

ALICJA KORZENIECKA-BONDAR

University in Białystok

ORCID: 0000-0003-1145-2996

MARIA CZEREPANIAK-WALCZAK

University of Szczecin

ORCID: 0000-0002-7565-5904

EWA BOCHNO

University of Zielona Góra

ORCID: 0000-0002-9841-3510

## **Scientific and artistic activities of frontier universities (the analysis based on data from the RAD-on System)**

### **Introduction**

Recent years have been a time of intensive work for female and male university employees due to the conduct of scientific and artistic activities under the conditions of: firstly – numerous economic, socio-cultural changes which were frequently unpredictable and violent as they were provoked by the Coronavirus pandemic, increased migrations; secondly – a change in the evaluation criteria for scientific disciplines, ultimately to be settled in August 2022. At that time, in accordance with the current Law of July 20, 2018 *Law on Higher Education and Science*, ‘the rules for the operation of higher education and the conduct of scientific activities were defined based on the following principia:

- the duty of public authorities is to create optimal conditions for freedom of scientific research and artistic creativity, freedom of teaching, and the autonomy of the academic community,
- each scientist is responsible for the quality and reliability of his/her research and for the education of the younger generation,
- universities and other research institutions fulfil a mission of particular importance for the state and the nation: they provide a key input to the innovation of economy, contribute to the development of culture, co-shape the moral standards of public life’ (Journal of Laws 2018 item 1668).

The legislator highlights the crucial role of science in the creation of civilisation, and treats scientific and artistic activity as an important dimension of shaping the humanistic world. It is worthwhile, therefore, to make attempts to outline the picture of scientific and artistic activities carried out at universities. This is, of course, a very

difficult task (given the peculiarities and possibilities of reproducing the university culture) and very time-consuming (due to the number and variety of data). Nevertheless, it is possible to diagnose and analyse the selected elements of university functioning and at the university. We make such an attempt and present an analysis regarding the characteristics of the selected elements of scientific and artistic activities carried out in the period from 2017 to 2021 at frontier universities, i.e. the University of Białystok, the University of Warmia and Mazury, the University of Szczecin, the University of Zielona Góra, the University of Opole, the University of Rzeszów (we will present the selection criterion later in the text). We conducted this analysis using the existing data available in the RAD-on System. The text will include our brief overview of the frontier category, we will explain what the Rad-on System database is, and we will reproduce the definition of scientific and artistic activity basing on official documents of the Ministry of Education and Science, then we will present the selected data. In conclusion, we will attempt to present the specifics of scientific and artistic activities carried out at the frontier universities.

### **The frontier – a category analysis and its significance for the functioning of the university**

Where nations, states, political and social systems meet, an intermediate area is created on both sides, where one senses a certain spiritual tension resulting from mutual attraction and repulsion. People living in the border area have a natural vigilance attitude. While people in the hinterland are languishing in safe and traditional conditions, borderland residents are always active, curious, enterprising, shrewd, disloyal, as they live in constant contact with what is unfamiliar. The new, semi-open horizon stimulates their imagination and enriches their consciousness, induces to comparisons and critical reflections. The transition from one set of relations to another gives rise to a peculiar sense of uncertainty,

– this is what a German historian, Ferdinand Gregorovius, wrote in the first volume of *Wędrowki po Włoszech* (translated by T. Zabłudowski) [*Eng.: Roaming across Italy*] (quoted after: Golka 2010, p. 275). Frontier denotes ‘1. ‘a part of the country lying close to the border; borderline, borderland’ [...] 2. *military* «a strip of land demarcated in the field during combat operations, having strategic, operational or tactical significance»’ (Sobol 1999, p. 816). Jerzy Nikitorowicz describes the frontier as an area: 1) ‘between centres, between what is on the borders and which may belong to both centres while overlapping’ 2) ‘of diversities, otherness and dissimilarities, where we can compare, discover, show surprise, negotiate’ (Nikitorowicz 1995, p. 11). According to J. Nikitorowicz, ‘the frontier is a chance’ because: 1) it provides an opportunity for choice; 2) it allows the formation of openness, respect, forbearance,

teaching coexistence; 3) it creates a natural situation for building positive interpersonal ties despite differences' (Nikitorowicz 1995, p. 15). Thus borderlands constitute 'areas of specific and interesting manifestation of socio-cultural environments, a kind of *milieu* that differs from many others, perhaps more stable, normalised, but not so interesting ones' (Golka 2010, p. 278). Basing on the analysis of the aforementioned features of the frontier, it is possible to formulate a hypothesis that the functioning of a frontier university offers a number of opportunities (inter alia, inspires, builds openness, awakens sensitivity, stimulates creative thinking and action) but also gives rise to numerous difficulties (which are absent in the centre) (e.g., constant contact with dissimilarity, initiates conflicts, indifference, asymmetrical concern for building relationships). From the perspective of the considerations undertaken, the significant question is **what might it mean for the scientific and artistic activities of universities to be located on the frontiers?**

## What is the RAD-on System?

### The RAD-on System

is a component of the Integrated Information Network on Science and Higher Education, the largest public system in Poland in terms of the scope of collated data, which helps the Ministry of Science and other state agencies shape the policy of science<sup>1</sup>.

According to the website, the

RAD-on system is a source of reports, analysis and data on higher education and science in Poland drawn from trusted sources. The indicated sources are:

- POL-on, a system of information on science and higher education<sup>2</sup>,
- Polish Scientific Bibliography (Pol.: PBN), a database collating data on publications by Polish scientists<sup>3</sup>,
- National Repository of Written Dissertations (Pol.:ORPPD)<sup>4</sup>,
- *Inventorium*, a platform linking scientists with business<sup>5</sup>,

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<sup>1</sup> About the system, <https://radon.nauka.gov.pl/o-systemie/czym-jest-rad-on> (11.04.2022).

<sup>2</sup> POL-on, <https://polon2.opi.org.pl/siec-polon> (11.04. 2022).

<sup>3</sup> Polish Scientific Bibliography, <https://pbn.nauka.gov.pl/core/#/home>.

<sup>4</sup> National Repository of Written Dissertations, <https://polon.nauka.gov.pl/polon/repozytorium-orp.d>.

<sup>5</sup> Inventorium, <https://inventorium.opi.org.pl/>.

- Polish Science, the Knowledge Database on Polish Science, including scientific and research papers, doctoral and postdoctoral dissertations and expert evaluations (SYNABA)<sup>6</sup>,
- Integrated System of Services for Science/Services for Funding Streams (Pol.: ZSUN/OSF), designed to register and service applications submitted in competitions of NCN [Eng.: the National Centre for Science], NCRD [Eng.: the National Centre for Research and Development] and MEiN [Eng.: the Ministry of Education and Science]<sup>7</sup>,
- System for Evaluation of Scientific Output (Pol.:SEDN)<sup>8</sup>,
- System for Supporting Reviewer Selection (Pol.:SSSR)<sup>9</sup>,
- System for Monitoring the Economic Fate of Higher Education Graduates (Pol.:ELA)<sup>10</sup>.

The RAD-on system was developed as a partnership between the Ministry of Education and Science and the Information Processing Centre – National Research Institute (Pol.:OPI PIB) as part of the project ‘ZSUN II Integrated System of Services for Science Phase II’. The team of OPI PIB, including analysts, programmers and scientists, created all of the aforementioned IT systems. Compared to them, the RAD-on system stands out as a comprehensive analytical tool that offers insights into large datasets on higher education and science.

### **Scientific and artistic activities – ways of defining in the documents of Ministry of Education and Science [Pol.: MEiN]**

The Law of July 20, 2018, *the Law on Higher Education and Science* defines the ‘scope of scientific activity’ (Article 4):

1. Scientific activity includes scientific research, development work and artistic creation.
2. Scientific research is an activity that covers:
  - 1) basic research understood as empirical or theoretical work aimed primarily at acquiring new knowledge about the underlying phenomena and observable facts without aiming at direct commercial application;

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<sup>6</sup> Polish Science Knowledge Database on Polish Science, [https://nauka-polska.pl/#/home/search?\\_k=zfc585](https://nauka-polska.pl/#/home/search?_k=zfc585).

<sup>7</sup> Integrated System of Services for Science/ Services for Funding Streams, <https://osf.opi.org.pl/app/>.

<sup>8</sup> System for Evaluation of Scientific Output, <https://polon.nauka.gov.pl/sedn2017/pages/login.xhtml>.

<sup>9</sup> System for Supporting Reviewer Selection, <https://recenzenci.opi.org.pl/sssr-web/site/home>.

<sup>10</sup> National System for Monitoring the Ekonomia Fate of Higher Education Graduates, <https://ela.nauka.gov.pl/pl>.

- 2) applied research, understood as work aimed at acquiring new knowledge and skills, aimed at developing new products, processes or services or introducing significant improvements to them.
3. Development works comprise activities that involve the acquisition, combination, formation and use of currently available knowledge and skills, including information technology tools or software, for production planning as well as the design and creation of modified, improved or new products, processes or services, with the exclusion of activities involving routine and periodic changes made to them, even if such changes take the form of improvements.
4. Artistic creativity represents creative activities in the arts, the result of which is a tangible or intangible artistic work being a contribution to the development of culture, including artistic performance' (Journal of Laws of 2018 item 1668).

The level of scientific and artistic activity is subject to evaluation. Basic evaluation criteria are: 1) the scientific or artistic level of the conducted activity; 2) the financial effects of scientific research and development works; 3) the impact of scientific activity on the functioning of society and the economy (Journal of Laws of 2018 item 1668, art. 267). The scientific level of the conducted scientific research and development activities shall be evaluated on the basis of scientific achievements such as authorship of scientific articles, authorship of scientific monographs, scientific editing of scientific monographs, authorship of chapters in scientifically edited monographs, and granted patents for inventions, protection rights for utility models and exclusive growers' rights for plant varieties (Journal of Laws of 2019, item 392, § 8).

The RAD-on System (let's repeat created by the Ministry of Education and Science) includes scientific and artistic activities described according to slightly different criteria than those indicated in the Law (Journal of Laws of 2018, item 1668) or the regulation on the evaluation of the quality of scientific activity (Journal of Laws of 2019, item 392). There are also investments and information on research related to defence and security. It also includes investments and information on research related to defence and security. The data compiled in it related to scientific and artistic activities are grouped according to the following criteria: 1) patents and protection rights; 2) publications; 3) artistic achievements; 4) projects; 5) investments; 6) information on research related to defence and security; 7) evaluation of scientific activity; 8) disciplines in which scientific activity is conducted; 9) reports on the impact of scientific activity on the functioning of society and the economy. In that order, they will be presented below.

## **Methodological grounds for own research**

The purpose of the undertaken analysis is to characterise scientific and artistic activities at the frontier universities made on the basis of data from the RAD-on System

(concerning the period from 2017 to 2021). The research problem the answer to which we are looking for is: What are the characteristic features of scientific and artistic activities at the frontier universities? We analysed data from the RAD-on System as regards six frontier universities:

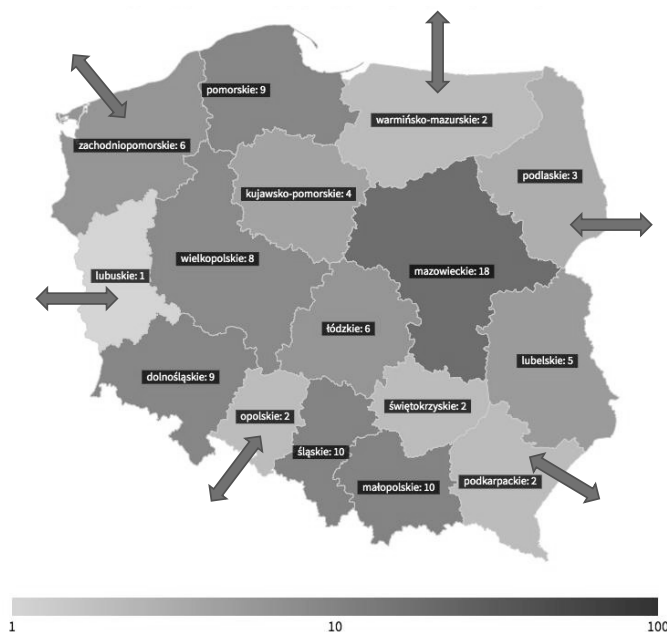
- The University of Białystok (Pol.:UwB),
- The University of Warmia and Mazury (Pol.:UWM),
- The University of Szczecin (Pol.:US),
- The University of Zielona Góra (Pol.:UZ),
- The University of Opole (Pol.:UO),
- The University of Rzeszów (Pol.:URz).

The selection of the universities was purposeful. The possession of an academic university statute and the territorial frontier location were the key selection criteria<sup>11</sup>. The number of universities in each voivodeship was an important criterion as well. The existence of universities is very important for the future of young people and thus the development of the community, the city (Nalaskowski, Dejna, 2020). It is possible to claim, basing on the research review, that academic institutions matter a lot to the local community, specific stakeholders (entities or groups of entities) (Karwowska, Leja, 2018, p. 5). Drawing on a review of a number of research reports, the researchers underline that universities, inter alia, support businesses run by the representatives of the underprivileged local community, socially and economically excluded representatives of the local community, provide access to education and is committed to taking up legal employment (Karwowska, Leja, 2018, p. 5).

The selected universities were located in the voivodeships with a small number of universities: Lubuskie voivodeship – 1 university, Opolskie, Podkarpackie and Warmińsko – Mazurskie voivodeships – 3 universities, Podlaskie voivodeship – 3 universities. The exception is the West Pomeranian voivodeship with six universities (but the presence of the University of Szczecin is justified by the fact that it is the initiator and the implementer of the project ‘Universities at the frontiers’).

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<sup>11</sup> Academic university: university conducting scientific research, in which at least one organisational unit bears the right to confer the PhD academic title (in accordance with the Act of 27 July 2005 Law on Higher Education, with further amendments). In accordance with the Act of 20 July 2018 Law on Higher Education and Science, an academic university is a university performing scientific activity and having the A+, A or B+ scientific category in at least one scientific or artistic discipline. The new Act states that an academic university conducts first degree studies and second degree studies or uniform master’s studies and may also provide education for doctoral students. Such a definition of an academic university shall apply from 1 October 2022 (Journal of Laws of 2018, item 1669 and of 2020, item 695). Download from: [https://radon.nauka.gov.pl/raporty/Uczelnie\\_2020](https://radon.nauka.gov.pl/raporty/Uczelnie_2020) (11.04. 2022).



Map no. 1. The number of universities in particular voivodeships

Source: [https://radon.nauka.gov.pl/raporty/Uczelnie\\_2020\\_mapa](https://radon.nauka.gov.pl/raporty/Uczelnie_2020_mapa) (11.04.2022).

## The character of the scientific and artistic activity at the frontier universities

We analysed the data indicated in the RAD-on System, in which the indicators of scientific and artistic activities were grouped according to the following criteria: 1) patents and protection rights; 2) publications; 3) artistic achievements; 4) projects; 5) investments; 6) information on research related to defence and security; 7) evaluation of scientific activity; 8) disciplines in which scientific activity is conducted; 9) reports on the impact of scientific activity on the functioning of society and the economy. We used this grouping but tables 1 and 2 present data beyond those listed herein above but demonstrating them helps create a more complete picture of the examined universities.

Each of the universities under analysis has been functioning for more than twenty years (UwB – 25 years; UWM – 23 years; UZ and UR – 22 years; UO – 28 years), and the University of Szczecin even more than thirty years. When compared to the leading Polish universities such as the Jagiellonian University in Cracow (in operation since: 12<sup>th</sup> May 364), the Warsaw University (19<sup>th</sup> November 1816) or the Adam Mickiewicz University in Poznań (1st January 1919), all of the analysed universities can be regarded

as young academic institutions. Three of them have branches, in Poland – UWM and UZ, in Lithuania – UwB. All of the said universities conduct teaching activities at the first, second and third degree level (Doctoral Schools), as well as scientific activities, including those in the evaluated disciplines. Additionally, most of the universities under analysis (with the exception of UwB and US) reported artistic achievements for evaluation. There are no investments only at the University of Rzeszów.

Table 1. Summary of basic data as regards the analysed frontier universities

Basic data	UwB	UWM	US	UZ	UO	UR
Date of creation	1.10.1997	1.09.1999	1.09.1985	1.09.2001	1.10.1994	1.09.2001
Branches	1 – Vilnius (since 2007)	1 – Elk (since 2012)	–	1 – Sulechów (since 2017)	–	–
Fields of study conducted within the university	71 (including branches)	153 (including branches)	153	115	140	113
Doctoral schools run by the institution	3 Sciences: Social Sciences; Humanities; Exact Sciences and Natural Sciencep.	1 (16 educational disciplines)	1 (16 educational disciplines)	2 Humanities and Social Sciences; Exact Sciences and Technology	1 (7 educational disciplines)	1 (18 educational disciplines)
Employees of the institution	1007	2089	1212	1208	1182	1925
Patents	7	68	–	12	3	9
Investments	9	20	16	46	30	–
Promotion proceedings Years 2020-22	37 (29 dr + 8 dr hab.)	114 (73 dr + 41 dr hab.)	11 (4 dr + 7 dr hab.)	6 (4 dr + 2 dr hab.)	6 (3 dr + 3 dr hab.)	45 (38 dr + 7 dr hab.)
Impact descriptions	32	50	38	46	35	44
Disciplines in which scientific activities are carried out	26, including 15 evaluated ones	49, including 25 evaluated ones	24, including 18 evaluated ones	41	44, including 18 evaluated ones	46 including 22 evaluated ones
Artistic achievements	–	172	–	629	431	3067

Source: Own analysis based on Data in RAD-on System. Download from: <https://radon.nauka.gov.pl/dane> (1.03.2022).

Each university employs teaching and research staff. The data can be presented as follows:



Table 2. Female and male academics and other instructors, scientific instructors and those involved in the conduct of scientific activities

Professional title/scientific title//scientific degree	UwB	UWM	US	UZ	UO	UR
Master's degree	158	137	245	117	237	335
Doctor	388	806	515	506	406	728
Doctor habilitated	199	469	294	235	186	326
Professor	83	192	94	110	80	103
Professor of Art	–	–	–	1	–	4

Source: <https://radon.nauka.gov.pl/dane> (11.04.2022).

The table with data reveals that the structure of the research and teaching staff at the frontier universities is varied. The largest number of employees at each university are holders of doctoral degrees while the smallest number of employees are holders of the title of a professor (the exception is UWM, where there are fewer master's degree holders) There are only two universities (UZ, UIR) which employ professors of Art. Such structure of the faculty seems to enable both the education of students in the fields of study, the conduct of research and also seems to ensure the formation of strengthening intergenerational relationships.

Table 3 shows data on patents and protection rights, including invention patents, utility model protection rights, and exclusive growers' rights to a plant variety versus the number of employees.

Table 3. Patents and protection rights at universities under analysis

University	UwB	UWM	US	UZ	UO	UR
Number of patents	7	68	–	12	3	9
Number of employees	1007	2089	1212	1208	1182	1925
%	0.7	3.2	–	0.99	0.25	0.47

Source: <https://radon.nauka.gov.pl/dane> (1.03.2022).

There is a small percentage of the analysed units' employees reporting patents and protection rights – mostly at the University of Warmia and Mazury (even more than at the Jagiellonian University or Warsaw University). This area of activity can be viewed as a weak point as regards not only the analysed institutions but also the leading

universities in Poland<sup>12</sup>. According to data presented by the Patent Office of the Republic of Poland, in 2020, 4058<sup>13</sup>, inventions were submitted in the domestic and international mode, including 1373 inventions initiated by higher education institutions (Zakrzewski 2020, pp. 59–60), accounting for 33.83% of submission. In the ranking of domestic and foreign patent applicants in 2022 (entities with more than 9 patents granted in 2020 were included), among the universities under analysis, only the University of Rzeszów was included with 12 applications (Zakrzewski, 2020, pp. 66–67). Meanwhile, by way of example, in 2011 German companies submitted 33,000 patents, Switzerland 8,000 (Kielbasiński, after Lech). It is difficult to specify the determinants of the indicated state of affairs without conducting research. Artur Kielbasinski (a journalist) explains that it is the ignorance of entrepreneurs and scientists regarding the role, value and content of the patent that is the main reason for the small number thereof (Kielbasiński, after Lech). As an aside, one should add that each of the cities in which the examined frontier universities are located has a Patent Information Centre (Zakrzewski, 2020, p. 28). It is worth undertaking broader research and debates to improve the number of patents filed by the studied academic units.

Scientific publications (articles, monographs, including the edited ones, chapters and post-conference materials) constitute one of the most significant results of scientific activity. Table 3 displays data on the number of publications at the surveyed universities covering the period from 2017 to 2022, linked to the profiles of the institutions in PBN [Eng.: Polish National Bibliography].

Table 4. Scientific publications at the universities under analysis (from 2017 to 2022)

University	UwB	UWM	US	UZ	UO	UR
Number of patents	5373	2095	8956	4084	92	10797
Number of employees	1007	2089	1212	1208	1182	1925
Average number	5.3	1	7.4	3.4	0.07	5.6

Source: <https://radon.nauka.gov.pl/dane>, date of access: 2022-05-06

The highest average number of publications per one employee at the University of Szczecin is more than 7, 5 can be found at the Universities of Rzeszów and Białystok, at the University of Zielona Góra 3, at the University of Warmia and Mazury 1. The information regarding the University of Opole evokes disbelief but the RAD-on System

<sup>12</sup> For example: Jagiellonian University 138 patents/ 6549 employees = 2.1% University of Warsaw 22 patents/ 5762 employees = 0.38%

<sup>13</sup> 2260 is the number of patents granted to national and foreign entities in 2020, including 1010 higher schools (Zakrzewski, 2020, p. 63).

includes such data. It is worth noting that the presented years from 2017 to 2021 cover the period in which the disciplines were preparing for evaluation (Journal of Laws 2019, item 392), and the heads of the units undertook a number of attempts to ensure that each person submitting a statement pledging publications to the evaluated discipline, prepared at least 4 publications to be placed in the PBN system. Given the data presented one can assume that the indicated condition was met at the Universities of Białystok, Szczecin and Rzeszów. It is difficult to draw any conclusions without juxtaposing the aforementioned data with the number of evaluated disciplines and the N number in a given discipline. The reported figures do not provide insight into the quality of publications, about their citations and contribution to the discipline. It would be worthwhile to make such analyses to determine the scientific policy (inter alia, providing support to individual researchers, institutional and departmental funding, intensity of research activity) implemented at the analysed universities pertaining to the selection of scientific journals, scientific publications – whether it serves the local environment, whether it fulfils the nationwide criteria set by the Minister of Science and Education in the lists of journals and publications or pretends to the world level (indexed in SCOPUS, Web of Science databases). Marek Kwiek highlights that:

publications determine the hierarchy in science at the level of individuals and research teams, departments, entire universities and countries. They are the determinants of promotions, degrees and access to competitive research funding. They also govern access to networks of global scientific collaboration. It happens primarily in the exact sciences and in parts of the social sciences. Publications in top journals bring prestige to scientists and their universities. (...) The prestige gained through publications is invariably linked to selectivity – and strongly stratifies academic staff, research groups and universities (Kwiek, 2020).

He concludes that “the success of an institution depends on the sum of the individual successes of the researchers employed by it” (Kwiek, 2020). It would also be worthwhile to analyse the participation of the surveyed universities in research and publications developed under international cooperation, which, according to Sławomir Rębierz and Marcin Kapczyński, analysing the publication activity of science and research employees from Poland, Slovakia and Hungary in the years 2005–2009 and 2010–2014, is a key factor in improving indicators of scientific publication efficiency (Rębierz, Kapczyński 2018, p. 420).

In addition to scientific publications, artistic achievements represent important outcomes as well. Table 5 provides information on the evaluated artistic achievements at the universities under analysis. The evaluation principles regarding the artistic level of scientific activity conducted in the field of artistic creation are specified in the Regulation of the Minister of Science and Higher Education of February 22, 2019 on the

evaluation of the quality of scientific activity (Journal of Laws of 2019, item 392 and Journal of Laws of 2020, item 1352).

Table 5. Artistic achievements at the universities under analysis

University	UwB	UWM	US	UZ	UO	UR
Number of employees	1007	2089	1212	1208	1182	1925
Number of artistic achievements	–	172	–	629	431	3067

Source: <https://radon.nauka.gov.pl/dane> (1.03.2022).

The greatest number of artistic achievements was reported by the University of Rzeszów – more than 3,000 with less than two thousand employees. Relatively the least number of achievements was registered at the University of Warmia and Mazury (172). No such accomplishments are evaluated at all by the University of Białystok and the University of Szczecin. There are significantly fewer artistic achievements than scientific publications at all universities under analysis (Table 4). Thereby it shows that this is not a key area of activity of the indicated universities' employees. It is worth noting that art professors are employed only at the University of Rzeszów (N = 4) and the University of Zielona Góra (N = 1). It is impossible to establish how many people with lower academic degrees are involved in the arts basing on the data available in the RAD-on System (presented in Table 2). The *Handbook for Experts and Evaluators in the Arts* (2021) developed by the Commission for the Evaluation of Science, indicates that:

different types and kinds of artistic achievements within 3 separate disciplines are evaluated. Achievements are of various types, not necessarily related to the authorship of an artistic work to which a title can be given. It is possible to demonstrate a range of creative activities, including participation or attendance at exhibitions, jury work, performing functions, etc.

The professional situation of visual artists, musicians, filmmakers, theatre makers, employed at universities in non-art departments is difficult – especially if the discipline is not evaluated (Morozewicz, Svidzinska, Sacharczuk, 2017). Evaluation will provide a means of determining the status and importance of artistic achievements at the universities under review. It would be worthwhile to conduct research showing the situation of artists, the rank, importance of their artistic achievements and contribution to the development of their own discipline.

Patents for inventions and protection rights, as well as scientific publications and artistic achievements, are the criteria for evaluating the scientific and artistic level of the activity carried out within the discipline – the so-called criterion I of evaluation

(it is a little different for entities conducting activities for defence and national security, which will apply for evaluation according to the procedure and conditions specified in § 29–32 of the Decree of the Ministry of Science and Higher Education dated February 22, 2019 (as amended, Journal of Laws of 2020, item 1352).

The Criterion II of the evaluation measures the effects of financial scientific research and development work (Journal of Laws of 2020, item 1352), which consists of research projects, revenues from commercialisation of the results of scientific research or development work, and revenues from research services for the benefit of entities outside the Science and Higher Education sector. The report *Science in Poland 2019* states,

In 2018, a total of 13,171 applications were submitted to the National Science Centre and the National Centre for Research and Development (11,114 to NCN and 2,057 to NCBR), and 2,816 projects received funding (2,703 and 743 respectively). The success rate for NCN was thus 24%, and for NCBR – 36% (Science in Poland 2019, p. 71).

How do the frontier universities under analysis look against this background? Table 6 shows the number of scientific projects implemented at the surveyed universities (implemented since 2017).

Table 6. Scientific projects implemented at the universities under analysis (implemented in 2017)

University	UwB	UWM	US	UZ	UO	UR
Number of projects	99	255	95	23	50	54
University employees	1007	2089	1212	1208	1182	1925
%	9.8	12.2	7.8	1.9	4.2	2.8

Source: <https://radon.nauka.gov.pl/dane> (4.04.2022).

The analysis of the data presented in the table reveals that the largest number of scientific projects at the surveyed frontier universities is carried out at the University of Warmia and Mazury (N = 2089) – they are acquired by more than 12% of the university's employees<sup>14</sup>. The projects at the other surveyed universities were acquired by less than 10% of employees – at UwB it was 9.8%, at US – 7.8%; much less at UO – 4.2%, UR – 2.8% and 1.9% at UZ. The number of applications mentioned above (based on

<sup>14</sup> What's interesting is that the percentage of people, receiving projects at the leading universities, varies slightly from the most effective universities of the frontier (12.2 % – UWM). Respectively: 12.7% – Adam Mickiewicz University in Poznań, 19.4% – University of Warsaw, 19.6% – Jagiellonian University in Kraków.

the report *Science in Poland 2019* display that the success rate of the surveyed universities appears to be small, and this further determines the funding of research and the intensity of scientific activities undertaken)<sup>15</sup>. It is possible to understand the indicated situation thanks to one of the conclusions in the aforementioned Report

The NCN grants are more likely to be awarded to scientific units with a high parametric rating. In 2018, the success rate for applications of A+ category units was 34%, and for applications of A category units – 26%. For units with B and C categories, it was 17% and 8%, respectively (*Science in Poland 2019*, p. 71).

So, in order to get funding, it must be preceded by high individual scientific achievements (in the form of high-quality scientific publications) and institutional achievements (in the form of the category held), which interact with each other.

The RAD-on system contains information on investments (archived and current) amid the data on scientific and artistic activities. The list covers public data on investments made by institutions of the system of higher education and science in Poland, including investments in scientific and research apparatus and IT infrastructure with a value exceeding PLN 500,000, investments co-financed from foreign sources.

Table 7. Investments (archived and current) implemented at frontier universities under analysis

University	UwB	UWM	US	UZ	UO	UR
Investment	9	20	16	46	30	–

Source: <https://radon.nauka.gov.pl/dane> (8.05.2022).

Examples of investments include construction and modernisation of buildings (campus, faculties, laboratories), modernisation of the computer network security system, construction of a fibre optic line, retrofitting of laboratories and even construction of a monument (UO). The investments undertaken by public universities are important for working conditions, conducted research and also for the local environment. The infrastructure of the university frequently serves the community, as exemplified by the Janusz Korczak Lecture and Performance Hall at the University of Białystok, which hosts scientific events, concerts, theatre and dance performances, as well as exhibitions and fairs.

<sup>15</sup> For example: University of Warsaw – 1118 projects/ 5757 employees (19.4%); Jagiellonian University in Kraków – 1283 projects/ 6547 employees (19.6%); Adam Mickiewicz University in Poznań – 516 projects/ 4055 employees (12.7%).

When it comes to the information on the defence and security research, basing on the list providing public information on research conducted by scientific and higher education entities in Poland included in the RAD-on System, none of the frontier universities under analysis conducts research related to national defence and security.

At the moment, universities are undergoing evaluation. *The Regulation of the Minister of Science and Higher Education of February 22, 2019, on the evaluation of the quality of scientific activity* (Journal of Laws 2019, item 392) sets out detailed guidelines for the evaluation criteria. The website of the Ministry of Education and Science includes key pieces of information:

The evaluation shall be carried out within the disciplines practiced at the entity. The evaluation shall take into account individual achievements of employees representing the discipline. Individual disciplines will be given scientific categories of A+, A, B+, B or C. The entitlement to conduct studies, doctoral schools, grant degrees and titles depends on the grade obtained. In addition, it also determines the amount of subsidies, i.e. the funds that scientific units receive from the state budget. The first evaluation of the quality of scientific activity according to the new rules will be carried out in 2021<sup>16</sup>.

Around mid-June 2022 (today we already know that this deadline has been extended) the results of the evaluation will be known, and then the Minister will proceed to issue administrative decisions on the categories granted to universities and institutes. The Minister announces that the system of quality evaluation with regard to scientific activity for 2022–2025 is going to face changes (Zdziebłowski, 2022).

The disciplines in which scientific activity is carried out at the frontier universities under analysis are known (Table 8 and Table 9).

Table 8. The number of disciplines in which scientific activity is carried out at the frontier universities under analysis

University	UwB	UWM	US	UZ	UO	UR
Number of disciplines	26, including 15 evaluated ones	49, including 25 evaluated ones	24, including 18 evaluated ones	41	44, including 18 evaluated ones	46, including 22 evaluated ones

<sup>16</sup> <https://www.gov.pl/web/edukacja-i-nauka/ewaluacja-i-dyscypliny-naukowe> (8.05.2022).

Table 9. Disciplines in which scientific activity is carried out at the frontier universities under analysis

No.	University	Discipline in which scientific activity is carried out
1.	The University of Białystok	Archaeology, economics and finance, philosophy, history, computer science, technical computing and telecommunications, linguistics, literary studies, mathematics, biological sciences, chemical sciences, physical sciences, earth and environmental sciences, security sciences, social communication and media sciences, cultural and religious sciences, political and administrative sciences, management and quality sciences, legal sciences, sociological sciences, theological sciences, pedagogy, canon law, psychology, musical arts, fine arts and works of art conservation
2.	The University of Warmia and Mazury in Olsztyn	archaeology, architecture and urban planning, astronomy, automation, electronics and electrical engineering, economics and finance, philosophy, socio-economic geography and spatial management, history, computer science, information technology and telecommunications, biomedical engineering, chemical engineering, civil engineering and transportation, materials engineering, mechanical engineering, environmental engineering, mining and energy, linguistics, literary studies, mathematics, biological sciences, chemical sciences, pharmaceutical sciences, physical sciences, forest sciences, medical sciences, earth and environmental sciences, security sciences, social communication and media sciences, physical culture sciences, cultural and religious sciences, political and administrative sciences, art sciences, management and quality sciences, health sciences, legal sciences, sociological sciences, theological sciences, pedagogy, canon law, psychology, agriculture and horticulture, film and theatre arts, musical arts, fine arts and works of art conservation, food and nutrition technology, veterinary science, animal science and fisheries science
3.	The University of Szczecin	archaeology, economics and finance, philosophy, socio-economic geography and spatial management, history, linguistics, literary studies, mathematics, biological sciences, physical sciences, medical sciences, earth and environmental sciences, security sciences, social communication and media sciences, physical culture sciences, cultural and religious sciences, political and administrative sciences, art sciences, management and quality sciences, legal sciences, sociological sciences, theological sciences, pedagogy, psychology
4.	The University of Zielona Góra	architecture and urban planning, astronomy, automation, electronics and electrical engineering, economics and finance, philosophy, socio-economic geography and spatial management, history, computer science, technical computing and telecommunications, biomedical engineering, civil engineering and transportation, materials engineering, mechanical engineering, environmental engineering,



No.	University	Discipline in which scientific activity is carried out
4.	The University of Zielona Góra	mining and energy, linguistics, literary studies, mathematics, biological sciences, chemical sciences, pharmaceutical sciences, physical sciences, forest sciences, medical sciences, security sciences, social communication and media sciences, physical culture sciences, cultural and religious sciences, political and administrative sciences, art sciences, management and quality sciences, health sciences, legal sciences, sociological sciences, pedagogy, psychology, film and theatre arts, musical arts, fine arts and works of art conservation
5.	The University of Opole	archaeology, architecture and urban planning, astronomy, automation, electronics and electrical engineering, economics and finance, philosophy, socio-economic geography and spatial management, history, computer science, technical computing and telecommunications, biomedical engineering, chemical engineering, materials engineering, mechanical engineering, environmental engineering, mining and energy, linguistics, literary studies, mathematics, biological sciences, chemical sciences, pharmaceutical sciences, physical sciences, forest sciences, medical sciences, earth and environmental sciences, security sciences, social communication and media sciences, physical culture sciences, cultural and religious sciences, political and administrative sciences, art sciences, management and quality sciences, health sciences, legal sciences, sociological sciences, theological sciences, pedagogy, canon law, psychology, agriculture and horticulture, fine arts and works of art conservation, food and nutrition technology
6.	The University of Rzeszów	archaeology, architecture and urban planning, automation, electronics and electrical engineering, economics and finance, philosophy, socio-economic geography and spatial management, history, computer science, technical computing and telecommunications, biomedical engineering, materials engineering, mechanical engineering, environmental engineering, mining and energy, linguistics, literary studies, mathematics, biological sciences, chemical sciences, physical sciences, forest sciences, medical sciences, earth and environmental sciences, security sciences, social communication and media sciences, physical culture sciences, cultural and religious sciences, political and administrative sciences, arts sciences, management and quality sciences, health sciences, legal sciences, sociological sciences, theological sciences, pedagogy, canon law, psychology, agriculture and horticulture, film and theatre arts, musical arts, fine arts and works of art conservation, food and nutrition technology, veterinary science, animal science and fishery science

Source: <https://radon.nauka.gov.pl/dane/dyscypliny-w-ktorych-prowadzona-jest-dzialalnosc-naukowa> (4.04.2022).

At most of the analysed universities, scientific activities are conducted in the field of:

- a) **Humanities**, in the following disciplines: philosophy, history, linguistics, literary studies, social communication and media sciences, cultural and religious sciences (activities in archaeology are not conducted only at UZ, and art sciences at UwB);
- b) **Social sciences**, in the disciplines of management and quality sciences, economics and finance, legal sciences, sociological sciences, pedagogy, political and administrative sciences, security sciences, psychology (activities in socio-economic geography and spatial management are not conducted at UwB, in canon law at US and UZ);
- c) **Exact and natural sciences**, in the disciplines of mathematics, biological sciences, physical sciences, (not conducted activities: in chemical sciences – at US, in earth and environmental sciences – at UZ, in astronomy – at UwB, US, UR, in computer science – at US);
- d) **Theological sciences**, in the discipline of theological sciences (not conducted at UZ);
- e) **Arts**, in the disciplines of film and theatre arts – UWM, UZ, UR (not taught at UwB, US, UO), musical arts – UwB, UWM, UZ, UR (not taught at US, UO), fine arts and art conservation – UwB, UZ, UWM, UO, UR (not taught at US);
- f) **Medical sciences and health sciences**, in the disciplines of medical sciences and physical culture sciences – UWM, US, UZ, UO, UR (not conducted at UwB), health sciences – UWM, UZ, UO, UR (not conducted at UwB, US), pharmaceutical sciences – UWM, UZ, UO (not conducted at UwB, US, UR).

At some universities, research activities are carried out in the field of:

- a) **Agricultural sciences**, in the disciplines of agriculture and horticulture and food and nutrition technology – UWM, UO, UR (not conducted at UwB, US, UZ), veterinary science and zootechnics and fisheries – UWM, UR (not conducted at UwB, US, UZ, UO), forest sciences – UWM, UZ, UO, UR (not conducted at UwB, US);
- b) **Engineering sciences**, in the disciplines of: biomedical engineering, materials engineering, environmental engineering, mining and power engineering, and mechanical engineering, automation, electronics and electrical engineering, architecture and urban planning – UWM, UZ, UO, UR (not taught at UwB, US), technical informatics and telecommunications – UwB, UWM, UZ, UO, UR (not taught at US), chemical engineering – UWM, UO (not taught at UwB, US, UZ, UR), civil engineering and transportation – UWM, UZ (not taught at UwB, US, UO, UR).

The aforementioned description of the disciplines in which scientific activity is carried out is complemented by numerous accounts of the impact exerted by scientific activity on the functioning of society and the economy (hereinafter: social impact assessment). Social impact confirms that the scientific activity conducted at a university affects not only the academic environment, but also the socio-economic sphere

and helps society understand culture and history (Journal of Laws 2019 item 392 and 2020 item 1352). According to the *Handbook for Experts and Evaluated Entities on Describing the Impact of Scientific Activities on the Functioning of Society and the Economy*, prepared by the Commission for the Evaluation of Science,

documented social impact shows that the scientific activity carried out has been used to improve the surrounding world and has helped society to understand the surrounding reality. (...) it is also important for science operators, as it allows them to justify an increase in funding for science (Criterion III Handbook of the National Education Commission, 2021, p. 1).

Table 10. The number of impact descriptions in a given field of science at the frontier universities under analysis

Field	UwB	UWM	US	UZ	UO	UR	In total
Humanities	11	8	8	8	7	10	52
Engineering and technical sciences	–	6	–	10	2	4	22
Medical and health sciences	–	3	2	4	4	6	19
Agricultural sciences	–	8	–	–	–	4	12
Social sciences	11	15	18	12	10	10	76
Exact and natural sciences	10	4	8	8	8	6	44
Theological sciences	–	2	2	–	2	–	6
Arts	–	4	–	4	2	4	14
In total	33	50	38	42	35	44	

Source: <https://radon.nauka.gov.pl/dane>, (17.03.2022).

Scientific activities in all fields of science are conducted by the University of Warmia and Mazury. All the universities under analysis are engaged in scientific activities and have reported the highest number of impact descriptions in the fields of social sciences (N = 76), humanities (N = 52) and exact and natural sciences (N = 44). The University of Białystok has reported impact descriptions only in the three fields of science, the other universities in greater numbers. Only UWM and UR have significant activities in the field of agricultural sciences for society. At this stage of evaluation, it is difficult to determine what significance and reach the submitted impact descriptions will achieve. The Committee for the Evaluation of Science will assess their reach (the assumed criteria are international, national, regional, local, marginal in scope) and significance (groundbreaking, significant, limited, inappreciable) (Journal of Laws 2019, item 392). It would be worthwhile to undertake further research showing *what* (which

scientific achievements) are considered important by universities and *how* they document it (evidence of impact). It would make it possible to recognise the specific nature of scientific activity individually and within a particular university.

## Conclusions – an attempt to generalise

The analysis of the rich and interesting data placed in the RAD-on System permits the conclusion that the scientific and artistic activities of the frontier universities are multifaceted and diverse. The analysed universities pursue clear outcomes of their activities, in the form of scientific publications, patents and protective rights, implementation of research projects; they undertake a number of investments to support infrastructure and research conditions. They are also clearly oriented at student education (including 3 universities also in branches), which proves the fact that they care about university employees for the needs of the local environment. The entities are relatively young (the oldest of the ones under analysis is the University of Szczecin – 37 years old) but with a potential for future development, as evidenced by the university staff members, the largest number of which are PhDs (Table 2), and therefore people with prospects for independent scientific development. Moreover, each of the universities offers education in a doctoral school(s), which provides an opportunity to take special care of the young researchers' competencies.

The examined universities started evaluating their scientific activities, demonstrating a number of scientific achievements and impact descriptions, especially in the social sciences, humanities, and sciences and natural sciences. The number and diversity of impact descriptions show that the 'universities under study cease to be "lonely islands" closed to reality but become active *change* makers at the regional, national, and some of them – at international levels' (Kościelniak, Makowski 2011). The potential spaces of growth are also determined by the fact that only one of the analysed universities (UWM) is active in all scientific disciplines, the remaining ones have an opportunity to launch further areas of scientific activity and fields of study – the ones that would support local needs and prepare for the challenges of the modern world, an example is the development of agricultural sciences at the University of Białystok located in an agriculturally significant part of the country. Descriptions of influence are worthy of in-depth, qualitative analyses revealing the content and significance of the scientific and artistic activities undertaken for the functioning of society and the economy. In the evaluation, they will be rated point-wise, which will certainly be an important signal revealing their quality, but the subject matter and content of the ratings could reveal how researchers problematise socially important issues and how they transfer knowledge into the practice of social life.

All universities under analysis should make greater efforts to win more and more research grants which demands prior concern for high quality scientific publications.

The analysis of the collected data proves that the policy pursued at the analysed universities is focused on specific outcomes. This mindset has certainly been ‘programmed’ to a large extent by the criteria for scientific activity assessment. It would be worthwhile to identify actions taken by people in charge of science management at universities while ‘waiting for the result of the evaluation’ and ‘after the evaluation’. What actions have been taken in order to, on the one hand, develop mechanisms for achieving the highest results of scientific activity, and, on the other hand, form a scientific ethos and social commitment to the development of their own scientific discipline.

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## Abstract

Recent years have been a time of intensive work for female and male university staff, due to the conduct of scientific and artistic activities under the conditions of: firstly – numerous economic, socio-cultural changes being often unpredictable and violent ones because of a coronavirus pandemic, increased migrations; secondly – the criteria for the evaluation of scientific disciplines, to be finally settled in August 2022. The chapter aims at examining the scientific and artistic activities carried out at the frontier universities on the basis of data from the RAD-on System (pertaining to the period from 2017 to 2021). Borderland is understood as a specific and interesting area, which differs from many other, perhaps more stable and normalised ones. The universities were purposefully selected for examination. The key criteria were the possession of a statute of an academic university and a territorial location in the border area. The selected universities for analysis were: the University of Białystok, the University of Warmia and Mazury, the University of Szczecin, the University of Zielona Góra, the University of Opole, the University of Rzeszów. The issues that underwent analysis were the ones that involved scientific and artistic activities: patents and protection rights, publications, artistic achievements, projects, investments, information on research related to defence and security, evaluation of scientific activity, disciplines in which scientific activity is carried out, descriptions of the impact of scientific activity on the functioning of society and the economy.

**Keywords:** university, frontier, scientific and artistic activities