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Doctoral training model in Poland and its determinants

1. Introduction

Building the 'Europe of Knowledge' in keeping with the Bologna process and the Lisbon agenda means that there must be a rapid increase in the number of doctoral degree holders as they are an essential resource for the growth of academic research and the expanding job market (which includes not only academic research but also research in industry). In Poland, the dynamically growing number of doctoral students in 1995–2004 (a three-fold increase) stumbled upon the very low demand for doctoral graduates and new PhD holders. Starting from 2005, the number of students at this third level of tertiary education has been declining[1] and universities have reported a shortage of candidates in some specialisations, notably technical ones. Statistics indicate that the number of doctoral candidates successfully obtaining their degrees in 2000–2006 was a multiple of the new jobs available for PhD holders in the broad science and research sector (research and development).[2] A question arises, therefore, what happens to the new PhDs who do not find jobs in this sphere? Where do they find employment outside R&D? This question entails another one: How are doctoral students trained nowadays? To what extent does the current doctoral training model equip students with competencies which correspond with the needs of research jobs and of those of the labour market at large? If changes in the education model are required, which direction should they take?

These questions have prompted us to undertake empirical research, with the main aims defined as follows:[3]

[1] In the academic year 1995/96 the number of doctoral students was 10,482 whereas the corresponding numbers for recent years are as follows: 33,040 in 2004/05, 31,831 in 2005/06, 30,036 in 2008/09 [in: *Roczniki GUS 'Szkoły Wyższe i ich finanse'* – Central Statistical Office yearbooks on schools of higher education and their finances].

[2] In 2000–2006 employment of individuals with doctoral degrees in R&D increased by over 9,000. During that period 4,500–6,000 new PhDs graduated each year. In just two years, i.e. 2005 and 2006, a total of nearly 12,000 people received their doctorates [as in: *GUS Rocznik Statystyczny 2007* – Central Statistical Office Yearbook for 2007, pp. 427 and 422].

[3] The results of this research were disseminated in: M. Dąbrowa-Szefler and P. B. Sztabiński '*Model kształcenia doktorantów. Wnioski z badań'* [Doctoral Training Model. Findings from Research'] published by the University of Warsaw, Centre for Science Policy and Higher Education, Warsaw, 2008. The research was financed from the Centre's statutory funding.

a) attempt to identify the current and potential job market for graduates of doctoral programmes;
b) analyse the existing and the desirable training model in doctoral programmes.

As regards the labour market for doctoral graduates, there are no statistics available which would allow us to track their paths to employment. Moreover, research on the further career paths of graduates is very difficult to perform and any findings obtained from such research are burdened with numerous concerns.[4]

For this reason, we made an attempt to explore the potential future situation of PhD holders on the labour market by looking at their plans after completion of doctoral programmes on the one hand and, on the other, by asking employers about the demand for newly minted PhDs. In other words: to what extent are companies from the industry and the service sector willing to employ people with a doctoral degree and how do they see the place of such individuals in their organisations?

Another question, concerning the existing and desirable training model at the doctoral level, was asked to doctoral students approaching graduation, heads of doctoral programmes and employers.

Our research work was conducted in 2005–2007 and consisted of surveys (mail questionnaire or online questionnaire), conducted among 3rd-year doctoral students of five public universities in Warsaw, as well as four focus group interviews (FGIs). The focus groups consisted of doctoral students approaching graduation (grouped by fields of knowledge), heads of doctoral programmes and employers.

This paper presents the findings from those studies against the background of processes where the tradition and ethos of academic research meets contemporary challenges in the context of labour market needs and the Bologna process challenges. We believe that responses to the questions posed in our studies, while perhaps not extrapolable to other academic centres, may provide a starting point for a debate on the doctoral training model.

2. Tradition of two training models

Doctoral programmes are not new to Poland as a form of education. The system existed as early as in 1960s–1980s but was seen as complementary to the more

[4] P.B.Sztabiński, *Badanie absolwentów studiów doktoranckich – Problemy warsztatowe i wstępne hipotezy* [A study of doctoral programme graduates. Methodological concerns and preliminary hypotheses] in: *Nauka i Szkolnictwo Wyższe* [Science and Higher Education] no. 2/20,2002, pp. 77–90.

developed assistantship model. Most individuals recruited for doctoral programmes were already employed, many of them delegated by employers who financed their education. The aim was to improve employees' qualifications by expanding their theoretical background in the respective disciplines, as candidates already had practical knowledge. In 1980 the number of students enrolled in doctoral programmes was 5,844 (1,510 in 1989 [cf. GUS 1990:478]. In the same year, universities employed nearly 20,000 research assistants and senior research assistants (in 1990: over 17,000 [cf. GUS 1993/94:184]). Those groups represented, respectively, 36% (1980/81) and 26% (1990/91) of the total number of academic teachers. They underwent their doctoral training while working at a university, teaching undergraduates and taking part in academic research. The assistantship system in doctoral training also existed in research institutes and industrial R&D units. Therefore, two training models still co-existed in early 1990s: doctoral studies and assistantships, each employing different training methods and organisational framework.

The assistantship model rests on assistant's participation in research. As a result, assistants become more familiar with the discipline-specific research methods (versus the training available in undergraduate and graduate programmes) and, in parallel, expanded their knowledge by reading literature, participating in academic discussions, seminars and conferences. The path to a doctorate consists in 'continuity of search, discussions, writing, being constantly part of the life of the research community,' to quote Janusz Goćkowski [Goćkowski 1980:61]. According to Florian Znaniecki [Znaniecki 1984:75], 'training an individual to become a scholar essentially boils down to two functions: equipping candidates with some techniques or skills in preparing conditions corresponding with their cognitive intents, and awakening more or less original exploratory endeavours.'

According to the common view held by science of science specialists, methods of scholarly training are the key determinant of future academic careers. A rapid progress in mastering research skills was also valued more highly by young researchers than the doctoral dissertation itself [cf. Cichomski 1976]. Those skills were acquired largely through the relationship with the supervisor i.e. 'master-student' relationship as well as through contacts with 'many other masters' [Goćkowski 1999:28]. Participation in academic debates and seminars is essential for evaluation of current academic achievements and for expanding cognitive

perspectives. When ideas and opinions permeate one another and clash with one another, new quality and new ideas are born and the young researcher's horizons expand. Academic debate is conducive to creativity. In the master-student relationship, a young person who wishes to pursue an academic career also becomes familiar essential ethics of scholarly work. During such training, the cognitive personality is shaped with such essential characteristics as: disobedient thinking, ability to use 'alternative thinking' and constant 'critical reflection' [Gońkowski 1999:29]. This type of training is the first stage towards an academic career, preparing the candidate for becoming an independent scholar.

The aims and guidelines for doctoral training, as expressed by representatives of the academic community, have not changed. This is reflected, among others, in opinions voiced in the discussion at the Conference of Presidents of Polish Universities entitled 'The Model of Academic Promotion and Advancement in Poland' and in opinions expressed in expert groups in our qualitative study. Oskar Achmatowicz defined the first stage of a research career as 'acquiring the skills of independent research work aiming to solve an identified problem, and ending with the doctoral degree' [Achmatowicz 2006:131]. 'A successful doctorate opens the door to the first curia in the academic community, the criterion being the mastery of existing knowledge and secrets of researcher's trade,' Piotr Sztompka asserted [Sztompka 2006:123].

These criteria seem easier to meet in the assistantship framework because assistants are limited in number and, as such, have a better opportunity to stay in touch with their supervisor, to take part in seminars and academic debates. This claim is confirmed by doctoral students who took part in our study (focus group discussions). On the other hand, assistants tend to have a heavier teaching burden.

The number of research assistants, senior research assistants and trainees,[5] regardless of periodic fluctuations, has declined in the last quarter of a century, as demonstrated by the following data:

In academic year 1980/81 = 19,753 (senior asst., asst. and trainees)

In academic year 1989/90 = 16,286 (senior asst., asst. and trainees) [GUS 1990:477]

In academic year 1995/96 = 18,073 (senior asst., asst. and trainees)

[5] They existed until 1990.

In academic year 2006/07 = 15,953 (senior asst., asst. and trainees) [GUS 2007: 362]

A decline in the overall number of assistants (senior assistants and trainees) in 1980s by nearly one fifth and their declining share in the total population of academic teachers revealed a potential gap in the supply of academic teachers and, in future, in the supply of academic teachers at large.[6]

Studies conducted by Elżbieta Wnuk-Lipińska in 1993 suggested that shortages of new academic staff were mentioned at that time by more than a half of the studied researchers/teachers at universities and higher schools of technical and pedagogical education. Therefore, during the tertiary education reform in early 1990s an idea was conceived to establish another form of doctoral training in parallel to assistantship: full-time doctoral study programmes. This was not an entirely new form but, rather, a thoroughly modified one. It was intended for full-time students who were expected to obtain a doctoral degree over a shorter period of time [Szulczewski 2000:79].

Available statistics suggest[7] that the idea to increase the number of doctoral students was successfully put into practice and so was, to some extent, the idea to reduce the time between the official registration and the conferment of a doctoral degree.[8]

Universities were motivated to accept increased numbers of doctoral students and to open doctoral programmes by the prospect of obtaining budget grants and savings on teaching at the 1st and 2nd tier of tertiary education. This is because doctoral students provide 'free labour force' with their mandatory teaching commitment of 90 hours, a figure which is viewed as ensuring the essential practical training for any academic teacher.[9] In 1999 an algorithm was introduced to allocate the budget grant between universities reporting to the Ministry of National Education. 60% of the grant was represented by the number of student units: the number of full-

[6] Such trends and resulting concerns were observed at that time (and earlier) in the US and Western Europe (for a discussion, see Dąbrowa-Szefler 2001, Chapter I, and Careers in Science, 1995).

[7] There are no statistics showing the average duration of the period between the start of a doctoral programme and the doctoral viva. Likewise, there are no statistics on the dropout rate during doctoral studies.

[8] In 1994–2005 there was a constant increase in the number of doctoral students who successfully defended their PhD thesis within 2 years from the official registration for the defence. This ratio reached 69.0% in 2005 [GUS 2006 and Dąbrowa-Szefler 2001, p. 115]. However, these data may indicate another phenomenon, for instance a more rigorous selection of candidates who are admitted to official registration.

[9] According to a survey conducted by the National Representation of Doctoral Students, the statutory limit of 90 teaching hours is not exceeded and the number of actual teaching hours is much lower at many universities. [Martowska 2008].

time doctoral students was weighted by a factor of 5 whereas the number of 1st and 2nd tier students was weighted by a factor of 1. Starting from 1995, in response to the increasing number of part-time doctoral students a factor of 2 was introduced for that group [Pakuła 1996].

The aforementioned algorithm turned out to be an effective policy tool aimed at increasing the number of undergraduate, graduate and doctoral students. However, what seems to have played a more important role in driving the number of PhD students were the growing educational aspirations in the society, which translated into a dynamic increase in the number of students at the 1st and 2nd tier of tertiary education. There was also a positive change (versus the communist times) in the situation of university degree holders. Education became a gainful investment [Jarecki 2006, Rutkowski 1996]. In the period from 1995/96 to 2005/06 the number of participants in doctoral study programmes tripled. This may have been driven, especially in 1990s, by the rising unemployment rate among graduates of 2nd tier programmes. This is a factor which we took into consideration in our survey when asking about the motivation to enrol in a doctoral programme.

3. Doctoral students' aspirations and career prospects

The findings from our 2005 survey indicate that the most commonly reported motivation for enrolling in a doctoral programme is consists in further education in order to acquire more knowledge and skills in a particular field. This motivation was mentioned by nearly three quarters of the survey participants, with more than a half identifying it as the most important one. Slightly over a third of the respondents claimed they undertook doctoral studies in order to pursue an academic career and only a fifth chose it as the most important motivation. This result seems to indicate that doctoral studies in Poland are not perceived by young holders of master's degrees as the first stage of an academic career.

However, it is important to reiterate that our study was conducted in Warsaw universities. Job opportunities for new PhD holders in the capital city are better than elsewhere and, on the other hand, Warsaw is the largest academic and research centre in Poland so the conditions for studying and pursuing an academic career are relatively better here than in other centres (a large population of scholars representing numerous fields and disciplines, scholarly tradition of institutes and chairs at universities etc.). In the course of doctoral programmes the percentage of

students who declare their willingness to undertake a research career increases (to 53% in our study of 2nd- or 3rd-year doctoral students). This indicates that doctoral programmes largely represent a preparatory stage for academic careers. This claim is confirmed in students' responses to other questions from the survey, concerning execution of doctoral programs (participation in research projects and conferences, publications etc.), the flow of doctoral studies and supervisors' performance.

At present, two facts speak against the idea of doctoral programmes as the first step of an academic career: 1) such programmes do not necessarily lead to conferment of the doctoral degree, and 2) even a successful completion of education in such a programme crowned with a doctoral degree does not guarantee employment in research or academia, which is the case with research assistants who have obtained a doctorate. The careers of doctoral graduates are an important social problem in view of the costs borne by the government and by doctoral students themselves.

As mentioned earlier, no systematic research has been conducted to date to track the careers of doctoral graduates. Such studies would allow us to identify the types of organisations which eventually employ graduates. Would this be the science and technology system? Or perhaps doctoral graduates (and PhDs) undertake employment which does not correspond with their qualifications? The few studies on graduates of doctoral programmes, undertaken in a limited number of countries (EU and USA) and with a limited scope, show that the highest percentage of graduates take up jobs in higher education and in the R&D sector in industry. In 1995–2005, the population of research staff in the European Union (27 member states) increased from 964,421 to 1,301,022, or by 35%, and the respective increase in all of the OECD countries was 38% [Main Science 2007]. The number of researchers per 1,000 employed citizens rose from 4.7 to 6.0 in the European Union and from 5.8 to 7.4 in OECD. In Poland, the respective ratio went up from 3.2 to 4.7 during the period concerned [Main Science 2007]. There are no data to answer the question about the number of doctoral graduates who found employment in the national R&D sector. In 2000–2006 a total of 37,421 doctoral degrees were conferred in Poland [GUS 2007 and earlier], whereas employment of PhD holders within the entire S&T system increased only by just over 9,000 during the same period (2000–2006).

Therefore, the question arises: What happens to the newly minted PhDs? Where do they find employment if not in the broadly understood science and

research? To date, this question has not been answered in Poland or in the majority of EU countries.[10] For this reason, our study sought to explore doctoral students' post-graduation plans and to explore (through expert group discussions) opinions of the industry and services sector on employment prospects for doctoral graduates (PhD holders). The results of our survey show that more than a half of doctoral students approaching graduation plan to pursue an academic career: usually at their home university but also in other (public and non-public) schools of higher education or, less commonly, in research institutions. However, a quarter of graduates plan to take up a job outside research and academia, whereas 10% have no specific plans. Our qualitative studies (discussions in expert mini-groups) revealed a considerable variety of opinions with regard to employment opportunities for individuals with newly earned doctorates. The interviewed doctoral students believed that they would find employment in R&D after receiving their degree, whether at a university or in a company engaging in R&D. Similar opinions were voiced by respondents from the manufacturing sector whereas entrepreneurs from the services sector did not think their companies needed to employ PhDs. From their perspective, a doctoral degree as such does not represent added value. If they do employ PhD holders (which *does* happen), they do so 'by accident' i.e. because of the candidate's other competencies acquired during the doctoral work. Respondents from the services sector were invited to take part in the discussion because in Western European countries doctorate holders are employed, for instance, in banks, media or public administration [Sadlak 2004, Dąbrowa-Szefler 2002]. The aforementioned statistics and our empirical studies indicate that the demand for PhDs comes only from the R&D sector (notably universities, and, to a lesser extent, research institutions and industry-based R&D), yet the demand is much lower than the supply of new PhDs. Therefore, it is hardly surprising that some doctoral students have no precise career plans. They represent a group (nearly a half of the survey respondents) which does not plan to take up jobs in S&T. It is this particular situation that gives rise to questions about the model of doctoral training. Should doctoral programmes train students only to help them to obtain the doctoral degree and continue an academic career, or should they (also) help them to find jobs outside the academia and S&T (with or without a doctorate)?

[10] At present, OECD is running an international survey on 'Careers of Doctorate Holders' within its statistics of Human Resources in S&T. The aim of the programme is to develop international methodological standards to study career paths of doctoral degree holders. [Niedbalska 2008].

What would doctoral programmes involve if they were focused on employment outside research?

4. The existing doctoral training model

The term ‘model’ is used here to describe the characteristics of the training system which were to be defined through responses to our survey. While the survey contained questions about the characteristics of doctoral training oriented towards both academic and non-academic careers, we set out with a hypothesis that doctoral training is aimed at preparing new PhDs who will take up jobs in the research sector at large. Such education should involve exploration of knowledge from the discipline and field concerned and acquisition of discipline-specific research methods, which means that students should participate in research projects or pursue their own research. The survey also asked whether doctoral studies help to develop students’ academic interests, prepare them to conduct research and encourage independent thinking. Moreover, the survey contained questions about forms of training such as participation in research projects, conferences, conventions and traineeships, the number of publications and the role of supervisor and other university staff in these research activities.

Analysis of survey responses confirms the hypothesis that the existing model of doctoral training focuses mostly on preparing students for academic careers and to obtain a doctoral degree. PhD students take part in academic research projects (nearly 50% of them, with significant differences across disciplines), prepare academic publications (71%) and take part in academic conferences (75%). Participation in applied projects (20%) or in conferences organised by business/industry (ca. 10% of the participants) is much less widespread. Questions about applied research projects and conferences organised by business/industry was asked only to students from those disciplines where this was a valid question. The majority of students’ academic activities are initiated by their supervisors but also a considerable part is undertaken on the students’ own initiative (this pertains, in particular, to practice-oriented projects and conferences).

Focus group discussions with experts also confirmed the hypothesis that doctoral training in Poland aims to prepare students for further careers in scholarly world and a PhD degree should be a ticket to an academic career. Therefore, we are dealing with a traditional model of nurturing new scholars (a doctoral student’s

opinion: ‘To me, a PhD is a transition to the academia,’ ‘A PhD means you have fallen in love with a field of study.’). A doctoral student in natural sciences expressed a belief that such a traditional model continues to exist because, in fact, doctoral study programmes do involve academic research. Another student said that while doctoral studies should accustom young people to academic activities under a supervisor’s guidance, yet the existing model does not always fulfil this postulate because ‘the coursework stands in the way.’

In the light of our survey, some other facts which characterise the current doctoral training show that doctoral programmes do not always optimally train new people to work in academia. Those facts are as follows:

a) Low rate of students’ participation in research projects (43.6% of the surveyed students did not take part in any), which, however, does mean that students do not take part in research as such but, rather, in modern research formats (22.4% of PhD students participated in international projects). Group discussions showed that doctoral students undertake their own research.

b) Among PhD students who do take part in projects, 13% performed mostly or exclusively auxiliary tasks whereas independent work on a portion of a project was performed by 44.5% of students involved in a research project.

c) Traineeships outside the home institution turned out to be a rare training format. During the focus group discussions some students, as well as academic staff, asked about the goal and sense of traineeships. This is particularly surprising in the context of the Bologna process where mobility of research staff is one of the key priorities.

d) When evaluating curricula in the light of their further career plans, doctoral students held the view that more time should be devoted to demonstrate practical applications of research and analysis. Moreover, they expressed the need for research staff to spend more time supplying information about state-of-the-art developments in their field.

Therefore, one may conclude that both survey findings and expert opinions from focus groups indicate that the current doctoral training model in Poland aims to prepare students to obtain a doctoral degree and continue an academic-type career. In many cases this model is not very modern in either its format (participation in research projects or traineeships) or content (not enough updates on the most recent developments in the field and on possible practical applications of research).

However, one should also bear in mind that the ‘master-student’ relationship have been largely maintained, which is evidenced in the fact that supervisors take initiative in encouraging students to prepare research presentations, in contacting the company where the student underwent a traineeship. Other examples include supervisors who invite students to join a research project, and, first and foremost, those who encourage doctoral students to present the concept for their dissertation, report interim results and present the ongoing dissertation in other formats.

5. Alternative doctoral training models

There is a considerable institutional and organisational differentiation of doctoral study programmes and training models across Europe. The traditional model continues to exist and is the dominant one. This is shown by the UNESCO-CEPES report on studies conducted in 2002–2005: *Doctoral Studies and Qualification In Europe and the United States: Status and Prospects* [Sadlak 2004] and by seminars organised by the European Universities Association under a research programme entitled *Doctoral Programmes in Europe* [Bologna Seminar on Doctoral Programmes, 2005 and 2006]. The institutional models and doctoral programmes began to ramify in Europe as early as in 1980s [Dąbrowa-Szefler 2001]. There was also an increase in the number of analytical works describing forms such as PhD programmes conducted jointly by universities and industry or PhD programmes fully organised and funded by business corporations. Those programmes aimed to train doctoral students to conduct research in the industry. As such, they represent an alternative training model versus the academic one [OECD Research 1989, OECD Science 1999, Dąbrowa-Szefler 2002].

The differentiation of doctoral training models and, consequently, of doctoral degrees obtained in many Western European countries and elsewhere (e.g. Australia) is a fact [Sadlak 2004]. According to Andrzej Kraśniewski, we are witnessing ‘the spreading of a training model where participation in group coursework is an important element, and sometimes a core element (subjects offered by universities, usually under the ECTS), and which are intended primarily for people who pursue careers outside the academia. As many as approx. 60% of European universities already offer this model.’ [Kraśniewski 2004:17]. A question arises, therefore, whether or not the latter training model, intended primarily for working students or for those who intend to work outside the academia afterwards

(administration, public services, rehabilitation, aesthetic medicine) would also be recommendable for Poland as a less costly effort since it would not require the competencies needed for academic careers. This question raises concerns in the scholarly community in Poland as this community is strongly attached to the idea of doctoral training as the first stage of an academic career. This is illustrated in statements made by scholars and research organisers at the KRASP conference in 2006 [Model…2006]. The issue of doctoral training model is also debated within the European Union despite the fact that individual member states fulfil the Bologna requirements, transforming various stages of doctoral studies transformed into 3rd-tier of university education, in accordance with the guidelines issued by the Conference of European Ministers responsible for Higher Education.

However, the situation in Poland differs from that in the 'old EU' in a very important aspect. The labour market for graduates of doctoral programmes in Poland is limited to the sphere of research and development, i.e. to the academic and industrial research. Employment opportunities in this broadly understood research sector are also limited, which results from the under-funding of the science and higher education system and, particularly, from low degree of innovativeness in enterprises [Okoń-Horodyńska and Pangsy-Kania (ed.) 2007]. Enterprises conduct no research work (for a variety of reasons, usually related to their size and the available capitals: the country has a prevalence of sole traders or small businesses employing a small number of people) and, moreover, they conduct no applied research. For financial reasons, universities and institutes of the Polish Academy of Sciences (PAS) may only admit individuals who already hold a PhD degree. However, the situation is beginning to change: as an increasing number of PAS units and universities take part in EU-funded projects, they are able to employ graduates of doctoral programmes who have not yet obtained a PhD degree. However, little is known about this topic and the overall increase in the number of newly employed PhDs is negligible. As the demand for new PhDs is confined to the research and development sphere, notably higher education, there is a reason to maintain nothing but the traditional training model, even though only some graduates will take up an academic career after obtaining a degree. One may only express hope that those are the best graduates with the best competencies for research needs.

However, another question remains open: what about the remaining graduates of doctoral programmes? Perhaps the selection for academic careers happens at a

moment which is too late and, as such, perhaps it is too costly for the society and for the students themselves? One cannot exclude that the current circumstances, which are not conducive to further academic careers or to employment in R&D, are beginning to drive down the number of participants in doctoral study programmes (a trend dating back to 2004). Without knowing the number of candidates, we do not know if the decline in the numbers of newly admitted doctoral students may be caused by more rigorous selection at universities. Another valid hypothesis is that some potential candidates have recently taken up doctoral studies abroad, where two training models co-exist: one for academic careers and another one, more useful in other types of careers requiring high qualifications.

One possible argument supporting the idea to have two types of doctorates in Poland ('academic' and 'professional' PhDs) and, consequently, two training models, is the effort to improve the quality of doctorates and the quality of training for the needs of research and science at large. This kind of training could become more 'elitist' and targeted at individuals who are currently strongly motivated to undertake a academic career and who are passionate about research (one fifth of the respondents in our studies said that a possibility to embark upon a research career was their main motivation when enrolling in a doctoral programme). Some kind of preselection (perhaps after the first year of study) would help to maintain the quality of doctorates which would continue to be the first steps towards an academic career (an 'academic PhD').

A differentiation in doctoral training models does not mean that technology would gain even more dominance over science and research. On the contrary, it promises to maintain the potential of academic research at a suitably high level. What is particularly significant for the 'training for research' model is that the study programme should be more heavily based on the so-called 'non-aging knowledge' i.e. knowledge in basic disciplines, especially mathematics and logic [Kasprzak 2005].

On the other hand, the model of 'training for research' also evolves and incorporates elements of practice such as lectures in the management of science and research, organisation of research work or applicable legal regulations (incl. copyright laws). Interdisciplinarity is another new element in the current traditional training model. The origins of this phenomenon should be sought in the internal rules of the

evolution of knowledge, in the tendency to ramify and to establish new disciplines.[11] Interdisciplinarity is a way to create novelty in academic research and to make a genuine contribution by generating new ideas. The effects are similar to those of crossing species in biology [International Mobility… 1981]. While interdisciplinarity calls for a separate discussion (from the science of science perspective), it is important to bear in mind that interdisciplinarity in doctorates clashes with the established discipline-based structure of research and does not always get through the existing regulations. In practice, this means that responsible bodies (e.g. university department boards) may not feel competent to confer a doctoral degree in such cases. They want to prevent the spread and practice of ignorance disguised as 'interdisciplinarity.' Experts participating in focus groups spoke against this idea (also those who favoured interdisciplinarity as a phenomenon necessitated by the internal logic of scientific evolution). Therefore, the traditional doctoral training model, viewed as the first step into an academic career, is also evolving in response to the needs of science and research as a system and as a body of knowledge. These trends are not equally pronounced in all academic centres which train doctoral students. A survey conducted by the National Representation of Doctoral Students reveals a considerable differentiation in this respect [Martynowska 2008].

Moreover, one must not neglect the existence of significant differences in the training formats in doctoral programmes across various disciplines. Our survey have clearly demonstrated that natural and technical sciences come closest to the 'training for academic career' model. This is reflected in the fact that doctoral students get involved in research projects, publish research papers, participate in conferences and seminars (such activities are more widespread in those disciplines than in humanities or economic sciences). Doctoral students view their training programmes favourably: the survey indicates that such programmes meet students' requirements (above all, they enable students 'to expand their knowledge in the field', 'to learn how to think independently,' 'to develop their intellectual abilities'). Not surprisingly then, all doctoral students in our focus groups supported the current 'training for research' model. Similar opinions prevailed among entrepreneurs. Only a handful of participants supported the idea to have two co-existing models.

[11] What stimulates integration is when the object of study from one discipline is studied with methods characteristic of other disciplines. Moreover, the complexity (multidimensionality) of the object of study often calls for complex research, thus necessitating interdisciplinarity [Żegleń 2005].

6. The problem of the quality of doctoral degrees

As mentioned earlier, the survey-based evaluation of the quality of available doctoral training programmes brought positive results. However, opinions focused mostly on supervisors' work. Our results indicate that supervisors play the role of 'masters' and fulfil their role properly by providing all types of assistance in writing a dissertation, presentation of interim findings and in other aspects of doctoral training. Meanwhile, evaluation of study programmes from the perspective of students' career plans is varied, depending on the field of study.

In the course of group interviews the issue of the quality of doctoral training came up spontaneously (it was not included in the discussion guide), which reflects the gravity of the problem. The respondents unanimously agreed that the quality of doctoral dissertations has deteriorated, which is the main (albeit not the only) indicator of the quality of doctoral training. The mass character of doctoral training was mentioned as the main culprit. As a stimulus for further discussions, one should ask: what does the 'mass nature' of doctoral training involve? What kind of criteria should we use when speaking about 'mass training'? In comparison with other OECD countries (data for 2003) Poland occupies the 18th position (out of 27) in the number of doctoral students (it has 1.43 doctoral students per 10,000 residents, [OECD 2007, App. 4:137]). This stems from the overall condition of Poland's economy, with a low propensity to innovate, and from the low level of funding for science, research and higher education. If we ask whether differentiated doctoral training models would improve the quality of such training in that they would provide different competences for doctoral students trained for further academic career and for those trained under a different model for other careers, we can seek an answer in a debate within the academia. A substantial proportion of the academic community supports the idea of maintaining a single, classic model of 'training for research.' This is partly related to the lack of understanding for the idea of vocational training as such (at all levels), which is considered to be 'inferior' [Wójcicka 2001, Minkiewicz/Drogosz-Zabłocka 2006]. Meanwhile, vocational training has a different social mission to fulfil [OECD Tertiary… 2007]. With reference to doctoral studies, this fact entails the existence of another training model, aiming to prepare graduates to undertake employment outside the research and development sector, in various kinds of public services which call for high qualifications and competencies which are different from those

required in research. Moreover, such a model would prepare PhDs with qualifications to undertake applied work in the economy, at the borderline of science and technology (innovation). The latter form of training may not be imposed in a top-down fashion but should be allowable under the law. Whether or not it thrives will depend on the demand for such graduates and PhDs.[12]

7. Concluding remarks

Our empirical research do not purport to answer the question about the sense and the need to have differentiated doctoral training models. The aim was to identify the nature and the mission of the current doctoral training model in Poland and to explore its perception among doctoral students. The answer is that the current model aims to prepare students for further academic careers. The fulfilment of this goal was assessed positively by students. The other aim of our research was to check if all graduates need this type of competence (in their subjective perception and given the objective circumstances of the labour market). No unambiguous answer can be provided in this case, yet our research has brought some important findings, such as the following:

- most students who enrol in a doctoral programme do not intend to embark upon an academic career (only one fifth of our respondents mentioned it as the key motivation behind their enrolment),

- over a quarter of those who are about to complete doctoral studies intend to work outside the broadly understood science and research sector, and 10% of the students have no definite plans for the future,

- a doctorate is not seen as an asset by entrepreneurs i.e. potential employers,

- doctoral studies prepare students to work in research,

- a quarter of new PhDs find employment in the research and development sector each year.

These facts as well as other findings from our report will hopefully give an input for a discussion in the academia about the future of doctoral studies. It is

[12] One example of differentiation between the two training models and two doctoral degrees can be found in medical sciences where doctoral degrees are awarded, under a common aegis, in strictly medical specialisations and in other fields, such as nursing or rehabilitation.

evident that there is no clear idea of what such programmes should look like under the new environment in which science, research and higher education exist.

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