Doctoral Studies in the Context of the Bologna Process: Industrial Doctorates in Greece

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ABSTRACT

There is a major shift, recently, in the structure, content and even the very focus of doctoral studies in Europe - both for universities and students themselves. In the context of the Bologna Process, at the Berlin meeting in 2003, ministers responsible for higher education in the Member States agreed to place doctoral studies at the service of the effort to achieve the EU’s research objectives, acting as a link between the European Higher Education Area (EHEA) and the European Research Area (ERA), with the aim to serving the overarching economic purpose. Accordingly, in this paper, we will attempt, first of all, to highlight recent changes in doctoral studies in Europe and describe the corresponding developments in Greek legislation. Finally, we will focus on a very recent trend concerning doctoral studies in Greece: industrial doctorates

Keywords: Bologna Process, Comparative Approach, Industrial Doctorates, Third Cycle

I. INTRODUCTION

The production of new knowledge, which is often a task and the major ambition of doctoral candidates, is no longer considered exclusively an academic matter, but a strategic resource in emerging knowledge societies. Doctoral studies have become the subject of institutional management, national policy, funding programmes, as well as supranational incentives, regulations and measures. The aim is their best integration into the existing knowledge and innovation systems. A common thread seems to be the intention to establish a more constructive interaction between researchers and the market, with research being less embedded into the ‘traditional’ framework of higher education, but in close dialogue with professional bodies and the labour market.

In this paper we will attempt to document the changes in the legislative framework governing doctoral studies and highlight the emergence of a recent trend that concerns Greece: industrial doctorates. First, we will refer to the Bologna Process and the process of the formation and characteristics of the third cycle of studies. The modernisation of doctoral studies and the intention to realise collaborations between university institutions and industrial partners was prioritised in order to enhance the global competitiveness and attractiveness of the EHEA. Emphasis will also be given to the Salzburg principles (2005) and the contemporary content and focus of doctoral studies in the EHEA. However, the fulfilment of these commitments depends on the coordinated efforts of national policymakers, public authorities, institutions, staff, students and other stakeholders at both national and sub-national levels, as well as the appropriate coordination at the level of the EHEA. The solutions to common challenges in the EHEA countries lie in the political support and ownership of all the stakeholders. Consequently, after briefly reviewing the current implications of doctoral studies in Europe, we will focus on Greece by describing the current legislative framework for doctoral studies in the country and presenting the most recent developments regarding the introduction of industrial doctorates.

II. THE BOLOGNA PROCESS AND THE THIRD CYCLE OF STUDIES IN HIGHER EDUCATION

The Bologna Process1, launched essentially after the Sorbonne Declaration of 25 May 1998, is the product of a voluntary political commitment of the participating countries to reform their higher education (HE) systems within a framework of common principles and a commonly agreed goal, renewed2 almost every two years3. This also includes the Bologna commonly agreed objectives in the Member States’ own HE institutions. In the meantime, at the Ministerial Meeting in Budapest and Vienna, 11-12 March 2010, the EHEA was officially launched. In this sense, the renewed focus in the current period we are in refers more to the issues at the top of the agenda of the Process to be implemented.

1 Today, the Bologna Process involves 49 states, countries and entities and a number of supranational actors such as the EU, UNESCO, the European Students’ Union, etc.
2 One could distinguish between two periods in the evolution of the Bologna Process. The period 1999-2005, up to the Ministerial Conference in Bergen, Norway (19-20 May 2005), marks the phase of formulating the basic principles, objectives and axes of action of the Process. The second phase, which is still evolving today, can be characterised by the effort to implement

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taking policy initiatives to enhance the comparability, compatibility, attractiveness and transparency\(^1\) of Member States’ HE systems, to promote mobility of students, teachers, researchers and administrative staff, to support Lifelong Learning\(^2\) (LLL), the link between HE and research and more recently – following the London meeting in 2007 – the consolidation of student-centred learning–learning outcomes\(^6\). In particular, on the issue that concerns us here, at the Berlin meeting in 2003, the formulation of the third cycle of studies was included in the reform of the structure of the European HE. This development was fueled, among other things, by the belief that doctoral studies would help to promote closer links between the EHEA and the ERA (Kehm, 2007). Following this initiative, in February 2005, a Bologna Seminar organised by the EUA in Salzburg\(^3\) formulated the ten basic principles governing the third cycle of studies. The recommendations, known as the Salzburg recommendations, were agreed by the Ministers responsible for HE in the member states of the Bologna Process, and are seen as the cornerstone for modernising doctoral studies in the countries of Europe. More specifically, the Salzburg recommendations for the third cycle of studies concern: a) the promotion of knowledge through original research – doctoral training should increasingly respond to the needs of a labour market broader rather the academic one, b) the promotion of doctorates embedded in institutional strategies and policies - in other words, doctorates should be able to address contemporary challenges and include appropriate opportunities to facilitate the careers of their holders, c) the formulation and development of common European doctoral curricula - attention is given to the diversity of doctoral programmes; d) doctoral research candidates should be recognised as early-stage researchers with professional rights that contribute to the production of new knowledge; e) doctoral programmes should aim to produce a significant amount of academic work, based on different types of innovative practices proposed by universities across Europe, bearing in mind that different solutions can be suitable in different contexts, f) supervision and evaluation for the successful completion of doctoral research should BE conducted in a transparent and compatible framework between the doctoral candidates, supervisors and the institution; g) the duration of doctoral studies should be between three and four years of full-time employment; h) the promotion of innovation, interdisciplinarity and transferable skills should characterise doctoral education, (i) increased mobility and cooperation between university institutions and other partners through the promotion of innovative structures; and finally, (j) increased funding for research, given that the development of quality doctoral programmes and their successful completion by doctoral candidates requires sustainable funding.

The objectives formulated at the ministerial meetings following the Salzburg principles in the context of the Bologna Process seem to be in alignment\(^4\). Thus, interdisciplinary research, training in transferable skills, mobility-networking through the development of common curricula, the need for quality assurance in doctoral studies, original research, broadening the content of studies towards the needs of the labour market, funding and finally the creation of an attractive institutional environment and research excellence, were part of the objectives of the third cycle over the years. The common thread seems to have been the willingness to enhance constructive interaction between researchers and market forces, with research being in close proximity with professional bodies and the labour market. Similarly, the learning outcomes attributed to doctoral studies at level eight of the EQF highlight the importance of transferring the appropriate competences and skills to enable researchers to judge, analyse and synthesise innovative ideas in order to develop and pursue a professional career outside the academia. On the other hand, they focused on the quality of research: researchers should contribute to the production of research, expanding their frontiers, while having material capable of being published in nationally or internationally reputable journals (Crosier et al., 2007).

In summary, in the framework of the Bologna Process, the creation of industry and business-related doctorates is proposed, innovative, with a specific structure and duration, which can act as incentives for economic growth and people’s prosperity. The basic principles of doctoral studies in Europe, established in Salzburg, remain unchanged. European universities are attempting to develop a distinctive model of doctoral education, adapted to different contexts to produce excellent and original research in accordance with academic standards. Except for the diversity of practices in doctoral studies, it is possible to create and in common develop inspiring ideas between institutions, adapted to their own legal and academic contexts. The change initiated in 2005 by the EUA in Salzburg under the leadership of the universities is now tending to become a reality, as doctoral studies in the

\(^{1}\) Two cycles (undergraduate, postgraduate), ECTS, recognition of qualifications, quality assurance, external dimension, etc.

\(^{2}\) The objective of developing the LLL first appeared in Prague in 2001. The Ministers responsible for AE in the Member States stressed that it would make a significant contribution to the reconstruction of European societies and that it is essential to meet the challenges posed by the use of new technologies.

\(^{3}\) Learning outcomes are understood as “formulations” of all that a learner knows, understands and can do after completing a learning process, and the relevant definitions refer to knowledge, skills and competences. The terms knowledge, skills and competences, which do not have a common meaning in each Member State, are understood as the result of assimilating information through learning’ (knowledge), the ability to apply knowledge and use know-how to perform tasks and solve problems’ (skills) and ‘demonstrated competence in the use of knowledge, skills and personal, social, and/or methodological abilities in work or study situations and in professional and/or personal development’. (Stamelos et al., 2015, pp. 68–69)

\(^{4}\)The Salzburg recommendations were co-developed in the city of Salzburg as part of a Bologna Seminar organised by the EUA. They emerged and evolved from ongoing processes of exchange of good practice between European universities. This demonstrates that beyond the diversity of practices concerning doctoral education in Europe, it is possible to create and develop inspiring ideas together, adapted to the legal and academic contexts of the institutions. (Hagall, Saenen, & Borrell-Damian, 2019, pp. 7–16).

\(^{5}\) It is obvious that in parallel with the Bologna Process, before and after the publication of the Salzburg I & II Recommendations in 2010, further important developments were launched with the EUA as the main protagonist, culminating in the establishment of the European University Association Council for Doctoral Education (EUA-CDE) in 2008. For a brief review of these developments see. and Lazana (2018). In the same context, however, we should also include funding that comes from the EU, through the Erasmus+ Programme for example, and supports policy processes undertaken at the European level (Bologna, EUA initiatives, etc.).
European area are being reshaped - the third cycle of studies (Hasgall, et al., 2019, pp. 26–34).

### Table I: The Third Cycle of Studies in the Bologna Ministerial Documents

<table>
<thead>
<tr>
<th>Year</th>
<th>Communique</th>
<th>References to the third cycle in the Bologna ministerial documents</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>Berlin</td>
<td>research training interdisciplinary-diversity increased mobility at doctoral and post-doctoral level European networking and cooperation in doctoral studies financial support - funding of research alignment of doctoral qualifications within the framework of the EHEA aiming at research and innovation</td>
</tr>
<tr>
<td>2005</td>
<td>Bergen</td>
<td>quality assurance - supervision - evaluation completion time 3 - 4 years interdisciplinary - competitiveness increased mobility and cooperation treating doctoral students as early-stage researchers increasing mobility and cooperation fluid access/progression between study cycles integration of doctorates into institutional strategies and policies labour market, careers and competitiveness funding of researchers</td>
</tr>
<tr>
<td>2007</td>
<td>London</td>
<td>linking education and research through a learner-centred approach innovation and interdisciplinarity linking research and the labour market quality assurance and promotion mobility and career development of doctoral candidates (bridge between the EHEA &amp; ERA)</td>
</tr>
<tr>
<td>2009</td>
<td>Leuven/ Louvain</td>
<td>linking education and research through a learner-centred approach innovation and interdisciplinarity linking research and the labour market quality assurance and promotion mobility and career development of doctoral candidates (bridge between the EHEA &amp; ERA)</td>
</tr>
<tr>
<td>2012</td>
<td>Bucharest 9</td>
<td>mobility and career development of doctoral candidates (bridge between the EHEA &amp; ERA)</td>
</tr>
<tr>
<td>2015</td>
<td>Yerevan</td>
<td>developing innovation and entrepreneurship research-teaching-learning interface research linked to innovation</td>
</tr>
<tr>
<td>2018</td>
<td>Paris</td>
<td>research linked to innovation</td>
</tr>
<tr>
<td>2020</td>
<td>Rome</td>
<td>enhancing the mobility of young researchers research oriented towards the Sustainable Development Goals (SDGs)</td>
</tr>
</tbody>
</table>

### III. Doctoral Studies in Europe

Increased public investment in doctoral education, as a result of the new priorities regarding the third cycle and the connection of the EHEA and ERA, has led to an increase in the number of doctoral graduates (Germain-Alalmartine et al. 2021, OECD 2016). But they also created a problem. Traditionally, after graduation, the priority of PhD graduates has been to secure an academic tenure-track position (Sauermann & Roach, 2012). In recent years, however, there have been few who have succeeded (OECD, 2016). Consequently, more and more doctoral graduates seek jobs outside academia (Bloch et al., 2015).

The private sector is increasingly becoming a destination for doctoral degree holders, which corresponds in part to the increasing R&D capacity of the private sector (Bloch et al., 2015) and the growth of industry in their regions (Germain-Alalmartine & Moghadam-Saman, 2019). However, the skills acquired during doctoral studies do not necessarily meet the requirements of employers. There are significant skill-mismatches in the fields of study, of excessive education or qualifications (CEDEFOP, 2016). Overeducation and overqualification are closely correlated and lead to negative effects on the earnings and job satisfaction of PhD holders (Gaeta et al., 2016). Relatively, public criticism of doctoral education has become more pronounced: too long, too many dropouts, too much specialization, questionable quality of supervision, lack of competencies for non-academic labor markets.

At the same time, developments in relation to the third cycle of studies in the framework of the EHEA have also led to the formulation and promotion of the model of "structured doctoral education". Doctoral Schools is an important development in European level aiming at moving away from a highly individualised model based on the interpersonal relationship between supervisors and doctoral candidates (apprenticeship model). This development, adopted by several countries (EUA-CDE, 2016) has three, notable, consequences: (a) the dominant professor-supervisor model of doctoral studies ceased to be the only one; (b) the focus on the process of support (viva) and subsequent award of the degree, with emphasis on the product, the 'thesis', shifted towards the process of doctoral education-structures, content and quality; and c) access to doctoral education and the process of obtaining a doctoral degree became increasingly embedded in a dense layer of regulations, criteria, defined rights and obligations, evaluation procedures and controls on success (Kehm, 2006, pp. 73).

Thus, new forms of doctoral education emerged linking university and industry more systematically: the PhD by Published Work, the Taught Doctorate, the Practice Based Doctorate, the Professional Doctorate, the Joint Doctorate, the Cooperative Doctorate, the New Route PhD, and the Industrial Doctorate (Bao et al., 2018). The last one, the Industrial PhD, is mostly awarded in the field of engineering. The candidate’s research work is conducted, for example, in the R&D department of a company and is oriented towards solving a specific problem or issue. The research work is supervised by a senior engineer of the company, while the taught elements, theory and methodology, are supervised by a university professor. Research topics often arise from working at this company during the internship. By creating programmes that link universities with industry and the public sector, it is hoped that doctoral graduates will transfer and apply the knowledge they gained during their studies. This is part of a knowledge-production, in which teams of researchers from different contexts and disciplines work together on problems and products. The links between government, industry, and university in this new mode of knowledge production are often referred to as the "triple helix" (Bao et al., 2018).

Industry-based doctoral programmes give doctoral researchers a more positive orientation towards working with industry (Harman, 2004) and industry funding can enhance their career prospects (Harman, 2002). Such programmes can also give graduates a more nuanced understanding of the different skills required in each employment sector (Manathunga et al., 2009).
IV. GREEK REALITY

A. The Legislative Framework for the Selection of Doctoral Candidates in Greece

According to the Greek legislation, doctoral programmes set as their main priority the development of competent researchers for the advancement of science. They aim to conduct high quality scientific research, to promote original research approaches in their scientific field, and create scientists capable of contributing both to the progress of science and the development of existing or new technologies, while attributing academic prestige and international distinction. They include the preparation of a doctoral thesis for obtaining a doctoral degree. The duration of a doctoral thesis is set at a minimum of 3 years and a maximum of 6 years. The preparation of a doctoral thesis is a particularly demanding and time-consuming process, which requires close cooperation between the supervisors and the doctoral candidates (L. 4485/2017, par.2, ar.39).

Doctoral studies are organised and offered free of charge by the autonomous departments of the Universities that operate Postgraduate Studies Programmes (PSP). They follow the terms of the relevant regulations for doctoral studies of each department and the doctoral degrees are awarded by the University to which the department belongs. The doctoral graduates can be employed in research, education and business in Greece or abroad. At the same time, for advancing their career prospects they can contact the University’s Liaison Office. For their selection, the interested doctoral candidates must: a) have a degree from a Greek Higher Educational Institution (HEI) or a similar foreign university recognised by the Interdisciplinary Organisation for the Recognition of Academic Titles and Information (D.O.A.T.A.P. in Greek) and b) hold a Master’s Degree in Greek or recognized by the D.O.A.T.A.P., or an integrated master’s degree (Eurydice, 2021). Regarding the right to supervise doctoral studies, the legislation in force provides for faculty members of grade A, associate or assistant professor of the relevant or other Higher Educational Institution, researchers of grade A, B or C of research centres12, including the research centre and the Institute of Medical and Biological Research of the Academy of Athens. For the supervision of the doctoral thesis, the secretariat of the relevant University Department certifies that the faculty member has supervised no more than eight (8) doctoral theses13. Also, special reference is made by the secretariat in case the supervisor is unable for any reason to act as a supervisor and is replaced by decision of the Assembly of the department 12. In the case of co-supervision, one supervisor is appointed by each institution/agency 13. The relevant parameters for the preparation of the doctoral thesis, from the selection of the doctoral candidate to the awarding of the doctoral degree, or the granting of a single or separate degree, in the case of cooperation between institutions, are clarified by the Special Cooperation Protocol (SPC), which is drawn up by the cooperating departments - institutions, approved by the Senate and the collective governing bodies of the research centres (Eurydice, 2021).

The awarding of a doctoral degree by the Hellenic Open University (HOU) is governed by the current legislation on Higher Education and the individual provisions, as defined by the founding Law 2252/1997 of the Foundation. The internal regulations for doctoral studies of the institution concern the admission of doctoral candidates and the evaluation of the progress of doctoral theses. The subjects of doctoral theses are determined separately on the basis of the internal regulations of each faculty. The duration from registration to completion of the doctoral thesis may not be less than 3 years. The candidate wishing to carry out a doctoral thesis at the HOU should contact a faculty member of the HOU whose research interests are related to the field in which the candidate wishes to carry out the thesis. The faculty member should assess the qualifications of the candidates, whether their research interests coincide with the research interests of the faculty member, and the workload of the faculty member, and accordingly encourage the candidates to apply to the Dean's Office of the Faculty. The Dean's Office, on the basis of academic criteria and with the positive recommendation of the faculty member who is to supervise the doctoral thesis, shall judge whether the candidate does indeed meet the requirements for the preparation of a doctoral thesis and shall appoint as a rapporteur the HOU faculty member who proposed the Doctoral Candidate. The rapporteur proposes the three-member Advisory Committee (AC) (Regulations for Doctoral Studies14).

B. Doctoral Studies in Greece: The Industrial Doctorates

In Greece, in line with the trends in OECD countries, the total number of PhDs has tripled compared to 2000 and in almost twenty years has reached about 44,000, i.e., 2% of all AE graduates. The largest share of doctoral degree holders is concentrated in the fields of Humanities, as well as in Health Sciences and Education. More specifically, 1,685 new PhDs were awarded by Greek HEIs in 2019, where 28.5% of PhDs were in Medicine & Sciences, while 23.3% completed their studies in 5 years. In terms of the geographical distribution of new PhDs, based on the University where they supported their thesis, newest PhDs in 2019 received their PhD from universities in the Region of Attica, followed by the Regions of Central Macedonia, Western Greece, Crete, Epirus and Thessaly. Regarding the source of funding for doctoral studies, personal savings and family support were the main resources on which the PhDs relied. The average age of obtaining a PhD in Greece is 35 years. And while Greek scientists participate to a very large extent in European competitive programmes (6th place in the relevant ranking), Greece is consistently ranked at the bottom of international indicators in terms of innovation output. Thus, despite

12 Law 4310/2014 no.13a.
13 In some departments the maximum number of supervisors is 5 (five).
14 N. 4485/2017 no. 39., no.40.
15 Law 4009/2011 provided for the establishment of doctoral schools, but they were not implemented. In particular, Article 39, para. 1 to 6, of Law 4009/2011 on the “Structure, operation, quality assurance and internationalization of higher education institutions” refers to the planning and organization of the third cycle of studies as the responsibility of the Universities. There, a doctoral studies course programme is organised, which contains the titles of compulsory, optional compulsory and optional courses, their content, their weekly teaching hours, which include any form of teaching work performed and the time sequence or interdependence of the courses (Law 4009/2011, 4276).
16 Available at: https://www.eap.gr/education/phd-regulations/, accessed on: 01.25.2022
significant scientific excellence, knowledge is still not a significant growth factor\(^5\).

As it appears, based on the data presented earlier, but also on the current legislative framework for the selection of doctoral candidates as presented in the previous section, in Greece we are acting in accordance with the developments concerning doctoral studies, both in terms of participation and curriculum/syllabus. The award of a doctoral degree requires the completion of a three-year- original research, while the possibility of joint doctoral programmes is provided for, in the context of cooperation between two institutions (Law 3404 of 2005) and the establishment of doctoral schools (Law 4009/2011). Cooperation with other universities, both in Greece and abroad is also provided for (Law 3549/2007), in the context of the objectives of the EHEA and EU funding.

The General Secretary of the Ministry of Education, has recently, presented the elements of the national strategy for HE—at the Rectors’ Meeting in April 2021: the aim of the Greek government is to strengthen the international standing of Greek universities and their contribution to the transformation of the growth model of the Greek economy through research, innovation and education with emphasis on cutting-edge technologies supporting the view that, in the country, we are following international developments in what concerns the focus and the content of doctoral education\(^6\).

The total funding for all the projects presented amounts to EUR 604 million. Of this amount, 36.5 million is for industrial doctorates. Moreover, in accordance with the current legislative framework, the possibilities for developing such partnerships are provided, which have given the opportunity in recent years to significantly strengthen cooperation between universities and the market at the level of the third cycle of studies. In particular, through private funds, a series of collaborations between the Stavros Niarchos Foundation and public bodies, or the Association of Greek Industrialists and Universities, and through the possibilities offered by the Erasmus+ programme, there is already an increasingly clear attempt to link research produced in Greece with the labour market and the economy through the development of industrial doctorates.

Specifically, the National Centre for Natural Sciences Research (NCRC) “Demokritos”, sponsored by the Stavros Niarchos Foundation, announced, in 2017, the implementation of the "Industrial PhD and Post-Doctoral/Adjunct Researchers Fellowships” programme in order to support applied research of industrial orientation\(^7\). In addition, the Foundation for Research and Technology-Hellas (FORTH), since 2018, with the implementation of the project "Advancing Young Researchers’ Human Capital in Cutting Edge Technologies in the Preservation of Cultural Heritage and the Tackling of Societal Challenges - ARCHERS”, under the exclusive sponsorship of the Stavros Niarchos Foundation (SNF), aims to support young-graduate- doctoral candidates and post-doctoral fellows, who are at the beginning of their careers, through education and training in interdisciplinary cutting-edge research and technological fields (study and conservation of cultural heritage and the tackling of societal challenges in the fields of environment, energy and health, cutting-edge fields within FORTH’s high-quality competitive research activities). The project involves researchers working with businesses and industry ("ARCHERS Project Stavros Niarchos Foundation FORTH Fellowships - ARCHERS Project Stavros SNF FORTH", 2018).

University of Patras and the Chamber of Achaia—a prefecture in Greece—joined the Patras Innovation Quest initiative\(^8\) (Patras IQ). This\(^9\) is a platform for linking research conducted in academic institutions with productive institutions, in which the Ministry of Development & Investment, the Ministry of Education & Religious Affairs, the University of Patras, the Hellenic Open University, the Region of Western Greece and the Chamber of Achaia participate. Within the framework of Patras IQ, the University of Patras decided to establish the "UPatras IQ Industrial PhD Program". This programme supports four-year doctoral programmes of industrial orientation, with the cooperation of the University of Patras, a private industrial company established in Greece and a PhD candidate. The aim of the programme is to create strong and fruitful links between academia and industry, with multiple benefits for all collaborating institutions (‘UPatras IQ Industrial PhDs’, 2020). A relevant cooperation agreement, with young scientists and students as direct beneficiaries, was ratified by the administrations of the Athens University of Economics and Business (AUEB) and SEV in 2021. The agreement opens a new chapter in the cooperation of academic and research institutions in our country with businesses participating in the development of industrial doctorates. With the signing of this Memorandum of Understanding, new horizons are opened up for students and the new generation, as well as, for businesses and their employees. It is the realisation of the link between the academic community and strengthening of innovation in the country with all the positive effects for the economy and society. (See also: http://www.gsr.gr/central.aspx?sid=12414866122358246510887&nnID=777 &neID=589&neTa=25_61419&nnID=0&nnHC=0&dbid=0&oldUI ID=a1777f00119428108903&actionID=load, accessed in 01.25.2022)

In the autumn of 2020, the 1st call of the “Industrial PhD UPatras IQ” program was announced with the aim to fund a total of 6 proposals from all the Faculties of the University of Patras with a total funding of 240.000 EUR. (120.000 EUR from own resources & 120.000 EUR from partner companies/industries). By the deadline, 14 proposals from 3 Faculties of the University of Patras, namely 11 proposals from the Faculty of Engineering, 2 proposals from the Faculty of Science and 1 proposal from the Faculty of Economics and Business Administration, were submitted to the online platform of the programme. Available: https://uphd.upatras.gr/, accessed in 01.25.2022

https://uphd.upatras.gr/, accessed in 01.25.2022
In the process of enlargement is that the university has increased the percentage of public and private institutions on the European level. It has therefore expanded its research activities, especially in the natural sciences, which, although they are the real driving force of the European economy, still face considerable difficulties in organizing R&D. The Department of Computer Science and Telecommunications of the University of Ioannina participates, in this context, in the formulation and establishment of an inter-institutional Doctoral Studies Program in collaboration with European Educational Institutions on the topic: "Industrial Ph.D." in order to introduce modern innovative research and education practices at the University of Ioannina and to contribute to the strengthening of research cooperation with European SMEs. The Inter-institutional Industrial Doctorate is implemented within the framework of the project: "Grasping opportunities of Industrial PhDs for SMEs across Europe-(GIENAH5)" of the Erasmus+ KA2 Programme in which the Greek company Noesis Technologies participates (‘Grasping Innovation in Europe through a Closer Interaction between HEIs and SMEs’, 2017).

From what has been mentioned above, it is clear that doctoral studies in Greece are also expanding into non-academic fields, in order to develop innovation, strengthen the economy and upgrade professional careers. Industrial doctorates in the country maintain a specific structure that serves specific needs depending on the circumstances, are strictly structured and completed within a specific timeframe, and are characterised by sustainable funding. The change initiated in 2005 in Salzburg seems to be gaining momentum at national level as well. In other words, public and private actors at national level are working, within the possibilities offered by the legal framework, to achieve, among other things, the linking of academic research with industry in the context of the Salzburg principles and the objectives of the Bologna Process. Important is the enhanced mobility offered to doctoral candidates and the flexibility, as well as the time necessary to carry out their research with sufficient funding, while being treated as early career researchers, who in the future can follow different career paths both within and outside academia.

V. DISCUSSION

In the present paper, an attempt was made, initially, to describe the reforms and the most recent developments regarding the structure, the content and the targeting of doctoral studies and the consequent research produced within the framework of the EHEA. Then, we referred to the Greek context by presenting the current legislative framework for doctoral studies in Greece and finally, we focused on a very recent development, a new form of doctoral education, which has appeared in our country linking more systematically the university and industry: the industrial doctorates.

At the level of structure, changes in the third cycle of studies and the adaptation of research to market needs seem to have led to the creation of diverse doctoral programmes that depart from the traditional model of doctoral studies based on the interpersonal relationship between supervisors and doctoral candidates (apprenticeship model). What is apparent, for reasons which we will discuss below, is the transition from doctoral studies to doctoral education, with an emphasis on university teaching. A development, which is rather consistent with the emphasis placed on the participation of more and more, diverse student population and the provision of LLL services by the university for the benefit of both society and the individuals themselves. A development that has taken place over the last two decades (Vassilopoulos et al., 2020).

Regarding the latter, in terms of targeting, doctoral studies are no longer seen as an exclusively academic matter. The private sector is increasingly becoming a destination for doctoral graduates. The objective of increasing the production of doctoral degrees is not closely linked to the ambition of countries to gain a competitive advantage in the global knowledge economy. Doctoral studies are, therefore, becoming the subject of a transnational agenda, institutional management and national policymaking. Doctoral education is seen not only as a milestone in the development of highly skilled professionals for work inside and outside academia, but also as a product that will give the economy, overwhelmingly, significant results.

Finally, with regard to the content of doctoral studies, the changes in the third cycle of studies and the adaptation of research to new conditions by creating diverse doctoral programmes go beyond the narrow academic boundaries and

20 Within the framework of the cooperation between the Economic and Business University of Athens (OPA in Greek) and the Association of Greek Industrialists (SEV in Greek), a programme of Applied Doctoral Research will be implemented, including, among other things, a programme of Applied Doctoral Research on topics of interest to SEV members, through the preparation of applied doctoral theses by students of the OPA. With 50% co-funding from business, the programme aims to link research at the OPA to the needs of improving the competitiveness of SEV members, especially industry. In particular, six research positions will be advertised in the areas of Digital Transformation and cutting-edge issues in Information and Communication Technologies, Management Science and Business Administration in the era of the 4th industrial revolution, Statistics, Accounting and Finance, Economics, Marketing in the digital era. Also, in the context of the interface with research, analyses and studies on issues of concern to SEV member companies, especially industry, will be produced through postgraduate theses and postdoctoral research, with small co-funding from companies. Links to the same topics as in the case of applied doctoral research are directly initiated. Finally, in order to strengthen the interface with industry, students of the OPA will have the opportunity to participate in internship programmes in SEV member companies.

21 HE is undergoing a significant change: from elite, mass to universal form where the latter form implies the need for the population to adapt to rapid social and technological change and attributes to the University an important role in this direction (Isanović Hadžiomerović, 2016; EUA, 2008). The main difficulty in the process of enlargement is that the university has changed in size but seems to strongly resist change when it comes to its philosophy or values (Kavassakalis, 2015, pp. 105-106).

22 Technological change, globalisation, demographic changes and multiple changes in working life are constant arguments supporting the constant demand for continuous upgrading of adults’ knowledge and skills.
are integrated with the needs of the rapidly evolving labour market. This is bound to have an impact on the promotion of basic research in one of its most privileged fields that of doctoral studies.

In Greece, the traditional model in doctoral studies continues to dominate and research is closely linked to the university. However, what emerged from this investigation is that European trends are gaining ground through the formation of industrial doctorates. What is also interesting is that this development, which took place recently, in 2017, in several universities, came from funding, basically, from the private sector and the EU, outside the control of the Greek state. In any case, it seems that in our country we are following European developments regarding the third cycle, linking research with the labour market and the employability of PhD graduates. Industry-academia cooperation is certainly a two-way exchange of knowledge and technology and the momentum gained through this cooperation can be sustainable in the long term by offering substantial solutions to today’s challenges - the development of new products, improved processes and new training methods, etc. Although, it is difficult to predict the future, collaboration between industry and academic institutions can create a strong foundation for continuous exchange of knowledge, practices and technology, as well as collaborations in both research and educational activities (Mueller, 2006). Concerns about the originality of research, when it serves the needs of the market, as well as concerns about the quality of the doctorate itself when it is completed strictly under pressure within a certain time frame raise new debates that need further investigation.

CONFLICT OF INTEREST
Authors declare that they do not have any conflict of interest.

REFERENCES