SOURCES OF FUNDING ACADEMIC ENGAGEMENT: EMPIRICAL RESEARCH OF UNIVERSITY OF NOVI SAD AND UNIVERSITY OF BELGRADE

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Abstract: *The research paper analyzes the various funding sources available to support academic engagement activities among scholars in the Republic of Serbia. The study focused on the two largest and most influential universities, the University of Novi Sad (UNS) and the University of Belgrade (UB). A questionnaire was sent to 3,163 scholars, and 184 respondents' answers were analyzed to compare funding sources. These sources included government grants, foreign (EU) grants, university resources, own resources, private market capital, and venture capital. The study tested for statistically significant differences in funding sources between the two universities and found a significant difference in relation to two sources: own resources and venture capital. The University of Novi Sad had a significant advantage in attracting venture capital. Overall, the study shows that researchers at the two universities use slightly different funding sources to support academic engagement activities.*

Keywords: sources of funding academic engagement, government grants, foreign (EU) grants, university resources, own resources, private market capital, venture capital

1. INTRODUCTION

The knowledge economy emphasizes the importance of knowledge as a strategic resource in the global economy, and learning as a crucial competitive activity. While the terms knowledge economy and learning economy are often used interchangeably, the former is more commonly used by OECD countries and American authors, with traces of the latter found among Nordic authors. High-tech companies have been associated with innovative and knowledge-intensive activities, particularly in the information and communication sector. Research and development (R&D) activities are closely linked to knowledge acquisition and innovation, which provide a clear competitive advantage in the global economy. The approach to innovation depends on whether the economy is defined as knowledge-based or learning-based. The learning economy sees innovation as a socially and territorially embedded, culturally and institutionally shaped interactive learning process.(Lundvall and Borras, 1998).

Each university operates uniquely in accordance with its surrounding environment. In addition to their fundamental roles of educating and conducting research, universities also have a responsibility to enhance the progress of the economy, society, and culture of the region they are located in.(Cirella and Murphy, 2022). Modern universities have a multifaceted role.(Thomas and Pugh, 2020) and encompasses teaching, research, and entrepreneurship functions (Audretsch, 2014). Many universities are transforming by incorporating innovative activities and adopting practices that promote entrepreneurship (Siegel and Wright, 2015). Establishing strong external partnerships with key players in the ecosystem, such as entrepreneurs, universities, local and national governments, and private industries, is crucial for the successful commercialization of research.(Ács, Autio and Szerb, 2014).

The transfer of knowledge from universities and the financial compensation that follows are areas of interest for researchers and policymakers in both developed and developing economies. There is ongoing research being conducted on these mechanisms(Marozau and Guerrero, 2016).

Over the past two decades, there have been changes in the way higher education funding is allocated worldwide. The proportion of public funds has decreased significantly, while private sources such as businesses have increased their share. (Sengupta and Rossi, 2023). Universities have been compelled to rely more on private sources of income due to the decrease in public funding for academic research and education (Muscio, Quaglione and Vallanti, 2013), including income from knowledge exchange (Sengupta and Ray, 2017). Currently, policymakers in developed and emerging economies are urging universities to

utilize their intellectual property and prioritize socioeconomic impact in all their pursuits. (Perkmann *et al.*, 2021). In light of external challenges, universities have strategically adapted their approach to research, teaching, and knowledge exchange to make the most of their competitive advantages. The response has been thoughtful and deliberate (Horner *et al.*, 2019).

2. SOURCES OF FUNDING ACADEMIC ENGAGEMENT

In modern society, universities hold a unique position as key knowledge generators. With the addition of a third mission - technological transfer - it has become crucial to assess their contribution to economic growth. The investigation of transforming academic knowledge into commercial products - such as patenting, licensing inventions, and academic entrepreneurship - has become increasingly crucial for both academia and policymakers.(Di Gregorio and Shane, 2003; Lockett, Wright and Franklin, 2003). Generating academic impact can be exemplified by commercialization, which provides tangible market validation. The academic community's fundamental and crucial contribution to society and the economy is through academic engagement, that encompasses more than commercialization and refers to the transfer of university knowledge through scientific cooperation (Perkmann and Walsh, 2007).

Working together can be defined in various ways, such as conducting research, providing consulting services, or simply connecting with colleagues. Once a collaborative relationship has been established, there may be opportunities for academic entrepreneurship to develop. This can involve commercializing a patent, invention, or area of expertise that is not yet protected (Würmseher, 2017). Commercialization is defined as the pursuit of financial gain through academic engagement. This definition highlights the narrow and precise nature of the term (Petrov, 2022).

The issue with academic engagement is that it is driven primarily by the individual motives of scientists. To establish entrepreneurially oriented universities that can easily collaborate with the economy and innovation systems, it's crucial to motivate university researchers to work on commercializing scientific research.

Many obstacles hinder the commercialization of scientific research, including excessive teaching and administrative duties that leave little time for pursuing commercialization. Additionally, researchers and teachers often perceive commercialization as unimportant to their academic careers and consider it a burdensome waste of time. This mindset reflects a lack of understanding regarding the potential market applications of research and its potential value for society. Furthermore, many fear active involvement in commercialization may impede their academic progress(Van Looy *et al.*, 2004).

The level of engagement in academic activities is influenced by a multitude of factors, including personal preferences, individual attributes, as well as organizational and institutional factors. The presence of a proficient technology transfer office can greatly facilitate the commercialization of university research. Moreover, the organizational culture, accessibility of successful academic startup models, and proximity of business incubators, technology parks, and other supportive institutions all contribute to academic engagement. It is important to note that academic engagement has a significant impact not only on scientific research but also on the teaching outcomes of researchers (Petrov, 2022). As we move into the 21st century, student characteristics and motivations are evolving. Therefore, it is essential to showcase the practicality of the knowledge being imparted. By fostering academic engagement, educators can make their teaching more captivating and relatable, ultimately increasing interest in their subjects, modules, and profiles.

Successful scientists with strong connections and social capital often engage in academic activities at higher levels. These individuals typically hold higher scientific and teaching positions, have many approved grants, and publish numerous scientific papers, making them experts in their fields. This level of engagement has been shown to positively correlate with grant funding and scientific production, demonstrating that academic progress and engagement go hand in hand(Perkmann *et al.*, 2013).

Cities in Serbia that have universities and a strong industrial foundation, namely Belgrade, Novi Sad, and Niš, exhibit a notable presence of academic involvement. Nevertheless, this involvement lacks consistency and primarily relies on personal networks and individual initiatives. Presently, there is no established and organized collaboration between state scientific research institutions and private sectors in the Republic of Serbia. The historical partnership between industries and universities has resulted in a regional clustering of researchers. Studies indicate that the research sector lacks a significant pool of human resources, with the exception of Belgrade and Novi Sad (*Industrial Policy Strategy Of The Republic Of Serbia From 2021 To 2030.*, 2020).

The output of university research can vary depending on the funding source and its priorities. Historically, governments have been the largest funders of such research in most economies. They usually disburse public funds through project grants or contracts with government bodies. Governments also use competitive mechanisms to allocate funds to institutions, evaluating project proposals and considering the expertise and past performance of researchers during the selection process. Expected performance is a crucial factor in funding decisions. (Jongbloed and Vossensteyn, 2001; Hooi and Wang, 2020).

The purpose of this study is to investigate the funding resources that are available for academic engagement activities for scholars at two esteemed universities in the Republic of Serbia: the University of Belgrade and the University of Novi Sad. The potential for commercialization of these activities can vary, as scientific paper publications typically lack a direct economic connection. Conversely, participation in conferences and lectures may or may not offer compensation (Petrov *et al.*, 2023). The practice of consulting entails leveraging research expertise in a manner that is financially sustainable, thus representing a more sophisticated approach to commercialization. The closest academic engagement activities to commercialization involve selling research products, patent licensing, and creating a spin-off business.

The purpose of this paper is to examine the significant diferences in funding sources for academic activities between respondents from the University of Novi Sad (UNS) and the University of Belgrade (UB).

3. RESEARCH METHODOLOGY

We conducted research using a survey instrument (Belitski, Aginskaja and Marozau, 2019) that had been previously utilized in transitional economies such as Belarus, Kazakhstan, and Azerbaijan. This same instrument was also used in a study conducted in the Republic of Serbia(Petrov *et al.*, 2022).

The instrument is comprised of three sections. The initial section includes essential information about the participants, such as their age, work experience, job title, research area, faculty, and university. The second section consists of inquiries concerning academic progress, particularly the quantity of papers published in both Serbian and international journals during the preceding five years, as well as the level of involvement in academic research (Petrov *et al.*, 2023). Finally, the third section focuses on the sources of funding for academic research activities (Belitski, Aginskaja and Marozau, 2019):

- Government grants;
- Foreign (EU) grants;
- University resources;
- Own resources;
- Private market capital;
- Venture capital business.

The empirical analysis is based on a dataset collected via online survey over the four months from September 2018 to January 2019 in the Republic of Serbia.

3.1 Sample

Our initial focus was on gathering contact information of scholars from the two most prominent universities in the Republic of Serbia. Through their official websites, we discovered 3,163 established scholars. From this pool, we sent out 956 questionnaires and received 266 responses, resulting in a response rate of 27.82%. Unfortunately, we had to reject 41 responses due to incomplete information as the respondents did not mention their university affiliation.

Out of 225 responses that were deemed valid, 115 participants hailed from the University of Novi Sad, while the remaining 110 were from the University of Belgrade. Among the 115 respondents from the University of Novi Sad, 17 individuals (14.78% of UNS respondents) did not disclose any engagement in academic activities. Similarly, 24 respondents (21.82% of UB respondents) from the University of Belgrade also reported the same.

We were left with a subsample of 184 individuals who reported engaging in academic entrepreneurial activity. Figure 1 provides an overview of the respondents' demographic characteristics.

Out of the total number of respondents, the age range of 30 to 39 years had the highest representation with 64 individuals (34.78%). This was followed by 51 respondents (27.79%) between the ages of 50 to 59 years, and 38 individuals (20.65%) aged between 40 to 49 years old. The percentage of the youngest and oldest scholars is lower, with 9.78% and 7.07% respectively.
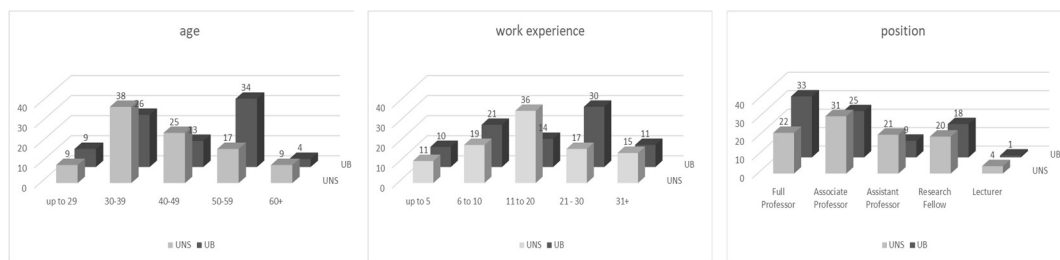
Figure 1: Demographic characteristics of survey respondents from UNS and UB
Source: Authors

Regarding work experience, the majority of respondents had between 11 and 30 years of experience, with 27.17% having between 11 and 20 years and 25.54% having between 21 and 30 years. The remaining groups with 6-10 years, 31+ years, and up to 5 years of work experience were less represented, with 21.74%, 14.13%, and 11.41% respectively.

In our sample, the most common academic title was PhD, with 79.89% of respondents holding this degree. MS and MSc were held by 16.3% and 3.8% of respondents respectively. The majority of respondents held teaching positions, with 29.89% as full professors, 30.43% as associate professors, and 16.30% as assistant professors. Research fellows represented 20.65% of the sample, while lecturers made up 2.72%. You can find a detailed overview of the sample in Figure 1.

4. RESULTS AND DISCUSSION

In this study, we examined the funding sources of academic engagement among employees at the two most important universities in the Republic of Serbia, as well as any potential differences in the types of engagement. To determine whether the sample data had equal variances, we used Levene's test. Table 1 displays the results of the t-test.

Table 1: Results of independent t-test for two samples

Sources of funding academic engagement	t statistics	df	p
Government grants;	-1.382	181.812	.169
Foreign (EU) grants;	.262	182	.794
University resources;	.080	182	.936
Own resources;	2.730	173.118	.007
Private market capital;	-.152	182	.879
Venture capital	2.516	96.000	.014

Source: Authors

It was discovered that there were significant differences between the respondents from the University of Novi Sad and the University of Belgrade regarding the mean values computed for three kinds of academic engagement activities:

- Own resources (t=2.730, df=173.118, p<0.01), and
- Venture capital (t=2.516, df=96.000, p<0.5).

For these two types of sources of funding academic engagement, the variance homogeneity test indicated that equal variance was not assumed (F=21.468, p=0.000 and F=26.013, p=0.000 rrespectively).
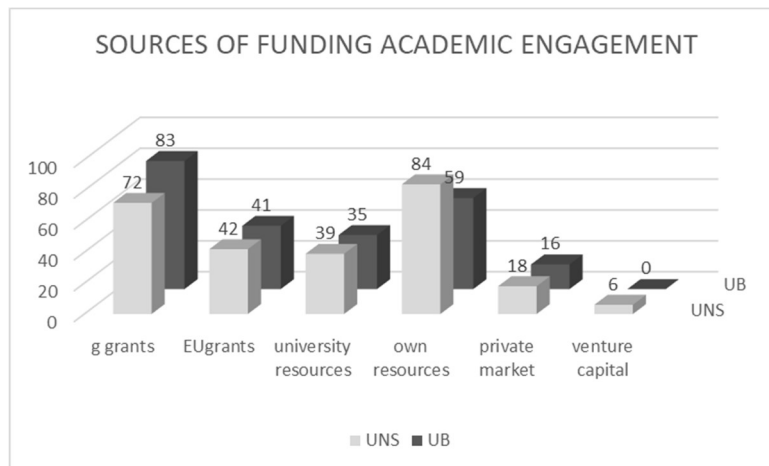
Figure 2: Reported sources of funding academic engagement at UNS and UB
Source: Authors

Figure 2 presents distribution of frequencies for sources of funding academic engagement activities at University of Novi Sad and University of Belgrade. Government grants and own resources are the most represented sources of funding activities at both universities. For the University of Novi Sad own resources are more commonly used compared to government grants, as opposed to University of Belgrade were opposite holds. Almost evenly represented are foreign (EU) grants and university resources at both universities. From the responses it is evident that money from the private market and venture funds is rarely used, or hardly at all.

5. CONCLUSIONS

The research was conducted at two of the largest and most important universities in Serbia. According to the Academic Ranking of World Universities, the University of Belgrade achieved a ranking within the range of 401-500, while the University of Novi Sad ranked between 901 and 1000.

According to a survey conducted among individuals who engaged in academic activities and studied at the University of Novi Sad, the majority of respondents were Associate Professors aged between 30 and 39, with 11 to 20 years of work experience. Meanwhile, respondents from the University of Belgrade who participated in academic engagement activities were typically Full Professors aged between 50 and 59, with 30 to 39 years of work experience, as depicted in Figure 1.

Based on Table 1, it was discovered that there is a statistically significant difference at the 95% confidence level between the survey participants from the University of Novi Sad and the University of Belgrade in terms of variables: Own resources, and Venture capital. For the variable Own resources, in total 143 respondents reported using own resources, of which 84 were from the University of Novi Sad, while 59 were from the University of Belgrade. For the variable Venture capital in total only 6 respondents from the University of Novi Sad reported using Venture capital, while none of the participants from the University of Belgrade did so.

Apart from the significant statistical differences between the University of Novi Sad and the University of Belgrade, there is also a noticeable dissimilarity concerning the variable of Government grants, as depicted in Figure 2. Though not statistically significant, the disparity implies that researchers from Belgrade's universities tend to rely more on financial aid from the budget of the Republic of Serbia to support their academic initiatives.

As a helpful suggestion for policymakers, we recommend that scientific research is funded to achieve sustainable growth. It is important to balance funding strategies between stimulating innovations in higher education and industry (Le *et al.*, 2022). Additionally, funding schemes should closely link academic research directions with emerging industry and societal issues. For researchers at universities and firms, proactive collaborations for research, technological transfer, and academic knowledge diffusion have proven to be beneficial for research outputs in both types of organizations.

6. ACKNOWLEDGMENTS

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