GINEAHS challenge resulted very particular in Greece where there is a significant knowledge gap between SMEs needs and HEIs research plans, where SMEs need to develop their internal skills to face innovation in a more structured and systematic way, while HEIs need to improve their ability to interact with SMEs so that researchers also can see a genuine career prospect within SMEs.

GIENAHS main goals are [a] to share best practices of interaction HEIs/SMEs at EU level, [b] to define an EU standard of HEIs/SMEs interaction to better enhance the territorial competitiveness due to the co-creation of knowledge and innovation [c] to define a new methodological approach to design industrial PhD paths “SMEs oriented” targeted on the specific needs of European SMEs that will pragmatically allow the integration of different cultural approaches to R&D, [d] to test the new methodological approach by designing jointly (HEIs+SMEs) a new industrial PhD path “SMEs oriented” and [e] to propose the harmonisation of industrial PhD disciplines in Europe, to concretely promote the mobility of researchers;

## 1.2 Industrial PhD definition

Nowadays the demand for highly qualified researchers in the industry has increased considerably highlighting the need to train PhD students for a career outside academia. While most traditional PhD programs do not offer the “industrial” or “business” training, the fundamental skills and techniques developed as a graduate student or a postdoc are extremely valuable for working at a high-profile company. Nevertheless, there is no widely accepted definition for “industrial” PhD so far. An Industrial PhD could be normally a three-year industrially focused research project and PhD education in parallel which is carried out in collaboration between a private company or public sector organization, an Industrial PhD candidate and a Higher Education Institution (HEI). An Industrial PhD student could be employed in a company and enrolled at the university. The company could apply for funding from various financing sources and the student is employed by the company and receives a wage during the entire Industrial PhD project. The student shares her/his working time between the company and the university, and spends all the work time on the Industrial PhD project.

The Industrial Doctorate or Industrial PhD (I.PhD) as an innovative model of university-industry cooperation offers a potential answer to the question of how to equip engineers with knowledge, competences and skills relevant to their professional qualification requirements. However, the concept has rarely been explored among academic scholars and only little empirical work exists on the framework and practical management of cooperative PhD constellations between industry and academia [2].

Among GIENAHS projects goal is to test the new approach through the joint design of a first industrial PhD path for SMEs, along with a proposal of harmonization of Industrial PhD disciplines in Europe, to concretely promote the mobility of researchers.

## 2 Current Achievements

To achieve GIENAHS goals, a Survey phase, using two sets of questionnaire with similar questions, were developed aiming to get insights the existing approaches of interaction between HEIs and SMEs. After pre-testing with some HEIs and some SMEs, two common shared questionnaires were online provided 9 questions addressed to HEIs and 6 questions addressed to SMEs. Similar questions were defined for both targets (HEIs and SMEs) enabling comparative analysis of the feedback collected. A total of 4-6 response alternatives were given as well as a possibility to provide open comments

for each question. The rank of relevance was also given in case of multi alternative response selection. Besides the questions there were also two open questions. To get the responses grouped country wise a specific password for each country was used. To maximise the willingness to fill the questionnaires the ambition was to have them as short and simple as possible.

The Criteria for sample creation (HEIs and SMEs) includes: a good distribution over the respective countries, age and size of the companies, personal contacts and knowledge about possible ongoing HEI/SME collaborations. In most cases the communication has been performed via e-mails but also interviews via telephone have been undertaken anticipating short information about the project. All the survey respected the recent updating of GDPR rules on voluntary participation and on keeping anonymous the provided feedback. The selected Greek SMEs and HEIs have been chosen according to project criteria prioritizing the possible on-going HEI/SME collaborations.

## 2.1 Greek Results

GIENAHS offered to 8 Greek HEIs and 23 Greek SMEs the possibility of expressing their sceptics about their interaction at EU level by inviting them to submit the uploaded online questionnaire. In Greece we collected 8 responses from HEIs and 13 from SMEs.

A major finding of the data analysis of the collected questionnaires is that Greek SMEs are rather sceptical on how a PhD program that focuses on research could be adjusted to specific market needs and how this could lead to design of new innovative products/services. Moreover, SMEs are interested in research collaboration with HEIs with the aim of building new scientific skills, increasing SME's market value and exchanging professional knowledge; Relevant notice was the information about administration and assistance issues that need to be resolved. Surprisingly, it seems that Greek SMEs do not believe that the lack of trust is a major barrier for SME-HEI collaboration since they argue that they can build a trustful physical relation with HEIs. Greece is a small country thus a SME can easily create communication channels with HEIs. Participation in workshops and joint project proposals resulted to be not an important incentive for the creation of an interactive relationship between SMEs and HEI. It seems that SME are not able to ensure financial coverage for PhD candidates thus to guarantee their scientific careers within SME. They have limited financial capacity for business investments in R&D activities. Beyond that, they not that keen on leading an expert/employee in innovation culture. This is something that entails the creation of prerequisites that will lead SMEs to invest in training and capacity building aiming at innovation.

The most significant expected outcome from the collaboration of HEIs – SMEs, according to the results, is effective knowledge transfer and the design of new products and methods including innovation. Certainly, there is a knowledge gap between the perceptions that share SMEs' representatives and the improvements that have been already listed in recent research advances. The establishment of an Observatory Board (with the participation of SMEs & HEIs) can serve as the vehicle for bridging the gap between future research orientation and practical requirements, challenges that should

be considered for future research. The project highlighted the need for more detailed and specified methodology on how a collaborative industrial PhD program between SME and HEI that can [a] define a formal framework that ensures compact and substantial information flow [b] provide external funding and economic profits [c] promote new innovations/products/processes/methods and [d] ensure an effective knowledge transfer in both directions.

### **3 Conclusion and Future Work**

Our first results indicate that there exists cooperation between the Greek HEIs and the Greek SMEs, but it is bounded by the differences in organizational goal, shortage of required project duration and financial support. To overcome the barriers of two different types of organization a program of industrial PhD can work as a bridge between the SMEs and the HEIs. The statistical analysis of the collected Greek questionnaires shows that, HEIs have good levels of interest to collaborate with SMEs to apply their research findings and knowledge. To maintain the cooperation and the knowledge transfer between organizations, the financial support as well as the length and depth of such projects are vital. The Greek economy was hit by the global economic crisis thus an industrial PhD program can support innovation in small and medium enterprises and it is crucial to cover the financial support of the potential researchers. The next step is to promote the use of the produced industrial PhD by the Greek government for enhancing new methods and tools of interaction HEIs/SMEs in Greece based on the results of GIENAHS project by supporting a small group of PhD students.

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