



POLISH NATIONAL AGENCY
FOR ACADEMIC EXCHANGE

ACADEMIC COOPERATION BETWEEN POLAND AND BELGIUM



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INTRODUCTION

The aim of this study is to present a picture of academic cooperation between Poland and Belgium. Academic cooperation is understood here in its broad context, both individual and institutional.

The study is exploratory and practical in nature and contains answers

the following questions:

- What is the volume of publications written in the Polish-Belgian co-authorship?
- What thematic areas dominate in this respect?
- What has been the intensity of this cooperation over the years?
- Which higher education institutions in Poland cooperate most intensively with their counterparts in Belgium?
- Which Polish universities host the most students/scientists from Belgium?

The study is addressed to the broadly understood academic community and the environment of higher education and science institutions, as well as to the creators of national international policy in the field of academic cooperation.

The study used data from the following databases: SCOPUS,¹ OECD, UNESCO and POLon.

Due to the small groups of Belgian students and employees studying or working at Polish universities, this study limits the presentation of data to that necessary to ensure the anonymity of the people.

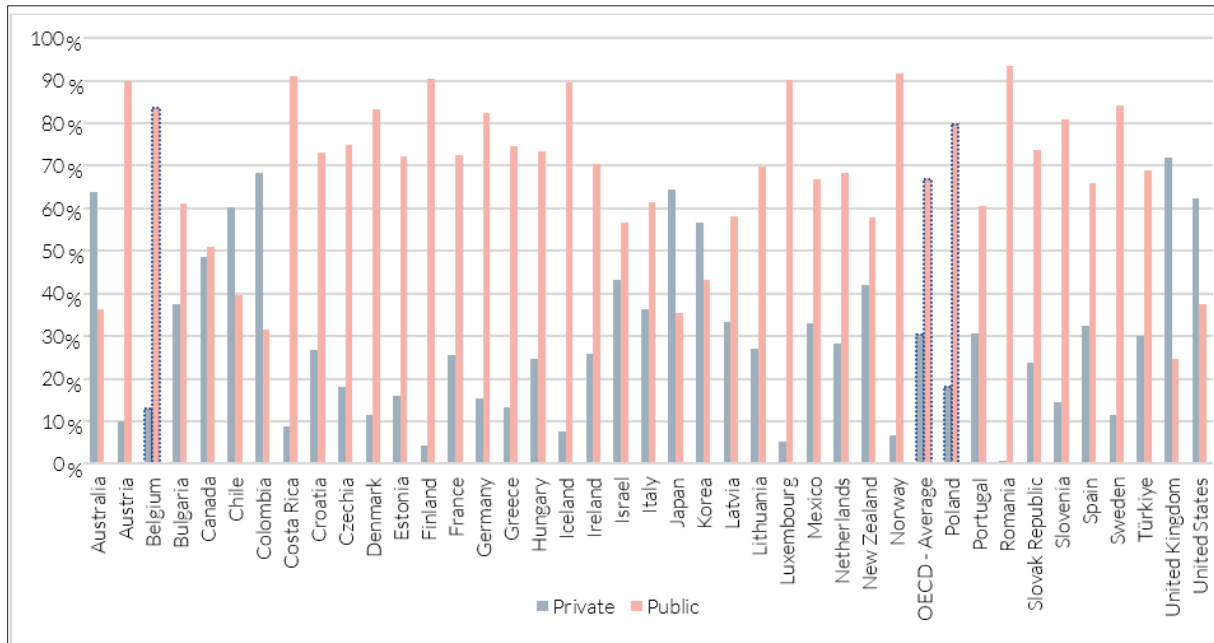
The study is another in a series of analyses available on the NAWA [website](#).

¹ Access to the SCOPUS database and the SciVal tool under the national license provided by the Ministry of Science and Higher Education

1 POLAND AND BELGIUM – BASIC DATA

Below are charts showing the percentage distribution of public and private expenditure on higher education, the share of people with higher education by age group and the international mobility of students, in OECD countries. All presented indicators refer to average levels for OECD countries, including Belgium and Poland. Unfortunately, the last available data dates back to 2020, which is especially important in the case of financial data, in which events related to the COVID-19 pandemic and Russian aggression against Ukraine were of great importance.

Graph 1 Higher education expenditure (public and private) as a % of total higher education expenditure (2020)

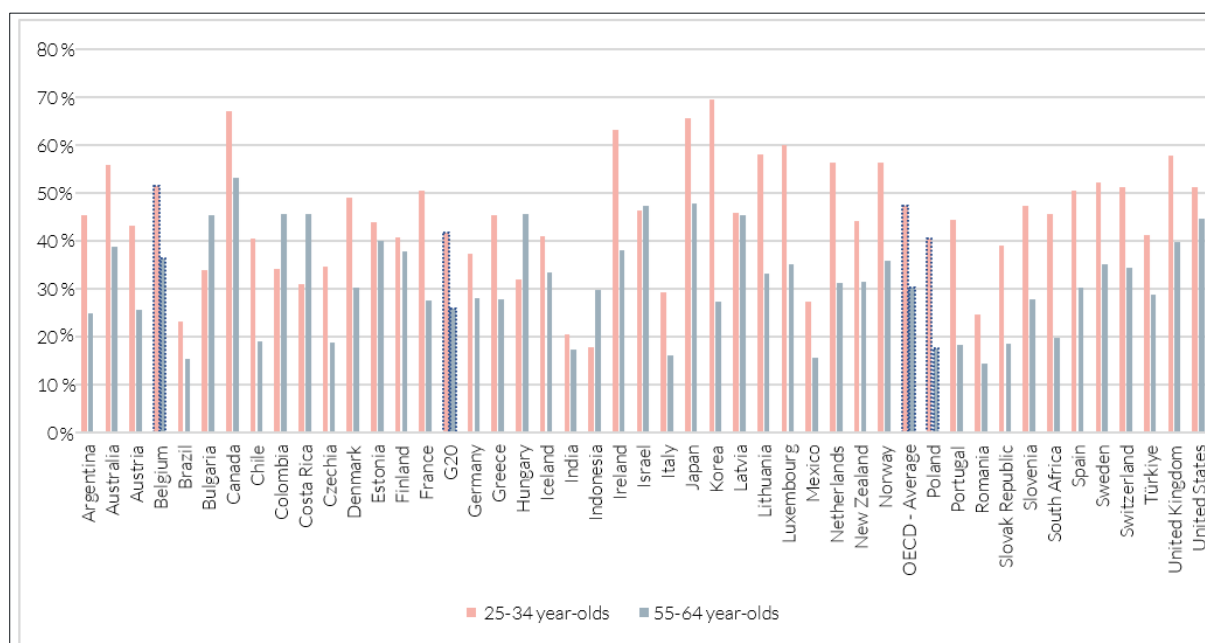


Source: OECD (2024), *Spending on tertiary education (indicator)*, doi: 10.1787/a3523185-en (Accessed on 15 April 2024)

The chart above presents a measure of the percentage of total expenditure on higher education. In OECD countries, tertiary education institutions are mainly financed by public funds, although there is a significant and growing level of funding from households and other private entities (NGOs, unions, associations, foundations, etc.). The low level of public expenditure on higher education generates a larger stream of private funds allocated for the purpose. In OECD countries, the average level of financing from public funds is 67% and from private funds - 30%. Against the background, the proportions of financing sources in Romania are noteworthy, the level of public expenditure exceeds 90%. The highest percentage of private expenditure on higher education is in the UK (72%), Colombia (68%). Educational expenses, commonly associated with a heavy burden on home budgets, are in the fifth place (62%), behind Japan and Australia.

In the case of Poland, the percentage of public expenditure on higher education is above the OECD average and amounts to 80%, and private expenditure - below the average (18%). The values of the discussed indicators for Belgium are at a similar level as in the case of Poland and amount to 84% and 13%, respectively.

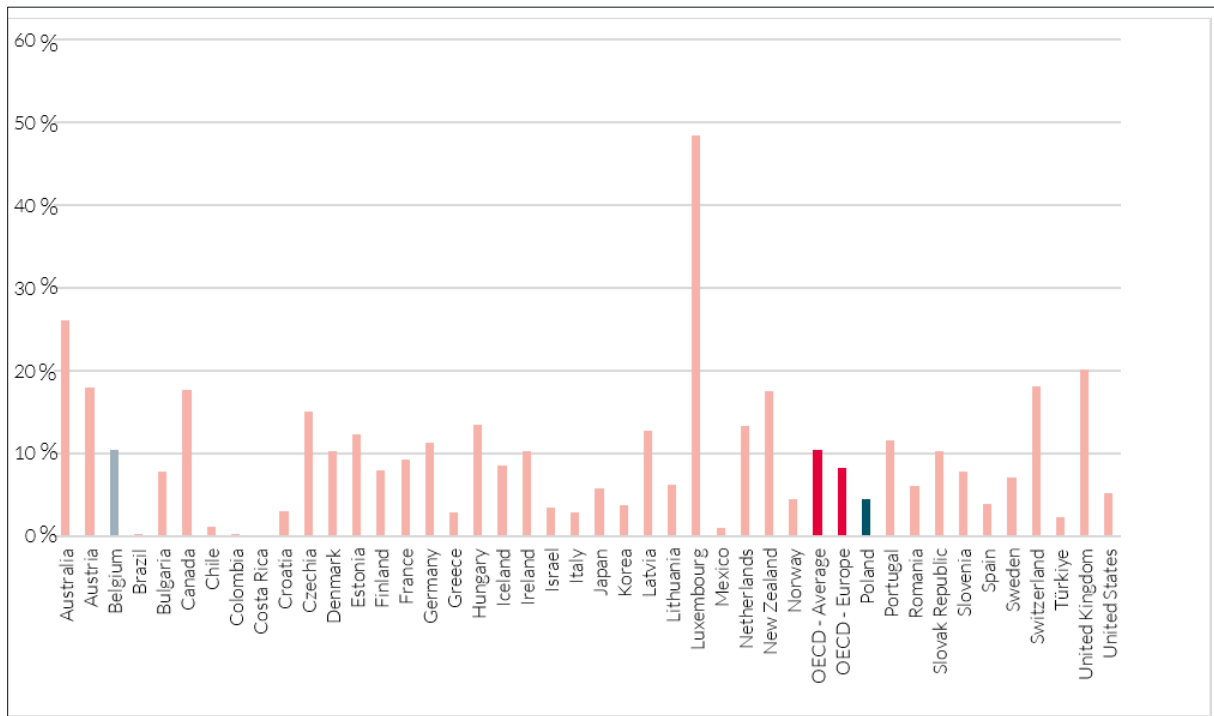
Graph 2 Percentage of people with higher education by age group (2022)



Source: OECD (2024), Population with tertiary education (indicator), doi: 10.1787/0b8f90e9-en (Accessed on 15 April 2024)

The above chart shows indicators describing the share of people with higher education within two age groups. The educational level of adults is often used as a measure of the human capital and skills available in a given population as a labor force. In OECD countries, the share of people with higher education in the younger age group is on average 47%, and in the older age group - 30%. In the group of G20 countries, the distance between the groups is smaller and amounts to 42% and 26%, respectively. The indicators for Poland are below the averages for both groups of countries: 41% and 18%. In the case of Belgium, every second person aged 25-34 and every third person aged 55-64 have higher education.

Graph 3 Student mobility indicator (2020)



Source: OECD (2024), "International student mobility" (indicator), <https://doi.org/10.1787/4bcf6fc3-en> (Accessed on 15 April 2024)

The indicator shows the number of international higher education students admitted as a percentage of all students enrolled in the host country. International students are those who have obtained their prior education in another country and are not residents of the country in which they are currently studying. The average for OECD countries is 10%, for European countries – 8%. The highest percentage of foreign students is recorded in Luxembourg (48%), Australia (26%) and Great Britain (20%). According to OECD data, foreigners constitute 4% of all students in Poland, and 10% in Belgium.

According to data from the POLon system for the 2022/2023 academic year, citizens of Ukraine, Belarus and Turkey predominate among foreign students studying in Poland. Foreigners most often study management, IT and medicine. Among foreign employees who conduct research activities in particular fields and are employed as academic teachers, the largest group are citizens of Ukraine, India and Italy. Most often, they hold a doctoral degree and represent the fields of exact and natural sciences, social sciences and humanities.

In the case of Belgian citizens, the number of students studying in Poland does not exceed 40 people. The most popular fields of study in this group are medicine and *European studies*. Belgian academic teachers employed in Polish research units constitute a group of less than 20 people. Majority of them hold at least a doctoral degree.

To sum up, the group of Belgian citizens who have linked their educational path and scientific career with Polish science and higher education institutions does not exceed 50 people.

Another important measure describing international scientific cooperation are publications that appeared in indexed sources. In OECD countries, among the publications registered in the SCOPUS database, every second one concerned the area of *Natural Science*, every third one concerned *Medical Science*, and every fourth one concerned *Engineering and Technologies*. In terms of the number of publications by authors affiliated to institutions grouped according to their

countries of affiliation, the first three places are occupied by: the USA, Great Britain and Germany. Poland is in the second ten. The institutions to which the authors of indexed publications are most often affiliated are: the French Center national de la recherche scientifique (CNRS) and two American ones - Harvard University and the United States Department of Energy.

Among the Belgian institutions, the highest is KU Leuven (40th position), and among Polish institutions - the Polish Academy of Sciences (91st position).

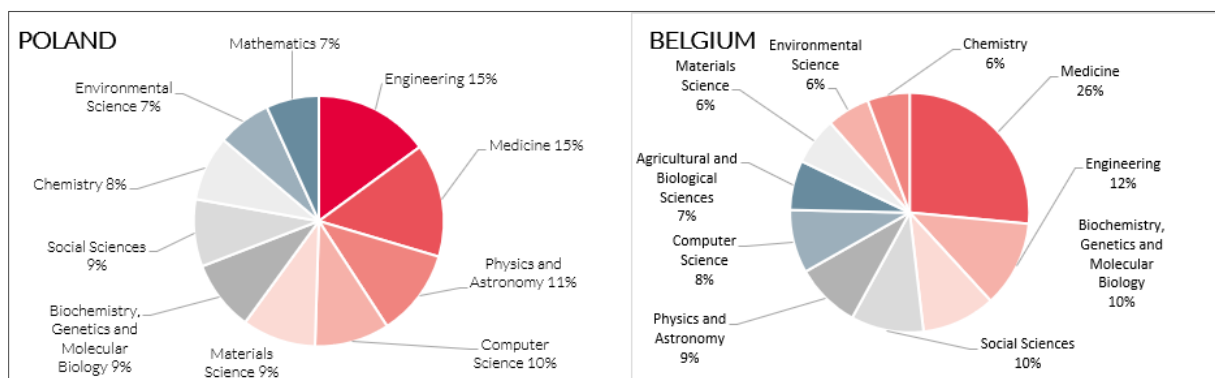
Tabele 1 Comparison of the number of publications by Polish and Belgium scientists (2017-2023²)

Publication year	Number of publications	
	Poland	Belgium
2023	59,027	41,037
2022	61,131	41,392
2021	64,577	42,764
2020	60,484	39,230
2019	56,950	37,033
2018	53,296	37,498
2017	50,379	36,098
Total:	405,844	275,052

Source: SCOPUS-SciVal [accessed: 16.04.2024]

The pool of indexed publications for 2017-2023 by scientists affiliated to Belgian institutions was more than half as large as in the same period - to Polish institutions. However, what is interesting is the level of dynamics of change in the number of publications within both countries - in the case of Poland, the average year-to-year increase was 3%, and in Belgium - it was 2%.

Chart4 Publications of Polish and Belgian scientists by area of knowledge (%) – comparison



Source: SCOPUS-SciVal [accessed: 16.05.2024]

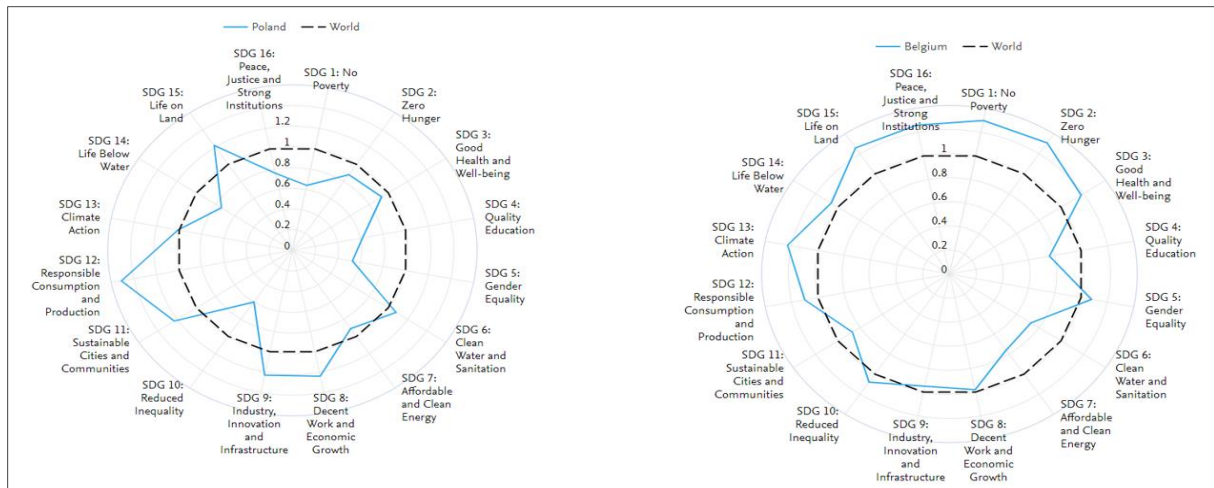
Converging areas of publications constituting the two largest thematic collections were observed. Scientists affiliated with Polish or Belgian institutions most often published in the following areas:

² Data for 2023 is updated on an ongoing basis, so it is expected that in the second half of 2024 there will be an increase in both publications published in 2023 and their citations.

Engineering; Medicine. Among the 10 thematic areas of the publication, 9 are similar (in Poland the tenth area is *Mathematics* and in Belgium - *Agricultural and Biological Sciences*).

Polish scientists most often publish in co-authorship with colleagues from the USA, Germany and Great Britain. However, Belgian scientists most often cooperate with their counterparts from the USA, Great Britain and France (Polish co-authors are in the second ten).

Wykres 5 Sustainable Development Goals (SDGs)³ Relative Activity Index⁴ (RAI) - Poland-Belgium comparison (2018-2022)



Source: SCOPUS-SciVal [accessed: 16.04.2024]

Another area that will be used to compare Polish and German contributions to the development of world science are publications identified as responding to the challenges of one of the UN Sustainable Development Goals (hereinafter: SDG). Globally, among the publications assigned to SDG goals 1-16, those dealing with health and quality of life (SDG 3) predominate. Eight times fewer publications were identified in the field of access to sustainable energy (SDG 7), although on a global scale it is the second goal in terms of the number of publications.

If we look at the share of scientists from both countries in a given field (here the field is the SDG goal) in relation to the global share of publications in the same field (RAI index), we will see that in Poland the largest share of achievements is within the goal focusing on solving problems regarding ensuring sustainable consumption and production (SDG 12). In Belgium, however, scientists focus on the problem of poverty (SDG 1).

³ SCOPUS provides indicator values for SDGs 1-16. SDG 17 is not monitored in the database.

⁴ Relative Activity Index (RAI) is defined as the share of publications of an individual (here: country) in a given field in relation to the global share of publications in the same field. A value of 1.0 indicates that an individual's research activity in a given field exactly matches the global activity in that field; a value higher than 1.0 means more pressure; and a value lower than 1.0 suggests less pressure. For SDGs, RAI is calculated by looking at the total number of publications by an entity on a given SDG, divided by the total number of publications by the same entity to obtain a percentage. The same calculations are performed for each SDG for the world. The rate for an individual is calculated by dividing the percentage of the unit by the percentage for the world.

2. POLISH-BELGIAN SCIENTIFIC COOPERATION (2017-2023)

This part will analyze the publication cooperation of scientists affiliated with Polish and Belgian scientific institutions. Only those publications were taken into account where at least one author indicated that he belonged to the Polish and Belgian academic community.

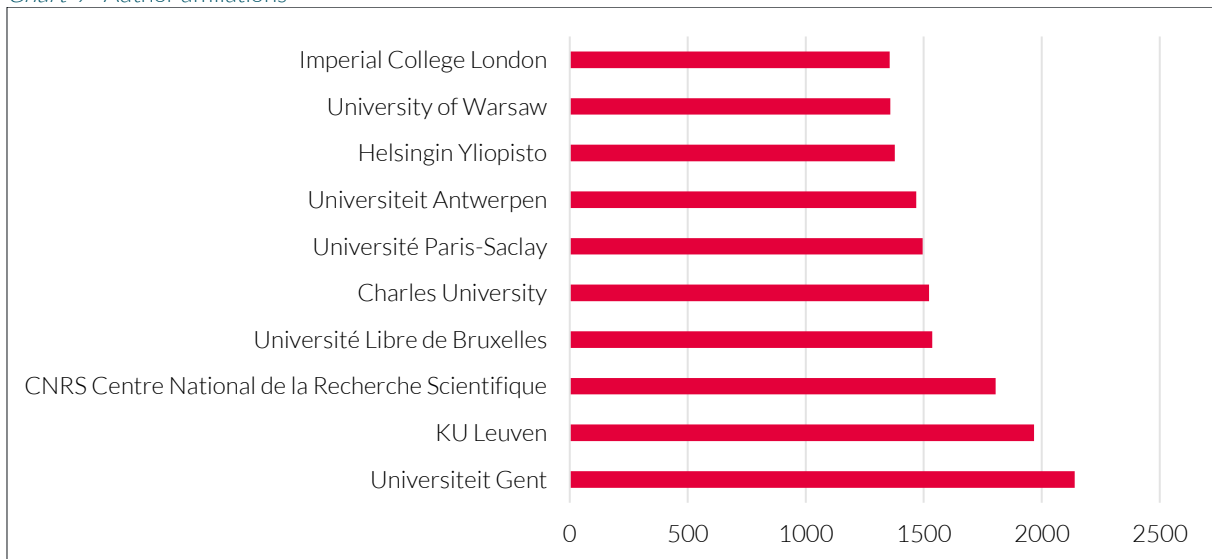
Table 2 Joint Polish-Belgian publications in the SCOPUS database

Publication year	Number of publications
2023	1,486
2022	1,564
2021	1,516
2020	1,367
2019	1,214
2018	1,195
2017	1,105
Total:	9,447

Source: SCOPUS-SciVal (accessed: 16.05.2024)

Since 2017, over 9,000 joint publications have been recorded in the SCOPUS database. During the time, the average year-to-year change in the number of publications was 5%. The most abundant year in this respect was 2020, where the number of publications increased by 13%, as compared to 2019.

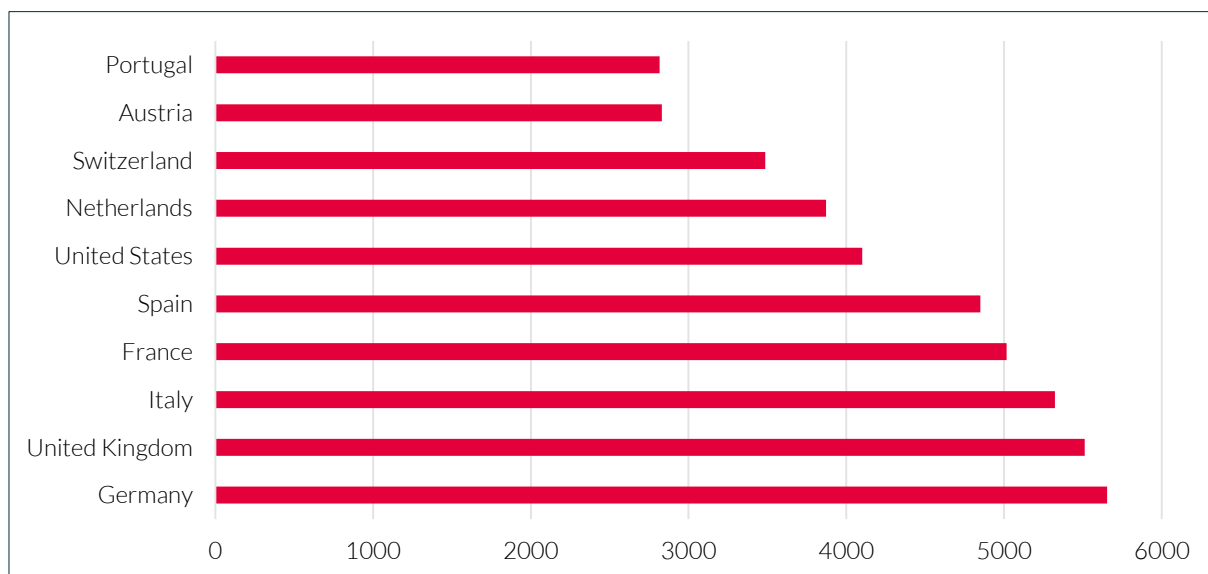
Chart 7 Author affiliations



Source: SCOPUS-SciVal (accessed: 16.04.2024)

Among the ten most popular affiliations, apart from Polish and Belgian ones, there are also French, Finnish and Czech ones.

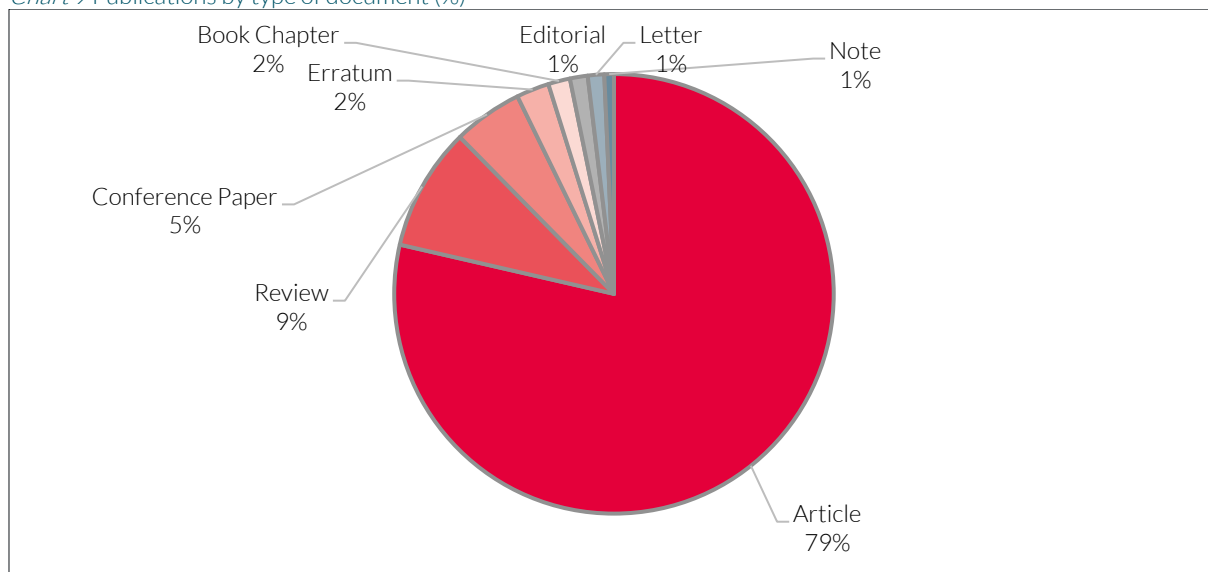
Chart 8 Countries of origin of co-authors of publications (excluding Poland and Belgium) (%)



Source: SCOPUS-SciVal [accessed: 16.04.2024]

The authors of the publications most often indicate the countries of origin (apart from Belgium and Poland): Germany, Great Britain, Italy. It is different from the case of affiliation to an institution (see Chart 7).

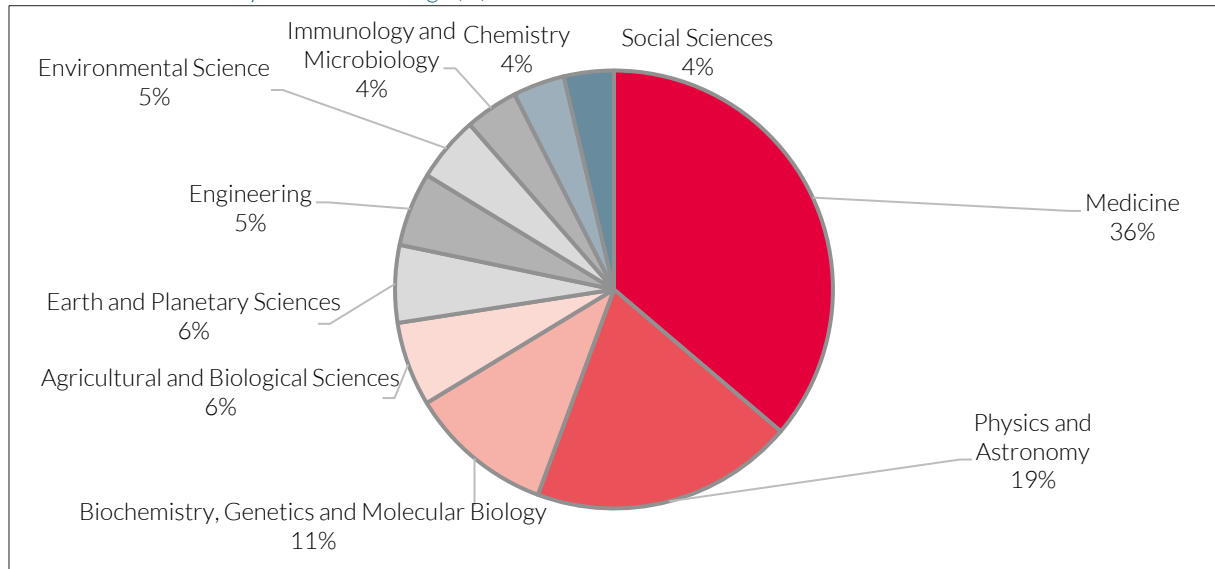
Chart 9 Publications by type of document (%)



Source: SCOPUS-SciVal [accessed: 22.04.2024]

In terms of the type of joint publications, articles in scientific journals predominate, accounting for $\frac{3}{4}$ of all Polish-Belgian publications.

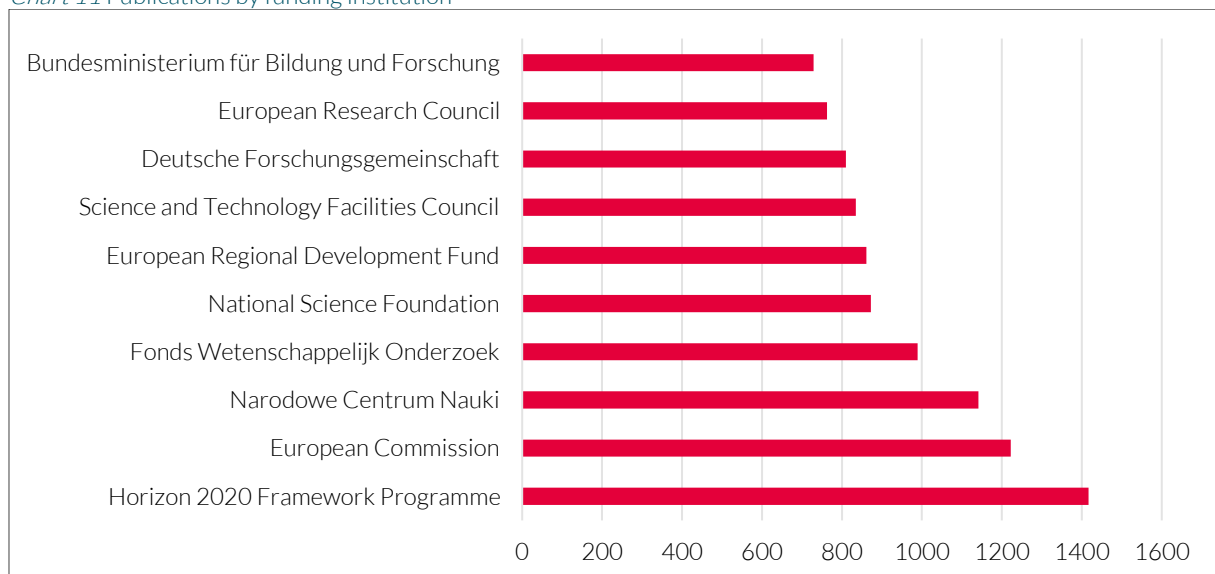
Chart 10 Publications by area of knowledge (%)



Source: SCOPUS-SciVal [accessed: 22.04.2024]

In their joint publications, scientists from Poland and Belgium focus primarily on the research area of: *Medicine, Physics and Astronomy, Biochemistry, Agricultural and Biological Science and Earth and Planetary Science*. It is interesting because Chart 4 shows that the area of *Agricultural and Biological Science* differentiates both countries (if you look at them separately).

Chart 11 Publications by funding institution



Source: SCOPUS-SciVal [accessed: 22.04.2024]

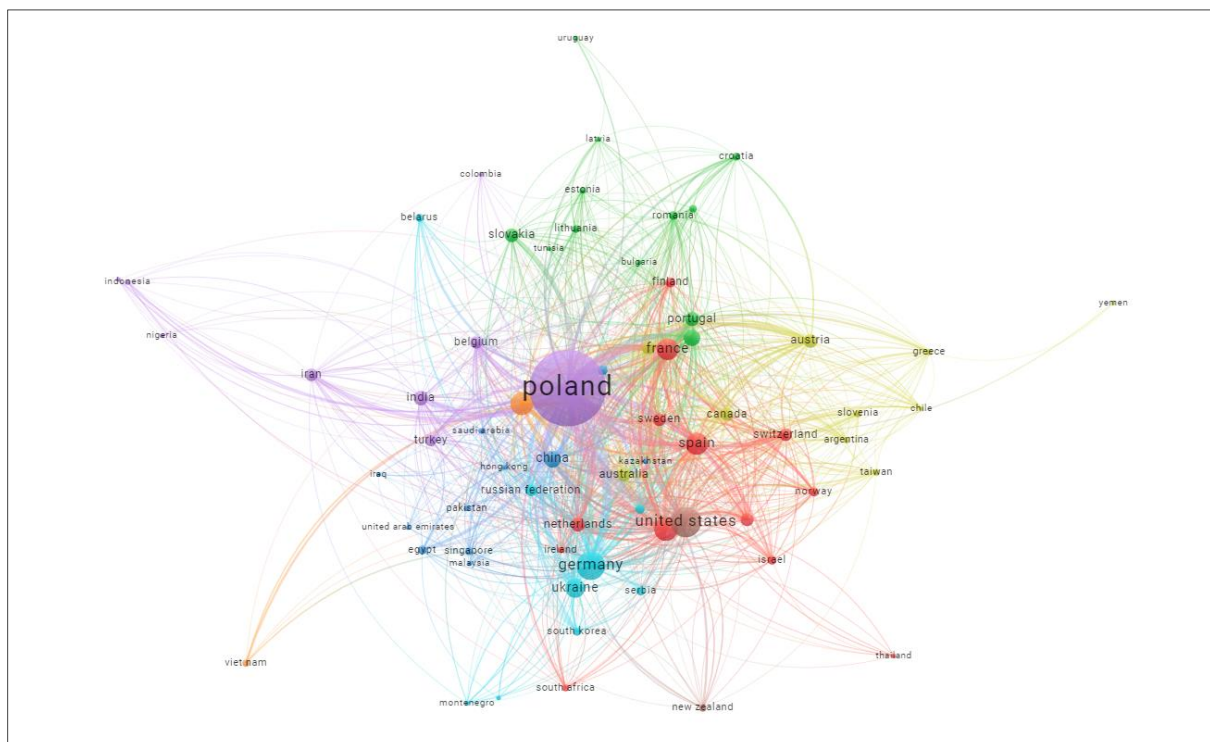
Joint Polish-Belgian publications were most often financed from three sources: Horizon 2020 Framework Program, European Commission and the National Science Center. Apart from European institutions, the American National Science Foundation is among the top ten.

3. NAWA'S CONTRIBUTION TO POLISH-BELGIAN SCIENTIFIC COOPERATION

The part of the analysis is intended to show not only the impact of NAWA funding on the resulting publications, where at least one author is affiliated to a German and Polish institution, but also to show NAWA's global contribution to the resulting scientific publications.

A bibliometric analysis based on the SCOPUS database shows that publications co-financed by NAWA were co-authored by scientists from 68 countries. The network map generated below shows that the publications are grouped into 8 thematic clusters, creating 1,061 links between themselves and 9,075 links between countries. It means that each of the publications co-financed from NAWA funds “generated” another 3 connections with other countries to which their co-authors are affiliated.

Map 1 Map of the network of connections between the countries of origin of the co-authors of publications co-financed by the Polish National Agency for Academic Exchange

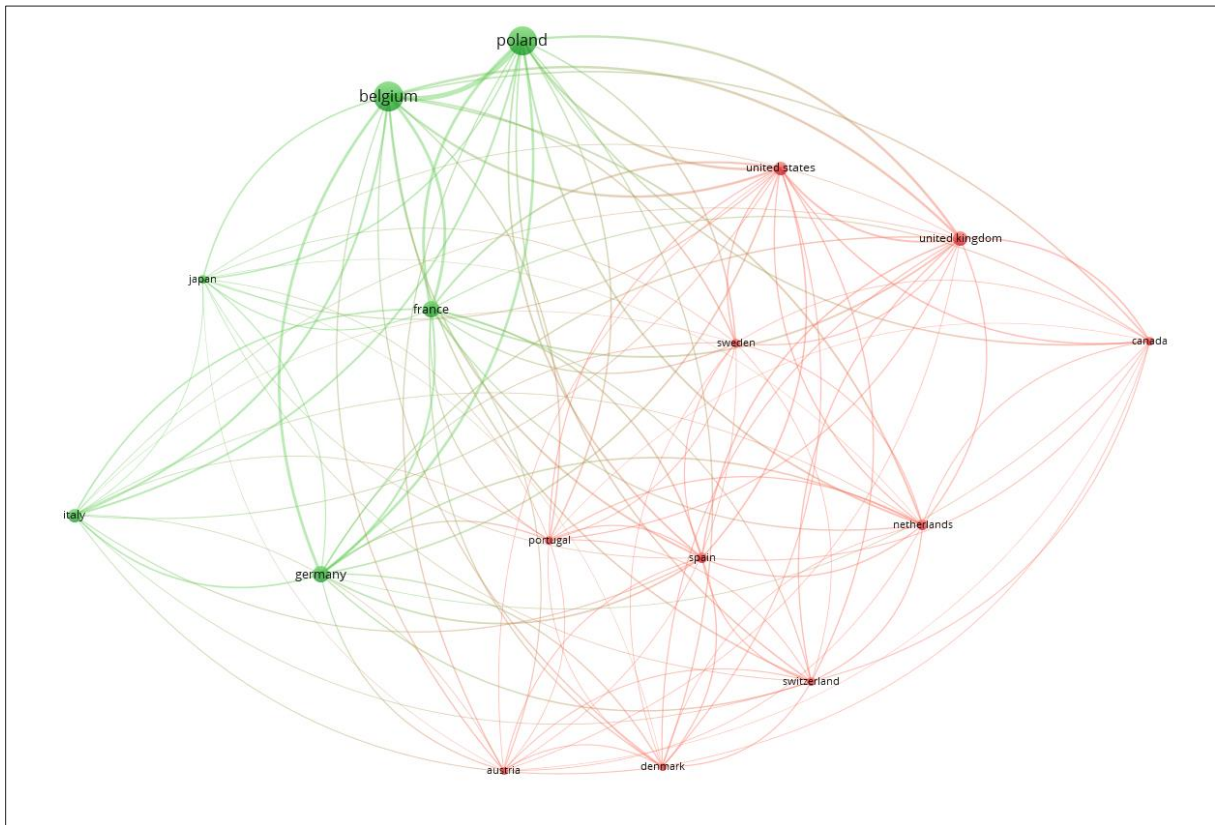


Source: own development based on SCOPUS/SciVal [accessed: 19.04.2024 r.]; visualization using the [VOSviewer](#)

Pursuant to data from the SCOPUS database, a correlation coefficient was calculated, determining the correlation for the variables “documents/number of documents” and “total link strength” and for “citations” and “total link strength” for all observations (i.e. 68 countries). A very strong relationship was noted in both pairs of variables (from 0.97 to 1.00), confirming the thesis of high importance for scientific visibility and international cooperation among the authors of publications (in this case - publications created with the financial support of NAWA).

In 2017-2023, 78 publications were created in Polish-Belgian cooperation, co-financed by NAWA, it constitutes less than 1% of the total joint achievements of scientists from both countries.

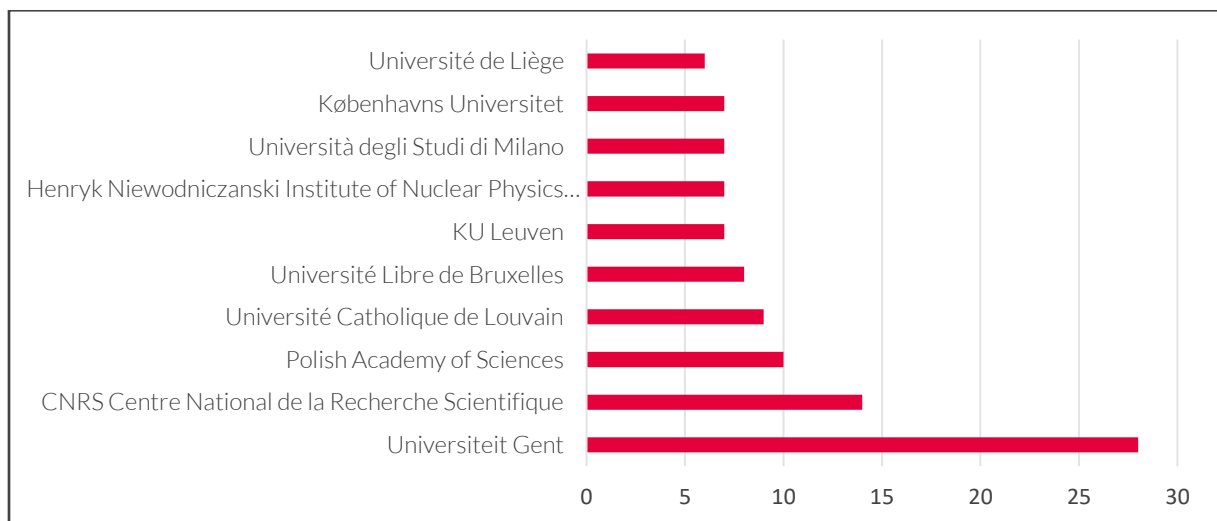
Map 2 Map of the network of connections between countries of origin of Polish-Belgian co-authors of publications co-financed by the Polish National Agency for Academic Exchange



Source: own development based on SCOPUS/SciVal [accessed: 19.04.2024 r.]; visualization using the [VOSviewer](#)

The map above shows that cooperation between scientists from two countries resulted in cooperation with another 14, which in turn resulted in 118 connections between the countries. The 16 countries visible on the map form two geographical groups. One includes: Poland, Belgium, France, Germany, Italy and Japan, and the other: the USA, Great Britain, Canada, Spain, the Netherlands, Switzerland, Denmark, Austria, Portugal and Sweden, but between each country from both geographical groups there are connections in the form of joint, international publications.

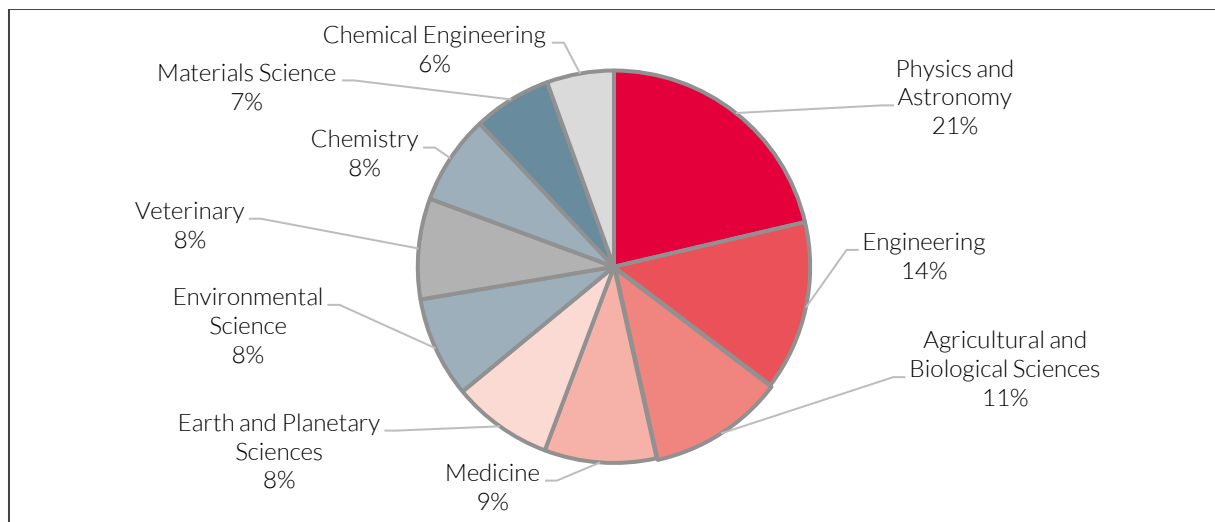
Chart 12 Affiliations of authors of publications co-funded by NAWA



Source: SCOPUS-SciVal [accessed: 16.04.2024]

In the Polish-Belgian cooperation in which NAWA participates, as the institutions to which the authors are affiliated, European centers are in the lead.

Chart 13 Publications co-funded by NAWA by thematic field



Source: SCOPUS-SciVal (accessed: 22.04.2024)

The thematic area of joint publications is partially consistent with those shown earlier. The example of the *Medicine* area shows that the differences show a different orientation of scientific interests - at the level of joint publications created with NAWA co-financing, the *Medicine* area has a 9% share, while in Figure 10 it is the leading area (36%).

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