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Research Insights
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PROFESSIONAL SUPPORT FOR YOUNG RESEARCHERS

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Abstract. Young researchers' competence for scientific research is a significant starting point for their professional development, but also an extremely important prerequisite for realising their full potential within the academic community. This implies the need for the provision of organized professional support to young researchers. The goal of this research was to determine the needs and opportunities for improving the professional support of young researchers (PhD students, assistants, postdoctoral students). For the purposes of this research, an e-questionnaire for young researchers was prepared (N = 335). The research results confirm that the quality of support for young researchers provided by scientific-professional institutions and individuals is determined by young researchers' years of work experience, work-professional status, and educational-scientific field. The research results will show methods for improvement and enhancement of the scientific research quality of young researchers. Hence, the overall objective of this research is to strengthen the professional competencies of young researchers.

Keywords: professional support; young researchers; competence for scientific research; professional development] quality analysis

Introduction

The current *Strategy of Scientific and Technological Development of the Republic of Serbia for the period from 2021 to 2025* called "Power of Knowledge"[1] and *Law on Science and Research*[2] contribute to the scientific research quality of young researchers by providing various forms of support such as the development of financial and technical support programs, institutional financing and publishing, integration into international scientific projects and systems, cooperation and partnership with the scientific diaspora, availability and openness of research results and projects, and the program for development of scientific staff.

The strategic directions of scientific and technological development in the Republic of Serbia clearly determine the indicators of scientific research and

innovation system success. Indicators of success in science are determined by the quantity and quality of scientific production by researchers and by their number of published papers and citations. Also, key performance indicators of international cooperation are determined by participation in multilateral, regional and bilateral programs and projects; the precondition for such engagements is quality international cooperation and research connectivity.

An important fact is that the average age of research staff in Serbia in the period 2010 – 2019, was under 45. As pointed out in the Strategy, the rejuvenation of staff took place at the beginning of the previous project cycle (2010 – 2011) and in the period 2018 – 2019.

Also, it was determined that after the end of this strategic period, the expected state (vision) of science includes researchers who are competent and internationally recognized and research teams that will be ready to participate in development and scientific project activities. Such expectations imply systematic and meaningful professional support for young researchers, that is PhD and postdoctoral students, by scientific and professional institutions and their mentors, in the development of their professional competencies for scientific research (conducting research, involvement in scientific projects, publishing co-authored scientific papers, presenting at conferences and participating in their organization, connecting with other scientific institutions, etc.).

Previous research confirms that professional support for young researchers is a focus in higer education in other countries as well, and it is being addressed in various ways. For example, the National Report on Junior Scholars in Germany 2013 presents the status of young researchers and provides an overview of enhancement tactics. In Germany, there are institutions such as the German Research Foundation3 whose task is to support PhD and postdoctoral students. Their programs include the promotion of young talents, different types of support depending on level of qualifications, individual grants, programs for acquiring additional knowledge, and possible engagements and scholarships. In the promotion phase, PhD students are enabled to cooperate on international projects, including staying up to six months at partner universities abroad in order to collect research material and analysis. Regarding scientific work and research, the focus of these support programs is both acquiring professional knowledge and additional competencies, such as scientific independence of young researchers, in order to shorten the period of writing a PhD thesis and the ultimate creation of a more successful PhD dissertation. Together with these programs, faculties offer additional support by cooperating with non-university research and business institutions, museums and many other institutions to create their own national network of partners, not only for writing projects but also for additional resources, in which PhD students and young researchers can practically use their knowledge, perhaps for later employment. Likewise in Serbia, the precondition for possible internships or employment is good, successful

work and experience in the scientific field. Intensive exchange of PhD students is encouraged through Erasmus+ and other types of mobility programmes. There are programmes in Germany that, in addition to professional content and activities, also offer workshops that aim to prepare PhD students for the process of acquiring a degree or writing projects. An interesting fact is that at the time of finishing the habilitation, young scientists are on average 40.8 years old. At the same time, more than two thirds of young researchers are employed at universities and research institutes during the PhD period, with the support of funding programmes for young researchers that allows them to lead their own research group and work on their own research topics, with their own budget, since great importance is given to a high degree of scientific work independence (Burkhardt et al. 2013).

Apart from additional support systems such as funds for research activities, young academics in Switzerland are provided with special support by teaching assistants and full professors from the completion of their PhD thesis to postdoctoral projects. Both the faculty and the professors are responsible for the future young researchers, within their narrower scientific fields (Suter et al. 2011).

Young researchers in African countries4, as much as in Europe, gain their research experience at universities or other academic institutions during internships, projects or special trainings (Fairfoul, Stege & Rømer 2015; Ngongalah et al. 2018). One type of support to researchers in their early career in higher education in some European countries5 is to establish a balance between teaching and research, since it has been observed that in many European countries PhD students have a full teaching load while trying to complete their thesis (Fairfoul, Stege & Rømer 2015).

In the mentioned studies, early career researchers state that the greatest benefit is received through the guidelines provided by mentors and researchers-supervisors (Burkhardt et al. 2013; Fairfoul, Stege & Rømer 2015; Ngongalah et al. 2018; Suter et al. 2011). Support is diverse, including meeting prominent scientists in specific areas, networking with young scientists, providing references, sharing experiences regarding grant or scholarship applications, or even giving informal advice. At the same time, senior colleagues, mentors, and family and friends support young researchers – colleagues provide professional contacts and experience, while family and friends are there for encouragement and understanding. However, in the humanities and social sciences, young scientists more often lack the support network, role models and peers who guide and advise them regarding their own choices (Waheed 2021). Differences between developing and developed countries have also been identified. While in developing countries this cooperation and support has helped young researchers secure very high academic positions such as professorships, researchers in developed countries have been given access to global networks by their senior colleagues, including the most respected research groups, laboratories and universities, enabling them to present their work at the most prestigious conferences and publish in the most prestigious books and

journals. Additionally, one of the most important factors in career advancement is the writing and publishing of papers, as well as training programs in these activities, and secondary factors are networking and politics (Friesenhahn & Beaudry 2014; Waheed 2021)6.

A study from 2020 "Voices of Early-Career Researchers" (VoECR) – was conducted to determine how the research environment is changing and affecting early-career researchers across the globe and confirms the results of previously mentioned studies regarding the great importance of collaborative research and cooperation with other researchers in the country and abroad; these findings were established based on a questionnaire conducted in as many as 94 countries (Dooley et al. 2020). However, many problems that young academics face in establishing cooperation with senior colleguaes have been identified, such as exclusion from the list of authors when publishing papers, insufficient guidance within joint research, lack of financial resources and adequate equipment, difficulties in identifying and hiring associates for projects, closed circles of associates involving senior colleagues and full professors, unwillingness of researchers to cooperate due to lack of funding, poor communication with the university, or even the lack of interest of researchers in project activities (Dooley et al. 2020). Furthermore, establishing employment at universities and job insecurity are real problems also faced by young researchers, as constant work on publications, as well as participation in or leadship of projects and conferences are important prerequisites for career advancement and job preservation (Dooley et al. 2020; Keays et al. 2014).

The listed results of the published research were an important starting point for our research on current professional support to young researchers in our conditions and environment and whether and in what way it is evident and determined by current strategic directions of scientific and technological development in Serbia. We consider that trustworthy relationships in science are nurtured and considered the most useful and fruitful support for the career development of young scientists. Therefore, being on good terms with mentors and senior colleagues, as well as establishing relationships of mutual trust and respect, are some of the most important factors for career success.

Previous research studies carried out in 2015 in Serbia on the problems of young researchers, especially in the social sciences underscore problems such as the lack of funds for empirical research, projects without clear outcomes, the socio-economic status of young researchers, and the overloading of young researchers with administrative and technical tasks (Ocokoljić, Kleut & Radovanović 2015). In addition, it was noted that in 2005, Serbia invested very little financial resources in scientific research; although funding has increased over the years, it was and still is insufficient (Pudar Draško, Krstić & Radovanović 2015). Although project requirements encourage the inclusion of young researchers and that is certalny one type of support for young researchers, the importance of their role in projects was

and is still minimally valued due to their exclusion from high scientific production. Furthermore, only the participation in the projects funded by the Ministry determine the qualification for other types of support, such as co-financing of the final processing of the doctoral dissertation, participation in scientific meetings in the country and abroad, co-financing of the application and defense costs of the doctoral dissertation, and the costs of publishing papers in reference international journals as well as study stays abroad (Kleut, Ocokoljić & Radovanović 2015).

Research methodology

The subject of our research is the professional support provided by scientific and expert institutions and mentors to young researchers in Serbia. According to the literature, our presumption is that the support provided to young researchers is a prerequisite for strengthening their research skills and capacities. The aim of the research, based on the respondents' self-assessment of the forms and levels of support they receive from scientific and professional institutions and individuals, is to determine the reach of the professional support of young researchers in Serbia. Based on such an aim, we have developed specific research questions to determine whether the support (participation in project activities, preparation and publication of scientific papers, organization of scientific conferences and participation in conferences) for young researchers by scientific and professional institutions and mentors is determined by young researchers' years of work experience, their work-professional status, or their educational/scientific field of work. Their views, according to the statements, are grouped in relation to the presented types of support (Table 1).

Table 1. Types of support for young researchers

Types of support for young researchers for/ in ...	Question code	CLAIM
For participation in project activities	Po1	The institution provided me with support for conducting research (e.g. providing cover letters to other institutions, support in obtaining consent of respondents to participate in the research, providing space and conditions for printing, distributing and collecting materials, procurement of literature and equipment).
	Po2	I have been invited to take part in scientific projects of the institution.
	Po6	I have been included in their research teams.
	Po7	Senior colleguaes helped me within the project to improve my research competencies by giving me examples, comments and suggestions, and providing me necessary literature.
	Po10	They helped me connect with researchers from other institutions in the country and abroad.
In the preparation and publication of scientific papers	Po3	I have been regulary invited to publish scientific papers in institution's publications (e.g. thematic issues of journals, monographs and chapters in proceedings).
	Po8	I have been invited as a co-author of scientific papers.
	Po9	They eased the difficulties I faced while writing scientific papers.
For participation in organization of scientific conferences and participation in conferences	Po4	I have been actively supported to present at scientific conferences organized by the institution.
	Po5	I have been actively supported to get involved in the organization of scientific conferences hosted by the institution (e.g. organizational or program committees, guest lecturer).

The perceptions of young researchers (N = 335) were examined, with an online instrument (Likert-type scale), which was specifically made for this research[7]. The value of the Cronbach's alpha coefficient of internal consistency (0.887) indicates good reliability of the instrument (Pallant 2020).

The sample included young researchers, PhD students and PhD alumni, all under 40, with or without employment, of different working-professional status, from different educational and scientific fields and from different universities (Table 2 and Table 3).

Table 2. Sample structure in relation to years of work experience and work-professional status

	Years of work experience			Work-professional status				
	1-5	6-11	12-18	Associate professor	PhD, working in the institute	Teaching assistant with PhD	PhD student (teaching assistant, teaching fellow)	PhD student working in the institute
Frequency	153	136	46	89	16	14	184	32
Percent	45.7	40.6	13.7	26.6	4.8	4.2	54.9	9.6

Table 3. Structure of the sample in relation to the educational-scientific field and the university where they attend or have attended PhD studies

	Educational-scientific field				University			
	Social sciences and Humanities	Natural science	Technical sciences	Medi-cine	Bel-grade	Novi Sad	Kragu-jevac	Nis
Frequency	169	80	67	19	175	50	56	54
Percent	50.4	23.9	20.0	5.7	52.2	14.9	16.7	16.1

The SPSS statistical package, version 19.0, was used to process the research results. The Shapiro-Wilk test of normality of distribution was used to test the hypothesis regarding normal distribution of scores. The following statistical procedures were used for quantitative analysis of research results: frequency, percentages, mean ranks, and Kruskal-Wallis non-parametric tests.

Results and discussion

The first research task was to *determine whether young researchers have the support of scientific and professional institutions and individuals regarding their participation in project activities and whether this type of support is determined by their years of work experience.* We implemented this task by analyzing the perceptions of the respondents in relation to the following statements: Po6: *I have been included in their research teams*; Po7: *They helped me improve my research competencies.*

The perceptions of young researchers from our sample indicate that such support is significantly determined by their years of work experience. Regarding inclusion in research teams, we identified that there is a statistically significant difference in the perceptions of respondents between the category of those with 6 – 11 years of work experience and the category of respondents with 12 − 18 years of work experience ($p = 0.027$), in favor of category 6 − 11. Regarding the help of institutions to young researchers to improve their research competencies, it was confirmed that there is a statistically significant difference in the perceptions of respondents with 1 − 5 years of service and the category of respondents with 12 − 18 years of service ($p = 0.015$), in favor of category 1 − 5.

These research results confirmed our assumption that researchers with less work experience have greater support from institutions for their involvement in project activities, compared to researchers with more work experience. Such statements are well-founded and expected for several reasons. First, younger researchers do not have enough experience in searching for information on upcoming projects, nor understanding requirements and tasks in relation to application processes and project documentation. Therefore, they have much greater need for support. In order to acquire and develop professional competencies for quality scientific research work, it is important to get involved in research teams and project activities as soon as possible, which is one of the priority tasks of scientific and professional institutions, in order to strengthen young researchers. Also, young researchers represent significant resources for organizational and technical activities within projects and can be of great benefit to entire research teams in the implementation of planned activities.

With the second research task, *we wanted to determine whether young researchers have the support of scientific and professional institutions and individuals regarding preparation and publishing of scientific papers, and whether this type of support is determined by their years of work experience.* We implemented this task by analyzing the perceptions of the respondents in relation to the following statements: Po8: *I have been invited as a co-author of scientific papers*; Po9: *They eased the difficulties I faced while writing scientific papers*. The perceptions of the respondents from our sample indicate that this type of support is also significantly determined by the their years of work experience. Regarding their involvement in the preparation and writing of co-authored papers, we found that there is a statistically significant difference in the perceptions of respondents between the category of those with 1 − 5 years of service and the category of respondents with 12 − 18 years of service ($p = 0.037$), in favor of category 1 − 5. Also, in relation to helping young researchers with writing scientific papers, it was confirmed that there is a statistically significant difference in the perceptions of respondents between those with 1 − 5 years of work experience and the category of respondents with 12 − 18 years of work experience ($p = 0.005$), in favor of category 1 − 5.

These research results confirmed our assumption that researchers with less work experience have more help in their training to write scientific papers and that it is important to provide them with the opportunity to be co-authors of papers with more experienced individuals. This provides them with the opportunity to develop their professional competencies for quality research work, such as recognition of the current research subject, knowledgeable theoretical approach to the problem, clear specification of research methodology, and analysis and interpretation of research results. Such activities imply the continuous training of young researchers, with permanent mentoring support from more experienced ones (consultations and review). Such work of experienced individuals not only contributes to the development of young researchers' competencies for scientific, but also implies the continuous development of personal competencies of these individuals for mentoring. For that reason, it is important that young researchers are equal participants in writing scientific papers, with clearly shared responsibilities and duties for all co-authors, and the support of more experienced young people.

With the third research task, *we wanted to determine how much young researchers are supported by scientific and professional institutions and individuals in relation to their engagement in the organization of and participation in scientific conferences.* We implemented this task by analyzing the perceptions of the respondents for the following statements: Po4: *I have been actively supported to present at scientific conferences organized by the institution*. Po5*: I have been actively supported to get involved in the organization of scientific conferences hosted by the institution*. The perceptions of the respondents from our sample confirm that this type of support is partially determined by the educational-scientific field (Social sciences and Humanities – SH, Sciences and mathematics – SM, Technology and Engineering sciences – TE, medical sciences – MD) and the professional status of young researchers (PhD student who is employed/unemployed/employed in another institution, PhD student with a scientific title engaged in a higher education institution, PhD in science employed in a scientific institute with a scientific title, or associate professor).

With regard to supporting young researchers to present at scientific conferences organized by the institution where they are employed (Po4), a statistically significant difference was confirmed in the perceptions of respondents in relation to their educational and scientific field, between the categories of medical sciences and social sciences and humanities ($p = 0.016$), in favor of social sciences and humanities. In relation to the statement Po5, support for young researchers for involvement in the organization of scientific conferences hosted by the institution where they are employed, there was a statistically significant difference in the perceptions of respondents, in relation to their work-professional status. Namely, there is a statistically significant difference between the category of respondents with the titles of teaching assistant or teaching fellow and respondents with the title of assistant professor ($p = 0.024$), in favor of assistant professors.

These research results confirmed our assumption that young researchers who were part of this study reportedly receive support when it comes to organizing scientific conferences and participating in conferences and that this support is determined by the educational-scientific field and work-professional status of young researchers. It is not surprising that the data show that associate professors receive more support for participation in organizing scientific conferences than teaching assistants and teaching fellows. Their experience in these activities and number of presentations at conferences are probably greater. Also, their interest in getting involved in such activities may be determined by upcoming new elections for the role of assistant professor. It cannot be ignored that associate professors, except in the field of art, have defended their dissertations, which significantly reduces their professional workload. We believe that these are just some of the important reasons why their more intensive participation in the organization of conferences is expected. Greater support for young researchers from the area of social sciences and humanities to present at scientific conferences than those from the field of medical sciences prompts research circles to reflect on possible different reasons for this diference in support for different scientific fields and on different possibilities for the dessimination of scientific research results.

By taking a thorough look at Table 3, it is evident that we structured the sample according to the universities that the respondents attend or have attended PhD studies (University of Novi Sad, Belgrade, Kragujevac and Niš). A non-parametric statistical test (Kruskal – Wallis test) confirmed that no statistically significant difference was observed in the answers of the respondents in any of the listed items in relation to the university where the respondents attend or have attended PhD studies.

Conclusions

The professional support of young researchers by scientific and professional institutions can significantly determine the development of their competencies for scientific research. Through the research presented in this paper, we wanted to identify to what extent the professional support provided to young researchers within institutions in regard to projects, activities, publication of scientific papers, and participation in conferences help to strengthen their already mentioned professional competencies. The paper presents an empirical inventory of support for young researchers in relation to their educational-scientific field, professional status, work experience, and the university where young researchers attend or have attended PhD studies.

It has been established that the length of young researchers' work experience determines the level of support from institutions and individuals for their involvement in project activities and writing scientific papers. As we have assumed, researchers with less work experience have more support in these activities compared

to researchers with more work experience. As for their participation in organizing scientific gatherings and conferences, researchers with more work experience have greater support, both due to their experience and upcoming election to a scientific or academic-teaching title. As to the educational-scientific field of young researchers, greater support was given for their participation in scientific gatherings in the field of social sciences and humanities than in the field of medical sciences. Reasons for these findings are possibly the different methods of support in the mentioned scientific fields, as well as differences in the possibilities for the dissemination of scientific research results.

The strategic guidelines for scientific and technological development in the Republic of Serbia determine our study's underlying assumptions and indicators of scientific research system success. These primarily include the quantity and quality of researchers' scientific production and participation in project activities and are further based on the presented experiences of young researchers in other countries. The results of this study suggest the following conclusions: Strengthening professional competencies of young researchers for scientific research work implies a long-term process, regardless of the length of service, educational and scientific field and professional status of young researchers; The ability of young researchers to do scientific work is indicated by their intensive involvement in research activities, finding new ways to improve this work; Collaborative research in which young researchers participate can be a significant prerequisite for their professional advancement in scientific work; In order to encourage young researchers to produce higher quality research, it is important to establish procedures at the institutional level to promote young talent in all educational and scientific fields.

We believe that the presented research results and conclusions can be a starting point for researchers in the search for answers to new research questions about possible forms of action for the training and advancement of young researchers' scientific research competencies.

NOTES

1. GOVERNMENT OF THE REPUBLIC OF SERBIA (2021). Strategija naučnog i tehnološkog razvoja Republike Srbije za period od 2021. do 2025. godine "Moć znanja" [in Serbian]. Available from http://www.pravno-informacioni-sistem.rs/SlGlasnikPortal/eli/rep/sgrs/vlada/strategija/2021/10/1/reg. [Viewed 2022-1-12].
2. ZAKON O NAUCI I ISTRAŽIVANJIMA [in Serbian]. Available from: https://www.mpn.gov.rs/wp-content/uploads/2019/07/Zakon-o-nauci.pdf. [Viewed 2022-1-10].
3. ORIGINALLY: DEUTSCHE FORSCHUNGSGEMEINSCHAFT.
4. YOUNG RESEARCHERS IN CAMEROON, NIGERIA, GHANA, UGANDA, TANZANIA, KENYA, MALAWI, DEMOCRATIC REPUBLIC OF CONGO, SOUTH AFRICA AND RWANDA.
5. In Cyprus, Finland, Germany, Italy, Romania, and the United Kingdom.
6. See also: IN SUPPORT OF EARLY CAREER RESEARCHERS - EDITORIAL (2021). Nature communications, vol. 12, article no. 2896. Available from: https://doi.org/10.1038/s41467-021-23455-8. [Viewed 2022-3-11].
7. ONLINE INSTRUMENT was made within the inter-institutional scientific project implemented by the Faculty of Education in Jagodina and the Faculty of Education in Vranje (*Professional competencies of young researchers in the system of university education,* 2021−2022).

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