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## From product to process. The reform of doctoral education in Europe and China

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This contribution is based on an analysis of recent changes in doctoral education that can be observed in Europe and China. It traces the policies having led to these changes and discusses related policy transfer. The contribution is divided into five parts. It begins by sketching recent changes in doctoral education in the framework of the European Bologna Process and the framework of Chinese higher education reforms looking at similarities and differences in the underlying rationales. The second part will elaborate on the extended policy field for doctoral education which is no longer regarded as an exclusively academic affair but has become an object of institutional management, national policy-making and – at least in Europe – supra-national agenda setting. The third part will take a closer look at the multiplication of purposes and models for doctoral education. While in Europe, altogether, nine different types of doctoral education and training can be identified, China has just started to diversify its doctoral training by adding professional degrees and (in engineering) joint doctoral programmes to the traditional pathway. The fourth part will discuss two overarching issues which are equally in the centre of debates and policy-making in Europe and in China – quality management and internationalisation of doctoral education. In the last and concluding part, we will reflect on the implications of the extended policy field and the diversification of doctoral education models in terms of the question of how this reflects on quality assurance mechanisms, who is qualified to convey the extended skills set and whether academic careers remain sufficiently attractive to attract the best and the brightest talent.

**Keywords:** doctoral education; European higher education reform; Chinese higher education reform; models of doctoral education; international comparisons

### 1. Introduction: reforms of doctoral education

In recent years, the need to reform doctoral education and training has been high on the policy agenda in many countries around the world. The goal to increase the production of doctoral degrees is closely related to ambitions of either establishing a given nation, such as China, for example, as a knowledge society and economy or in cases such as Europe gain a competitive advantage in the global knowledge economy. Accordingly national governments but also the European Commission have encouraged universities to increase the number of doctoral degrees awarded, recruit best talent internationally for research training and structure this phase of

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qualification in such a way that doctoral degree holders have the necessary competencies and skills to work in academic as well as non-academic labour markets. In both China and Europe, this has led to a diversification of types of doctoral degrees and models of training. At the same time quality issues in doctoral education and training are moving into the foreground of debates and policy initiatives in order not to compromise the status of the degree. And while in Europe more differentiated approaches can be observed to reform doctoral education and training, reforms in China are just beginning and have a slightly different emphasis. In the following, a comparison will be made between developments in Europe, more specifically in the EU member states, and in China with regard to reforms of doctoral education and training.

## 2. Driving factors for the initiation of reforms

### 2.1. *Reforms of doctoral education in the context of the European Bologna process*

Increasingly the production of new knowledge, often a task and an aspiration of doctoral candidates, is no longer regarded as a purely academic affair but as a strategic resource in the emerging knowledge societies. With this shift doctoral education and training has become an object of institutional management, of national policy as well as support or funding programmes, and of supra-national incentives, regulations and measures for better integration into the existing knowledge and innovation systems. Furthermore, an increasingly international competition for best talent has begun (Kehm 2006, 67).

At the same time public criticism of doctoral education and training became louder: too long, too many dropouts, too specialised, questionable quality of supervision, lack of competences for non-academic labour markets. The continental European answer to such criticism was 'structured doctoral education', that is, the integration of this qualification phase into programmes, centres, schools or colleges, etc. and the addition of systematic curricular provisions to offer theoretical, methodological and labour market-related competences to the research work on the dissertation. This development has currently three observable consequences: first, the dominant master–apprentice model is regarded as a phasing-out model; second, the focus on a point in the framework of a rite of passage (i.e. defence and award of title) with an emphasis on the product 'dissertation' is shifting to a focus on the process of doctoral education and training (its structures, content and quality); third, access to doctoral education and the process of getting a doctorate are increasingly embedded in a dense layer of regulations, criteria, defined rights and obligations, procedures of evaluation and controls of success (Kehm 2006, 73).

In the framework of the European Bologna Process, the phase of getting a doctoral degree also has become a much discussed topic. The reform initiators (ministers for higher education from 27, later 46 European countries) conceptualised doctoral education at first as a third cycle of studies in the framework of which seminars had to be taken and credit points earned. However, this conceptualisation as a third cycle of studies met with resistance from a number of European countries. Such a concept was only valid in those European countries in which doctoral candidates were traditionally regarded as students and had to pay fees for supervision and seminars or in countries in which graduate studies follow a Bachelor's degree. Such a concept did

not fit at all in those European countries (Germany among them) in which eligibility for doctoral education is only granted after a Master's degree and in which doctoral education and training takes place dominantly in the framework of employment contracts as research assistants or junior academics and is understood as a first phase of an academic or research career (in Sweden, for example). Typical for Germany is the multitude of pathways towards a doctoral degree (see Burkhardt 2008) whereby the status of the candidates depends on their form of funding: doctoral candidates are employees of the university when getting their degree in the framework of a research assistant position, they are scholarship holders when they get support from one of the many foundations, or they are externals when they have a regular job on the non-academic labour market and fund themselves through their salaries or use their own money. In the two latter cases, doctoral candidates have a professorial supervisor but have no status vis-à-vis the university (Burkhardt 2008).

However, in the meantime, the structuring of doctoral degrees has found many supporters in Germany as well as other European countries which traditionally followed the so-called master–apprentice model with individual supervision. Despite the fact that the organisational forms as well as the terminology (e.g. graduate college, graduate centre, doctoral programme in German as well as in all English language variants) continue to proliferate, it is hoped in principle that structuring the doctoral phase will solve a number of problems (Kehm 2006).

In the framework of the European Bologna Process, new aspects are entered into the discussion. First among these is the better preparation of doctoral candidates for non-academic labour markets because a growing proportion of doctoral degree holders will not remain within a higher education institution or an extra-university research institute.

A second issue is that professors are increasingly made responsible for the success of the doctoral candidates they supervise. In some European countries (e.g. in the United Kingdom and in Spain but also, for example, in Australia), regulations have been introduced which define who can act as a supervisor (no longer every professor) and what kinds of formal qualifications and further criteria must be obtained and fulfilled in order to have the right to supervise doctoral candidates (e.g. some kind of further professional qualification in supervision or a minimum number of research projects and publications) (Lee 2007; Halse and Malfroy 2010). This trend has an impact on the degree of selectivity in terms of access and admission of doctoral candidates.

Third, there are issues pertaining to the meaning of 'critical mass' in the framework of ongoing discussions about efficiency and effectiveness. This means that at quite a number of European universities criteria are established to determine (a) how many professors a university should have in a given field or discipline in order to offer optimal conditions for doctoral candidates and (b) how many doctoral candidates a given doctoral programme, doctoral school or doctoral college should have ideally (or minimum and maximum numbers). These numbers can differ from subject to subject but we can observe concentration processes with consequences for smaller subjects and for a further institutional differentiation into research universities with the right to award doctoral degrees and teaching universities without this right (Kehm 2004, 2005, 2006, 2007).

## ***2.2. Doctoral education in the framework of Chinese higher education reforms***

In China, doctoral education is offered by both universities and the research academies at national, provincial and regional levels. However, universities educate and train a considerably higher number of doctoral candidates than the research academies do.

Since graduate education was resumed in 1978 after the end of the Cultural Revolution (1966–1976) and the establishment of an academic degree system in 1981, post-graduate education has experienced a remarkable development in China. The country produced 19 doctoral degrees for the first time in 1983 and after this first milestone, doctoral education has grown significantly in China (Wu 2009). The total enrolment of doctoral students was 536 in 1982 and increased to 10,998 in 1989 (Ministry of Education 1990). It continued to grow during the 1990s and reached the number of 54,038 doctoral enrolments in 1999 (Ministry of Education 2010). According to the *Annual Report on China's Graduate Education Quality* (2015), the total enrolment of doctoral students has reached 312,676 in 2014. So the number of doctoral students reached an all-time high with more than 300,000 which equalled an increase of 600% compared to the number in 1999.

Figure 1 shows the development trend in the number of doctoral students and the number of doctorates conferred during the past 20 years. In line with the rapid expansion of higher education since 1999 in China, recruitment of doctoral students increased dramatically from 19,915 in 1999 to 54,794 in 2005. The same holds true for the increase in the number of doctorates conferred, from 10,320 in 1999 to 27,677 in 2005 (Ministry of Education 2006, 2010). And both trends towards considerable increase have remained stable after 2005. According to the latest statistics, China recruited 70,462 doctoral students in 2013 and in the same year 53,139 doctoral degrees were awarded (Ministry of Education 2014).

In terms of absolute numbers this makes China the biggest producer of doctoral degrees worldwide, although not in terms of their proportion among the relevant age cohort (higher education graduates between the age of 21 and 25). In this respect, Switzerland, Sweden, Germany and Finland have higher proportions. But China is clearly catching up and at a very rapid pace.

In China, doctoral degree holders have become a significant force in the nation's research and innovation system contributing to the economic and social development of the country. Doctoral education and training is strongly and strategically supported and promoted by the Chinese government. It is seen as an important form to develop highly qualified human resources in order to boost the economy and the government

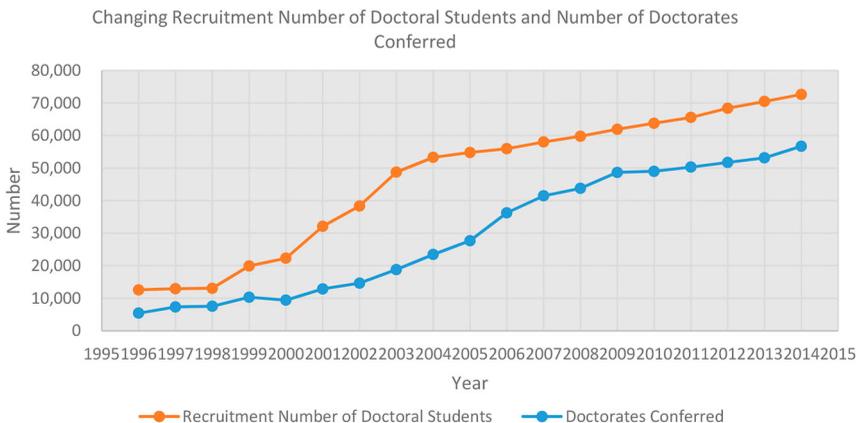


Figure 1. Doctoral Students and Doctoral Awards in China (1996–2014).  
Source: Statistics of the Chinese Ministry of Education.

has formulated medium-term and long-term strategic plans to increase the number of doctoral degree holders and improve the quality of their training. Thus, in China as in Europe, doctoral education has become an object of national policy-making and in China it has been given unprecedented national priority.

China understands itself as an emerging knowledge economy so the government is keen to meet the demands of the various sectors of the national economy for highly qualified young people. However, as with all rapidly expanding systems, quality is one of the main concerns and this holds true for doctoral education in China as well. The Ministry of Education has prioritised quality assurance in the ongoing reforms and the continued expansion of doctoral education.

Ongoing reforms of doctoral education in China are based on two principles: (a) promoting innovation in graduate education and (b) establishing mechanisms for assessment and evaluation. The first one of these principles indicates attempts to diversify doctoral education to some extent, for example, by introducing professional degrees; the second one indicates existing concerns about quality and attempts to improve it. The measures to achieve these principles have been laid down as (Ding 2013; Niu 2014; Xiao et al. 2014)

- optimising the structure and layout of doctoral education;
- seeking innovative approaches to graduate education;
- motivating teachers and students;
- and promoting international collaboration.

We will come back to these measures later on in this contribution.

### 3. The extended policy field

As mentioned before, doctoral education and training is no longer an exclusively academic affair but has become an object of institutional management as well as national and supra-national policy-making. The inclusion in 2003 of doctoral education as a third level or cycle of a tiered structure of studies and degrees in the framework of the Bologna Process was among other things a consequence of the European Council's and Parliament's strategy in the year 2000 to create a common European Research Area (Lisbon Summit 2000). This strategy was supposed to develop Europe into the most dynamic knowledge-based economy of the world in order to be globally competitive. To achieve this, the number of doctoral degree holders was to be increased and doctoral candidates were supposed to become better prepared for non-academic labour markets. The descriptors for the doctoral level of the European Qualifications Framework clearly reflect this.

China is currently looking to a number of countries around the world in order to find out about new and different models of doctoral education. Certainly the European Bologna Process serves as one possible template in this respect but also the US American forms of graduate education. There is no supra-national agency which influences Chinese policy-making in this field but rather there is a certain degree of policy emulation going on.

Let us have a look at the national policy field. In most European higher education systems, we can observe an increasing number of initiatives and support programmes to establish a structure for doctoral education and training. The number of doctoral degrees awarded has become part of indicator and performance-based funding and budgeting in negotiations between universities and the state about the overall budget as

well as in intra-institutional budget allocations. German universities produce about 35% of doctoral degrees in the European Union, that is, almost 28,000 in 2013 (Destatis 2014). The German Excellence Initiative supports the establishment of graduate schools and the German non-academic labour market is relatively open for job seekers with a doctoral degree. This also implies that the unemployment rate among doctoral degree holders in Germany is the lowest compared to all other levels of education and training. National policy by and large is in favour of increasing even further the number of doctoral degree holders because it is believed that a high number of people with high qualifications provide a competitive advantage for the economy on a global scale.

We can observe a similar development in China. Doctoral education and training is a priority in the relevant Ministry's policies. Support and funding programmes are in place and universities compete for this money by submitting their plans to increase and at the same time improve doctoral education and training. There is a pronounced emphasis on quality management and internationalisation both of which are also issues in the European reforms. However, while national policies in Europe tend to emphasise programme or structure and time-to-degree as well as competences for non-academic labour markets, the Chinese government has focused strongly on quality management issues in doctoral training. Regulations have been put into place concerning the approval of doctoral programmes, regular rankings and reviews of existing programmes, the selection of supervisors, the number of doctoral candidates to be admitted, the availability of scholarships and doctoral dissertation inspections through selective assessment. Furthermore, American-type graduate schools have been established since the 1990s to regulate student and faculty activities at the Master's level as well as in doctoral education.

The institutional policy field has also changed with regard to the indicator 'doctoral degrees' and this is the case for both Europe and China. Almost all universities encourage their professors as well as faculties and departments to increase the number of doctoral degrees awarded and to reduce the time-to-degree. The number of doctoral degrees awarded is an important indicator when measuring research output, in the context of establishing a profile and reputation as a research-intensive institution, and in the framework of the general competition for reputation and funds. But there is a further intra-institutional dimension. Within universities competition has also become stronger and departments, research groups or individual professors who have been particularly successful in terms of doctoral education and training can negotiate for extra funds or other material advantages (e.g. additional human resources or better infrastructure). Traditionally a high number of successful doctoral supervisions contributed to the individual reputation of a given professor within the scientific community. This continues to be the case; however, it is complemented by the aspect that this success is also supposed to contribute to the reputation of the institution. Those less successful in the endeavour of doctoral education and training will most probably end up not being allowed to have doctoral candidates any longer.

Despite the fact that the Chinese government still regulates and monitors many aspects of doctoral education and training, the originally rigid state control model has given way to a state supervision model in recent years in accordance with the gradual transformation from a planned economy into a market economy. Both higher education institutions and research institutes of the academy of sciences have been granted a higher level of autonomy to explore reforms of their own doctoral education and training. This includes, for example, recruiting strategies (e.g. substituting test

scores through application and recommendation processes), supervision practices (e.g. providing younger researchers with opportunities to supervise and introducing two rather than just one supervisors), the organisation of learning experiences (e.g. joint training exercises by universities and research institutes) or the evaluation of dissertations (e.g. anonymous assessment of PhD dissertations).

#### 4. Multiplication of purposes and models of doctoral education

##### 4.1. *European trends*

If we look at the changes in doctoral education from a European perspective we can note that the models of doctoral education and training and with them their goals and purposes have multiplied in recent years. This is most progressed in the United Kingdom but gradually also is extending to Continental European universities. Mostly we find an increasing differentiation between a research doctorate and a professional doctorate. Further research has yielded nine different models which will be introduced here briefly (Kehm 2009).

##### 4.1.1. *The research doctorate*

For the research doctorate, the dissertation is central and expected to be an original contribution to the knowledge base of a discipline or a research domain. Independent of the fact whether the degree (or title) is acquired within the framework of a structured programme including course work or in the framework of a master–apprentice relationship, the research doctorate as a rule is an entrance ticket to the academic profession who – by being responsible for the training – also has a gatekeeper function. Using the example of six disciplines, Golde and Walker (2006) have characterised the main purpose of doctoral education in the research doctorate as developing students to be ‘stewards of the discipline’. The goal of such a training is a scientific or scholarly ideal type characterised as someone ‘who can imaginatively generate new knowledge, critically conserve valuable and useful ideas, and responsibly transform those understandings through writing, teaching and application. A steward is someone to whom the rigour, quality, and integrity of the field can be entrusted’ (Golde and Walker 2006, 5). This rather normative image contrasts starkly with the image generated by Slaughter and Leslie (2000) of the successful academic as ‘capitalist entrepreneur’ who has recognised the demands and challenges of market orientation, competition and globalisation in the emerging knowledge societies and knows how to draw advantages from these developments.

##### 4.1.2. *The professional doctorate*

A number of European countries (e.g. Austria, Belgium, Denmark, France and the Netherlands) have by now picked up the British trend to explicitly distinguish between a research doctorate and a professional doctorate. The professional doctorate is not awarded in all disciplines but restricted to subjects like business administration, medicine and health care, education, engineering, social work, etc., that is, to subjects which have a relatively demarcated field of professional practice. In professional doctorates, the title usually includes an indication of the professional field (e.g. DBA for Doctor of Business Administration or EdD for Doctor of Education), while research

doctorates are typically awarded distinguishing between the sciences (Dr. Sc.) or the humanities (Dr. Phil.). Quite a number of publications have appeared in recent years on the professional doctorate (Bourner, Bowden, and Laing 2001; Green and Powell 2005; Park 2005). To some extent this seems to be related to the fact that in academic circles the professional doctorate is often looked down upon as a second-class doctorate so that pressure for legitimization increased.

The professional doctorate is defined as a programme of advanced studies which – apart from fulfilling university criteria for the award of the degree – is geared towards satisfying a particular demand from a professional group outside the university and towards developing research skills needed within a professional context (Bourner, Bowden, and Laing 2001, 219). In the United Kingdom, professional doctorates are typically taken up by people who are pursuing a professional career and are employed. Therefore, professional doctorates are frequently offered as part-time programmes and usually require several years of professional experience. Tuition fees are often covered fully or in parts by the employer. The target group wants to gain the degree in order to be eligible for promotion in their professional field. Consequently the research work carried out for the dissertation is regarded less as a contribution to the knowledge base of a discipline but more as a contribution to the development of a professional domain. The dissertation then has a focus on the generation of new but more applied knowledge and the topic is often generated from the respective professional practice. In some areas, for example, in engineering the dissertation can also have the form of a larger or a series of smaller projects which are carried out in the framework of actual professional practice.

#### 4.1.3. *The taught doctorate*

By definition, the taught doctorate consists of a substantial proportion of course work. Typically there will be a fixed curriculum and learning outcomes will be graded and weighted for the final grade. As in the research doctorate, students are supposed to contribute to the generation of new knowledge but they do this in the framework of a research project the results of which are summarised in a project report. The report is presented in the framework of an oral examination and is graded as well. In contrast to the two-phase doctorate in the United States (course work first, then research and writing of thesis), the course work of the taught doctorate is spread over the whole period of degree training (predominantly offered in the United Kingdom). The oral examination and the grade of the research project report are regarded as an equivalent to a dissertation and its defence.

#### 4.1.4. *PhD by published work*

The model of the PhD by published work is known in Germany since the nineteenth century (where it is called ‘cumulative dissertation’). From there it spread to other parts of the world, mainly the United States but also to Belgium, to the Netherlands and to Sweden. At second glance the British model of the PhD by published work differs to some extent from the German model of a ‘cumulative dissertation’. Both models are basically characterised by combining several articles which have appeared in peer-reviewed scholarly or scientific journals into a book and providing them with a coherent framework. But while this option is open for many candidates in Germany, the PhD by published work is awarded in the United Kingdom almost

exclusively to members or alumni of the university awarding the degree (Green and Powell 2005, 72).

This model has frequently been criticised for its lack of consistency, differences in the definition of what constitutes a publication, its threat to other forms of doctoral education and the difficulty to provide adequate supervision. Furthermore, in this model of the doctorate it is predominantly a product which is evaluated and graded and not the process of getting the degree itself. Therefore, most countries which provide this opportunity have regulations in place which determine the character and the content of the dissertation and possibly also the question whether and in which form a programme of additional studies has to be taken (Green and Powell 2005, 71).

#### 4.1.5. *The practice-based doctorate*

The practice-based doctorate is a terminological specificity of the British university system as well but it is also awarded in Australia. It denotes the award of doctoral degrees in the Arts and in Design. While German universities, for example, award a doctoral degree in musicology or art history, the highest degree in the various arts as such (e.g. painting, sculpting, acting, singing, dancing, playing an instrument) is called *kuenstlerische Reife* (which can be translated literally as ‘artistic maturity’). No doctoral degree is awarded in these fields.

The practice-based doctorate increased in importance with the integration of colleges of art into the universities in the 1990s in the United Kingdom. The degree is awarded as a result of course work in the framework of which students are familiarised with theories and research methodologies and the presentation of a work of art or a performance as a substitute for the dissertation. The presentation or performance is accompanied by a text in which the candidate explains how he or she has arrived at the result or product by applying research methods. This is regarded as generating new knowledge through practice. Successful candidates are also expected to demonstrate how their work of art is related to other works of art in the same field (theoretical, historical, critical or visual context) and to evaluate possible effects. In the field of composition frequently not just one work is presented but a whole portfolio. In the oral examination, the work of art will be presented or performed and the candidate demonstrates on the basis of the accompanying text that she or he has sufficient knowledge and appropriate skills to independently generate new knowledge.

The practice-based doctorate is contested in the United Kingdom because – compared to all other models of the doctorate – it shows the least proximity to the traditional notion of a dissertation. However, about half of all British universities offer such a doctorate (Green and Powell 2005, 100ff.).

#### 4.1.6. *The ‘new route’ doctorate*

The model of the ‘new route PhD’ (also called integrated doctorate) was developed by 10 British universities as a form of brand name in 2001 with the purpose of attracting international students. In the meantime, it is offered by more than 30 British universities. The programme basically consists of three (integrated) elements: a taught component in the area of research methods and subject specialisation, another taught component in the area of transferable skills and the work on a dissertation (disciplinary or interdisciplinary). Admission can be granted right after having completed a Bachelor’s degree. The taught components are frequently offered in the framework of related Master’s

programmes and accompany the whole four years envisaged for getting the degree. For the taught components 240 credit points are awarded. Requirements for the dissertation are similarly high as for the research doctorate ([www.newroutephd.ac.uk](http://www.newroutephd.ac.uk)).

However, in comparison to the research doctorate the taught elements are more important and also prescribed in more detail with respect to the qualifications and competences to be acquired. After having finished all the course work there is also the possibility to write a Master's thesis instead of a doctoral dissertation and finish with a Master's degree.

In Germany, this model has become known as 'fast track PhD' and is offered in specific subjects at some universities. Although the Master's degree in Germany is required for admission into doctoral programmes or acceptance as a doctoral candidate, this model offers transition into the doctoral phase for particularly talented students right after their Bachelor's degree.

Basically the new route PhD as well the fast track PhD follow the American model of an integrated postgraduate education in which the Master's level and the doctoral level are combined in terms of the course work to be done. However, the American model clearly separates the course work phase from the phase of writing a thesis which follow each other in sequence and are not integrated. This American two-phase approach results in high drop-out rates after having finished the course work or (compared to Europe) a rather long time to degree (between six and nine years). Despite the fact that a fast track to the doctoral degree is possible in exceptional cases in many European countries, the European University Association (EUA) has recommended that the Master's degree should constitute the rule for access into doctoral programmes or the doctoral qualification phase (see EUA-CDE website: <http://www.eua.be>).

#### 4.1.7. *Two models of the joint doctorate*

The model of the joint doctorate is characteristic for doctoral programmes jointly offered by two or more universities which may be located in the same region, the same country or different countries. A study carried out by EUA (2005) about changes in doctoral education in Europe included a survey among member institutions; 18% of responding universities confirmed that they offer joint doctorates. Leading countries in terms of the number of joint doctoral degree programmes are Germany, Spain, France, Italy, the United Kingdom and the Netherlands.

In the EUA study (2005, 28ff.), the joint doctorate is characterised as follows:

- a joint curriculum for the taught components which has been developed in close cooperation among the participating institutions; the doctoral students take courses at several universities;
- an agreement signed by all participating institutions clarifying funding issues and other matters (e.g. mobility, quality assurance).

Certification of a joint doctorate is regulated in various ways: from award of the degree from the university at which the candidate is enrolled, to a double degree on the basis of joint supervision (i.e. co-tutelle arrangements) and a joint degree.

Joint doctorates are predominantly awarded by universities (or more exactly by faculties and departments) cooperating in transnational networks. The advantages for doctoral students are that in most cases phases of mobility are built into the programme, that they often have more than one supervisor and additionally access to

further experts in their field who are members of the network. However, the actual practice differs from this ideal type. Joint doctorates have a higher degree of internationalisation and more opportunities for mobility but they are often not based on a joint curriculum of the participating partner institutions.

A particular variant of the joint doctorate is the 'European doctorate' which does, however, not yet exist in practice. The idea and an informal initiative came up at the beginning of the 1990s during a meeting of the Confederation of European Rectors' Conferences (an organisation which has merged with the former CRE to become EUA). The 'Doctor Europaeus', as the planned title was to be, is contested until today, although there is a consensus about promotion and improvement of European cooperation in doctoral education and mobility of doctoral students (or candidates). Currently another initiative in this direction is undertaken by the European Commission offering funding for joint doctoral programmes emerging from partner universities of an Erasmus Mundus Programme. The difficulty of putting the idea into practice is due to the fact that within Europe there is an increasing competition for best talent among institutions and on the national level a more competitive research policy and innovation strategy. Thus, best talent is not easily 'shared'. Still, the discussion about the 'Doctor Europaeus' has been revived in the context of the Lisbon Strategy to create a European Research and Innovation Area (EUA 2005) and several Italian universities are offering it by now.

#### 4.1.8. *The cooperative doctorate*

The cooperative doctorate is a model in which professors from universities and professors from (German) universities of applied sciences (the latter have no right to award doctoral degrees) jointly supervise a doctoral candidate who graduated from a university of applied sciences. Taught elements of such a degree are typically offered in the framework of a university graduate school or programme while the research topic is often developed between the candidate and his or her professor from the university of applied sciences. The degree is awarded by the university. This model has emerged in the framework of attempts of research-oriented universities of applied sciences to acquire the right to award doctoral degrees which so far has failed due to the resistance coming from the universities and lack of political will.

#### 4.1.9. *The industrial doctorate*

The industrial doctorate is mostly awarded in engineering fields and is a rather applied degree. Research work of the candidate is carried out, for example, in the R&D department of a company and is oriented towards the solution of a particular problem or issue. The research work is supervised by a senior engineer of the company while taught elements, theory and methodology are supervised by a university professor. Research topics frequently emerge from work in that company during an internship.

## 4.2. *Chinese trends*

Up to now the research doctorate and the professional doctorate are the two main models of doctoral education in China. But currently some other training models are being developed, such as the integrated doctorate and joint doctorate.

#### 4.2.1. *The research doctorate and the professional doctorate*

Until rather recently the research doctorate was the only type of doctorate awarded in Chinese universities (and academies of sciences). The 1981 government regulations of academic degrees stated that ‘the goals of the doctoral degree are having the ability to undertake independent scientific research and having made original and creative contributions in science or in a special technology’ (Degree Regulations of the People’s Republic of China 1981, Item 13).

The need to establish a professional degree system at the Master’s and doctoral levels emerged in the mid-1990s. At that time demand from non-academic labour markets was growing to have young people highly qualified in applied and professional fields to support the country’s economic and social development needs. Between 1998 and 2000 three professional doctorates were established: in the fields of stomatology, medicine and veterinary medicine. These were followed by the establishment of a professional doctorate in education in 2008, in engineering in 2011 and in Chinese medicine in 2014. In total, there are six professional doctoral degrees currently in China. Although still small in scale compared to the enrolment in research doctoral programmes, there is a steady increase in the number of professional doctoral degrees awarded, that is, from 2% of all doctoral degrees awarded in 2009 to 3.5% in 2013 (Ministry of Education 2010, 2014).

#### 4.2.2. *The integrated doctorate*

Similar to many continental European countries, only Master’s degree holders were traditionally eligible to apply for doctoral study in China. But in order to keep the best students in academia, integrated doctorates were gradually developed since the early years of the twenty-first century in China as well (Ministry of Education 2001). There are two models of integrated doctorates in Chinese universities. One type is the ‘fast track PhD’ as known in Europe. By combining Master’s level and doctoral level study, outstanding Bachelor’s degree holders can now be recruited into the doctoral programmes directly. Another type is ‘combined Master and PhD’. Outstanding Master’s students can be chosen and recruited into the doctoral programmes during their study process. The number of integrated doctoral students has been growing, accounting for more than 50% of the total doctoral students in many universities.

#### 4.2.3. *The joint doctorate*

Joint training with partner institutions abroad has also become an important model of doctoral education in many Chinese universities. Similar to the European model of the joint doctorate the Chinese joint doctorate is based on an agreement with a partner university abroad. However, unlike the European model the regulations are less comprehensive and might vary depending on the international partner. In many cases, there is no detailed agreed-upon curriculum and Chinese doctoral students are sent for a year abroad to the partner institution and are supervised by academic staff from that partner institution while there. Whether both institutions will award the degree or whether the degree will be awarded by the Chinese home institution of the doctoral student is a matter of negotiation between the two partners and the strength of the relationship.

#### 4.2.4. *First steps towards an industrial doctorate*

In order to encourage the development of innovative PhD training models, the Chinese Ministry of Education and the Chinese Academy of Engineering together initiated a pilot project in 2010 in the framework of which universities and extra-university engineering research institutes cooperate in the doctoral training of engineers by taking advantage of their respective resources and strengths. In principle, the pilot project aims at training high-level talents in key industrial areas. Seven universities and six engineering research institutes joined the pilot project for the first time in the same year. The project is undergoing further expansion since then and 40 universities and 112 engineering institutes were involved in 2014 with a total enrolment of more than 600 doctoral students (Special Enrolment Plan of Joint Training Pilot Project 2014). Those doctoral students enrolled in this joint training project usually have two supervisors, one from the university and the other from the engineering research institute. Their doctoral degrees will be awarded by the university in the end.

## 5. Comparing European and Chinese developments

### 5.1. *Diversification as transnational policy coordination*

In the description of the diversification of doctoral education and training models in Europe and China one issue stands out. It is related to the fact that a considerable increase in numbers typically leads to a diversification of forms of training as not all doctoral candidates aim for jobs in academia any longer and thus have different purposes and motives to get a doctoral degree. Developing a highly qualified workforce for non-academic sectors of the economy tends to be a phenomenon of emerging knowledge societies. In China this diversification is currently happening while it is a more established phenomenon in Europe.

This seems to be related to a kind of policy and practice transfer from Western countries (mainly Europe and the United States) to China. Holzinger and Knill (2005) have described the process of transnational policy coordination as a form of transnational communication leading to policy diffusion. Transnational communication is characterised by four mechanisms:

- lesson drawing,
- transnational problem-solving,
- policy emulation and
- international policy promotion.

Lesson drawing is a process where states learn from each other what can be done when problems occur. It implies the existence of ‘best practice’ which is taken as an efficient way to reform policies by using examples and models developed elsewhere.

In transnational problem-solving, solutions are sought and found in transnational networks or epistemic communities who – with the help of transfer agents like international organisations – facilitate the exchange between polities and spread the policy.

Policy emulation is a one-directional policy transfer which basically consists of copying and implementing a policy without adaptation to local, regional or national contexts. Thus, policy emulation is imitation rather than innovation.

In international policy promotion finally, we have specialised organisations which actively promote certain policies while defining objectives and standards in an international setting.

It is quite evident that the various models of doctoral education and training China has implemented have not been established without adaptation to local and national practices because the academic cultures in China are quite different from those in Western countries. Thus, we would argue, we have here a case of lesson drawing. Furthermore, the Chinese differentiation of models of doctoral training has occurred quite recently and some of the models chosen (e.g. the industrial doctorate) are still in an experimental phase and only the future can tell whether the process of differentiation will continue.

### **5.2. Two overarching issues: quality management and internationalisation**

Quality management and internationalisation of doctoral education are important policy and reform issues in both China and Europe, perhaps more pronounced in China because the country feels that it has some catching up to do in this respect due to the rather quick increase in numbers of doctoral enrolments. The rapid expansion of doctoral education in China since 1999 has led to a national investigation of the quality of doctoral training. The research team who had been commissioned to carry out the study acknowledged in 2010 that Chinese doctoral education was not up to the standards of major Western countries of comparison (China's Doctoral Education Quality Research Team 2010). Theoretical foundations and subject knowledge scored poorly in the social sciences were only slightly better in business administration and management, although satisfactory in agriculture and medicine. Only the natural sciences scored highly in comparison to selected benchmark countries, such as the United States, the United Kingdom, Germany, Japan and Korea. Despite the fact that China's booming economy was able to absorb all doctoral degree holders rather quickly, the research team that investigated the quality of doctoral education indicated that Chinese doctoral degree holders would have problems to enter the internationally competitive labour market. Thus, quality improvement of doctoral education became an important task which was also laid down in the National Strategic Plan for Education 2010–2020 (National Strategic Plan for Education 2010). One important element of the quality assurance mechanisms was the establishment of graduate schools to provide more structure for the doctoral education phase, another mechanism was the setting of standards and guidelines for conferring of the degrees by the Academic Degree Committee of the State Council. Further reforms in the framework of quality improvement were regular rankings and reviews of doctoral programmes, doctoral dissertation inspection, and changes in the recruitment strategies and supervision practices.

Within Europe two policies have led to a closer scrutiny of the quality of doctoral education and training: the Bologna Process and the Lisbon Strategy. In the framework of the Bologna Process, a tiered structure of studies and degrees was introduced, doctoral education being the third one after the Bachelor's and Master's degrees. Integrating doctoral education into schools and programmes with elements of targeted course work is supposed to provide doctoral candidates or students with a set of skills and competences that make transition into non-academic labour markets easier and shorten the period of doctoral training from an average of four to five years to an average of three years. The Lisbon Strategy of the European Commission and the Council of Europe is aimed among other things at producing more doctoral degree

holders specifically for the knowledge-intensive sectors of the economy. This has led to a moderate expansion in numbers of doctoral degree holders and more attention to the preparation of candidates for labour markets outside academia without losing the quality and rigour of traditional doctoral training. Thus, in comparison to China quality management of doctoral training in Europe has a somewhat different focus.

Internationalisation is another issue in doctoral education in both world regions studied here that has drawn a lot of attention and scrutiny in recent years. And again, despite the fact that the issue is relevant in both regions, the focus in each is a bit different. In Europe internationalisation is not only strongly associated with quality but also with competition for best talent. Most universities in Europe have opted for a double strategy. First, they will provide their doctoral students with opportunities to do some of their research at a partner institution abroad and attend international conferences to present their work. Both activities are also deemed important because of the opportunities they provide to establish and build up networks. Second, universities will do their best to attract a mixture of domestic and international doctoral students into their schools and postgraduate programmes because this is seen as an indicator of quality and attractiveness.

China also aims to improve the internationalisation of its doctoral training; however, the country is more focused on sending its doctoral students abroad for limited periods. In 2006, the China Scholarship Council created the National Programme for Postgraduate Study Abroad by signing agreements with 59 top Chinese universities to provide postgraduate students with financial support to carry out part of their research in top universities around the world. An emphasis was put on sending doctoral students abroad who did their research in key research areas identified by the government, including key disciplines, leading-edge technologies, fundamental research, humanities and applied social sciences. Currently about 200 Chinese universities are part of the programme. With five years as a cycle the programme has completed its first cycle and is currently almost at the end of its second cycle. Between 2007 and 2011 (first cycle) about 5000 students each year were selected to study abroad for their doctorates (He, Hu, Jia 2012). Joint training and supervision with partner institutions abroad has become an important model of doctoral education in many Chinese universities, a key element in European policies as well. In the third cycle which is currently being prepared to start in 2015/2016 the aim is to send 8000 doctoral students abroad, among them 5000 in joint training agreements (CSC 2015 Guideline 2014). The funding period for doctoral students in joint training will be between 6 and 24 months, while it will be up to 48 months for the other doctoral students doing their research abroad but not in the framework of joint training arrangements. Thus it is possible to compare the doctoral students in joint training with what in Europe is called temporary study or research abroad while the others will get their whole degree abroad. Of course the risk of losing them as a form of brain drain is an issue not to be neglected.

In the meantime, nearly all Chinese key universities have initiated their Doctoral Students Overseas Projects and finance temporary periods of study and research abroad, usually for three to six months.

## 6. Conclusions

The proliferation of types and models of doctoral education and training described above is an indicator of new forms of functional differentiation in doctoral education

and training resulting from an increased number of doctoral candidates and their interests and motives. Doctoral education does no longer serve exclusively the reproduction of the academic profession but becomes also a qualification for knowledge-intensive non-academic sectors of the economy and for steps up the professional career ladder.

However, these developments have also triggered some criticism (see overview in Park 2005, 201). The four main points of criticism can be summarised as follows:

- Other models than the research doctorate tend to be regarded as second-class doctorates. The quality of the dissertation as well as the quality of the process of getting the degree are often ranked lower than the research doctorate.
- External examiners have noted – in particular with respect to practice-based doctorates – a lack of intellectual depth, of cohesion, of discussing existing literature, of originality and generalisable results of the work. In addition, they have criticised methodological weaknesses and bad presentation.
- Bourner, Bowden, and Laing (2001) criticised the new types of doctorates as often lacking clarity and coherence.
- Some experts have also voiced concerns about the growing proliferation of titles and the increasing differentiation of types and models.

Supporters of the growing differentiation of doctoral models have argued that it reflects the growing heterogeneity of reasons for getting a doctorate and these should be taken into account when shaping this phase of qualification.

In order to draw this contribution to a close we would like to make a further observation. In continental Europe as well as in many other countries around the world with well-established and mature higher education systems, the doctorate is no longer the entrance qualification to an academic career. It is a necessary but insufficient condition and decisions as well as selection processes have shifted into the postdoc phase. This is not, at least not yet the case in China. However, getting a doctoral degree tends to qualify for a rather wider range of jobs as knowledge workers for non-academic labour markets. For Germany, which has an exceptionally high output in terms of doctoral degrees awarded annually, Janson, Schomburg, and Teichler (2007, 95) have calculated that overall only about 10% of doctoral degree holders eventually become tenured professors. The vast majority of the remaining 90% leave the university either immediately after getting the degree or eventually. So the issue is what skills and competences do these 90% of doctoral degree holders need and how can they acquire them?

Certainly, doctoral candidates today are no longer exclusively trained to become ‘stewards of their discipline’ (Golde and Walker 2006) as has been the case up until the end of the 1980s and in some European countries until well into the 1990s. The extended policy field for doctoral education and training has contributed to the fact that doctoral candidates today need to acquire a considerably broader set of skills and competences. This is the case for China as well. Doctoral degree holders are not only in demand in the knowledge-intensive sectors of the economy but in other fields, for example, services, public administration, media, etc., as well. Having said that, two questions remain which still need further research and debate. The first question is who within the universities has the knowledge and skills to convey this extended skills set? The second question is whether academic careers in Europe with their extended periods of uncertainty and even precarity continue to remain sufficiently attractive to attract the best and the brightest.

In this comparison of recent and ongoing changes in doctoral education and training, we have attempted to demonstrate the differences and similarities between European and Chinese reform processes. We can see that in both of these world regions policy borrowing and policy emulation are going on with models and changes in the most successful countries and universities being adapted and implemented according to local and national needs. What we wanted to demonstrate is when looking at the formulation and implementation of national reform policies, it is always worthwhile to make international comparisons in order to be able to analyse international and perhaps increasingly even global trends.

### Disclosure statement

No potential conflict of interest was reported by the authors.

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