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Article

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Development of Lifelong Education in the Republic of Croatia: An Analysis of Trends in PhD Graduations

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Abstract

This research thoroughly examines the development and present condition of lifelong education in the Republic of Croatia, with a particular emphasis on the patterns related to individuals who have obtained a PhD degree. This study encompasses data at both the national level and country-specific levels, facilitating a comprehensive analysis of regional discrepancies and patterns. Moreover, this study differentiates data based on gender, providing insights into gender-related patterns within higher education. The initial results indicate diverse growth rates among counties, and significant gender differences were observed. The discussion pertains to improving lifelong education and ensuring equal educational opportunities for all individuals in Croatia, considering the consequences of the findings above. This paper provides a significant resource for policymakers, educators, and stakeholders interested in the continued development and improvement of Croatia's education system.

Keywords: lifelong education, Republic of Croatia, PhD, gender, social sciences, economy

JEL classification: I21, I23, J16

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Introduction

The concept of lifelong learning is significant in society's progress, as it not only facilitates personal development but also contributes to economic growth, social integration, and the ability to adapt to the ever-changing global environment (Morris, 2019).

Doctoral education is a crucial element in the development of science and technology policies, particularly in developing countries (Maheu, 2014). The pursuit of a PhD can serve both personal and nationalistic agendas, with the potential to address societal issues and contribute to economic growth (Samuel, 2016). However, the quality of PhD programs and the skills of PhD students are key factors in their successful completion (Steenhuis, 2010). The increasing importance of the PhD in the knowledge economy underscores the need for high-quality supervision in doctoral education (Fourie, 2016).

The development of lifelong education in Croatia, particularly in the context of PhD graduations, is influenced by various factors. Karačić (2015) emphasises the need for education programs to adapt to market needs, while Burai (2021) calls for the harmonisation of programs for acquiring pedagogical competencies. Žiljak (2023) highlights the influence of EU and national education policies on adult education practices, and Kurtov (2020) underscores the importance of professional development and lifelong education for educators. These studies collectively underscore the need for a dynamic and responsive education system that can meet the evolving needs of the labour market and society. The comprehension of higher education developments in Croatia becomes of great significance as the country advances in its educational trajectory within the wider European context (Doolan et al., 2018), however, with the funds still limited (Huňady et al., 2023).

This study investigates the evolution of lifelong education in Croatia, focusing specifically on the educational paths pursued by those who have obtained a PhD degree, both at the national and County levels. An important aspect of our analysis is based on the gender-related patterns seen in the field of higher education. In an era characterised by the increasing global recognition of gender equity, it is important to examine the status of Croatia in relation to this issue within the realm of higher education. Such an analysis offers valuable insights into the prevailing societal norms and difficulties at large (Jusaj et al., 2022).

Methodology

In this study, we employed a descriptive analysis to investigate the evolution of lifelong education in Croatia, concentrating on individuals who have achieved PhD degrees. The data, sourced from the Croatian Bureau of Statistics, provide a foundation for the inquiry into educational trajectories. The main outcomes measured included the proportion of the population attaining higher education degrees, regional variations in educational attainment, and gender disparities in educational achievements.

Results

General trends in PhD graduation

Table 1 shows the total number of PhDs completed per 1000 inhabitants. From 2013 to 2019, statistics for 35 European countries (EU member states plus Iceland, Norway, Montenegro, Macedonia, Serbia and Turkey) were collected from the Statistical Database of the European Commission - Eurostat. It can be noted that the largest number of people are in Denmark (2.8 per 1000 inhabitants), Germany (2.7 per 1000

inhabitants), Ireland (2.5 per 1000 inhabitants), Finland (2.5 per 1000 inhabitants), Liechtenstein (5.7 per 1000 inhabitants), Norway (2.2 per 1000 inhabitants), Switzerland (3.7 per 1000 inhabitants), the United Kingdom (3.3 per 1000 inhabitants). Graduated at doctoral level per 1000 inhabitants in 2019.

Table 1
Completed PhDs (number per 1000 inhabitants)

| Country / Year | 2013. | 2014. | 2015. | 2016. | 2017. | 2018. | 2019. |
|---|-------|-------|-------|-------|-------|-------|-------|
| European Union - 27 countries (as of 2020) | 1.8 | 1.8 | 1.9 | 1.9 | 1.9 | 1.9 | 1.7 |
| European Union - 28 countries (2013-2020) | 1.9 | 1.9 | 2.0 | 2.1 | 2.1 | 2.1 | 1.9 |
| Belgium | 1.7 | 1.8 | 1.9 | 2.0 | 2.0 | 2.1 | 2.0 |
| Bulgaria | 1.2 | 1.4 | 1.5 | 1.5 | 1.5 | 1.5 | 1.4 |
| Czech Republic | 1.6 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 |
| Denmark | 2.9 | 3.2 | 3.3 | 3.2 | 3.2 | 2.9 | 2.8 |
| Germany (until 1990 territory of FRG) | 2.7 | 2.8 | 2.9 | 2.8 | 2.7 | 2.6 | 2.7 |
| Estonia | 1.2 | 1.1 | 1.1 | 1.2 | 1.3 | 1.3 | 1.3 |
| Ireland | 2.1 | 2.5 | 2.1 | 2.4 | 2.2 | 2.3 | 2.5 |
| Greece | 1.0 | 1.1 | 1.3 | 1.5 | 1.5 | 1.3 | 1.5 |
| Spain | 1.6 | 1.8 | 1.9 | 2.6 | 3.7 | 3.2 | 1.8 |
| France | 1.7 | 1.7 | 1.8 | 1.7 | 1.7 | 1.7 | 1.7 |
| Croatia | 1.4 | 1.5 | 1.6 | 1.2 | 1.3 | 1.3 | 1.4 |
| Italy | 1.5 | 1.5 | 1.5 | 1.4 | 1.4 | 1.2 | 1.2 |
| Cyprus | 0.4 | 0.4 | 0.6 | 0.7 | 0.7 | 0.8 | 0.9 |
| Latvia | 1.1 | 0.9 | 0.9 | 0.7 | 0.5 | 0.5 | 0.5 |
| Lithuania | 1.2 | 1.1 | 1.1 | 0.9 | 0.9 | 0.9 | 0.9 |
| Luxembourg | 0.8 | 1.0 | 1.3 | 1.2 | 1.7 | 1.5 | 1.1 |
| Hungary | 0.8 | 0.9 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| Malta | 0.4 | 0.3 | 0.5 | 0.5 | 0.7 | 0.7 | 0.5 |
| Netherlands | 2.1 | 2.2 | 2.3 | 2.4 | 2.2 | 2.2 | NP |
| Austria | 2.0 | 2.0 | 1.9 | 1.9 | 2.2 | 2.3 | 1.8 |
| Poland | 0.6 | 0.6 | 0.6 | 0.6 | 0.5 | 0.6 | 0.7 |
| Portugal | 1.9 | 2.0 | 1.9 | 2.0 | 1.8 | 2.0 | 1.9 |
| Romania | 1.9 | 1.4 | 1.5 | 0.8 | 0.7 | 0.7 | 0.8 |
| Slovenia | 4.0 | 3.5 | 3.5 | 3.8 | 1.9 | 1.8 | 1.9 |
| Slovakia | 2.4 | 2.5 | 2.2 | 2.1 | 2.0 | 1.7 | 1.8 |
| Finland | 2.8 | 2.9 | 2.9 | 2.9 | 2.6 | 2.6 | 2.5 |
| Sweden | 2.8 | 2.9 | 2.9 | 2.7 | 2.7 | 2.3 | 2.3 |
| Iceland | 1.2 | 1.9 | 1.4 | 1.5 | 1.3 | 1.2 | 1.7 |
| Liechtenstein | 2.6 | 3.7 | 2.8 | 5.7 | 5.6 | 3.5 | 5.7 |
| Norway | 2.3 | 2.1 | 2.0 | 1.9 | 2.1 | 2.1 | 2.2 |
| Switzerland | 3.3 | 3.5 | 3.4 | 3.4 | 3.6 | 3.6 | 3.7 |
| United Kingdom | 3.0 | 2.9 | 3.0 | 3.1 | 3.1 | 3.3 | 3.3 |
| North Macedonia | 0.7 | 0.6 | 0.8 | 0.6 | 0.6 | 0.8 | 0.6 |
| Serbia | NP | 0.8 | 1.1 | 1.1 | 1.7 | 1.0 | 0.9 |
| Turkey | NP | 0.4 | 0.4 | 0.5 | 0.5 | 0.6 | 0.6 |

Source: Eurostat

Note: NP – no data

This trend has been stable throughout the period from 2013 to 2019. Countries with the lowest Number of People with a PhD in 2019 such as Cyprus (0.9 per 1000 inhabitants), Latvia (0.5 per 1000 inhabitants), Lithuania (0.9 per 1000 inhabitants), Luxembourg (1.1 per 1000 inhabitants), Hungary (1.0 per 1000 inhabitants), Poland (0.5

per 1000 inhabitants), Romania (0.8 per 1000 inhabitants), North Macedonia (0.6 per 1000 inhabitants), Serbia (0.9 per 1000 inhabitants), Turkey (0.6 per 1,000 inhabitants) has yet to reach the average number of PhD graduates per 1,000 inhabitants in the European Union during 2013 and 2020, which was 1.9 per 1,000 inhabitants.

The data suggest that the highest number of PhDs per 1,000 inhabitants is the highest in the most economically and socially developed countries, such as Western Europe. However, these numbers are expected to reach continued growth in developing countries as education systems progress and competition in the labour market grows.

To determine the development of lifelong education in the Republic of Croatia, in Table 2. the total number of PhDs by residence in the Republic of Croatia in the period from 2015 to 2020 is shown, as well as the number of inhabitants according to the last available census from 2011.

Table 2

Total number of PhDs by residence in the Republic of Croatia (2015-2020)

| County / Year | Population (2011. Census) | 2015. | 2016. | 2017. | 2018. | 2019. | 2020. |
|------------------------|---------------------------------|-------|-------|-------|-------|-------|-------|
| Zagrebačka | 317,606 | 43 | 23 | 25 | 38 | 30 | 30 |
| Krapinsko-zagorska | 132,892 | 10 | 3 | 7 | 3 | 6 | 11 |
| Sisačko-moslavačka | 172,439 | 10 | 5 | 12 | 5 | 11 | 9 |
| Karlovačka | 128,899 | 10 | 3 | 7 | 3 | 6 | 11 |
| Varaždinska | 175,951 | 13 | 14 | 20 | 19 | 14 | 19 |
| Koprivničko-križevačka | 115,584 | 7 | 9 | 13 | 6 | 11 | 10 |
| Bjelovarsko-bilogorska | 119,764 | 7 | 4 | 6 | 6 | 4 | 8 |
| Primorsko-goranska | 296,195 | 69 | 57 | 60 | 49 | 41 | 46 |
| Ličko-senjska | 50,927 | 2 | 2 | 1 | 3 | 1 | 2 |
| Virovitičko-podravska | 84,836 | 6 | 4 | 0 | 3 | 0 | 5 |
| Požeško-slavonska | 78,034 | 7 | 4 | 0 | 3 | 0 | 4 |
| Brodsko-posavska | 158,575 | 3 | 2 | 3 | 5 | 2 | 3 |
| Zadarska | 170,017 | 28 | 16 | 18 | 14 | 10 | 21 |
| Osječko-baranjska | 305,032 | 59 | 55 | 71 | 39 | 64 | 34 |
| Šibensko-kninska | 109,375 | 9 | 8 | 6 | 8 | 3 | 5 |
| Vukovarsko-srijemska | 179,521 | 18 | 10 | 9 | 9 | 8 | 7 |
| Splitsko-dalmatinska | 454,798 | 78 | 92 | 55 | 60 | 74 | 47 |
| Istarska | 208,055 | 20 | 10 | 19 | 18 | 16 | 13 |
| Dubrovačko-neretvanska | 122,568 | 19 | 6 | 11 | 5 | 6 | 10 |
| Međimurska | 113,804 | 12 | 11 | 5 | 9 | 9 | 9 |
| Grad Zagreb | 790,017 | 410 | 255 | 307 | 285 | 299 | 290 |

Source: Croatian Bureau of Statistics

In most of the County, the total number of PhDs varies over the years. By far, the largest number of PhD holders reside in the City of Zagreb (290 persons in 2020). The counties with the largest number of people with a doctorate in 2020 are Zagreb County (30 people), Primorje-Gorski Kotar County (46 people), Osijek-Baranja County

(34 people) and Split-Dalmatia County (47 people). This may be a consequence of the larger number of total residents in the mentioned County.

On the contrary, the number of PhDs is lower in Lika-Senj County (2 persons), Požega-Slavonia County (4 persons) and Brod-Posavina County (3 persons). Furthermore, the data indicate a trend of decreasing the number of PhDs in Vukovar-Srijem County and Međimurje County during the analysed period. This trend is present in all countries where a strong decline in the number of PhDs is observed.

The data from Table 3 reveals significant insights about the distribution of PhD holders per 1000 inhabitants across various counties in the Republic of Croatia from 2015 to 2020.

Table 3

Number of PhDs by residence in the Republic of Croatia per 1000 inhabitants (2015-2020)

| County / Year | Population (2011. Census) | 2015. | 2016. | 2017. | 2018. | 2019. | 2020. |
|------------------------|---------------------------------|-------|-------|-------|-------|-------|-------|
| Zagrebačka | 317,606 | 0.14 | 0.07 | 0.08 | 0.12 | 0.09 | 0.09 |
| Krapinsko-zagorska | 132,892 | 0.08 | 0.02 | 0.05 | 0.02 | 0.05 | 0.08 |
| Sisačko-moslavačka | 172,439 | 0.06 | 0.03 | 0.07 | 0.03 | 0.06 | 0.05 |
| Karlovačka | 128,899 | 0.08 | 0.02 | 0.05 | 0.02 | 0.05 | 0.09 |
| Varaždinska | 175,951 | 0.07 | 0.08 | 0.11 | 0.11 | 0.08 | 0.11 |
| Koprivničko-križevačka | 115,584 | 0.06 | 0.08 | 0.11 | 0.05 | 0.10 | 0.09 |
| Bjelovarsko-bilogorska | 119,764 | 0.06 | 0.03 | 0.05 | 0.05 | 0.03 | 0.07 |
| Primorsko-goranska | 296,195 | 0.23 | 0.19 | 0.20 | 0.17 | 0.14 | 0.16 |
| Ličko-senjska | 50,927 | 0.04 | 0.04 | 0.02 | 0.06 | 0.02 | 0.04 |
| Virovitičko-podravska | 84,836 | 0.07 | 0.05 | 0.00 | 0.04 | 0.00 | 0.06 |
| Požeško-slavonska | 78,034 | 0.09 | 0.05 | 0.00 | 0.04 | 0.00 | 0.05 |
| Brodsko-posavska | 158,575 | 0.02 | 0.01 | 0.02 | 0.03 | 0.01 | 0.02 |
| Zadarska | 170,017 | 0.16 | 0.09 | 0.11 | 0.08 | 0.06 | 0.12 |
| Osječko-baranjska | 305,032 | 0.19 | 0.18 | 0.23 | 0.13 | 0.21 | 0.11 |
| Šibensko-kninska | 109,375 | 0.08 | 0.07 | 0.05 | 0.07 | 0.03 | 0.05 |
| Vukovarsko-srijemska | 179,521 | 0.10 | 0.06 | 0.05 | 0.05 | 0.04 | 0.04 |
| Splitsko-dalmatinska | 454,798 | 0.17 | 0.20 | 0.12 | 0.13 | 0.16 | 0.10 |
| Istarska | 208,055 | 0.10 | 0.05 | 0.09 | 0.09 | 0.08 | 0.06 |
| Dubrovačko-neretvanska | 122,568 | 0.16 | 0.05 | 0.09 | 0.04 | 0.05 | 0.08 |
| Međimurska | 113,804 | 0.11 | 0.10 | 0.04 | 0.08 | 0.08 | 0.08 |
| Grad Zagreb | 790,017 | 0.52 | 0.32 | 0.39 | 0.36 | 0.38 | 0.37 |

Source: Cities in Statistics - PhDs, available on [https://www.dzs.hr/Hrv_Eng/Pokazatelji/Gradovi in statistici.xlsx](https://www.dzs.hr/Hrv_Eng/Pokazatelji/Gradovi%20in%20statistici.xlsx)

Another notable aspect is the increase in PhD holders in Osječko-baranjska, which peaked in 2017 with 0.23 per 1000 inhabitants, highlighting a potential growth in educational or research opportunities in the region during that time. Similarly, Splitsko-dalmatinska showed a significant increase in 2016 with 0.20, although the number slightly fluctuated in subsequent years. In contrast, smaller counties like Ličko-senjska and Brodsko-posavska consistently reported lower numbers, reflecting perhaps lesser

access to higher education or research facilities or a smaller population base. The data also shows varied trends in other counties, such as Varaždinska and Primorsko-goranska, which maintain moderate to high numbers, indicating stable educational development in these regions. Overall, the fluctuation in numbers across the counties and years could reflect changes in local education policies, population dynamics, and the presence or expansion of higher educational institutions or industries requiring high qualification levels. A standout observation is the consistently higher number of PhDs per capita in Grad Zagreb, which consistently shows the highest rates ranging from 0.32 to 0.52 over the six years. This likely reflects the concentration of academic and research institutions in the capital.

Trends in PhD graduation in social sciences

The data extracted from Table 4 offers a comprehensive analysis of the patterns and distributions of doctoral graduates in different fields within the Social Sciences in Croatia between 2015 and 2020. The data reveals notable fluctuations and intriguing trends across disciplines.

Table 4
Number of PhD graduates in Social Sciences

| | 2020 | 2019 | 2018 | 2017 | 2016 | 2015 |
|--|------|------|------|------|------|------|
| Social Sciences | 135 | 160 | 132 | 150 | 128 | 197 |
| Economy | 57 | 59 | 45 | 62 | 48 | 67 |
| Law | 8 | 12 | 11 | 6 | 18 | 23 |
| Political science | 7 | 9 | 8 | 2 | 4 | 8 |
| Information and communication sciences | 18 | 24 | 27 | 36 | 32 | 33 |
| Psychology | 7 | 8 | 7 | 7 | 6 | 13 |
| Educational and rehabilitation sciences | 2 | 1 | 1 | 3 | NP | 3 |

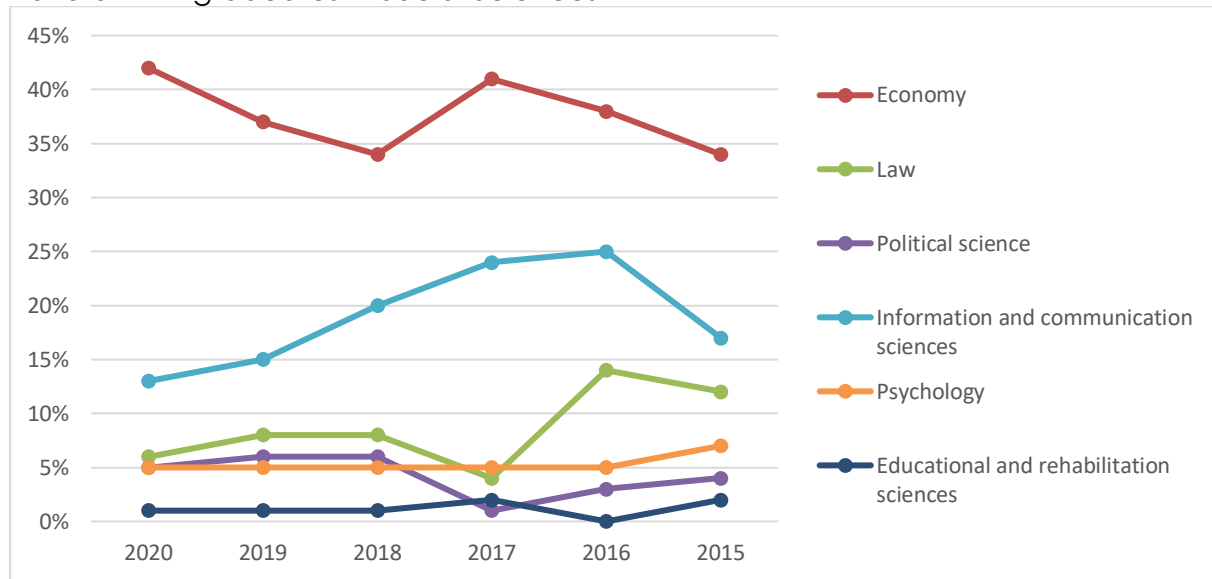
Sources: Croatian Bureau of Statistics

The total count of Social Sciences PhD recipients reached its highest point in 2015, with 197 graduates, and subsequently decreased to 135 graduates by 2020. The field of Economy exhibited marginal fluctuations but sustained a consistent level of productivity, with a slight decline observed in 2018. Conversely, the discipline of Law exhibited significant variations, reaching its peak number of graduates in 2015 but experiencing a noteworthy decline by 2017. Political Science and Information and Communication Sciences both experienced their highest levels of interest in 2017 and 2018, respectively. This indicates a significant increase in attention or emphasis on these fields during those years. Meanwhile, the fields of Psychology and Educational and Rehabilitation Sciences experienced a relatively stable state, with a consistently modest level of output.

The ratio of PhD graduates in these specific fields, adjusted to the total number of PhD graduates in Social Sciences annually, provides additional clarity on these patterns. The field of Economy consistently represented a substantial proportion of the PhD graduates, ranging from 34% to 42%. In contrast, the proportion of Law graduates' contribution experienced a substantial decline from 12% in 2015 to a mere 4% in 2017. The field of Information and Communication Sciences witnessed a rise in activity until 2018, indicating a growing focus in this domain, which was then followed by a subsequent decrease.

The fluctuations in the number of PhD graduates in different disciplines within the Social Sciences field indicate that multiple factors, such as alterations in funding for academic research, changes in job market requirements, and evolving research focuses, have had an impact. These observations suggest that the academic environment in Croatia is constantly changing, which is in line with larger patterns and changes in higher education and its connection to the needs of society and the Economy. Figure 1 presents the ratio of PhD graduates in Social Sciences.

Figure 1
Ratio of PhD graduates in Social Sciences



Sources: Croatian Bureau of Statistics

The data from Table 5 provides insights into the number and percentage of female PhD graduates in various fields within the Social Sciences in Croatia from 2015 to 2020, revealing important trends in gender distribution among higher education achievements.

Table 5
Number of female PhD graduates in Social Sciences

| | 2020 | 2019 | 2018 | 2017 | 2016 | 2015 |
|--|------|------|------|------|------|------|
| Social Sciences | 83 | 92 | 72 | 89 | 69 | 113 |
| Economy | 37 | 34 | 26 | 34 | 22 | 33 |
| Law | 3 | 4 | 5 | 4 | 14 | 11 |
| Political science | 6 | 3 | 6 | 1 | 2 | 4 |
| Information and communication sciences | 9 | 15 | 13 | 25 | 19 | 18 |
| Psychology | 6 | 6 | 5 | 5 | 4 | 12 |
| Educational and rehabilitation sciences | 2 | 1 | 1 | 0 | NP | 2 |

Sources: Croatian Bureau of Statistics

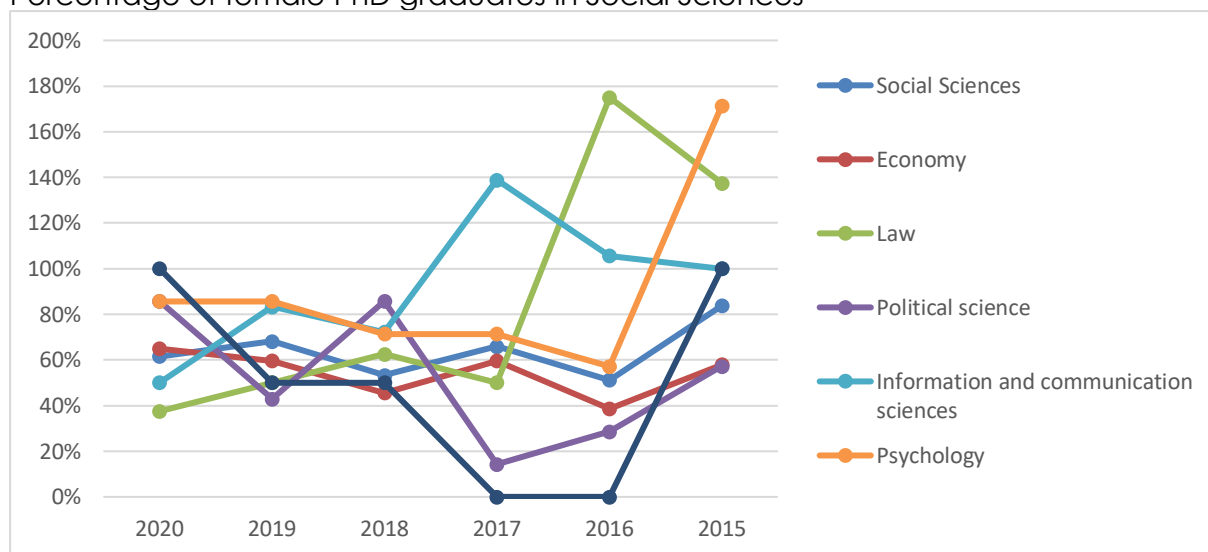
In terms of the number of graduates, Social Sciences saw a fluctuation overall in the number of female PhD graduates, peaking in 2015 with 113 graduates and then experiencing a decrease to 83 graduates in 2020. The field of Economy had a relatively steady output, albeit with slight variations, while Law showed considerable inconsistency, reaching its highest number of female graduates in 2016. Notably,

Information and Communication Sciences and Psychology saw some fluctuation but generally maintained a consistent output of female graduates.

From a percentage standpoint, female graduates in Social Sciences constituted over half of the total PhD graduates each year, with percentages generally increasing over the six years, from 54% in 2016 to 61% in 2020. However, in fields like Economy and Law, the percentages were significantly lower, suggesting a gender gap in these areas. Information and Communication Sciences showed a more promising trend with increasing percentages, reaching a peak in 2017.

These figures not only reflect the progress and setbacks in gender equity within the Croatian academic sector but also highlight the areas where female representation is lagging. The consistent presence of women in fields traditionally dominated by males, such as Economics and Information and Communication Sciences, indicates a slow but positive shift towards gender balance. However, the varying percentages suggest that more targeted efforts may be required to support female scholars in fields where they remain underrepresented. This data serves as a crucial indicator for policymakers and educational institutions aiming to enhance gender diversity in academia. Figure 2 presents the percentage of female PhD graduates in Social Sciences.

Figure 2
Percentage of female PhD graduates in Social Sciences



Sources: Croatian Bureau of Statistics

Conclusion

The results of our study indicate that although there has been a significant advancement in the number of individuals obtaining a PhD degree nationwide, there are noticeable discrepancies between different regions. The highest concentrations of individuals with PhD degrees were consistently observed in urban and economically advanced regions such as Grad Zagreb. This implies that these areas have superior access to educational resources and more substantial academic and research prospects. Conversely, underdeveloped countries exhibited a lower number of individuals with PhD degrees, suggesting specific regions where educational policies could be implemented.

The gender-based analysis conducted in this research has revealed that although there is an overall improvement in female participation in PhD programmes in Croatia,

there are still notable disparities in fields such as Economics and Law. The study identified a prevailing pattern of achieving gender equality in academia while also highlighting specific fields where women are significantly less represented.

Given these insights, the following suggestions are put forward in the direction of: (i) the policy interventions customised to bolster and broaden educational opportunities in underprivileged regions, with the goal of achieving equal access to higher education nationwide; (ii) initiatives to promote and facilitate the involvement of women in fields where they are currently lacking representation, such as scholarships, mentorship programmes, and awareness campaigns aimed at promoting gender equity in academia; (iii) continuous monitoring of educational trends and outcomes at both the national and regional levels; and (iv) implementation of various initiatives, such as university spin-offs (Hunady et al., 2018).

Based on this study on lifelong education in Croatia, numerous research areas may be suggested to better understand educational progress and its effects in the region. First, longitudinal research might examine PhD holders' educational paths across time. Such study may examine PhD graduates' long-term job outcomes and how they affect academia, industry, and government. Second, the causes of regional PhD graduation disparities must be investigated. Further research might use qualitative approaches like interviews and focus groups to investigate these inequalities. This might include analysing higher education accessibility, financing and resource availability, and regional economic and social variables that affect educational achievement. Research might examine the social, cultural, and institutional variables that encourage or discourage women's higher education, particularly in STEM professions with large gender inequalities. These future research approaches would complement the current study and help Croatia create a stronger educational environment that meets its society and economy's changing requirements.

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