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Polish Higher-Education Institutions in International Cooperation: Evidence from the European Union Framework Programmes

Abstract

Objective: Polish higher-education institutions (HEIs) compete for European funds with excellent European universities that have comprehensive support systems for applying for research grants. This paper's aim is to analyse the patterns of participation of Polish higher-education institutions in the 7th and 8th EU framework programmes, and their relationship with the characteristics of universities and national and geographical effects.

Research Design & Methods: This article uses the CORDIS database for analysing data concerning projects financed under FP7 and the Horizon 2020 Programme.

Findings: The literature emphasises the weak starting position of Polish entities in competing for international grants. The low results of Polish institutions in EU FPs might be due to many factors, including system and structural, institutional, and mental barriers.

Implications / Recommendations: There is the necessity for a detailed examination of the determinants of the success of research proposals and the development of a system that will support strategic decisions on applying for grants at Polish universities in order to increase the absorption of EU funds.

Contribution / Value Added: New legislation in Poland has forced universities to change their expectations towards academic staff in order to achieve the highest possible categorisation of disciplines and universities. Polish scientists are under pressure to publish their research in reputable journals. Therefore, it might be possible to observe a direct emphasis on application for research grants and timely settlement of projects in case of obtaining grants.

Keywords: research funding, EU Framework Programmes, Horizon 2020, research policy, higher-education institutions

Article classification: research paper

JEL classification: I23, O39

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Introduction

Poland has been a member of the European Union (EU) since May 2004. Owing to this, it has the opportunity to participate in EU funds, which play an important role in the support of innovation and economic development (Drela & Szymański, 2013). EU funds contribute, in particular, to the empowerment of Polish science and education. The opportunities of European funds are long-range, because they help to establish a close cooperation between science and business. This makes universities and enterprises the precursors of change, allowing them to compete with the global industry.

The European Union framework programmes (FPs) are the largest instruments for financing scientific research and technological development in the European Union. They are addressed to research institutions and small and medium-sized enterprises. The EU FPs are managed directly by the European Commission (EC) through a selected executive agency. FPs do not have national or regional allocations, which means that applicants compete at the level of the entire EU (*Programy Ramowe*, 2022).

The history of the framework programmes dates back to 1984, when the first four-year Framework Programme was announced. Over the next 30 years, successive framework programmes have provided financial support for the implementation of EU research and innovation policies. Their focus has changed: from programmes supporting cross-border cooperation in research and technology to programmes supporting a truly European coordination of actions and policies. Currently, the largest and most ambitious is the 9th framework programme, namely the Horizon Europe, with a budget of over 95 billion EUR (*Polityka w Zakresie Innowacji*, 2022). The framework programmes, and their budgets in billions of euros, are presented in Table 1.

Table 1. The European Union Framework Programmes

ID	Framework Programme	Period	Budget (billions of €)
FP1	First	1984–1987	3.8
FP2	Second	1987–1991	5.4
FP3	Third	1990–1994	6.6
FP4	Fourth	1994–1998	13.2
FP5	Fifth	1998–2002	15.0
FP6	Sixth	2002–2006	16.3
FP7	Seventh	2007–2013	50.5 over seven years + 2.7 for Euratom over five years
FP8	Horizon 2020 (H2020)	2014–2020	77.0
FP9	Horizon Europe	2021–2027	95.5

Source: https://en.wikipedia.org/wiki/Framework_Programmes_for_Research_and_Technological_Development.

Entities from all over the world can participate in EU framework programmes, e.g. universities, large enterprises, small and medium-sized enterprises, public institutions, hospitals, foundations, and international organisations. Still, there are different requirements for financing the participation of European Union member states, FPs associated countries, and third countries (other countries). The rules for their participation are always specified in the call documents.

The benefits of participation in the EU FPs include, e.g. (NCBiR, 2019; 2022):

- increasing the international recognition of institutions involved in cooperation within projects;
- exchanging good practices, research methods, and procedures;
- creating international research teams, conducting simultaneous research in many different countries, verifying theories in different cultural contexts;
- building international networks of contacts;
- access to knowledge networks;
- benchmarking against those best in Europe;
- an exchange of knowledge and personnel, increasing the mobility of research staff;
- the internationalisation of research and a wider dissemination of results;
- the possibility of enriching the research workshop with approaches derived from different cultural or technological contexts;
- gaining experience in managing international projects;
- increasing the productivity of researchers (e.g. the number of publications);
- improving the quality of the results of scientists' work (e.g. the number of citations);
- increasing the probability of identifying blunders;
- access to unique material, equipment, and intangible resources (knowledge, experience);
- pro-evaluation activities – each international project increases a score for Polish universities in evaluating the quality of the scientific activity.

Despite so many advantages of the EU FPs, the share of Polish higher education institutions in the H2020 budget is only 0,83% (Poland in Horizon 2020, 2021). With all this in mind, this article's aim is to analyse the patterns of participation of Polish higher-education institutions in the 7th and 8th EU framework programmes, and their relationship with the characteristics of universities and national and geographical effects.

Research background

The topic of international research cooperation in the European framework programmes has been tackled by numerous authors. Most studies suggest that the critical factor for obtaining grants is the reputation of the university and belonging to the EU15 (the group of the so-called 'Old European Union' countries: Austria, Belgium, Denmark, Finland, France, Greece, the Netherlands, Spain, Ireland, Luxembourg, Portugal, Germany, Sweden, Italy, the UK) (Ajdarpašić & Qorraj, 2019; Lepori et al., 2015; Nokkala et al., 2011). Nokkala et al. (2011) suggested next factors, such as research productivity, the size of the university, and the specificity of the country. Additionally, high GDP per capita in the country was found to have a positive impact on participation and coordination of projects from the EU FPs. The topic of the importance of an institution's productivity in acquiring EU funds has been investigated by Geuna (1998). An econometric model was developed to investigate the relevance of various factors, both the likelihood of joining a EU-funded project and the number of times that a university has participated in these projects. The results show that the likelihood of participation in a EU-funded research and development project depends primarily on the university's research and development productivity. Factors that explain the number of times that a university has participated in a project include research productivity, unit size, as well as differences between countries and fields of study (Geuna, 1998).

There is also research analysing networks of scientific institutions and their impact on the success of collaborative grant applications (Balland et al., 2019; Wanzenböck et al., 2020).

Having a strong, influential network position in a collaborative European Union research is found to affect participation in the EU FPs, greatly suggesting "closed clubs", to the detriment of less influential institutions (Enger, 2018). Universities with more resources (finance, staff) will have stronger networks compared to those with fewer resources. For example, universities with influential positions in the network will usually be involved in coordinating projects. A large pool of resources will positively strengthen the impact of the network's position on the likelihood of participation in joint FPs projects. The resources (scientific reputation, productivity) are a comparative advantage in the influence of the university's network position on the EU's participation in FPs (Enger, 2018). Moreover, previous coordination experience contributes to the successful acquisition of projects. This is all owing to the learning outcomes that facilitate the development of a coherent application (Enger & Gulbrandsen, 2020). Further empirical research suggests that both the research capacity and the scientific excellence of an organisation increase the likelihood of receiving funding (Bol et al., 2018; Wanzenböck et al., 2020).

Some studies focus on the so-called Matthew effect in science, i.e. the hypothesis that outstanding scientists and/or outstanding research institutions have an advantage in competing for funding (Smith et al., 2019; van den Besselaar & Sandström, 2015). However, Bol et al. (2018) have shown that previous funding in itself is not an advantage in obtaining funds at a later stage.

Henriques et al. (2009) support the view that the institution's reputation is the critical factor in participation in EU funds. The authors characterised the participation of universities in the FP6, with particular emphasis on the profile of participation of the best research universities. Europe's top research universities account for the lion's share of participation in higher education in FP6 and act as lead coordinators and key partners. According to Lew (2009), one of the primary criteria for world-class universities is the ability to attract and retain excellent and experienced academics, and, as a result, research projects and programmes. Finally, the low success rate for partners from Central and Eastern Europe should be taken into account; the more consortium partners are from this part of Europe, the less likely it is to be awarded a grant (Paier & Scherngell, 2011; Wanzenböck et al., 2020).

Lepori et al. (2015) conducted research on the participation regularity of the countries of Southeast Europe in the EU FPs. The results suggest that: 1) there is a high concentration of EU participation in FPs in a small group of universities with a high reputation; 2) the participation of non-doctoral universities in the EU framework programmes is very limited, even though they account for a significant proportion of all universities in Europe; 3) the number of participants tends to increase in proportion to the size of the organisation and is strongly influenced by international reputation; and 4) there is limited evidence of significant national impacts on participation in the EU Framework Programme, as well as the impact of distance from Brussels. Table 2 lists all the institution-related factors that influence their participation in the European framework programmes.

Research methods

Data taken from the CORDIS database was analysed. CORDIS is an information base on European research and development activities (CORDIS, 2021). The analysed data concerned projects financed under FP7 and the Horizon 2020 Programme. Data was downloaded on August 30, 2022.

Table 2. The institution-related factors that influence participation in the European Framework Programmes

1	the reputation of the institution (Ajdarpašić & Qorraj, 2019; Lepori et al., 2015; Nokkala et al., 2011)
2	the institution's experience in project coordination (Enger, 2018; Wanzenböck et al., 2020)
3	prior participation (Enger, 2018; Wanzenböck et al., 2020)
4	research productivity of institution (Ajdarpašić & Qorraj, 2019; Geuna, 1998)
5	geographic location (Ajdarpašić & Qorraj, 2019; Balland et al., 2019; Lepori et al., 2015; Wanzenböck et al., 2020)
6	institution size (Lepori et al., 2015)
7	GDP per capita (Nokkala et al., 2011)
8	existing cooperation between institutions (Hoekman et al., 2013)
9	date of the institutions' establishment (Ajdarpašić & Qorraj, 2019)
10	type of institution (Ginther et al., 2012)
11	Matthew effect (Boyack et al., 2018; Nokkala et al., 2011)

Source: own elaboration.

Results

Table 3 presents the results of Polish higher-education institutions in FP7 and H2020. Poland's results are not satisfactory. Moreover, the results of Polish higher-education institutions in the Horizon 2020 programme are worse than in the 7th Framework Programme. In FP7, Polish HEIs participated in 4.56% of projects in which worldwide HEIs participated. Polish HEIs coordinated 0.77% of these projects. In H2020, however, these results deteriorated to 3.96% and 0.51%, respectively.

Table 3. The participation of Polish higher-education institutions in FP7 and H2020

Number of	7th Framework Programme	Horizon 2020
projects in which higher-education entities participated	19,341	22,141
projects in which Polish entities of higher education participated	763	724
institutions	90	88
participations in projects	883	878
coordination	149	115

Source: own elaboration.

Figure 1 shows the results of Polish higher-education institutions with the highest involvement in FP7 and H2020-funded projects (both coordination and partnership). The top results included the University of Warsaw, the Jagiellonian University, the Warsaw University of Technology, and the AGH University of Science and Technology.

Figure 2 shows the countries with which Polish higher-education institutions collaborated the most often under projects financed under the 7FP and H2020. The list takes into account foreign higher-education institutions from the European Union member states. The United Kingdom was included as a member state, because Brexit occurred at the end of the implementation of the Horizon 2020 programme. It was the institutions from the United Kingdom that most often

partnered with Polish institutions in projects with both FP7 and H2020. Altogether, Poland has participated over 700 times in projects financed by both FP7 and H2020. Subsequently, the country cooperated with Germany, Italy, the Netherlands, France, and Sweden. In the case of financed projects, Poland most often participates in consortia with countries from Western and Northern Europe, while it works less frequently with countries from Eastern and South-Eastern Europe, such as Romania or Croatia.

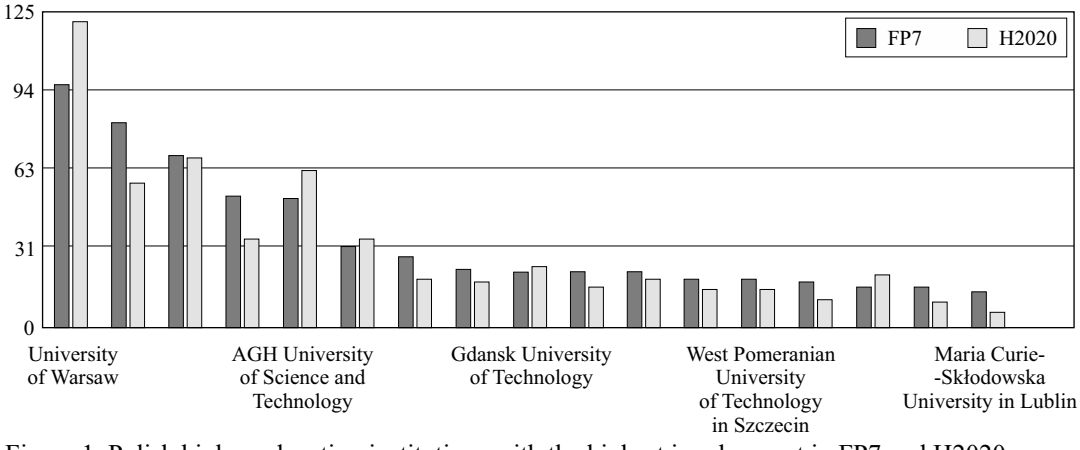

Figure 1. Polish higher-education institutions with the highest involvement in FP7 and H2020

Source: own elaboration.

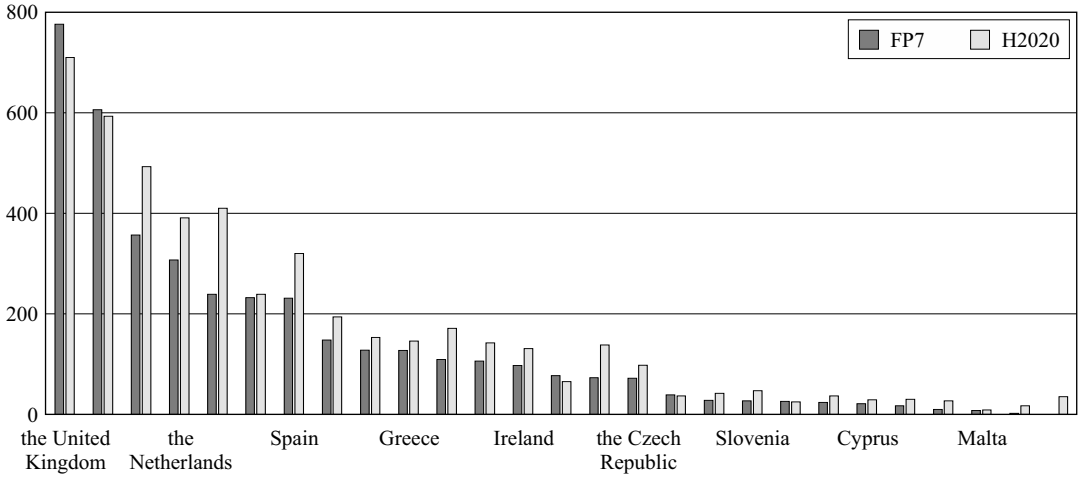

Figure 2. EU countries collaborating with Polish higher-education institutions under the 7FP and H2020

Source: own elaboration.

Figure 3 shows overseas higher-education institutions, which were the most frequently part of project consortiums with Polish institutions. Polish HEIs collaborated mainly with renowned entities from the United Kingdom, such as the University of Oxford, the University of Cambridge,

and the Imperial College London, as well as with the Belgian Katholieke Universiteit Leuven and the German Delft University of Technology.

Figure 4 shows the cooperation of Polish HEIs with associated countries. It cooperated the most often with Switzerland, Israel, and Norway. The tendency to cooperate with countries with high GDP per capita appears also in this case.

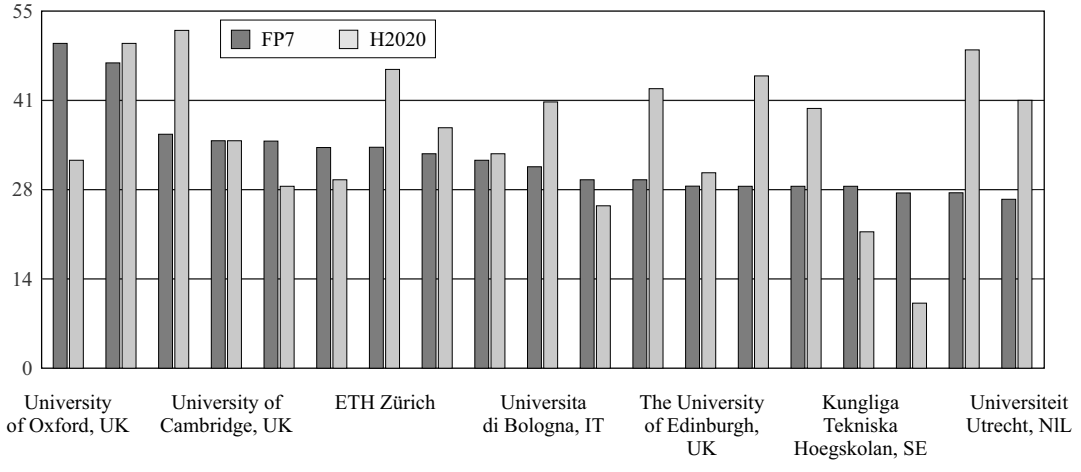

Figure 3. Overseas HEIs collaborating with Polish institutions under the 7FP and H2020

Source: own elaboration.

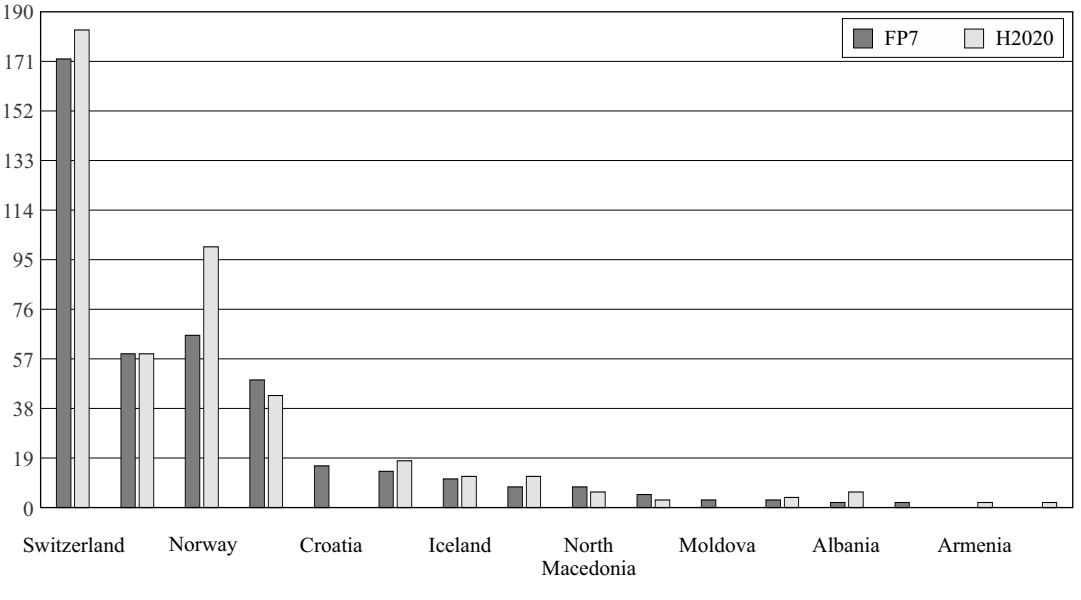

Figure 4. Associated countries collaborating with Polish higher-education institutions under the 7FP and H2020

Source: own elaboration.

Figures 5 and 6 concern the cooperation of Polish HEIs with the so-called third countries. Horizon 2020 shows greater cooperation with third countries than it is the case with FP7. In this programme, cooperation with the USA, China, Canada, Australia, and Singapore has increased significantly. Cooperation with Russia, Japan, South Africa, and Taiwan remained at a similar level as in FP7.

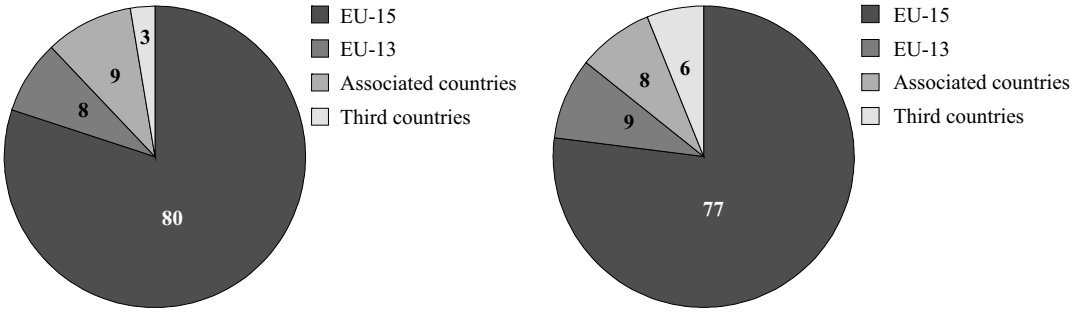

Figure 5. Comparison of the cooperation of Polish HEIs with different types of countries in FP7 and H2020 (%)

Source: own elaboration.

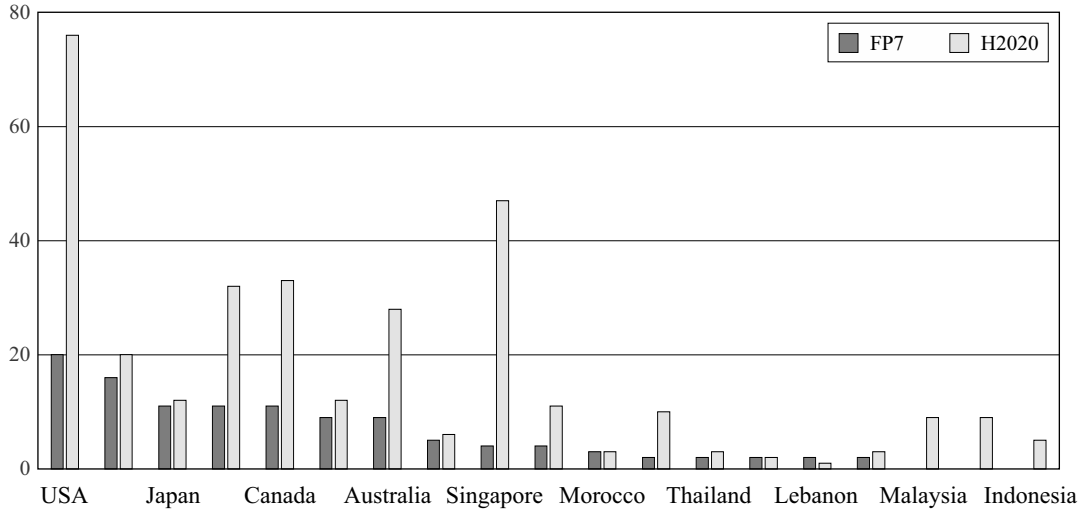

Figure 6. Third countries collaborating with Polish higher-education institutions under the 7FP and H2020

Source: own elaboration.

Discussion

Despite so many advantages of the EU FPs, the share of Polish HEIs in the H2020 budget is disappointing. The above conclusions from the literature emphasise the weak starting position of Polish entities in competing for international grants. Poland is a country with poor research

and innovation performance, and the level of research excellence is lower than the EU average (Horizon Europe – Work Programme 2021–2022). It ranks last regarding the level of research funding from EU programmes per scientist. Polish entities do not recover contributions to the joint EU budget for research and are net contributors to the EU budget in this area. The challenge for Polish science is the insufficient activity of universities and academics in obtaining grants. Polish higher-education institutions compete for European funds against excellent European universities that have comprehensive support systems for applying for research grants. Research on the determinants of the success of international research applications is important for increasing the acquisition of EU funds by Polish universities. Authorities should pay special attention to the process of applying for international grants, and provide applicants with specialist support in finding partners and preparing grant applications (Szczepaniak, 2019).

The low results of Polish institutions in the EU FPs might be due to many factors, including system and structural, institutional, and mental barriers. Table 3 presents the most common barriers that Polish HEIs face when participating in international research grants. Polish universities still lack clear strategic goals, incentive systems, and professional administrative and expert support at the institutional level (NCBiR, 2022).

Conclusion

New legislation in Poland has forced universities to change their expectations towards academic staff in order to achieve the highest possible categorisation of disciplines and universities. Polish scientists are under pressure to publish their research in reputable journals. Therefore, it might be possible to observe the direct emphasis on application for research grants and timely settlement of projects in case of obtaining grants. The results of Polish higher-education institutions in applying for European grants under the 7th Framework Program and the Horizon 2020 programme are unsatisfactory. For example, solely the University of Oxford obtained 527.48 million EUR in funding from the H2020 programme, while all Polish universities together received only 207.43 million EUR (Poland in Horizon 2020, 2021).

The low results of Polish institutions in the EU FPs when compared to expectations in terms of the number of inhabitants or the number of scientists is due to many factors, including system and structural barriers.

The author of this study sees the necessity for a detailed examination of the determinants of the success of research proposals and the development of a system that will support strategic decisions on applying for grants at Polish universities in order to increase the absorption of EU funds. Further research should also focus on analysing rejected applications in terms of the composition of the project consortium.

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