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Professionalization of science management—Comparing formal education and training across Germany, Poland, and Hungary

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Description of the examined questions: Our goal is to suggest a working definition of "science management" and to explore and systematically compare study programs related to this area. We focus on science management diplomas, short courses and workshops in three countries: Germany, Poland, and Hungary. What is common and what is different in the approaches to science management in three knowledge societies?

Methodology: Our method is descriptive and comparative. We use desk research to find out how the programs in science management are structured in three countries and what approaches are specific to them all.

Results: It became evident that in Germany there are plenty of offerings in terms of specialized study programs and short courses. There is a certain dynamic regarding the interconnectedness of research fields and the institutionalization of education and training. This leads to self-reinforcing dynamics concerning professionalization of science management, although science managers still can be hardly labeled as professionals. In Poland and Hungary there is still not much momentum to the process of professionalization, although first efforts are made. Programs such as European Research Area (ERA)-Fellowship might contribute to the evolution of multi-lateral networks between these countries and Germany. The awareness and broad understanding of science management might spread also in Central and Eastern European countries.

Conclusion: We conclude that the impact on the professionalization of science managers in Germany, Poland, and Hungary is unequal. Concerning training and education in Poland and Hungary, this article might be one step toward showing the broadness inherent to the concept of

"science management." It might stimulate more people in Central and Eastern European countries to think about this, to generate knew knowledge and to teach their insights within newly established study programs or short courses.

KEYWORDS

knowledge society, higher education, research systems, science management, innovation management, Poland, Hungary, Germany

Introduction

This paper contributes to the discourse about the role and place of science managers and science management as such in the hierarchy of higher education. In the knowledge society, the higher education and research system plays a key role for economic competitiveness (Böhme and Stehr, 1986). To improve conditions for research and teaching and the overall productivity of the science system, the performance of science managers is essential (Sorlin and Vessuri, 2007). Their importance cannot be denied.

Yet, science management is a challenging task. As interfaces between science and administration increase (Nickel, 2012, S. 287) and cannot be covered by classical administration anymore, the requirements for science managers grow. Science managers need to show outstanding competences. They are supposed to act responsibly and confidently within non-standardized situations (Pasternack et al., 2018, pp. 253–55). Therefore, science managers need to gain knowledge and competences, mostly through formal education and training.

The European Research Area (ERA)-Fellowship program from the BMBF (which was how the authors of this article met) is certainly one starting point to increase the skills of professionals throughout Germany and especially from young EU-fellows from Central and Eastern European countries. The goal of this program is to connect German host institutions with young science managers from the Central and Eastern European area to share knowledge and experience among each other. This program can be regarded as one measure for professionalizing and at the same time for internationalizing science management. The overall goal of the ERA-fellowship-program is to strengthen the ERA and Europe's competitiveness in general. The EU-fellows are young professionals who will be in charge of decision-making bodies within their universities in the future. They might influence organizational structures and positions for science managers within their respective universities. Therefore, the ERA-fellowship program will certainly contribute to a certain homogenization of the work area across Europe.

But before attaining homogenous structures, this article takes stock of the current variation of support structures science managers from different countries can rely on in tackling their demanding tasks. The German situation is to be compared with two selected Central and Eastern European countries, Poland, and Hungary. Those two post-communist countries have oriented themselves toward the West (just think about internationalization and homogenization efforts through the Bologna Process), but—despite these similar conditions—developed different trajectories that are worthwhile considering. Therefore, this article asks: What kind of study programs and what kind of short courses are available for science managers in Germany, Poland, and Hungary?

The goal of this article is to (1) find a common working definition of "science management," to (2) systematically compare study programs, short courses and workshop in Germany, Poland, and Hungary and to (2) draw conclusions on their impact on the professionalization of science managers in the respective countries.

Professionalization and profession

The concept of "professionalization" has a variety of meanings. In a colloquial usage "professionalization" means to make people more competent in order to enable them to "professionally" fulfill their tasks (Hölscher and Hipp, 2020). This is certainly something that this article wants to look at.

Moreover, the concept of "professionalization" derives from the sociology of occupations. It has been coined by Hughes (1958). In the classical sociology of professions the term "professionalization" refers to the subsequent sequences every occupation has to pass through in order to obtain the status of a "profession" (Blümel et al., 2011, S. 116). In this sense, researchers have generated a list with distinctive features an occupation has to fulfill in order to be called a "profession."

a) Existence of a socially relevant problem area urging for the development of specific knowledge.
b) Academic, specialized training that provides the abstract knowledge essential for professions.
c) The establishment of a professional association or a professional representation that acts as a regulating and standard-setting actor.
d) Extensive autonomy of action and exclusive decision-making of the professionals in their field.

The sought-after label "profession" or "professional" can only be granted when the above listed characteristics fully apply (Blümel et al., 2011, S. 116–117). Professionalization can be seen as a cultural resource which would grant legitimacy to new occupational groups and tasks in higher education and science management (Blümel et al., 2011, S. 120).

It is no surprise (and should not be hidden at this point) that it is doubtful that science managers (who will be closely defined in section "Defining science management") will reach all the distinctive features of a profession.

There is one more aspect to it: Following the distinction between "professional" and "organizational" professionalism by Evetts (2008) and Blümel et al. (2011) suggest that currently science managers tend toward the latter, namely they are mostly socialized within their specific institution and draw their motivation very much from the "organizational" goals and hierarchies of the university they work for (S. 106–107).

Furthermore, it can be expected that there are self-reinforcing effects between the above mentioned criteria. Therefore, the degree to which higher education research is institutionalized and legitimated in one country is likely to affect the respective offerings in terms of education and training in the subject area of science management.

Considering what has been said about professionalization so far, both the colloquial and the sociological definition of "professionalization" are important for this article. The scope of the article is to look into on only one aspect of "professionalization," namely the academic specialized education and training [according to (b)]. Is there a common, defined knowledge base and can this base be provided by study programs and short courses to an extent that may be called "professional" in the sense of the sociological definition?

Defining science management

Before focusing on education and training, we want to show that there are diverse debates on science management in the selected countries. In the following section, similarities and differences are presented.

As far as the research landscape in Poland is concerned, we had problems in finding empirical studies on science management workers in general, as such a category hardly exists in public or professional discourse. Consequently, a systematic review of databases showed lack of research focused on middle management of science in Poland. Observing the field and the personal work area we feel like their numbers are certainly growing, but they have no distinct professional identity.

If anything, it seems that science management is reduced to grants management (of mostly European projects). Interestingly, the definition of science managers used in the application form of the ERA-Fellowship program somehow mirrors this fact. While the definition starts out with a broad understanding (like the one that is adopted within this article), from the third phrase onward it narrows down to the job profile of a grant manager.

> *Science managers work in higher education institutions, non-university research organizations or research funding organizations. More specifically, they work in administration, central departments, staff units, at the Dean's office, or at chairs working with external funds. In their function as central contact point, they render advice to scientists during the application phase and help them to find a suitable funding instrument. They develop strategies for the institution and are responsible for implementation. They also handle the management of cooperation projects and organize and accompany administrative projects or are responsible for knowledge transfer and the exploitation of research results. In short: science managers provide services for scientists. (cf. ERA Fellowships application form).*

As far as the Hungarian higher education landscape is concerned, a similar picture can be seen as in Poland. There is only a few research and empirical studies on "science management" in Hungary. But gives a slight hint toward growing importance of science management in his dissertation when he describes—in light of the experiences at the Budapest University of Technology–usual managerial styles, managerial attitudes at state universities. Comparing to the Polish case, in Hungary a slightly different terms seem to be developing, namely "research and innovation manager" and "economist in research and innovation management."

Instead in German higher education research, there has been considerable effort in defining and describing the group of science managers. For what has been named "third space" in the international discourse (Whitchurch, 2012) in Germany, there have been coined terms like "Neue Hochschulprofessionelle/New Professionals," or "Hochschulmanagement" (Kehm et al., 2010). It is also important to notice that within the German Humboldtian tradition the term "science" refers to both research and teaching.

Regarding this group in quantitative terms, there is evidence from the statistics (Amtliche Hochschulstatistik) that this group of university employees has been rapidly growing in Germany during the last three decades. From 1992 to 2012 the number of non-scientific personnel in the higher grade of the civil service has grown considerably in Germany. Especially within the (general) administration field ("Personalgruppe Verwaltung") the number of employees has tripled (from approximately 3,300 to 10,800). In addition to that, science managers might be underestimated in the statistics, because quite often they are counted in the staff category "scientist." While unfortunately there is no reliable and comparable data from 2012 onward, some experts estimated that in the year 2017 there were

already close to 25,000 middle science managers in Germany (Konsortium Bundesbericht Wissenschaftlicher Nachwuchs, 2017, p. 34).

Klumpp and Teichler (2008) analytically differentiate into three fields of activities of science managers: tasks that (1) came along with higher education reforms and new requirements for universities like quality management, accreditation, evaluation, marketing and public relations, fundraising, internationalization, transfer and business start-up centers, and gender mainstreaming. Tasks (2) that evolved in the science area and that have been externalized from faculty to science managers, like research management and the support of junior scientists e.g., as coordinators of graduate schools. Tasks (3) that used to be administrative tasks have been "upgraded" and taken over by university-trained professionals, e.g., in the area of personal development (dual career and tenure track).

Taking a closer look at the organizational entities that "science managers" are located at, Banscherus et al. (2017, p. 89) find within their online-survey that surprisingly only 23% belong to the rectorate or central units, but 22% describe themselves of being part of the classical administration, and another big share of 22% declare to work within the decentral administrative units of single departments and faculties. The rest mostly works in other central scientific units, in the library, the computing center, and other facilities.

In terms of defining science managers according to the tasks they perform, it is pointed out that science managers are supposed to write conceptual and strategic papers, prepare decisions, foster change management (Banscherus et al., 2017, p. 27) and to come up with new solutions, given only a set goal and a set/certain time frame (Krempkow et al., 2019, p. 10).

Other definitions focus on the qualification of science managers describing them as a group that "take over support and service functions for scientists and therefore have university-training themselves or even experience in research and teaching"(Wissenschaftsrat, 2018, p. 85). In order to build bridges between administration and scientists, science managers ideally not only show closeness to academia (proven by academic degrees and even a publication record), but they need social skills like coordination and leadership competences, frustration tolerance, tact, and social robustness (Pasternack et al., 2018, p. 91; Krempkow et al., 2019, pp. 12–14).

In the following, this article refers to the broad understanding of science management, as it can be found in Germany already today.

Education and training for science managers in Germany, Poland, and Hungary

This section aims at describing the most recent education and training landscape for science managers in Germany, Poland, and Hungary. What kind of formal education and training and what kind of short courses are available for science managers in the respective countries?

The case of Germany

Back in 2010, Nickel and Ziegele already have found an enormous variety of programs and trainings which has been generated through competition for participants and through competition that has been fostered by a contest of the Stifterverband for the best ideas for study programs (Nickel and Ziegele, 2010a). But what does the landscape of further education and training programs as well as short courses in the year 2021 look like in Germany?

Study programs in Germany

The respective study programs (listed below) contribute intensively to the professionalization of science managers in Germany. The programs have in common, that they all are post-graduate part-time programs that rely on blended learning techniques (to different extents) and that are (mostly) held in German. Tuition fees for a whole program varies between 6,300 and 10,750 euros.

In terms of curricula they do not vary a lot. The compulsory modules usually comprise the historical, legal basics and international aspects of the science system as well as another set of management modules with a special focus to universities. For the specialization modules students can choose from modules like quality management in higher education, higher education marketing, human resources in higher education, controlling and internationalization. Furthermore, communication and leadership training are an integral part of the curriculum. Some programs also require a short job shadowing experience connected with a short transfer project in another institution than the home institution. Finally, the master thesis allows to dive into specific questions of science management.

Taking into account data from the two biggest players in the field, Speyer (Hölscher and Hipp, 2020) and Osnabrück (HWM Osnabrück, 2018), it seems that people applying and being admitted to the respective programs show some common characteristics. Around two thirds of students are female, which corresponds to the fact that careers in science management are considered as a very attractive career path especially for women (Nickel and Ziegele, 2010a, p. 190). While the formal requirement is a bachelor's degree of 210 ECTS, most students have a master's degree and one third has even a doctoral degree. Around 40% of students have a background in the humanities, around 20% in the natural sciences and engineering. The rest is covered by law, public administration and business administration. When they enter the program, the vast majority is between 30 and 39 years old, while some are still in their late 20s and others are already around 50. A big share of students,

between 40 and 55%, work at universities, between 15 and 25% work at universities of applied sciences. The rest is employed in extra-university research institutions or support institutions. When entering the program, around 50% already work on permanent contracts (HWM Osnabrück, 2018; Hölscher and Hipp, 2020).

The program from Osnabrück singles out on their homepage its target groups (HWM Osnabrück, 2021): the aim of the study programs is to provide students with practical management knowledge and skills, but also with the capacity of reflecting on their tasks in a research and theory-driven manner. Therefore, the programs target at higher education professionals with the desire to leave their everyday work and get acquainted with methodical tools in order to reflect their daily routines. Furthermore, the specific motivation for working toward a whole degree in science management can be of many kinds. Some of them want to change from a career in research to take over management roles, e.g., of graduate schools, faculties or staff units. Another group of professionals from public administration wants to adapt their knowledge and skills to the specifics of universities. And last but not least, there is a group of professionals who already work in a very specialized or narrow function in higher education management, who have the desire to broaden their skills in order to become employable also in other fields and positions of higher education management (HWM Osnabrück, 2021).

Short courses and workshops in Germany

In order to attract more potential degree-seeking students most of the study programs listed allow for people wanting to study only specific modules ("Kontaktstudium"). Certainly not everybody who (for various reasons) ended up in a science management job is willing to take up a whole master's degree. A large number of institutions offer short courses, workshops, conferences, and many also bookable as inhouse seminars. There is mostly free admission, but since those courses can be quite expensive, usually the employer institutions would pay for their staff.

The biggest players in the field who offer different types of formats are the ZWM Speyer[1] and the CHE[2], both having close connections to study programs (Speyer and Osnabrück) and respective professorships of science management. ZWM Speyer offers training courses (8–12 days) for e.g., faculty managers or managers of study programs that focus on the current challenges of daily work. Furthermore, they offer workshops (1–3 days) dedicated to specific topics such as the management of professorship appointments, quality management within administration or the implementation of digitalization projects.

The CHE offers 2 day-workshops to tailor-made topics such as change management or internal communication. The CHE-Forum or CHE-Symposia are short conferences located in big cities, hosted together with partnering institutions on highly specific topics like alternatives to system accreditation, tenure track, digitalization in study, and teaching.

Furthermore, professional networks explicitly dedicated to establishing science management as a profession offer training courses and seminars. The most comprehensive one is "Netzwerk Wissenschaftsmanagement e. V."[3] This network explicitly aims at fostering and professionalizing science management in Germany. For its members who are about to take over leadership positions the network offers 2–3 day courses, one individual coaching session included. Topics are: How to realize the full development of team members? How to align the team toward the university's goals?

The network FORTRAMA[4] focuses on the professionalization of a specific subgroup of science managers, mainly the group of research and transfer managers. Together with ZWM Speyer they offer a training course (2 modules of 4 days each) for research managers. Furthermore FORTRAMA offers some 1-day-seminars on themes like science system and governance, third party funding etc.

In addition, there are certain institutions addressing participants from a specific region (HüF[5]for higher education personnel in North-Rhine-Westfalia) or from certain university networks (like IUW[6]), the latter offering formats like peer consulting or thematic inputs on knowledge management or employer branding.

In Germany there are strong non-university research organizations (e.g., Helmholz,[7] Fraunhofer[8]), who have their own leadership programs, which certainly contributes to the finding that in these organizations there are better structured career paths for science managers than in the university sector.

The DAAD[9] offers courses for international coordinators, mostly on international aspects of science management and marketing. With Lemmens[10] there is even a private publishing company on science management offering services in the field of strategic communication, and internal and external communication. Finally, the EU-Bureau[11] of the BMBF dedicates itself to professionalize one specific group of science

1 https://www.zwm-speyer.de/

2 https://www.che.de/veranstaltungsformate/hochschulkurs/

3 https://www.netzwerk-wissenschaftsmanagement.de/

4 https://www.wissenschaftsmanagement-online.de/tags/9565

5 https://programm.huef-nrw.de/

6 https://www.bildungsserver.de/onlineressource.html?onlineressourcen_id=14226

7 https://www.helmholtz.de/en/jobs-talent/the-helmholtz-leadership-academy/

8 https://www.academy.fraunhofer.de/de/weiterbildung.html

9 https://www.daad-akademie.de/de/

10 https://www.lemmens.de/beratung/mkw

11 https://www.eubuero.de/zertifikat.htm

TABLE 1 Master's programs in Germany.

Offering institution	Name of the program	Type of degree
University of Applied Sciences Osnabrück	Higher Education and Research Management[a]	MBA
University of Speyer	Science Management[b]	Master of Public Administration (M.P.A.)
University of Oldenburg	Education and Science Management[c]	MBA
Technical University of Berlin	Science Management[d]	M.Sc.
Ulm University	Innovation and Science Management[e]	M.Sc.
University of Münster	Higher Education and Science Management[f]	M.A.

[a]https://www.hs-osnabrueck.de/en/study/study-offerings/master/higher-education-and-research-management-mba/
[b]https://wissenschaftsmanagement-speyer.de/
[c]https://uol.de/bildungsmanagement
[d]http://wissenschaftsmanagement.tubs.de/studium/
[e]https://www.uni-ulm.de/einrichtungen/saps/studiengaenge/innovations-und-wissenschaftsmanagement/
[f]https://weiterbildung.uni-muenster.de/masterstudiengaenge/hochschul-und-wissenschaftsmanagement/

managers, namely research managers or so-called EU-grant managers (see **Table 1**).

The case of Poland

Back in the year 2010, when Nickel and Ziegele did their comparative study on career advancement, they recurred to a selected Polish expert reporting on Poland (whom they saw in Mr. Lucjan Tabaka, Chancellor of Tadeusz Kościuszko University of Technology in Cracow) who confirmed that there were no specific career paths for science managers in Poland and that most candidates entered this field as career changers. Financial incentives seemed to be more important for the development of management competences in Poland as compared to the European average (Nickel and Ziegele, 2010b, p. 163). The expert stated that the availability of financial support for training was more crucial to the future development of career paths than according to the average opinion of European experts (Nickel and Ziegele, 2010b, p. 160). The following section looks on the professional training for science managers that has developed in Poland in the meantime.

Study programs in Poland

As of 2020, in Poland there is only one specific postgraduate program called "MBA - Higher Education Institution Management," designed for science managers of both the top and the middle levels. This postgraduate study program is offered by Adam Mickiewicz University together with Economic University in Poznań. The program duration is four semesters. First edition of the studies was held in 2011–2012, the sixth edition is planned for the years 2020–2021. Participants of the studies are mostly middle and high management of HEIs, including university deans or chancellors, but also middle management. It suggests that in terms of professional development and investment in personal and professional growth, the middle management is treated less seriously than C-level management by academic employers in Poland. MBA in Poland has usually been treated as a path for top management or those aspiring to achieve top organizational functions. This is why MBA for middle management might even sound unusual. MBA education designed for HEI is cheaper than other MBA degrees in Poland.

According to their website[12] the content of this MBA program is as follows. Firstly, the "psychological" block includes leadership skills workshops, negotiations, communication and social skills development is designed to sensitize and sharpen students' social skills. Secondly, the block of economics and finance includes microeconomics, finance management, accounting, international economics, and macroeconomics. Thirdly, the students learn marketing and management, including strategic management, HR management, project management, crisis management, team management, change management, and practical aspects of HEIs management. Finally, they attend the modules of the law block with the focus on the legal environment of higher education institutions in Poland, commercial law and business ethics is expected from future alumni as well. Such a broad program seems to allow getting an overview on general management issues and the helicopter view, broadening horizons.

The program website gives an impression of joyful academic ceremonies. There are references to some editions. The photostory describing 1st edition (2013) is available at the program webpage[13] and the 2nd edition at another page.[14] Analyzing the only detailed list of 32 participants (concerning the 2nd edition), there are more male than female participants and there is a huge gender gap in terms of the management level. Whereas 12 males already hold a top academic management position (such as vice-rector, chancellor, dean, etc.) only one woman does. There are no publicly available raw data which would allow performing similar analysis for the 3rd edition[15]

12 http://mba.amu.edu.pl/opis-przedmiotow
13 http://mba.amu.edu.pl/absolwenci/1-edycja
14 http://mba.amu.edu.pl/who_is_who_2014/files/assets/basic-html/index.html#1
15 http://mba.amu.edu.pl/absolwenci/3-edycja

nor the 4th edition.[16] For the 5th and the 6th edition there are even no traces on the program website, however the current recruitment concerns the forthcoming 7th edition.[17] The tuition fee is 3.6k PLN (ca. 820 euro) per semester, which makes it one of the cheapest MBA degrees in Poland.

Short courses and workshops in Poland

For middle-level science managers in Poland it seems more useful to attend short courses, webinars or workshops organized by public institutions or private actors. Firstly, quite popular are trainings delivered by Regional Contact Points (RCP) for Research Programs of the European Union as well as one National contact point (NCP). Trainings are free, available after registration, delivered also in a form of webinars (especially popular since the 2020 pandemic and lockdown). They give quite complex knowledge regarding formal and administrative aspects of financing research from the EU Programs, mostly Horizon 2020. Such trainings are also a good opportunity to exchange best practices with other beneficiaries and allow networking. They are listed on the website of National Contact Point for Research Programs of the European Union at the Institute of Fundamental Technological Research Polish Academy of Sciences[18] and sent out as newsletters. They usually last a few hours, sometimes, being performed in several parts, day by day or within longer periods. One of the most active and experienced regional contact points is the one in Poznań.[19]

Secondly, there are non-governmental organizations and private businesses, including consulting companies, who provide some short (usually several hours) trainings for university administrators, which can be of interest also for science managers. Such trainings are the ones performed within two private endeavors: the foundation Institute for Higher Education Development (Instytut Rozwoju Szkolnictwa Wyższego, IRSW[20]) and PCG Academia,[21] which is the Polish branch of the global company Public Consulting Group that specializes in IT solutions. Apart from open webinars, usually these trainings are tailor-made, commissioned by particular higher education institutions, not open for everyone.

Furthermore, other local companies, such as the Center for Value Analysis [Centrum Analizy Wartości (CAW)[22]] or the Center of Informatics Promotion [Centrum Promocji Informatyki (CPI)[23])] also operate partially in the science management market, delivering half-day trainings for middle managers. Topics of the trainings delivered by private actors are quite varied and refer to different tasks of higher education institutions such as finances, project management, HR, legal aspects, evaluation of science, quality assurance in didactics, education of foreigners and internationalization.

The case of Hungary

Study programs in Hungary

Recently, two study programs on research and innovation management have started at two universities in Hungary in order foster the collaboration between universities and economy and the innovation potential of the country: "Research and innovation manager" at the Pannon University and "Management of higher education, research and innovation institutions" at the Corvinus University. Both are postgraduate programs with a target group that aim to work either in academic leadership positions (rector, chancellor, lead of chairs or middle management, etc.) or in companies (management position) and understand him/herself as a bridge between the university and economy.

The aim of both study programs is to qualify professionals who wish to have theoretical and practical knowledge and skills of research and development and innovation projects and would like to be able to plan, prepare, realize and manage projects on research and innovation at institutions either in the academia or in the business field. Thus, the respective study programs contribute intensively to the professionalization of "science managers" in Hungary with a specific focus on research, development and innovation. The two programs have several aspects in common. Both of them offer a post-graduate, part-time programs that are held in Hungarian and focus on developing the management skills of professionals aiming to work directly at the interface between HEI and economy. The respective website at the Corvinus University highlights also the chances to achieve the professions of a rector, dean, chancellor of universities after graduating from the study program. Tuition fees for a whole program vary between 250,000 FT (ca. 600 euro) and 380,000 FT (ca. 900 euro). The curriculum of the two study programs is quite similar to each other and to those of the MA program in Poland, both of them provide basic knowledge of financing and accounting, project management, and negotiation techniques. Some differences can be detected tough: while the program at the Pannon University emphasizes the necessity to provide theoretical and practical, comprehensive and interdisciplinary knowledge (policy, legal, institutional, innovation-and project management) to the graduates on the management of R&D and innovation projects developing *at the edge of institutions* and Business environments, the study program at the Corvinus University highlights the importance of the knowledge of *the internal structures* (legal, financial, and organizational) that are essential to manage organizations and

16 http://mba.amu.edu.pl/who_is_who_2016/files/assets/basic-html/index.html#1

17 http://mba.amu.edu.pl/rekrutacja

18 https://www.gov.pl/web/ncbr/krajowy-punkt-kontaktowy

19 https://ppnt.poznan.pl/en

20 https://irsw.pl

21 https://www.pcgacademia.pl

22 http://www.caw.pl

23 http://www.cpi.com.pl

its relations to other institutions and funding opportunities. Interestingly, communication and negotiation training is only an optional part of the curriculum at both universities. There is also no requirement to have a short job shadowing experience connected with a transfer project in another institution than the home institution, such as in the German counterparts. Finally, there is a requirement of a master thesis at both universities that allows to dive into specific questions of research and innovation management.

As the study programs have been only started in 2020, there has not been any current statistics available on the students enrolled in such a program yet. The program seems to be successful/desirable though: according to the National Research Development and Innovation Office (NKFIH)[24] the Corvinus University is planning to introduce a new master's program to broaden their offer to this topic in the near future (NKFIH, 2020).

Short courses and workshops in Hungary

It is a top priority among the comprehensive objectives of the renewing Hungarian Research, Development and Innovation Strategy to encourage active knowledge and technology transfer between the actors of the innovation ecosystem, including in particular making greater use of the knowledge dissemination function of higher education institutions. In line with these objectives, the NRDI Office (National Research, Development and Innovation Office) has launched the University Innovation Ecosystem (2019-1.2.1-EGYETEMI ÖKO) program. The program encourages universities as knowledge bases to establish and ensure the result-oriented operation of organizational units that facilitate the commercialization of scientific results produced at universities, fosters cooperation between the academia and the business sector in research, development, technology and innovation, and increases the active participation of universities in the R&I framework programs of the European Union.

In the framework of the University Innovation Ecosystem universities undertook to establish and operate the *H2020 and Horizon Europe Information Point* in order to foster the participation within the EU research and innovation framework programs.

For the efficient operation of the Information Points, NRDI Office supports the University staff with trainings, workshops and online courses in the field of science management. In addition to learning, these free trainings provide a good opportunity to exchange best practices with other Hungarian universities. Workshops are organized and lead by National Contact Points.

Hungarian Development Centre (HDC)[25] is a non-profit organization established by the Ministry for National Development. It has been tasked to play a coordinative role in promoting and facilitating Hungary's participation in direct EU programs with a view to creating synergies with the indirect financial resources of the European Structural and Investment Funds and other European financial instruments.[26]

Hungarian Development Centre contributes to the above by providing up-to date information on opportunities such as calls for proposals and tenders in cooperation with relevant government departments, national, regional and international stakeholders. HDC acts as a project generator and promoter by connecting and matching beneficiaries with existing opportunities for participation in calls for proposals. Furthermore, HDC facilitates synergies for the optimal use of different European funding schemes by forging meaningful partnerships and by setting and disseminating best practices at national and regional levels.

Hungarian Development Centre usually organizes free of charge accredited trainings for their partners, among universities. The main parts of the trainings are as follows: project taxonomy, basics of project development and project management (writing, reporting, monitoring, and audit). Courses are primarily held by the colleagues of the HDC, but representatives of successful consulting companies and evaluators of EU-funded projects are also invited to share their real-life experiences.

V4 countries[27] are very active in organizing an annual training in Brussels for their science managers. This 3-day event is organized by the R&D support offices of the V4 countries in Brussels. Although the primary target groups of the training are project managers and application writing offices, it can be useful for anyone who wants to apply successfully for calls from the European Union's research and development framework programs. The aim of the 3-day event is to provide participants with detailed information on Horizon 2020 and Horizon Europe Research Framework Programs and also on research actors at European level, programs, grant application issues such as financial rules for participation, audit, communication and dissemination, protection of intellectual property rights or the review process. The training also provides an excellent opportunity to network with colleagues from the V4 countries, to meet representatives of the European Commission and other European institutions, project managers, and university colleagues, and to establish new relationships. Participation in the 3-day event is free, but travel expenses must be paid by the participants.

24 Nemzeti Kutatási, Fejlesztési és Innovációs Hivatal.

25 https://mfk.gov.hu/about-us.html

26 These programs are: CEF, COSME, Consumer Programme 2014–2020, Creative Europe, Customs 2020, EaSI, ERASMUS + , Europe for Citizens, Fiscalis 2020, Health III Programme, Hercule III, Horizon 2020, Internal Security Fund, Justice 2014–2020 Programme, LIFE Programme, Pericles 2020, Rights, Equality and Citizenship 2014–2020 Programme.

27 https://www.czelo.cz/files/Akce-2019/V4-TRAINING-3-2019-final_1.pdf

There are many other consulting companies offering online or on-site fee-based trainings who otherwise provide free webinars or downloadable learning materials (e.g., Europa Media).[28] The University of Pécs is about to give a chance to their science managers to take part on the trainings of these consulting companies, but it largely depends on the financial resources.

Preliminary comparison

As entire study programs are concerned, we can see that there is a rather big contrast between Germany as opposed to both Poland and Hungary. Whereas the numerous German study programs prepare students for jobs in whatever area of the higher education and the research landscape, the (mostly) newly developed programs in Poland and Hungary focus much more on the link between research and the economy, namely innovation, or grant management, with a special emphasis on EU programs. The German study programs certainly have a more holistic view, as they focus on building management skills of university staff to be able to deal with all the increasing demands they have to fulfill beyond focusing on technology projects or external, third-party funding. Whereas the German study programs stress the importance of adapting general management knowledge (originally created for private businesses) to the specifics of universities (leading to subfields like e.g., higher education marketing, human resources in higher education), the Polish program seems to remain very generic. At least for the polish MBA program it seems that the student is left almost alone with adapting the general management skills to specific university settings.

These findings correspond to the size of science management as a research discipline in the respective countries. Although there is much complaint even within Germany about the degree to which higher education research is financed and implemented, there are several specialized (publicly funded) research institutes and there been created several professorships. The professorships range from a more classical social science perspective to science management as a specific discipline or denomination (Pasternack, 2006). Of course, the more scientists deal with certain problems, gain expertise as well as generate scientific knowledge, the more potential is there for teaching in respective study programs. There seems to be a dynamic process of self-reinforcing professionalization processes.

Therefore, we assume that Poland and Hungary might not yet have entered this next stage of knowledge production in this field. Our analysis showed that there are only few people studying e.g., the impact of new public management on the science systems in Poland and Hungary. Consequently, the extent of institutionalization of higher education research and especially research on science management is lower in these countries than in Germany.

Looking at short courses and workshops, again in Germany there is a large variety of options to choose from, mirroring the broadness and diversity of the German understanding of "science management" itself. The large variety of short courses offered in Germany has in common that they foster specific management capacities to tend to optimize the internal structure of universities and to create rapidly adapting institutions within a competitive higher education system. Regarding short courses in Poland and Hungary, there currently even seems a greater emphasis on European funding programs, since many short courses are offered by the National Contact Points which try to spread knowledge on how to write successful grant applications. Therefore, the narrowness of the term science management in the Polish and the Hungarian case reflects the narrow offering of short courses. Whereas in Germany the broad offerings correspond to the broad term "science management."

The scarcity of available data results in the paper being mostly descriptive and theoretical, with only the basic analysis and empiricism. Our study has a very clear limitation: it is only exploratory. Trying to find more of the comparability, one would need to focus on the socio-economic, political and historical contexts. The Western geo-localization resulted in macro processual consequences such as wealthier economy and the longer academic tradition. Such conditions lead to a bigger extent of professionalization. The limitations of our study is that we do not analyze the country conditions in detail, only mentioning the former Iron Curtain and the general socioeconomic division between the West and the East.

Conclusion

It became evident that in Germany, according to the broad definition of science management, there are plenty of offerings in terms of specialized study programs and short courses. Starting from this, there is a certain dynamic regarding the interconnectedness of research fields and the institutionalization of education and training. This leads to self-reinforcing dynamics concerning professionalization.

But even in Germany this is not enough to meet the rigorous definition of all-encompassing "professionalization" (as put forward in section "Professionalization and profession"). The institutionalization of continuing education programs for science managers is not sufficient in order to legitimately label science managers as "real professionals." It is argued by some scholars that there is still no common knowledge base (Blümel et al., 2011, p. 106), not to mention the lack of other aspects which is why science managers can be hardly described as "professionals."

28 https://europamediatrainings.com/resources

In Poland and Hungary there is still not much momentum to the process of professionalization, although first efforts are made. The ERA-Fellowship program might contribute to the evolution of multi-lateral networks between these countries and Germany. The awareness and broad understanding of science management might spread also in Central and Eastern European countries.

Concerning training and education in Poland and Hungary, this article might be one step toward showing the broadness inherent to the concept of "science management." It might stimulate more people in Central and Eastern European countries to think about this, to generate knew knowledge and to teach their insights within newly established study programs or short courses.

Finally, what are our suggestions for the desirable future? We clearly do not want the study to contribute to the strengthening of ineffective or dysfunctional administration. Our endeavor to analyze the science management comes from the shared value of less bureaucratic administration. The kind of professionalization of university administration that we would like to see in the future expresses in strengthening soft skills, the capability of opportunity recognition and related areas, not an excessive formalization.

Author's note

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Author contributions

All authors listed have made a substantial, direct, and intellectual contribution to the work, and approved it for publication.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

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