

Industrial PhDs, Research Apprenticeships, and On-the-job training: The Case of Italy from a Comparative and International Perspective*

Michele Tiraboschi

Professor of Labour Law, University of Modena and Reggio Emilia

ADAPT Scientific Coordinator

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Abstract

This pioneering work provides a first systemic and comparative analysis of work-based training and research in Italy. This is done through an examination of industrial PhDs and apprenticeships for research purposes, which also takes account of the complex relations between businesses, tertiary education, and the labour market. To this end, the paper discusses the relationship between universities and employers, which is usually investigated through a perspective that only considers PhDs' employability. The author tries to move away from this approach, questioning the effects that these new arrangements might have on productivity and the employers' innovation capability in Italy. Cooperative research, and industrial and professional doctorates have been extensively covered in international literature. On the contrary, little interest has been shown towards industrial PhDs in Italy, even following the recent approval of a PhD regulation which for the first time introduces industrial PhD in Italy. Consequently, this analysis sets out to be a first attempt at analyzing industrial PhDs, drawing on a comparison with those countries where they have been in place for a long time. The paper identifies a number of obstacles which act as stumbling blocks to the implementation of on-the-job training in higher education: the absence of an employability logic in the planning of training programmes and little commitment on the part of industrial relations actors. These shortcomings are the same which hamper the diffusion of apprenticeship schemes – including those for research purposes – which are decisive to fill the void between education and the labour market.

Framing the Issue

From an international and comparative perspective, the emergence of innovative higher education courses has gained increasing attention over the last twenty years. This is particularly the case of pioneering PhD programmes featuring a closer cooperation with businesses to better match the needs of the labour market ⁽¹⁾.

The vast amount of literature produced so far on this topic has reported the experiences of many countries and the concurrent evolution of their regulatory framework ⁽²⁾, detailing the main issues and theoretical implications ⁽³⁾.

Tellingly, Italy cannot be counted among the foregoing countries. The “professional doctorates” as those devised in Australia, the UK and the US are practically unknown in our country and to date scant consideration has been given to the recent introduction of “industrial PhDs” on the part of the Ministry of Education, University and Research, which have been in place for forty years in Northern Europe. Today’s situation resembles that of ten years ago, when innovative apprenticeship schemes were introduced ⁽⁴⁾, giving apprentices the opportunity to obtain a doctoral degree. Regrettably, the implementation of these courses has been limited, although new forms of higher apprenticeships have been devised to give them fresh momentum ⁽⁵⁾.

In truth, massive economic incentives have been made available also in Italy to promote private investments in academic research ⁽⁶⁾ and important measures were introduced which at least on paper would provide stable employment to PhDs and graduates who are engaged in research and development activities in scientific and technical disciplines ⁽⁷⁾.

With special reference to PhD programmes, a tendency has arisen either on the part of lawmakers or educational providers to disregard the needs of the labour market and the promotion of a more effective collaboration with businesses at the time of planning academic programmes. At the national level, this lack of interest is reflected in the little contribution of the literature on this topic and on the few reported cases of higher and research apprenticeships put in place. This is despite the many protocols,

conventions and framework agreements ⁽⁸⁾ intended to realize a closer cooperation between businesses and production.

Even the most recent body of research investigating the connections between education, learning and the labour market ⁽⁹⁾ in a programmatic and systemic manner makes no mention of higher education, let alone doctoral research which, albeit strategic ⁽¹⁰⁾, seems to be overlooked in the transition from school to the labour market.

If an international and comparative perspective is taken, one may argue that Italy's struggle to keep up with the major developments in this field is due to the relatively recent introduction of PhD programmes in national legislation ⁽¹¹⁾. This is not an exhaustive explanation, as the implementation of doctoral degrees was likewise recent in countries such as Australia, Brazil and Malaysia. Yet they count among the most advanced countries in terms of innovation at doctoral level ⁽¹²⁾. Arguably, over the last thirty years, the function of PhD courses in Italy has been downplayed, since they are seen self-referential mechanisms to allure scholars and prospective academics, rather than as vibrant centres for innovation and technology transfer. More generally, they are by no means considered the new frontier of cooperation between university and industry for the advancement of knowledge and the economic, social and productive development of the country ⁽¹³⁾.

Aside from the distrust of workplace learning amongst IR practitioners (§ 4 below) and save for a few notable exceptions, this is exactly why PhD research in Italy has failed to attract significant private funding ⁽¹⁴⁾ and to provide relevant training and research opportunities in line with the needs of employers and the labour market.

Significantly, industrial PhDs and cooperation initiatives between universities and industry also referred to by the Italian Ministry of Education, University and Research have been mainly introduced to deal with the increasingly perceived need to promote the employment or the employability of graduate students at the end of the PhD ⁽¹⁵⁾, rather than as a tool to favour the university-industry interaction ⁽¹⁶⁾.

Over 12,000 graduates enter a PhD programme ⁽¹⁷⁾ in Italy each year with the intention of pursuing the academic career. This is also what their tutors and lecturers

wish for them – although being part of the inner circle that still holds an absolute monopoly on doctoral education in academia ⁽¹⁸⁾. They train them for this exclusive purpose. However, statistics show that only a minority (about 2,000 individuals) succeeds in entering the academic career after a long transition made up of work often provided on a voluntary basis, post-doctoral scholarships, research grants and temporary contracts. Hence, the idea of setting up PhD programmes in collaboration with industry, in order to prevent young researchers from wasting the wealth of knowledge and skills they have acquired in their PhD programme.

Where successfully implemented, industrial PhDs and industrial doctorates are not intended to ensure “new employment safeguards” ⁽¹⁹⁾ or *ex-post* “measures to boost employability” for those in academia ⁽²⁰⁾. They have been set up taking into account the shared interests of universities and businesses to promote innovative research opportunities of knowledge and skills transfer focused on training and learning processes that usually take place at workplace level and through real working tasks ⁽²¹⁾.

These work-based PhD programmes have been assigned an increasingly relevant role of late, as merely executive tasks are becoming less and less decisive ⁽²²⁾. The latter include processes which are typical of the legal systems governing the technical and functional subordination of workers to the employer, as well as mechanical or repetitive operations which marked Fordism and Taylorism.

Working in industry should not be seen as a second-best alternative to academic career, nor as a resigned response to the cuts in public funding in the self-referential market of academia ⁽²³⁾. Rather, it is the result of a novel approach to innovative research ⁽²⁴⁾ that fosters a closer relationship between universities and businesses. Such collaboration should be based on the dissemination of knowledge and partnerships to promote technology transfer and high professional and interdisciplinary skills which are often neither available in the labour market nor acknowledged in the workers’ classification and grading systems laid down in collective agreements.

It is against this backdrop that an analysis will be supplied concerning the industrial PhDs introduced in Italy by Ministerial Decree of 8 February 2013. By focusing on the industrial relations system and labour market institutions, the aim is to assess the potential scope for innovation of higher education, of doing business and working in the increasingly strategic field of academic research ⁽²⁵⁾. In line with the latest developments in pedagogical and managerial studies, the perspective adopted in this paper upholds the assumption that companies are evolving from mere “economic entities” legally conceived ⁽²⁶⁾ for the production or exchange of goods and services into “educational organisations”⁽²⁷⁾ or “learning organizations” ⁽²⁸⁾.

These new workplaces are characterized by people with hybrid skills – i.e. who are both scholars and “managers of change” in production and organizational processes – as work is performed as an educational and research process where theory and practice are combined in order to “learn how to do things”. Combining work, learning, research and planning generates high added value and enables constant innovation in production processes and/or in the way of delivering services. More precisely, the term *learnfare* is employed in pedagogy literature, as the evolution of traditional *welfare* systems is based on the idea of static production systems and salaried employment ⁽²⁹⁾.

Industrial PhDs are an essential component of these new business patterns, because they target the ever-changing “intermediate labour market” ⁽³⁰⁾ in a more organized and structured way, being the latter extremely fragmented. Again, the main aim is to bridge the gap between industry and academia.

Industrial PhDs: Defining Characteristics

Industrial PhDs entered the Italian legal debate through paragraph 2, Article 11 of the above-mentioned Ministerial Decree No. 45 of 8 February 2013, laying down the rules for the accreditation of doctoral programmes as well as the criteria for the establishment of PhD courses by certified bodies ⁽³¹⁾. This Article identifies as many as

three different PhD tracks (“PhDs in collaboration with enterprises” “Industrial PhDs” and “Higher Apprenticeships”), which are named and legally legitimized (“universities can...”) without further clarification, specification, parameters or criteria to frame these notions in an accurate and transparent fashion. In practical terms, the Decree clarifies that in relation to “PhDs in collaboration with enterprises” and “industrial PhDs”, “the regulation may *inter alia* set a different deadline for the submission of applications, the beginning of courses, and for the planning of the activities of PhD students to ensure the most adequate development of PhD courses”.

It is difficult to argue whether lawmakers were inspired by international and comparative experience or even by the very few cases existing in Italy. At any rate, the regulation briefly distinguishes three PhD programmes that are somewhat more closely connected with the labour market and businesses. Nevertheless, no mention is made of “professional doctorates”, which from an international and comparative viewpoint are similar to the three doctoral degrees laid down in the foregoing decree⁽³²⁾ – if conceptually different – and mainly target workers who wish to further their qualifications and skills.

Scrutinizing these three categories, the first one provided is the “PhD programme in collaboration with enterprises” that is realised through agreements concluded between Doctoral or graduate schools and “businesses engaged in research and development”. Given the laconic wording of paragraph 1 of Article 11 of the regulation and the intended aim of promoting new partnerships, it seems preferable to opt for a non-technical interpretation of the concept of “businesses engaged in research and development”, thus including all kinds of research and development activities carried out directly by a company also on behalf of third parties, regardless of the legal nature of the entity engaged in research.

The lack of public funding or benefits also discourages narrow and technical interpretations. Example are those on tax credits for businesses that engage in research and development activities⁽³³⁾: these provisions lay down measures to facilitate academic and technology research and make explicit reference to the activities numbered in EU law as those for which public funds for research,

development and innovation can be granted following the Communication of the European Commission 2006/C 323/01 for state aid for research, development and innovation ⁽³⁴⁾.

The focus of the present analysis is on “industrial PhDs”, which are different from the foregoing PhD courses and are referred to in the opening of paragraph 2 of Article 11 of the recent Decree mentioned above. The provision determines that, in addition to “PhDs in collaboration with enterprises” as explained in paragraph 1, “universities may offer industrial PhDs *as well*” (emphasis added).

The distinction between the two types of PhD is evident in the wording of the regulation, yet its practical implementation appears ambiguous. The difference cannot lie in what is stated about the possibility to “ earmark – on the basis of specific agreements – a number of posts for employees of companies engaged in highly qualified tasks, who are admitted to a PhD programme as a result of a selection procedure”.

This criterion is not to be intended as a distinctive feature of this PhD programme, since the law expressly regards it as a mere “possibility”. No further specification can be found in paragraph 3 of Article 11, which merely provides that agreements concluded to set up “PhD courses in collaboration with enterprises” and “industrial PhDs” require, among other things, “a detailed description of the research activities carried out at the company and, in the case of workers in salaried employment, the distribution of working time devoted to research and working activities and the duration of the PhD programme”. Paragraph 3 stipulates that even for PhDs delivered in collaboration with enterprises, as referred to in paragraph 1, it is possible for employees to enroll in a PhD programme. The second part of paragraph 4 of Article 11 seems to confirm this reading: “the positions earmarked for employees on the basis of specific agreements as referred to in paragraphs 1 and 2 shall be considered equivalent to PhD scholarships for the purposes of calculation of the minimum number required for the establishment of a PhD programme”.

Furthermore, paragraph 4 sets out that Apprenticeships regulation ⁽³⁵⁾ provides the opportunity to earn a PhD during an apprenticeship in partnership with external

institutions and enterprises. As seen “Higher apprenticeships” are the third type of doctoral degree envisioned in Article 11 of Ministerial Decree of 8 February 2013. They comply with the provisions of paragraphs 1 and 2, establishing that employees too can enter a PhD (either through higher apprenticeships or research apprenticeships).

A comparison with legislation in other countries and with the guidelines of the European Commission on doctoral research is particularly fitting for a legal analysis of innovative PhDs, especially when considering that one of the aims of lawmakers was to align Italy with the best practices implemented in Europe and elsewhere.

Considering the international and comparative perspective outlined in the following section, two additional aspects need to be discussed, which may help clarify the scope and meaning of the notions of “industrial PhDs” and “PhDs in collaboration with enterprises”.

The first is concerned with the definition of “PhD” and its main purpose. In evolutionary terms, some important conclusions can be drawn by looking at the regulation introducing PhD programmes in Italy ⁽³⁶⁾ and contrasting them with paragraph 3, Article 1 of Decree of 8 February 2013. The latter is clearer in pointing out that PhDs programmes must provide the “necessary skills” to perform “high quality research” either at the university level ⁽³⁷⁾ in the form of “academic degrees that can be assessed only in academic research” ⁽³⁸⁾, or – and with equal dignity – “in public and private institutions” ⁽³⁹⁾ and in liberal professions, thus helping “to create a European Higher Education Area and European Research Area”.

With a noticeable change in wording the recent regulation does not make use of the term “university” to designate the preferred employment option for PhD graduates and to define the contents of a three-year programme at the end of which a doctoral degree is awarded ⁽⁴⁰⁾.

The new PhDs in collaboration with enterprises and, more importantly, industrial PhDs cannot be simplistically defined through a series of formal requirements or parameters, such as the conclusion of one or more special agreements with businesses, for a description is needed of their contents, methods, related training and learning mechanisms.

Additionally, the reference to the construction of a European Higher Education Area and European Research Area at the end of Article 1, paragraph 3 of the Decree highlights the importance of comparison. More specifically, such a comparative analysis, whether in line with what has been recently clarified by the European Commission through the “Principles for innovative doctoral training” ⁽⁴¹⁾, might help regard industrial PhDs as an opportunity to make the most of training outcomes and knowledge transfer as a value for businesses as well ⁽⁴²⁾.

A second consideration which in planning terms is equally useful to understand contents, methods, and the training and learning paths of industrial PhDs derives from an assessment of the requirements for the accreditation to establish courses and institutions at doctoral level.

International and comparative experience, although in different respects, is unanimous in pointing out how the success of these innovative Doctoral programmes is linked to the conclusion and the progressive structuring of joint partnerships between universities and businesses.

From this perspective, and given the highly self-referential approach of the Italian university system, some doubts may arise about the viability of industrial PhDs when reading the provision laid down in Art. 2 and 4 of the Ministerial Decree of 8 February 2013. Not surprisingly, and although providing for the opportunity of granting accreditation as “qualified Italian higher educational institutions” ⁽⁴³⁾, lawmakers reasserted the *de facto* monopoly of universities in awarding doctoral degrees, even in cases of collaborations ⁽⁴⁴⁾ or consortia with private research institutes ⁽⁴⁵⁾, as well as agreements concluded with companies ⁽⁴⁶⁾. The Decree establishes that the faculty should be composed for the most part of university professors ⁽⁴⁷⁾ for the accreditation of PhD courses and schools, even in cases where the institutions involved are not universities, but “certified Italian higher education and research institutions” ⁽⁴⁸⁾.

Being the organizational and decision-making process still characterized by formal parameters and bureaucratic hurdles, it is difficult to devise successful industrial PhD programmes. Yet they can prosper through collaborations that maintain a level playing field ⁽⁴⁹⁾, even when entrusting universities with the responsibility to award degrees is

thought to be the only viable option. The mere adoption of traditional academic models in the planning, development and management of PhD curricula does not only involve time-consuming bureaucracy – making them unattractive for employers – but stands in contradiction with the underlying principles of doctoral programmes, as industrial PhDs are established in a workplace environment and in non-traditional learning contexts and are based on the assessment of training outcomes ⁽⁵⁰⁾.

The Need for a Comparative Analysis

As pointed out earlier, comparative analysis carried out at the international level is particularly useful also taking account of Italy's resistance to assimilate relevant legislation. The reference made in paragraph 3, Article 1 of Ministerial Decree of 8 February 2013 to the role of PhDs in envisioning a "European Area of Higher Education and Research" requires taking into account the specifications laid down by the European Commission in the report *Mapping Exercise on Doctoral Training in Europe – Towards a common approach* ⁽⁵¹⁾ and in the *Principles for Innovative Doctoral Training* ⁽⁵²⁾ in defining the notion of "industrial PhDs". The purpose of the report is to provide EU institutions and each Member State with a conceptual framework as well as operational tools not only to ensure the mobility of researchers and skills transfer but also to outline a common approach to the development of doctoral research in Europe ⁽⁵³⁾.

Taking into consideration some European best practices ⁽⁵⁴⁾, the report unambiguously points out that the notion of "industrial PhD" should be given the widest possible interpretation: "The term 'industry' is used in the widest sense, including all fields of future workplaces and public engagement, from industry to business, government, NGOs, charities and cultural institutions" ⁽⁵⁵⁾. In the same spirit, the European Commission, in collaboration with employers and through the activation of industrial doctorates does not follow fixed patterns, since "This can include placements during research training; shared funding; involvement of non-academics from relevant industry in informing/delivering teaching and supervision; promoting financial

contribution of the relevant industry to doctoral programmes; fostering alumni networks that can support the candidate (for example mentoring schemes) and the programme, and a wide array of people/technology/knowledge transfer activities”⁽⁵⁶⁾. The indications contained in the *Principles for Innovative Doctoral Training* confirm the all-encompassing interpretation of Article 11 of Ministerial Decree of 8 February 2013 discussed earlier.

The analysis of “industrial PhDs” devised in Europe is a further confirmation of this approach. The Danish case is worth a mention; here more structured industrial PhDs were introduced for the first time which were acknowledged in both legal and contractual terms⁽⁵⁷⁾.

Industrial PhDs can also take place in public institutions and non-profit entities⁽⁵⁸⁾. What characterizes “industrial PhDs” in Denmark is that PhD candidates conclude an employment contract; this aspect, coupled with the establishment of an academic plan, is the mainstay of the relationship between the student and the external entity involved in training and research⁽⁵⁹⁾. Although the students’ activity is mainly focused on their research project – also thanks to generous public subsidies ensuring an effective collaboration between employers and universities – working time is traditionally and equally distributed between the time spent at the company and at the university⁽⁶⁰⁾.

This seems to be the main success factor of industrial PhDs in Denmark and Northern Europe⁽⁶¹⁾. The same happens in France, where generous subsidies make it possible for employers to recruit students and contribute to define their research project⁽⁶²⁾. Similar cases in other countries proved less effective as doctoral candidates are legally qualified as mere students. This is usually the case⁽⁶³⁾; the collaboration between universities and businesses plays a role in facilitating the transition from PhD programmes to the labour market⁽⁶⁴⁾, yet only rarely do PhDs evolve into full-scale industrial PhDs.

The way these programmes are delivered in the United Kingdom⁽⁶⁵⁾, Ireland⁽⁶⁶⁾, and Germany⁽⁶⁷⁾ are a halfway house between the approaches adopted in Northern Europe and in France; the student presence in the company is the result of an

internship or a work placement of variable duration (three to eighteen months), and no employment contract is concluded for a joint training and research project.

The result of recent evolutions in higher education, work organization and production models, industrial PhDs fall within the increasingly broad area of “intermediate area labour markets”⁽⁶⁸⁾, as intended to achieve in a *learnfare* perspective a closer connection and integration between businesses and higher education institutions other than universities.

Thus it is not surprising that the connection between industry and academia and the consequent development of industrial PhDs are more likely to originate in culturally open systems where recruiting and training take place considering the future placement of graduates, and the fact that training is based on workplace learning through real working tasks.

Legal, Institutional and Procedural Shortcomings: Missing Placement Perspectives in Higher Education and Research Planning and the Resistance of the Industrial Relations System to Workplace Learning

In reference to the training, selection, and recruitment of researchers, it is some legal constraints, and not economic and financial hurdles⁽⁶⁹⁾ that have a detrimental effect on the development of industrial PhDs. An example in this connection is the need to take part in a public selection procedure to enter a PhD programme. This is a mandatory entry requirement in Italy; in other countries, industrial PhDs are considered a special tool to enhance the matching of labour demand and supply of highly specialized workers and are therefore regulated in the same way as any other contractual arrangement in the private sector⁽⁷⁰⁾.

Access to doctoral courses is intertwined with the delicate and highly debated question of the legal value of doctoral degrees, which yet goes beyond the scope of the present analysis⁽⁷¹⁾. In investigating labour market law, it is perhaps more useful to focus on the institutional shortcomings of work-based training as in the case of

industrial PhDs, which originate from the traditional resistance of the industrial relations system and the regulatory framework.

A first problem is the absence of professional university placement services for doctorates and higher education graduates, more generally. Unlike private labour market operators, who merely assist jobseekers in finding employment, a reliable placement system should feature dynamism and forward-planning. This should be accompanied by a preliminary assessment of the real needs of business in terms of innovation, research, development and targeted learning methods, to take place prior to designing educational programmes ⁽⁷²⁾.

In the same vein, a deep-seated prejudice exists both in academia, the industrial relations system and trade unions towards company-based training and businesses. This is because, in the language of the Civil Code ⁽⁷³⁾, they are still intended for the production and the exchange of goods and services ⁽⁷⁴⁾. In addition, in ideological terms businesses are also regarded as encouraging relentless exploitation.

This also applies to apprenticeship contracts for exercising the right and duty to take part in education and training and to programmes based on the alternation between school and work, as pointed out by the recent amendments to legislation on access to work, which intended to prevent the employment of minors within companies. The same holds for higher education, that is considered as a real “knowledge monopoly” on the part of universities. This state of play limits the contribution of employers, which have a different view in relation to a possible cooperation on industrial PhDs.

An example of this approach towards companies and training is the 2012 Fornero Reform (Law No. 92/2012), which covered aspects other than flexibility in hiring and dismissal ⁽⁷⁵⁾. Drawing on the notion of European flexicurity, Law No. 92/2012 devotes an entire section to the employment safeguards in the labour market, including employment services, social safety nets, and also vocational and continuous training, two aspects which are still overlooked in the relevant literature ⁽⁷⁶⁾. This points to the awareness that a modern system for the protection and promotion of employment needs to be focused on individual training and skills – either of the employed, the jobless or the unemployed – rather than on a formal system of mandatory precepts,

prohibitions and related penalties, subsidies, and government incentives. This aspect was already envisaged at the institutional level at the time of issuing the *Guidelines on Training* of 17 February 2010 on the part of the government, the Regions and the social partners.

Legislative Decree No. 13 of 16 January 2013 ⁽⁷⁷⁾ is particularly relevant in this respect. This provision is likely to have a profound impact on labour demand and supply, on the workers' classification and on the functioning of internal and external labour markets in relation to research activities.

The marginal role attributed to in-company training can be simply understood if one considers that the foregoing Legislative Decree regards as "formal training" – i.e. structured and planned training – only that provided by the mainstream system of education or for which a certificate is awarded which is in line with the formal education and training system (e.g. apprenticeship contracts to exercise the right and duty to take part in education and training and higher apprenticeships, but not vocational apprenticeships) ⁽⁷⁸⁾.

In consequence, the validation and certification of the skills acquired are carried forward through a bureaucratic and administrative mechanism, failing to reflect the real labour market dynamics. This procedure empowers "authorised entities" – public bodies or bodies authorised or accredited by a public entity – to verify the correspondence between informal and non-formal learning at the workplace and the standards laid down within the framework of the public education system. In other words, an assessment is provided of the system made up of all the institutions entitled to award diplomas or degrees (mainly schools and universities) or linked with public lists of vocational qualifications.

The absence of any reference to the specific Apprenticeship regulation concerning training standards or skills certification ⁽⁷⁹⁾ in a reform process intended to make apprenticeship the "prevailing contract" for youth labour market entry, indicates the narrow and public-driven approach of the Fornero Reform. More specifically, it shows the incapability to keep up with the increasingly necessary integration between

education and training and the labour market which constitutes the theoretical underpinning of industrial PhDs.

The approval process of Law No. 92/2012 is a clear confirmation that this move was not the result of an oversight but a deliberate choice. Indeed, the draft bill tabled on 5 April 2012 included a more varied range of entities entitled to deliver formal training: the bodies certified by the Regions, the social partners and the interprofessional funds, a convenient move if one thinks that the latter are the backbone of an innovative system of lifelong learning.

The reform challenged the innovative scope of the Consolidated Law on Apprenticeship and of the 2012 Guidelines on training, where work-based and workplace training was associated with job profiles and workers' classification systems, which lie at the heart of any organizational models in companies within a given productive sector.

When stating that "formal training" only refers to that provided by mainstream educational systems, Legislative Decree No. 13 of 16 January 2013 seems to place the skills acquired at work at a lower level than those gained through vocational training, thus widening the gap between universities and labour market.

This is a step backwards with respect to the 2010 Guidelines, which focused on the outcome and the quality of training rather than on the value of formal diplomas or certificates, regardless of the legal nature of training providers and learning centres.

Consequently, labour market operators and employers in particular will now assess one's skills – including researchers and postdocs' – without considering the workers' classification systems and therefore the real needs of the labour market and the areas involved. Such evaluation will be based on self-referential standards that, although defined by national and regional entities, will seriously affect labour demand and supply dynamics as a whole, as well as the daily management of the employment relationships.

It will all rest on complex and pre-established public lists of professions and trades, and on mechanisms that increase the rigidity of labour market dynamics, causing a sort of ossification which brings to mind the Tower of Babel.

On reflection, the certificates and diplomas issued upon completion of the certification process account as “public records”, meaning that the system is managed by public bodies (such as the Ministry of Labour, Ministry of Education, Regions, Autonomous Provinces). These public entities will also have the power to authorise private ones to provide identification and validation services, at times with some limitations, and the certification of competences in accordance with the standards and the public lists of trades and professions discussed before.

The negative aspects characterizing the legal value of qualifications, as well as its major shortcomings are currently debated in Italy. In this context, a new mechanism for the certification of skills and knowledge is likely to diverge from the set of occupations laid out in the workers’ classification and grading systems of collective agreements, and from the needs of the labour market, giving rise to disputes among the parties.

Indeed, the standards concerning skills qualification and certification will be collected in national or regional lists of vocational qualifications. This situation could produce a proliferation of unnecessary job profiles which have been pre-established by public authorities, do not reflect reality and might become quickly obsolete. Not to mention the enormous cost of setting up consultation meetings and public lists which have already proved unfruitful in the last twenty years.

Labour Law and Contractual Issues. Research Apprenticeships and their Relevance in linking Higher Education and the Productive System in the Labour Market

Becoming aware of the value of workplace training and of the need to consider the researchers’ employment prospects when recruiting candidates and designing training is only one side of the coin. In order to develop industrial PhDs, it is also pivotal to devise a modern industrial relations system that acknowledges the productivity levels related to these “hybrid” job profiles populating this fluid and dynamic area of labour market, also by means of adjustment mechanisms.

At the international level, there are only a few countries where students are legally regarded as employees ⁽⁸⁰⁾, i.e. workers engaged in research in the public and private sector. The number of countries where doctoral candidates are awarded the legal status of “student” is likewise limited. A work and study combination often prevails, through a number of different legal qualifications and contractual arrangements with a view to managing economic and regulatory aspects, and research and training issues.

Summary table – Doctoral Students and their Legal Status

Status	Number of Countries	Countries
Student only	10	Czech Republic, Estonia, Georgia, Iceland, Ireland, Latvia, Russia, Scotland, the UK
Employee	3	Bosnia and Herzegovina, Denmark, the Netherlands ()
Student and/or employee	22	Albania, Andorra, Armenia, Austria, Flanders and Wallonia, (Belgium), Croatia,

Source: European University Association, 2007

As a rule, the status of candidates (student and/or employee) depends on the source of funding of the research project, and on the existence of stable and structured relationships with businesses. In practice, the resources made available for research determine the activities performed by students, as well as the amount of time devoted to pure or applied research in various contexts and the appropriate education and learning paths.

As pointed out by those who for years have run one of the few industrial PhD programmes in Italy ⁽⁸¹⁾, “the close link between research funding and activities performed by the student mirrors the dialogue between higher education institutions and industry, since the involvement of the student (with a “dual status”) in production

processes is the cornerstone of the matching, as well as the compass that directs the planning of training”⁽⁸²⁾. To be successful, the establishment of the foregoing link should be facilitated by legal and fiscal incentives, and specific employment contracts and individual training plans which formally implement the partnership underlying industrial PhD programmes.

In theory, Italian legislation has long provided the opportunity to award graduate students the status of research workers engaged in training and formal learning. This was already possible thanks to the first systemic regulation of higher apprenticeships, the so called Biagi law of 2003⁽⁸³⁾, and now, following its repeal, to recent regulation of 2011⁽⁸⁴⁾ which also introduced innovative forms of “research apprenticeships”.

The first attempt is among the less successful provisions contained in the Biagi Law. Systematically neglected in collective bargaining⁽⁸⁵⁾, higher apprenticeships have never been given the necessary momentum; at a regional level, they have been only implemented in a few cases⁽⁸⁶⁾ and thanks to the considerable support from the Ministry of Labour which made use of the financial resources from the European Social Fund, under the system action PON Ob 3.

Yet, unlike other provisions of the Biagi Law, the failure of this special apprenticeship scheme cannot be attributed to the complexity of the legal framework, nor to political prejudice driven by trade union ideology⁽⁸⁷⁾ as was the case of other important innovations of the Biagi reform, among others staff leasing and on-call work.

As far as the legal framework is concerned, the Biagi Law stipulates that these programmes should be regulated through *ad-hoc* and flexible arrangements between the regions (or autonomous provinces), trade unions, employers’ associations at the local level, and the educational institutions awarding the degree. Nevertheless, the regulation of higher apprenticeship has been drastically simplified in 2008⁽⁸⁸⁾ – acknowledging the inertia of the Regions and social partners – setting forth that in the absence of regulations at a regional level, higher apprenticeships have to be governed through special agreements between and employers and universities or other educational institutions.

In relation to the second aspect, which brings to mind the charged atmosphere accompanying the passing of the Biagi law, training contracts and apprenticeships were not mentioned among the priority issues brought up by some trade union representatives.

A close evaluation of the very few cases in which these schemes were implemented – as well as of the regulations enforced at regional level or by collective bargaining, which are also few and far between ⁽⁸⁹⁾ – leads one to believe that the failure of this apprenticeship scheme was caused by the regional institutions, social actors and universities being culturally unprepared to develop and set in motion an innovative alternation system between work and training to overcome the strict separation between educational institutions and labour market entities on which our investigation has been drawn. Not surprisingly, the few initiatives in place are concerned with master's degrees, rather than apprenticeships and research PhDs which are way more demanding.

Far from being just a contract of employment laying down the particulars of training, higher apprenticeships are intended to be an innovative tool to increase cooperation between universities and businesses ⁽⁹⁰⁾, and benefit “labour market research”, a grey area that still lacks appropriate regulation and specific contractual arrangements.

In this sense, the recent Apprenticeships reform ⁽⁹¹⁾ provides an even clearer perspective. It envisions two forms of higher apprenticeships; an apprenticeship scheme designed for the acquisition of a university or post-university degree, and one according to which research contracts are not linked with the awarding of a degree (as laid down in previous regulation) ⁽⁹²⁾, since they are used to recruit and training young researchers in companies and other working environments in the private and public sector. The same approach can be found in the fact that the same regulation establishes that training in higher apprenticeships must comply with some public training standards. Conversely, research apprenticeships are considered as vocational apprenticeships and they must also refer to standards set out in the applicable collective agreements concluded at sectoral level.

On reflection, the scope to conclude “research apprenticeship contracts” on the part of universities and “other educational or research institutions, including those certified at the national or regional level which promote entrepreneurial activities, employment, training, innovation and technology transfer” (⁹³), is a commendable attempt to establish training or research centers – either public or private – more focused on applied research which respond to the needs of local businesses in terms of innovation and development (a nice example is US-based community colleges). In other words, this is a new way of conceiving apprenticeships (as well as PhDs) that is as a placement tool where labour demand and supply come together, dynamically strengthening each other through higher education and research, and moving on from traditional employment contracts involving learning activities.

Research apprenticeships – together with the PhDs earned through higher apprenticeship envisioned by the Biagi Law – are intended to be a tool for Italian small and medium-sized enterprises to invest in research and innovation at a reasonable cost, triggering corporate renewal, spin-offs, start-ups and, ultimately, the development of excellent human capital.

To enhance cooperation between universities and the labour market, higher and research apprenticeship contracts appear to be particularly effective to legally acknowledge research activity also in the private sector. On reflection, these innovative contractual schemes could even constitute the cornerstone of a modern system of higher education and research focused on job profiles that are consistent with workers’ classification and grading systems in collective agreements, which are faced with some major shortcomings. The few notable exceptions (⁹⁴) concern researchers in the private sector and provide information on specific provisions or a description of their work of researchers, which are also useful to understand the remuneration and bonus system.

Therefore, it seems that this could be the most effective way to bring Italy into line with the best practices implemented in other countries which the present comparative analysis has attempted to investigate.

⁽¹⁾ See V.L. Meek, U. Teichler, M-L. Kearney (eds.), *Higher Education, Research and Innovation: Changing Dynamics*, Report on the UNESCO Forum on Higher Education, Research and Knowledge, 2001-2009, International Centre for Higher Education Research, Kassel 2009 and M. Perkmann, K. Walsh, *University-industry relationships and open innovation: towards a research agenda*, in *International Journal of Management Reviews*, 2007, pp. 259-280 and L. Borrel Damian (eds.), *University-industry partnership for enhancing knowledge sharing*. Doc-careers project, European University Association, 2009. See also A. Kottmann, E. Weyer, *Exploration of the implementation of the principles for innovative doctoral training in Europe, 2013*, Final report for the European Commission, ARES(2011) 932978 (the report is available at www.faredottorato.it).

⁽²⁾ See the detailed review by M. Jones, *Issues in Doctoral Studies - Forty Years of Journal Discussion: Where have we been and where are we going?*, in *International Journal of Doctoral Studies*, vol. 8/2013, pp. 83-104, summarizing the discussion contained in the 995 articles published between 1971 and 2012 on PhD programmes.

⁽³⁾ See among others M. Nerad, *Increase in PhD Production and Reform of Doctoral Education Worldwide*, in Higher Education Forum, Hiroshima, March 2010, pp. 69-84. See also K. Harman, *Challenging Traditional Research Training Culture: Industry-oriented Doctoral Programs in Australian Cooperative Research Centres*, in J. Välimaa, O-H. Ylijoki (eds.), *Cultural Perspectives on Higher Education*, Springer, the Netherlands, 2008, pp. 174-190; L. Servage, *Alternative and professional doctoral programs: what is driving the demand?*, in *Studies in Higher Education*, 2007, pp. 765-779.

⁽⁴⁾ See art. 50, par. 1, of legislative decree of 10 September 2003, No. 276, known as the “Biagi Law”. See M. Tiraboschi (ed.), *Dottorati industriali e apprendistato per la ricerca: prime riflessioni e prime esperienze*, ADAPT Special Bulletin of 16 July 2013, No. 22 (at www.bollettinoadapt.it).

⁽⁵⁾ See Art. 5 of Legislative Decree of 14 September 2011, No. 167.

⁽⁶⁾ It refers to tax incentives allowing firms to deduct the full taxable business income from funds made available by way of contribution or donation taking the form of research funding. All contributions or donations to universities and university foundations, public (or private under the supervision of the Ministry of Education) research organizations are tax exempt, including indirect levies other than VAT, and any other dues, with notary fees which are reduced by 90%. See the financing plan for research approved by the Council of Ministries of 6 February 2014 containing support measures to innovative activities and research in business (PON Ricerca e Innovazione in www.faredottorato.it).

⁽⁷⁾ See Decree-Law No. 83/2013 which was followed by the Decree of the Ministry of Economics (DM of 13 October 2013), published in the Official Gazette on 21 January 2014.

⁽⁸⁾ Among the few studies in the field focusing on the collaboration between Italian universities and businesses, see the essay by Abramo, C. D’Angelo, F. Di Costa, *University-Industry Research Collaboration: A Model to Assess University Capability*, *The International Journal of Higher Education And Educational Planning*, 2011, pp. 163-181.

⁽⁹⁾ See also S. Ciucciiovino, *Apprendimento e tutela del lavoro*, Giappichelli, Torino, 2013 and A. Loffredo, *Diritto alla formazione e lavoro tra realtà e retorica*, Cacucci, Bari, 2012.

⁽¹⁰⁾ The strategic importance of doctorates both in terms of research and development as well as for innovation and human capital development is pointed out by numerous scholars. Among others, see OECD, *Skills for Innovation and Research*, OECD Innovation Strategy, Paris, 2010 and L. Auriol, M. Misu, R. Freeman, *Careers of doctorate holders: analysis of labour market and mobility, indicators*, STI Working Papers, OECD, Paris 2013 (available also at www.faredottorato.it).

⁽¹¹⁾ Article 8 of the Law No. 28 of 21 February 1980, Delegation to the Government for the reorganization of university teaching and training, and for the experimentation on organizational and teaching activity.

⁽¹²⁾ See M. Nerad, *Increase in PhD Production and Reform of Doctoral Education Worldwide*, cit., p. 69, p. 73, pp. 75-76,

⁽¹³⁾ This aspect, albeit with less emphasis, is highlighted also by L. Borrel Damian (ed.), *University-industry partnership for enhancing knowledge sharing*, cit. The close link between training courses and doctoral academic career is also highlighted in the report edited by the Ministry of Education, University and Research, *Horizon 2020 Italy*, Rome, March 2013, p. 97.

⁽¹⁴⁾ The rate is particularly low in Italy: the share of private investment in university research is equal to 1% in Italy, compared to the 6.8% European average. See Fondazione Rocca and Associazione TreElle, *I numeri da cambiare. Scuola, Università e ricerca. L’Italia nel confronto internazionale*, 2012.

(¹⁵) The employability of graduate students does not only concern Italy or Europe. See S. Jaschik, *Ph.D.s with and without Jobs*, in *Inside Higher Ed*, 9 December 2013, which provide an overview of the US situation.

(¹⁶) In this perspective, see N. Salimi, R. Bekkers, K. Frenken, *Governance and Success of University-Industry Collaborations on the Basis of Ph.D. Projects – An Explorative Study*, Eindhoven Centre for Innovation Studies (ECIS) Working Paper, No. 5/2013, which shows how PhD students can play a valuable and often indispensable role to enhance communication between universities and businesses.

(¹⁷) See F. Vitucci, A. Rotisciani (eds.), *Terza indagine ADI su Dottorato e post-Doc*, Associazione dottorandi e dottori di ricerca italiani, 8 February 2013. For an international and comparative perspective, which also discusses the drastic cuts experienced in higher education in Italy, see F. Magni, *Dottorati di ricerca: i numeri dell'Italia nel confronto comparato*, in M. Tiraboschi (ed.), *Dottorati industriali e apprendistato per la ricerca: prime riflessioni e prime esperienze*, ADAPT Special Bulletin, cit.

(¹⁸) This is despite Article 74, par. 2 of the Decree of the President of the Republic of 11 July 1980, No. 382 and Articles 2, 3 and 7 of Ministerial Decree of 26 November 1998 that allows, at least on a formal level, “to establish equivalences with a PhD or diploma in advanced studies [...] granted by other Italian post-graduate and doctoral courses, comparable to PhD courses in terms of structure, study and research activities and provided that a limited number of PhDs is granted annually”. In the same vein, see letter b), paragraph 2, Article 2 of Ministerial Decree of 8 February 2013, that encountered strong resistance from the Italian university system and is likely to remain unenforced, as is Article 74, paragraph 2 of the foregoing Decree of the President of the Republic of 11 July 1980 No. 382.

(¹⁹) See S. Ciucciovino, *Apprendimento e tutela del lavoro*, cit.

(²⁰) This is the perspective – now outdated – taken in the contribution by I. Senatori, *Le Scuole di dottorato e le tecniche per l'occupabilità dei lavoratori della ricerca*, in M. Tiraboschi, P. Gelmini (eds.), *Scuola, Università e mercato del lavoro dopo la Riforma Biagi*, Giuffrè, Milan, 2006, pp. 507-510. It was in a such culturally advanced scenario, with which relevant legislation failed keep up, that in 2006 ADAPT, the Marco Biagi Foundation and the University of Modena and Reggio Emilia founded the first Italian Doctoral School, also through an innovative agreement and a related Memorandum of Understanding with the Ministry of Education, University and Research. For an overview of the evolution of the project, which today is still promoted by ADAPT in collaboration with the Centre for the Quality of Teaching at the University of Bergamo, see L. Casano, *Esperienze pionieristiche di dottorato industriale: la Scuola di dottorato in formazione della persona e mercato del lavoro dell'Università di Bergamo promossa da ADAPT e CQIA*, in ADAPT Bulletin, 2 July 2013, cit.

(²¹) See T. Thune, *Doctoral Students on the University-Industry Interface: a Review of Literature*, in *Higher Education*, 2009, pp. 637-651; L. Cruz-Castro, L. Sanz-Menéndez, *The employment of PhDs in firms: trajectories, mobility and innovation*, in *Research Evaluation*, vol. 14, n. 1/2005, especially p. 63 and ff.; N. Salimi, R. Bekkers, K. Frenken, *Governance and Success of University-Industry Collaborations on the Basis of Ph.D. Projects etc.*, cit. See also L. Herrera, M. Nieto, *Recruitment of PhD Researches by Firms*, paper presented at the 35th DRUID Celebration Conference 2013, Barcelona, Spain, June 17-19 2013 (available at www.faredottorato.it).

(²²) See B. Rossi, *Lavoro, creatività e formazione*, in G. Alessandrini (ed.), *La formazione al centro dello sviluppo umano. Crescita, lavoro, innovazione*, ADAPT-CSMB book series, Giuffrè, Milan, 2012, p. 145. See also, with regard to the transition from scientific management implemented in Fordism and Taylorism to a new approach increasingly focused on the individual G. Bertagna, *Apprendistato e formazione in impresa*, in M. Tiraboschi (a cura di), *Il Testo Unico dell'apprendistato e le nuove regole sui tirocini*, Giuffrè, Milan 2011, pp. 105-125.

(²³) See J. Sugars, E. Pearce, *Competenze trasferibili e occupabilità dei dottori di ricerca: indagine sul panorama attuale*, Docent – Doctors in Enterprise, wp 1/D13, 2010, especially p. 6 where they call for “a change of that established and widespread culture that considers PhD as a training method (exclusively) aimed at academic research” and p. 7 where they urge to overcome an “outdated mentality that still sees the transition to the private sector as a failure for not having obtained a position in academia”.

(²⁴) On this score, some useful insights are provided not only by ADAPT (see L. Casano, *Esperienze pionieristiche di dottorato industriale etc.*, cit.), but also by the Polytechnic University of Milan. See in particular S. Pizzocaro, *Re-orienting PhD Education in Industrial Design: Issues arising from the Experience of a PhD programme revision, Artistic Research*. *Forschung durch Kunst und Design*, Bauhaus Universität Weimar, 17-18 October 2008; Id., *Learning design research. Critical issues derived from the Politecnico di Milano Ph.D. curricula in industrial design*, in J. Giard, D. Pijawka (eds.),

Proceedings of The 4th conference Doctoral Education in Design, Arizona State University, Tempe, June 25-28, 2005, pp. 69-88; Id., *Doctoral research as a learning hub – Perspectives from a PhD programme in progress*, in D. Durling, K. Sugiyama, *Proceedings of the Third Conference Doctoral Education in Design*, Tsukuba, Japan, 2003, pp. 113- 123.

⁽²⁵⁾ See the unequivocal OECD Report on *Education at Glance 2013*, Paris, 2013, especially p. 295 where it is acknowledged that “PhDs play a crucial role in driving innovation and economic growth [...] Companies are attracted to countries that make higher education and research opportunity easily accessible; at the same time, individuals who reach this level of education generally benefit from higher wages and a higher employment rate”.

⁽²⁶⁾ See Art. No. 2082 of the Italian Civil Code.

⁽²⁷⁾ See again B. Rossi, *Lavoro, creatività e formazione*, cit., here p. 154.

⁽²⁸⁾ See M. Minghetti, *Collaborative Intelligence. Towards a Social Organization*, Cambridge Scholars Publishing, Newcastle upon Tyne, 233-236 (forthcoming). In the Afterword, I emphasized the barriers posed by legislation and trade unions to the evolution of organisational and production processes.

⁽²⁹⁾ In this perspective, see U. Margiotta, *Dal welfare al learnfare: verso un nuovo contratto sociale*, in G. Alessandrini (ed.), *La formazione al centro dello sviluppo umano ecc.*, cit., especially p. 48.

⁽³⁰⁾ In this perspective, see C. Lanciano-Morandat, H. Nohara, *The Labour Market for the Young Scientists*, in E. Lorenz, B-A. Lundvall (eds.), *How Europe’s Economies Learn Coordinating Competing Models*, Oxford: Oxford University Press, 2006, pp.156-189. For an international and comparative assessment of the professional career of doctorate holders see L. Auriol, M. Misu, R.A. Freeman, *Careers of Doctorate Holders – Analysis of labour Market and Mobility Indicators*, OECD, Science, Technology and Industry Working Papers, No. 4/2013.

⁽³¹⁾ No mention is made of these courses in primary legal sources and, in particular, in Art. 4 of Law No. 210 of 3 July 1998 as amended by Law No. 240 of 30 December 2010, which regulates PhDs in Italy. Yet the regulation of 8 February 2013 takes for granted the notion of industrial PhDs, making their actual definition a challenging task.

⁽³²⁾ For a comparison between the different types of PhD see F. Kitagawa, *Industrial Doctorates – Engagement in Research and Skill Formation*, Centre for Learning and Life Chances in Knowledge Economies and Societies, 2011 and C. Costley, *Evaluation of the Current Status and Knowledge Contributions of the Professional Doctorates*, in *Quality in Higher Education*, 2013, pp. 7-27 e A. Zusman, *How New Kinds of Professional Doctorates are Changing Higher Education Institutions*, cit. For an overview of the Australian, Canadian and US case see F. C. Kot, D. D. Endel, *Emergence and Growth of Professional Doctorates in the United States, United Kingdom, Canada and Australia: a Comparative Analysis*, in *Studies in Higher Education*, 2012, pp. 345-354.

⁽³³⁾ Set forth in paragraphs 280-283, Article 1 of Law No. 296 of 27 December 2006 and, more recently, in Article 60 of Law No. 83 of 22 June 2012.

⁽³⁴⁾ As laid down in the Official Journal of the European Union 2006 No. C/323.

⁽³⁵⁾ Article 5 of Legislative Decree No. 167 of 14 September 2011.

⁽³⁶⁾ Article 4 of Law No. 210 of 3 July 1998, and more importantly, at Article 8 of Law No. 28 of 21 February 1980.

⁽³⁷⁾ As expressly provided in Article 4, par. 1, of Law No. 210 of 3 July 1998.

⁽³⁸⁾ As specifically laid down in Article 8, paragraph 3, of the Law No. 28 of 21 February 1980.

⁽³⁹⁾ As laid down in Article 1, paragraph 3, of Ministerial Decree No. 45 of 8 February 2013.

⁽⁴⁰⁾ Differently from what is stated in paragraph 1, Article 4 of Law No. 201 of 3 July 1998.

⁽⁴¹⁾ European Commission, *Principles for Innovative Doctoral Training*, Directorate General for Research and Innovation – Directorate B (European Research Area), Brussels 27 June 2011, especially p. 6 and 14.

⁽⁴²⁾ In this perspective, doctoral courses fall within the scope of the “Bologna process” for the purposes of building a European Research Area, see *Doctoral Programmes in Europe’s University: achievements and challenges*, European University Associations, Brussels, 2007, especially page 6 and 14.

⁽⁴³⁾ See Article 2, par. 2, letter. b), of Ministerial Decree of 8 February 2013 for what provided under note 31.

⁽⁴⁴⁾ See Article 2, par. 2, letter. a), of Ministerial Decree of 8 February 2013.

⁽⁴⁵⁾ See Article 2, par. 2, letter. d), of Ministerial Decree of 8 February 2013.

⁽⁴⁶⁾ See Article 2, par. 2, letter. e), of Ministerial Decree of 8 February 2013.

⁽⁴⁷⁾ See Article 4, par. 1, letter. a), of Ministerial Decree of 8 February 2013.

(⁴⁸) See again Article 4, par. 1, lett. a), of Ministerial Decree of 8 February 2013 that requires a faculty mostly made up of university professors “following a specific agreement between the institution and the university to which the professor is affiliated”.

(⁴⁹) In this perspective, see the detailed analysis by N. Salimi, R. Bekkers, K. Frenken, *Governance and Success of University-Industry Collaborations on the Basis of Ph.D. Projects etc.*, cit.

(⁵⁰) In this respect, see OCSE, *Innovative Learning Environments*, Paris, 2013. See in the relevant literature A. Kolmosa, L.B. Kofoedb, X.Y. Dua, *PhD Students’ Work Conditions and Study Environment in University and industry-Based PhD Programmes*, in *European Journal of Engineering Education*, vol. 33, No. 5–6/2008, pp. 539–550 cui adde J. Malfroy, *The impact of university–industry research on doctoral programs, and practices*, in *Studies in Higher Education*, vol. 36, n. 5/2011, pp. 571–584 and C. Manathungaa, R. Pittb, L. Cox, P. Borehamc, G. Mellickd, P. Lante, *Evaluating Industry-based Doctoral Research Programs: Perspectives and Outcomes of Australian Cooperative Research*, Centre graduates, in *Studies in Higher Education*, vol. 37, No. 7/2012, pp. 843–858.

(⁵¹) European Commission, *Mapping Exercise on Doctoral Training in Europe – Toward a common approach*, General Directorate for innovation and research – Directorate B (European Research Area), Brussels 27 June 2011.

(⁵²) European Commission, *Principles for Innovative Doctoral Training*, cit.

(⁵³) See European Commission, *From Challenges to Opportunities: Towards a Common Strategic Framework for EU research and innovation, funding*, Brussels, COM (2011)48 def.

(⁵⁴) European Commission, *Mapping Exercise on Doctoral Training in Europe – Toward a common approach*, § 3.

(⁵⁵) *Ibidem*.

(⁵⁶) *Ibidem*. For an in-depth analysis of the different types of collaboration between universities and businesses in the field of doctoral research, see L. Borrel Damian (ed.), *University-industry partnership for enhancing knowledge sharing. Doc-careers project*, cit. The Report of the Association to Advance Collegiate Schools of Business, *The Promise of Business, Doctoral Education, Setting the pace for innovation, sustainability, relevance, and quality*, AACSB International, Tampa, Florida, 2013 is particularly relevant, for it is concerned with the strategies to develop an *industry partnership* (available at www.faredottorato.it).

(⁵⁷) Industrial Doctorates were introduced for the first time in Denmark in 1971 through *Industrial Researcher Programme*. Cfr. *Analysis of the Industrial PhD Programme*, The Danish Agency for Science, Technology and Innovation, 2011.

(⁵⁸) The Danish Agency for Science, Technology and Innovation, *Guidelines for the Industrial PHD Programme*, Copenhagen, 2013, here § 5.

(⁵⁹) Here, remuneration is based on seniority and is higher than in Italy. A Doctoral student in Denmark earns 354.000 DKK in his first year (amounting to €47.450) and 428.000 DKK (€57.370) after 4 years’ seniority. In Italy, the scholarship granted to a Doctoral student amounts to €13.638 for year of the three years of the PhD programme.

(⁶⁰) For an assessment of the Danish model of Industrial PhD see A. Kolmos, L.B. Kofoed, X.Y. Du, *PhD students’ work conditions and study environment in university and industry based PhD programmes*, in *European Journal of Engineering Education*, 2008, pp. 539-550.

(⁶¹) On the Swedish model, see L. Wallgren and L. O. Dahlgren, *Industrial doctoral students as brokers between industry and academia: Factors affecting their trajectories, learning at the boundaries and identity development*, in *Industry & higher education*, (21), 3, 2007, pp. 195-210. On the Norwegian model see T. Thune, S. Kyvik, S. Sörlin, T. Bruen Olsen, A. Vabø and C. Tømte, *PhD education in a knowledge society: An evaluation of PhD education in Norway*, Nordic Institute for Studies in Innovation, Research and Education, 2012 (available at www.faredottorato.it).

(⁶²) On the French case, see *Les CIFRE, outil simple de coopération, à l’avant-garde de la qualité du doctorat et de l’employabilité des docteurs*, in *Rapport d’activité 2012*, ANRT- Association Nationale de la Recherche et de la Technologie (available at www.faredottorato.it).

(⁶³) See European Commission, *Mapping Exercise on Doctoral Training in Europe – Toward a common approach*, cit., p. 5.

(⁶⁴) With reference to the Spanish case, see J. Garcia-Quevedo, F. Mas-Verdù, J. Polo-Otero, *Which Firms Want PhDs? An Analysis of the Determinants of the Demand*, in *European Journal of Engineering Education*, 2012, pp. 607-620.

(⁶⁵) See above p.14, note 48.

(⁶⁶) See the Report published by the Higher Education and Training Awards Council in October 2010, *Research Degree Programme Policy and Criteria* (available at www.faredottorato.it).

(⁶⁷) See M. Ori, *Il dottorato industriale in Germania*, in ADAPT Special Bulletin of 5 luglio 2013, and for an analysis of occupational transitions of German PhDs J. Enders, *Serving Many Masters: the PhD on the Labour Market, the Everlasting Need of Inequality, and the Premature Death of Humboldt*, in *Higher Education*, 2002, pp. 493-517.

(⁶⁸) “Intermediate labour market” are discussed by C. Lanciano-Morandat, H. Nohara, *The Labour Market for the Young Scientists*, cit., pp.156-189.

(⁶⁹) As stated by the Ministerial Committee on Industrial PhDs established with Ministerial Decree No. 596 del 3 July 2013. The *Relazione conclusiva* of the Commission is published on www.faredottorato.it.

(⁷⁰) By way of comparison in Denmark, following the allocation of substantial public funding for *Industrial PhD* programmes, businesses are assigned much responsibility, in relation to laying down the criteria to distribute the resources. This involves such aspects as the financial sustainability of projects, training capacity, and the selection of doctoral students. Research projects are funded only if suitable candidates are available, meaning that when submitting a project, the company must already have recruited a candidate; once the ability to select the suitable candidate has been ascertained, the company will be given the opportunity to receive funding for additional grants (up to 5). The Danish Agency for Science, Technology and Innovation, *Guidelines for the Industrial PhD Programme*, cit. Therefore, in terms of *governance* and the relationships between the parties involved the focus is on the partnership between the university and the enterprise: they need to cooperate on a level playing field, as the role of the university is crucial to grant the PhD, with the company performing a recruiting function, since programmes cannot start without suitable candidates. Even in France, as part of *Conventions industrielles de formation par la recherche* (CIFRE, agreements between universities and businesses for training in the field of research), the firm selects and hires young candidates, assign them a research project useful in terms of corporate R&D strategy, which will also be the subject of their doctoral thesis. The results of qualitative research show how agreements are often concluded within already established patterns of cooperation between companies and research laboratories, with the CIFRE programmes that contribute to strengthening this relationship. In many cases, the matching between student and business is a consequence of the openness of companies and can be facilitated by a previous internship at the same company (R. Levy, *Les doctorants CIFRE: médiateurs entre laboratoires de recherche universitaires et entreprise*, in *Revue d'économie industrielle*, Vol. 111, 2005, pp. 79-96). Finally, in relation to German “individual doctorates”, it is up to the young graduate to find and submit an application in a company that has an interest in promoting and supporting a contract of employment for a person who is also doing a PhD: if the selection is successful, it is still the young graduate who has to look for a supervisor at a university, often through his own contacts (see M. ORI, *The industrial doctorate in Germany*, op.cit.).

(⁷¹) For an update, see the Research Department of the Italian Senate, *Il valore legale del titolo di studio. Contesto europeo ed elementi di legislazione comparata*, March 2011. See also S. Cassese, *Il valore legale del titolo di studio*, in *Annali di storia delle università italiane*, 2002, vol. 6.

(⁷²) The broad concept of placement refers to the transition from school or university to training-based work, through the devise of training programmes that meet the needs of businesses and that increase the employability of young people. Only young people who have acquired the knowledge and skills consistent with the training and professional needs expressed by businesses will find it easier to enter into the labour market. Accordingly, particularly important are the skills and experiences partly acquired through in-company training during an apprenticeship or internship to increase the employability of young people. See also, S. Spattini, *Riforma dell'apprendistato e nuovo placement*, in M. Tiraboschi (eds.), *il Testo Unico dell'Apprendistato e le nuove regole sui tirocini*, cit.

(⁷³) See the definition of “enterprise” laid down in Art. 2083 of the Civil Code. By way of comparison, see paragraph 1, Article 8-bis, letter. a) of the Decree Law of 12 September 2013, n. 104, converted with amendments into Law No. 128 of 8 November 2013, laying down urgent measures in the field of education, university and research, which expressly provides work with an “educational and training value”.

(⁷⁴) The topic is covered extensively in G. Bertagna, *Apprendistati e formazione in impresa*, in M. Tiraboschi (ed.), *Il Testo Unico dell'apprendistato e le nuove regole sui tirocini*, cit., pp. 105-125.

(⁷⁵) See the contributions collected in M. Magnani, M. Tiraboschi (eds.), *La nuova riforma del lavoro – Commentario alla legge n. 92/2012*, Giuffrè. See also M. Tiraboschi, *Italian Labour Law after the So-*

Called Monti-Fornero Reform (Law No. 92/2012) (2012). *The E-Journal of International and Comparative Labour Studies*, Volume 1, No. 3-4, October-December 2012.

⁽⁷⁶⁾ The relevant literature has only marginally touched upon this aspect of the Fornero Law. See G. Bertagna, L. Casano, M. Tiraboschi, *Apprendimento permanente e certificazione delle competenze*, in M. Magnani, M. Tiraboschi (a cura di), *La nuova riforma del lavoro*, Giuffrè, Milano, 2012, pp. 392-403, and the contributions collected in U. Buratti, L. Casano, L. Petruzzo (eds.), *Certificazione delle competenze. Prime riflessioni sul decreto legislativo 16 gennaio 2013, n. 13*, ADAPT University Press, 2013.

⁽⁷⁷⁾ Issued pursuant to paragraphs 58 and 68, Article 4 of Law No. 92/2012. See *Certificazione delle competenze. Prime riflessioni sul decreto legislativo 16 gennaio 2013, n. 13*, U. Buratti, L. Casano, L. Petruzzo (eds.) ADAPT LABOUR STUDIES e-Book Series No. 6, 2013 cit. The lengthy drafting and approval process was heavily influenced by the impositions of the European Commission, which placed formal limitations to the Italian Government and the Regions concerning stricter time schedules and predetermined outcomes, especially in relation to the definitions resulting from the recent Council Recommendation No. 2012/C 398/01 of 20 December 2012 on the validation of non-formal and informal learning.

⁽⁷⁸⁾ Quite the contrary, Article 49 of Legislative Decree No. 276/2003 (The Biagi Law) provides for the opportunity to receive “formal training” even by undertaking vocational apprenticeships and, in general, as part of vocational training designed and delivered by bilateral bodies or inter-professional funds for continuing education.

⁽⁷⁹⁾ Article 6 of Legislative Decree No. 167/2011. See the contributions published in M. Tiraboschi (ed.), *Il Testo Unico dell'apprendistato e le nuove regole sui tirocini*, cit.

⁽⁸⁰⁾ See EUA, *Doctoral Programmes in Europe's Universities: Achievements and Challenges*, Bruxelles, 2007, available at www.faredottorato.it.

⁽⁸¹⁾ I am referring to the Doctoral School in Human Capital Formation and Labour Relations promoted by ADAPT and the University of Bergamo, described in the contribution by Lilli Casano cited in note 27.

⁽⁸²⁾ See M. T. Cortese, *Apprendistato e dottorati di ricerca*, in (ed.) M. Tiraboschi, *Il Testo Unico dell'Apprendistato e le nuove regole sui tirocini*, cit.

⁽⁸³⁾ Article 50 of Legislative Decree No. 276 of 10 September 2003 allowing to earn a PhD through higher apprenticeships. See M. Tiraboschi, *L'apprendistato di alta formazione*, in M. Tiraboschi (ed.), *La riforma del lavoro pubblico e privato e il nuovo welfare*, Giuffrè, Milan, 2008, pp. 105-106.

⁽⁸⁴⁾ Paragraph 1, Article 5 of Legislative Decree No. 167 of 14 September 2011, known as “Consolidated Law on Apprenticeship”.

⁽⁸⁵⁾ See www.fareapprendistato.it for a review of the few provisions provided in the collective agreements concluded at national level and local level. Most of them were not renewed and only concerned the ongoing attempts to place these educational schemes in force. More often than not, the clauses laid down in collective agreements were insufficient to implement higher apprenticeships particularly with regard to the remuneration of those on these contractual schemes.

⁽⁸⁶⁾ See the monitoring reports on apprenticeship issued by ISFOL available at in www.adapt.it, A-Z Index, under Apprendistato.

⁽⁸⁷⁾ See my contributions on the Biagi reforms in M. Tiraboschi, *Labour Law and Industrial Relations in Recessionary Times. The Italian Labour Relations in a Global Economy*, Cambridge Scholars Publishing, Newcastle upon the Tyne. More specifically, *The Italian Labour Market after the Biagi Reform*, pp. 109-162, and *The Reform of the Italian Labor Market over the Past Ten Years: A Process of Liberalization*, pp. 163-205.

⁽⁸⁸⁾ By Article 23 of Decree-Law No. 112 of 25 June 2008, converted, with amendments, by Law No. 133/2008.

⁽⁸⁹⁾ The body of rules produced when Art. 50 of Legislative Decree No. 276/2003 was still in force can be consulted at www.fareapprendistato.it.

⁽⁹⁰⁾ See S. Spattini *Higher-level Apprenticeships in Italy*, Discussion Paper for Mutual Learning programme Higher Apprenticeships – a part of effective lifelong learning and a flexicurity strategy, Torino, 30-31 Ottobre 2008 (in www.faredottorato.it) for a more general overview of the types and functions of higher apprenticeship other than implemented in higher education.

⁽⁹¹⁾ Article 5 of Legislative Decree No. 167 of 14 September 2011.

⁽⁹²⁾ On the topic *Impianto e quadro regolatorio*, see M. Tiraboschi (ed.), *Il Testo Unico dell'apprendistato e le nuove regole sui tirocini*, cit., pp. 367-375. In the same book see also M. T. Cortese, *Apprendistato e dottorati di ricerca*, pp. 384-390.

⁽⁹³⁾ Art. 5, par. 2, of Legislative Decree of 14 September 2011, No. 167.

⁽⁹⁴⁾ See, for example, the national collective agreement of metalworkers placing the “researcher” in Grade 7 of the workers’ classification system i.e. a worker who “on the basis of general guidelines, carries out, in his/her own specific field and with the necessary knowledge, studies regarding the design and the operational planning necessary for the achievement of business objectives, ensuring the setting up and development of projects, producing the relevant work plans, researching, where necessary, innovative systems and methodologies and, where appropriate, coordinating other workers”. Also other collective agreements in some sectors (food, artisan, services, chemicals, construction and textiles) mention profiles of workers with the necessary skills to develop processes or products, although they do not contain a precise conceptual and normative framework nor appropriate descriptions necessary to define work content, skills, career and a specific professional profile.