Performance-based funding mechanisms as a tool for quality management of research in higher education in Poland

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ABSTRACT

The article analyzes the potential for implementing a performance-based funding (PBF) system for universities in Poland, drawing on experiences from countries such as the United Kingdom, Italy, and Finland. In PBF models, public funds are allocated based on academic and research performance, using indicators such as bibliometric data, expert reviews, or the number of research grants. In Poland, despite the introduction of the 2.0 Reform, the current subsidy system still only partially reflects research effectiveness, and the lack of a dedicated performance-based component (such as REF or VQR) limits its allocative efficiency. Based on data from 2018–2023 (including POL-on, GUS, and Scopus), the article reveals a growing concentration of funds among top research universities and the marginalization of regional institutions. It presents recommendations for implementing a hybrid funding model that combines stabilizing, performance-based, and equalizing components. The author argue that without reforming the subsidy algorithm and limiting discretionary financial decisions, a full-scale PBF system will fail to achieve its intended outcomes. The proposed model aims to balance the drive for research excellence with the mission of regional development.

Keywords: higher education, performance-based funding, Reform 2.0, academic inequalities, regional universities, funding for science and higher education.

INTRODUCTION

In many European and OECD countries, higher education funding mechanisms are increasingly linked to the results of scientific and teaching performance. Performance-based funding systems, referred to as performance-based funding (PBF) or performance-based research funding systems (PBRFS), are designed with a view to increasing the efficiency of public spending and improving the quality of scientific research (1). These models use various performance indicators, ranging from bibliometric to expert assessments, and funds are redistributed on the basis of the results achieved.

In Poland, despite the introduction of certain incentive elements, such as the categorization of scientific disciplines and publication scoring, a fully developed performance-based funding system is still not in place. The subsidy granted by the Ministry of Science and Higher Education (MNiSW) is based on an algorithm that takes into account the actual scientific effectiveness of universities to a limited extent (2). There is also no separate research component, similar to the British REF or Italian VQR, which would serve exclusively to evaluate and finance scientific activity (3).

The aim of this article is to assess the potential effects of implementing (or extending) elements of PBF at the university level in Poland, both in terms of scientific effectiveness and the phenomenon of concentration of funds in research universities at the expense of regional academic centers.

The main research hypothesis assumes that the effective implementation of the results-based component in university funding in Poland requires the introduction of transparent, measurable, and differentiated performance indicators and the application of a pilot implementation

model in selected types of universities. Only such an approach can ensure a balance between supporting scientific excellence and maintaining the mission of regional development.

The article uses a quantitative approach covering the years 2018–2023, i.e., the period before and after the implementation of the so-called Reform 2.0. Data from the POL-on system (on subsidies, employment, and scientific categories), the Central Statistical Office (financial reports), bibliometric databases (PBN, Scopus, Web of Science), as well as documents from the Ministry of Science and Higher Education and executive acts (4). The analysis covered, among other things, the relationship between the level of funding and research results (number of publications, citations, grants) and concentration indicators (e.g., the Gini coefficient). In addition, a case study was conducted comparing research universities with regional academies and technical universities.

The article is part of a broader debate on the applicability of PBF models in the Polish higher education system, which is characterized by a high level of centralization and limited transparency of funding allocation algorithms. The final sections present proposals for a mixed model that takes into account both the motivation for scientific excellence and the mission of regional development.

BACKGROUND

Performance-based funding (PBF) systems operate in many countries. Their common feature is that part of the money that universities receive from the state is allocated depending on the quality and results of their scientific activity. The literature contains descriptions of such models and the effects of their operation, both positive and negative.

Italy has a system called VQR, which is a national assessment of the quality of scientific research conducted at universities, carried out periodically by external experts. They analyze the scientific achievements of institutions—including publications, their quality, reach, and significance—and the results of the assessment are crucial for the distribution of part of the budget in the form of the so-called quota premiale. In 2022, quota premiale accounted for almost 30% of the total fund allocated to the basic activities of universities (Fondo di Finanziamento Ordinario, FFO), i.e. approximately €2.3 billion (5).

Total public expenditure on higher education in Italy in 2022 amounted to approximately €6.4 billion (FFO and other operating funds), while total public expenditure on research and development reached €12 billion, accounting for approximately 40% of all funds allocated to research activities in the country. The remainder of R&D funding came mainly from the private sector, including businesses, international grants, and non-profit organizations. The system of financing science and research is based on the synergy of national funds (FFO, FIS, FISR) and regional and European funds (6).

The Research Excellence Framework (REF) is a system for evaluating higher education institutions in the United Kingdom, in which institutions are assessed in terms of the quality of their scientific publications, the impact of their research on society and the economy, and the conditions they create for the development of science, including support for young researchers. Based on the REF results, "quality-related" (QR) funds are distributed – in the 2024/2025 academic year, the QR budget amounted to £2.3 billion. Total public spending on science and higher education in the UK in 2024 reached £7.16 billion, with a record £20.4 billion allocated to research and development, while central science management structures such as UKRI and Research Councils, had a budget of over £6 billion. The science funding system therefore includes both the allocation of funds according to research quality (REF/QR) and broad operational, infrastructure, and grant support for research institutions (7, 8).

Finland, on the other hand, uses a more balanced mixed model. Approximately 42% of funds are allocated to teaching (i.e., student education), 34% to research, and the remaining 24% are strategic funds, determined individually with each university (9). The research component takes into account, among other things, the number of publications and the amount of funds obtained from external sources, such as grants. In recent years, the effectiveness with which a university obtains research funding outside its own budget has become increasingly important—the share of this indicator in the overall formula has increased from 8% to 11% (10).

Discussions about PBF have been going on for years. Proponents emphasize that performance-based systems motivate universities to improve the quality of research and spend public money more effectively. However, critics warn against

the "Matthew effect"—a situation in which in which the rich get richer. This means that the best and most prestigious universities receive more and more funding, while weaker ones, especially regional ones, have less and less chance to improve their position (11).

It should be noted that if funding is based too heavily on simple indicators such as the number of publications or citations, universities may begin to "align" themselves more with these indicators than with the real needs of science and society. In the UK and Italy, where the performance component is very strong, there is a clear concentration of funds in the best universities (12). Finland and some Scandinavian countries, on the other hand, are trying to balance this by introducing greater stability and compensatory mechanisms.

Contemporary models of university funding are increasingly adopting a mixed structure that includes three complementary elements:

- base funding – ensuring institutional stability and covering basic costs,
- performance-based component – dependent on the quality of research, number of publications, citations, doctorates, or grants obtained,
- compensatory adjustments – aimed at supporting regional universities and reducing systemic inequalities (13).

Solutions of this type, combining motivation with balanced development, work best in countries such as Finland and the Czech Republic, where transparency and flexibility of the system are a priority (14). The introduction of demographic and territorial adjustments can protect smaller universities from marginalization without compromising from promoting scientific excellence.

Measuring the quality of scientific research remains one of the most controversial issues in contemporary science policy. Popular bibliometric indicators, such as the number of publications or citations, are easy to apply but do not reflect the specific nature of all fields, especially the humanities and social sciences. Therefore, international expert teams and scientific organizations, including the authors of the report "The Metric Tide" prepared for the British Research Councils UK and the UK Department for Education (HEFCE), recommend combining quantitative metrics with a reliable expert assessment conducted by independent specialists. This model, used, among others, in the REF system in the UK, serves as a benchmark for government agencies, universities, and evaluation committees in OECD countries. These recommendations aim to ensure a multidimensional and objective evaluation of scientific achievements, adapted to the specific nature of disciplines and the diversity of research methods (15).

Conclusions from Polish analyses suggest that the effectiveness of PBF systems depends not only on their design, but also on access to resources: infrastructure, administrative support, and time for research (16). Without this, universities with a weaker starting position—even in a well-designed system—have no real chance of improving their results.

THE CONTEXT OF THE POLISH SYSTEM

The higher education funding system in Poland is heavily dominated by subsidies from the state budget, which in 2022 accounted for an average of approximately 60–65% of the budgets of public universities (17). The subsidy is basic and stabilizing in nature—it covers the costs of teaching, organizational activities, part of scientific activities, and staff salaries.

Competitive grants are another important source of funding. In 2022, the National Science Centre (NCN) financed research projects with a total value of over PLN 1.4 billion, with the largest beneficiaries being universities with the highest scientific categories (A+ and A) (18). Grants from the National Centre for Research and Development (NCBR) (applied research and commercialization) accounted for an additional PLN 1.2 billion (19). In the case of research universities, grant revenues can account for as much as 25–30% of the total budget, while in regional universities this share often does not exceed 10% (20). European funds also play a significant role, in particular from the Operational Program Knowledge Education Development (POWER) and the new European Funds for Social Development (FERS) program. In 2014–2020, universities obtained over PLN 8 billion under POWER, mainly for pro-quality projects, infrastructure and internationalization (21).

Own revenues (tuition fees, services, commercialization of research) vary – at public universities, they account for approximately 10–15% of budgets, and at non-public universities, over 50%, as they are largely financed by student fees (22).

The 2018 Reform 2.0 ("Constitution for Science") introduced fundamental changes in the evaluation system:
- the evaluation of scientific activity was moved from the level of organizational units to the level of disciplines,
- a categorization system was introduced in disciplines (A+, A, B+, B, C), which has direct financial consequences,
- a list of scientific journals and publications was established, in which publications are assigned points (from 20 to 200 points) (23).

The 2022 evaluation assessed scientific activity in approximately 2.800 cases of scientific disciplines represented by 368 scientific units. Only 5.7% of the cases assessed were in the highest category (A+), and 33% were in category A. The category obtained affects the unit's ability to award academic degrees and indirectly determines the amount of subsidies (24).

One of the main parameterization tools is the scoring of journals, which has been criticized by some in the community for the opacity and variability of the lists. The evaluation also includes the number of normalized citations (e.g., according to Scopus, WoS) and the socio-economic impact of research (implementation, commercialization, social effects).

The subsidy distribution algorithm has a limited connection with scientific effectiveness (PEF). The subsidy from the state budget is divided among universities according to an algorithm that includes factors such as: the number of students, doctoral students, academic teachers, the profile of the university and the PEF (educational and research potential) index (25). This indicator is based on the scientific category of disciplines, but its share in the overall algorithm is limited (estimated at 15–20% of the subsidy value). As a result, differences in the quality of scientific research only have little impact on the level of funding. Universities with an A+ category receive a relatively higher subsidy, but these differences are not as significant as in fully performance-based systems.

Unlike in the United Kingdom or Italy, Poland does not have a separate research component of subsidies that would be allocated solely on the basis of the quality of scientific research. In the United Kingdom, the quality-related (QR) component accounts for approximately 30% of basic university funding and is directly linked to the results of the REF assessment. In Poland, the evaluation of scientific activity only indirectly affects the amount of subsidies, and the algorithm for the distribution of funds is dominated by teaching and structural criteria. This model may limit the financial incentives for intensive improvement of research quality and thus, to some extent, affect the international position of Polish universities (26).

RESEARCH METHODOLOGY

The analyses cover the years 2018–2023. This is a period in which major changes were introduced in the university funding system – a new subsidy algorithm has been in place since 2019, and the results of a new research quality evaluation were published in 2022–2023. This allows us to compare the situation before and after the reform.

The article is based on a variety of data sources, including information from the POL-on and RAD-on systems of the Ministry of Science and Higher Education concerning subsidies, scientific categories, and the number of university employees, data from the Central Statistical Office from financial reports covering the revenues and expenditures of higher education institutions, as well as results from the PBN, Scopus, and Web of Science scientific databases concerning the number of publications and citations; in addition, documents and regulations of the Ministry of Science and Higher Education specifying detailed rules for the distribution of funds among universities, as well as literature on the subject, were used.

Expenditures, i.e., the amount of funds received by the university, were compared with scientific results, including the number and quality of publications, the number of citations, research grants obtained, and the number of researchers and doctoral students.

In order to obtain comparable results between large and small universities, indicators calculated per researcher were used; on this basis, it was analyzed whether funds and scientific research results are concentrated in a few top universities, while smaller institutions receive less and less. 's Gini coefficient was used to assess the degree of this concentration—a higher value indicates greater inequality in the distribution of resources and research results. The results from 2018–2019 (before the reform) were compared with those from 2022–2023 (after the reform).

RESULTS

A comparative analysis of four Polish universities was carried out: the University of Warsaw (UW), Wrocław University of Science and Technology (PWr), the University of Rzeszów (URz), and the University of Słupsk (US) (Figure 1). The analysis allowed us to formulate several important observations regarding the relationship between research effectiveness and the level of funding.

Firstly, the data show a clear correlation between the number of publications and citations and the amount of subsidies. The University of Warsaw, which is a research university, significantly outperforms other institutions in terms of both the number of publications (approx. 6500 per year) and the average number of citations (7.2 per publication), which is reflected in the highest level of funding (PLN 783 million). In turn, regional universities, such as the University of Szczecin and the University of Rzeszów, are characterized by significantly lower scientific activity and, accordingly, a lower level of financial support. However, it is worth noting that inequalities in funding are not as pronounced in the case of subsidies and competitive grants. The Gini coefficient for subsidies is 0.37, which indicates a relatively moderate concentration of funds. By comparison, the Gini coefficient for NCN grants reaches 0.57, confirming a much greater diversity and concentration of funds among selected universities.

This means that although the subsidy system in Poland takes scientific efficiency into account to a certain extent, it is more balanced and less selective than grant funding, which may be a consequence of its mission-oriented nature and the desire to stabilize the sector. At the same time, however, such a model may limit the pressure to improve scientific performance, especially in universities with lower research potential.

The above data also shows that the current funding model favors maintaining the existing academic hierarchy rather than actively stimulating the development of weaker universities. This confirms the need to introduce a more diversified and performance-based funding component that would take into account not only the results, but also the starting point and the dynamics of improvement. The reforms to the subsidy algorithm introduced in 2018 have increased the
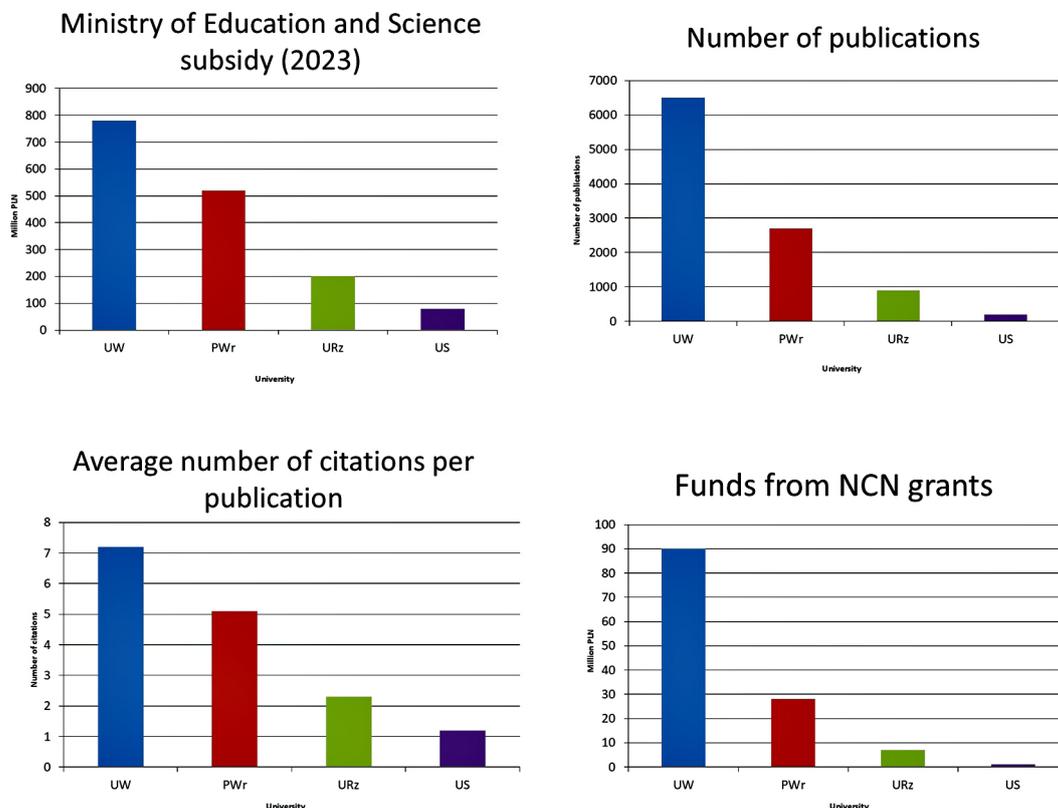
Figure 1. Comparison of selected Polish universities by research output, average citation rate, NCN grant funding, and Ministry of Education and Science subsidy (2023)

share of quality criteria, which in practice favors the concentration of resources in the largest and best-rated universities. According to a 2023 report by the Ministry of Education and Science, between 2019 and 2022, the share of the 10% largest universities in the total research subsidy budget increased from 65% to 72% (27). This phenomenon is particularly evident in the group of research universities, which receive over 80% of all NCN grants and European funds (28).

Data from 2018-2023 show a growing disparity in the research potential of Polish universities, particularly evident in the concentration of NCN and NCBR grants in a narrow group of research universities and in unequal access to infrastructure and human resources. This is confirmed by key indicators, including a high Gini coefficient for research grant funding of 0.57, indicating a strong concentration of funds, and the fact that the largest universities, such as the University of Warsaw (UW), Jagiellonian University (UJ), and Wrocław University of Science and Technology (PWr), publish more than ten times as much annually as smaller regional institutions.

The reform of the system of evaluation and distribution of scientific subsidies in Poland (the so-called "Reform 2.0"), introduced after 2018, significantly changed the mechanisms for evaluating and financing university research activities. Its impact on smaller regional research centers, such as the University of Rzeszów (URz) and the University of Słupsk (US), has been varied and often negative in terms of competitiveness and scientific development opportunities.

In the latest evaluation, the University of Rzeszów received only B+, B, and C categories, lagging behind research universities in terms of both the number of publications and grants obtained. The reform further exacerbated this difference, as the university did not receive support from programs such as the "Initiative of Excellence" and the revised subsidy algorithm rewards institutions with high bibliometric indicators to a greater extent. At the same time, access to development funds has become more limited and concentrated in a few leading research centers.

The University of Słupsk, as an academic institution with a regional profile and limited scientific achievements, was particularly affected by the effects of the reform, as the low number of citations and publications translated into an unfavorable parametric assessment, and the lack of strong scientific units limited access to funds from the National Science Centre (NCN) and the National Centre for Research and Development (NCBR). In addition, the lack of adequate infrastructure and staff made it difficult to improve scientific achievements, which in turn widened the gap between regional centers and research universities, reinforcing the so-called "Matthew effect" and leaving institutions such as URz and US with limited opportunities to compete for funds and improve their position in the evaluation.

DISCUSSION

Will a full-scale PBF be effective without reforming the subsidy algorithm? The experience of 2019–2021 shows that "safeguards" and discretionary decisions can significantly dampen the pro-quality signal. The Supreme Audit Office pointed out that in 2020, with a smaller amount distributed by the algorithm, the minister guaranteed universities a minimum of 98% or 100% of the previous year's subsidy (in accordance with regulations), and then made additional increases—ultimately, all universities received 102% of the 2019 subsidy under comparable conditions. The Supreme Audit Office concluded that such actions limited the pro-quality mechanism resulting from the research and internationalization components (29).

The basis for such "stabilizers" is formed by the implementing provisions of the Act - the algorithm in the regulation provides for a lower and upper limit for year-on-year changes in subsidies (e.g., 98–106% or 95–106% depending on the act and group of universities). As long as the stabilizing thresholds and discretionary increases (Article 368 of the Act) are widely applied, the effect of the PBF is weakened and the correlation between "results → funds" is weaker (30). Conclusion: a full-scale PBF requires modification of the algorithm – narrowing the stabilization range, spreading changes over a longer period, and greater discipline in the application of increases. Without this, performance incentives will lose their impact.

In response to the growing diversity of universities' potential and the need to improve the quality of research, the author proposes a mixed model based on three key components and supplementary funds to support regional universities.

The base component, which constitutes the fundamental part of funding and ensures predictability

and continuity of operation for universities, should be maintained as a pillar of the system, but should be more closely linked to the development potential of the institution. it is recommended to limit the current "safeguards" (cap/floor), which, as indicated by the Supreme Audit Office, weaken the impact of results on the amount of subsidies, replacing them with a stabilization mechanism based on averages from several years, so as to protect university budgets while maintaining an element of competitiveness (31).

The performance component, i.e., the pro-quality component, is the part of the funds that depends on the quality of research, the number of grants obtained, and the results of the evaluation. It should be based on the results of the evaluation of scientific disciplines (A+, A, B+, etc.) and on reliable data on publications and grants (32). However, it is necessary to standardize them by field in order to take into account differences in the pace of publication between different areas of science, for example between the humanities and the sciences. It is also advisable to use mechanisms to smooth data over time by averaging the results from the last two or three years, which reduces the impact of annual fluctuations.

Demographic and regional adjustments serve a compensatory function, taking into account the more difficult operating conditions of some universities, especially those in smaller cities or offering more expensive courses. Therefore, it is worth maintaining and developing cost weights and regional adjustment mechanisms (33). The profile of students and the geographical location of the university should also be taken into account, especially if it operates outside large agglomerations, where the possibility of recruiting staff and students is limited.

In addition to the performance-based funding (PBF) algorithm, special support funds are needed for regional universities, which often remain outside the mainstream of academic competition. To this end, the Regional Excellence Initiative (RID) program should be continued and strengthened (34). It is also worth launching permanent, competitive sources of funding for infrastructure development, internationalization, and digitization in these centers. It is necessary to ensure that universities outside the Initiative of Excellence – Research University (IDUB) program have access to stable development funds, which will allow them to level the playing field on the national and international scientific market. The proposed model combines the stability resulting from the base component, pro-quality motivation, and an element of systemic regional solidarity. This mechanism reduces the risk of polarization among universities, promotes research quality, and at the same time supports the development mission of regional centers. However, it should be remembered that the PBF mechanism inherently strengthens the strongest, if it is not accompanied by appropriate adjustments and compensatory instruments. There are already additional financial instruments, such as IDUB, treasury bonds, and increased subsidies, which, when allocated without transparent criteria, can exacerbate the concentration of funds. For this reason, when designing PBF, discretionary funding streams should be limited, annual change limits (so-called caps) should be introduced, and regional adjustments should be applied (35).

CONCLUSIONS

The current system of financing universities in Poland does not sufficiently support quality, as it depends too little on results and too much on mechanisms that perpetuate the status quo, which means that the best universities gain more and more, while regional ones struggle to develop. The proposed model consists of three parts: a base (60%) – stable funds ensuring the functioning of each university; results (30%) – funds for scientific achievements, such as publications, grants, or doctorates; and support (10%) – dedicated to universities in smaller cities for their social and educational role. The assessment should be based on simple, transparent indicators, including research quality, grants obtained, number of students, doctoral students, and cooperation with the surrounding community. Before implementing the new system, it should be piloted for 2–3 years on a group of both the largest and regional universities to test the new method of allocating funds, assess its impact on differences between centers, and refine the criteria and rules. It will be crucial to introduce restrictions on annual changes, ensure support for regional universities, and ensure full transparency of the mechanism, which will allow for the fair development of higher education, improve the quality of research, and strengthen academic centers throughout the country.

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