FINAL REPORT

Ex-post evaluation study of the 'Applied Research' Programme under the EEA and Norway Grants 2014-2021

Authors:

Sebastian Pałka (project manager)

Agnieszka Śnieżek (deputy project manager)

Cezary Przybył

Aleksandra Kamińska

Adam Grajek

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1 Summary and infographic

OBJECTIVES AND METHODOLOGY OF THE STUDY

SUBJECT OF THE STUDY	
The 'Applied Research' Programme **Years of implementation**: 2019-2024 **Budget**: EUR 77.65 million for projects **Program Objective**: To increase the quality of applied research in Poland by strengthening scientific and research cooperation between Poland and Norway	**Calls**: • POLNOR 2019 (38 projects) • POLNOR CCS 2019 (6 projects) • Small Grant Scheme 2020 (31 projects) • IdeaLab (6 projects) • Scheme of Support for Ukrainian Researchers
PURPOSE OF THE STUDY	**SURVEY METHODOLOGY**
Impact Assessment of the Programme "Applied Research" under the 3rd edition of the Norwegian Financial Mechanism and EEA Financial Mechanism (assessment of **effectiveness**, **impact** of the Programme, **efficiency** of the implementation system)	• Analysis of the data • IDI with representatives of NCBR, Research Council of Norway, Programme Committee • IDI with scientists from Ukraine • FGI with project managers and representatives of companies participating in POLNOR 2019 projects • CAWI/CATI with project managers • Recommendation workshop

EVALUATION OF THE EFFECTIVENESS OF THE PROGRAMME

High effectiveness of the Programme - results in terms of:

International cooperation:

- In accordance with the call rules, all projects under POLNOR, POLNOR CCS and IdeaLab were implemented in **partnership with Norwegian partners**, which strengthened scientific and industrial cooperation and knowledge transfer. These partnerships have enabled Polish teams to access advanced technologies and research methods.

Raising research quality and international visibility:

- More than **770 scientific articles**, most of which were available in open access and in **English**, increasing **the international visibility of Polish science**. Half of the publications have been or will be published in journals with an IF index higher than 2, and 13 with an IF index higher than 10.
- **Participation in conferences** (7 out of 10 conferences at which research results obtained in the project were presented had **an international character**).

Support for research careers, especially for young researchers and women:

- **30** projects under the Programme were led by **young researchers**.
- More than **1,700 researchers** were involved in the projects (1,393 from Poland and 329 from abroad; women made up 44% of the project staff).
- **Support for women** in male-dominated technical industries (SGS).

Innovation development and knowledge transfer:

- **73 applications for intellectual property protection**, 9 out of 10 are for patent protection, 8 out of 10 are applications filed in Poland.
- Half of the projects have produced **solutions that are ready for implementation** - some of the results have been implemented, others are in the pipeline.

Factors influencing the achievement of project outcomes

Positive internal factors	Internal negative factors
• Selection of topics for calls relevant to trends in international research • Highly regarded rules for project application and implementation • Appropriate choice of partners • Effective communication within consortia • Implementation of a mechanism for additional funding of projects	• Insufficient administrative support from research institutions (beneficiaries), which overburdened project managers • Communication and organisational problems in project teams
Positive external factors	**External negative factors**
• COVID-19 pandemic (development of new opportunities arising from digitisation) • High public demand for project outcomes (especially in the areas of urban development, medicine, environmental protection)	• COVID-19 pandemic (restrictions on access to laboratories and experimental work, disruption of supply chains, limited access to raw materials, supplies and equipment) • Increase in prices of goods and services, increase in labour costs (increase in project costs) • Regulatory and legal political developments • War in Ukraine (delays in procurement of materials and components necessary for research)

ASSESSMENT OF THE IMPACT OF THE PROGRAMME

Significant impact of the Programme on:

Sustainability of partnerships and continuation of projects

- **45% of** promoters are already **working with partners** from Norway; another **45% plan to do so** in the future.
- Continuation or plans to continue all projects in **other programmes**, mainly **Horizon Europe**, EFME, as well as calls organised by the National Science Centre.
- **91** follow-on projects from the 'Applied Research' Programme (proposals submitted or under development), including **28 proposals to Horizon**.
- The beneficiaries declared that they had submitted **64 joint proposals** (while the Programme assumed that this indicator would reach **6**).
- Continue to research and implement the technology in an advanced form in further projects.

Potential of scientific teams

- Increase in **prestige and scientific standing of** project coordinators, development of competences in international project management, strengthening of interdisciplinary skills and development of international networks.
- Influence on **preparing Polish teams** for more complex, international projects, increasing application potential, strengthening relationships with foreign partners.
- Easier **access to Horizon Europe** (similarity of implementation rules between the two programmes, gaining knowledge and experience in implementing international projects).

Potential of the actors involved

- Deepening of experience in the implementation of international programmes by **the Programme Operator** (NCBR).
- Ability to continue to **use laboratories, equipment, apparatus** used in projects.
- Strengthening **cooperation between science and business**.
- An increase in **the business position of companies** that are part of project consortia (possibility to expand their business areas and enter new markets more easily).

Socio-economic benefits

- Gradual **implementation of the resulting solutions** - both in business and in public services (already implemented implementations include: intelligent heating and cooling networks, automation and robotisation, clean urban transport).
- **Improving public awareness** in various areas of life - e.g. environment, health, mobility, agriculture, etc. - through extensive dissemination activities of project results.
- **Measurable benefits for society resulting from implementations** (solving problems in the areas of health, environment, transport, food, quality of life).

Factors ENHANCING the effects of projects in the long term:

Financial factors	• seeking sustainable funding to continue research • diversification of funding sources • commercialisation of products and technologies
Economic factors	• diverse forms of commercialisation of results • integration with other systems available on the market • scalability and adaptability of the technology to different conditions
Social factors	• positive public perception of the effects of projects • sustaining interest in the project within the scientific community • extensive promotion in the business sector
Environmental factors	• highlighting the environmental benefits of projects
Institutional factors	• development of a strategy or plans for the continuation of activities after the project has ended • strong institutional support and cooperation between partners

Factors JEOPARDISING the long-term effects of projects:

Financial factors	• insufficient funding to continue projects • high competition for research grants • high research costs • compulsory participation of industry in grant calls (barrier to scientific projects with high uncertainty of financial benefit)
Economic factors	• high volatility of markets, e.g. energy • the rapid pace of technological change • market scepticism towards new technological developments
Social factors	• not identified
Environmental factors	• high environmental requirements
Institutional factors	• political changes in local government • instability in regulatory systems • risk of staff turnover and loss of expertise • the requirement to form large international consortia and to commit significant own resources in some grant calls (a barrier to access for small teams) • low awareness of intellectual property issues

EVALUATION OF THE PROGRAMME IMPLEMENTATION SYSTEM

STRENGTHS	WEAKNESSES/DIFFICULTIES
• A transparent, effective **institutional system** • Positive **evaluation of the process and rules for applying** for funding under the Programme • High **evaluation of the IdeaLab project selection mechanism** (high evaluation of the rules of participation in workshops, methodology of workshops and activities, creation of a space for networking and making contacts, exchange of ideas) • Positive impact of **the reporting system** on project monitoring and management • Adequate **conditions for settlement of projects** and scope of **eligible expenditure** • High relevance of **the additional funding mechanism to** address the challenges of rising project costs • High evaluation of **the support of beneficiaries by the Programme Operator** - positive impact on the effectiveness of project implementation	• Problems concerning the role, tasks and responsibilities of **the Programme Committee** • Difficulties in **converting allocations** from EUR to PLN and vice versa, and in combining allocations from two Funds • Transitional **lack of a comprehensive IT system** for project and programme management • **Incompatibility of deadlines** for submission of annual reports on the implementation of the Programme and annual reports on the implementation of projects • **Insufficient number of staff** on the part of the Programme Operator and staff fluctuation

STRENGTHS	WEAKNESSES/DIFFICULTIES
• NCBR's successful efforts in **encouraging beneficiaries to apply to Horizon**	

RECOMMENDATIONS OF THE STUDY AND HOW TO IMPLEMENT THEM

- **Introduction of measures to ensure more efficient use of the financial allocation made at Programme level**
  - Preparation and submission a proposal for change concerning the consideration in procedures of situations of over-contracting of allocations (at the level of the whole Programme allocation).
- **Introduction of changes in the shape and role of the Committee in the subsequent editions of the Programme**
  - Preparation and submission a proposal to abandon the Programme Committee in its current form and replace it by a Project Selection Committee (Selection Committee) and a Cooperation Committee..
- **Reducing the reporting burden on project beneficiaries.**
  - Preparation and submission a proposal to simplify the template for annual financial reports or to dispense with the obligation to file them.
  - Grant access to the local IT system to all project partners.
- **Implement training and advisory activities for project team members in the area of intellectual property management.**
  - Organise training on IP management and/or offer consultancy services to project teams in response to individual needs.
- **Introduce into the call conditions criteria encouraging beneficiaries to develop already at the application stage a strategy for the exploitation of research results, which may cover both commercialisation and implementation in the public sphere**
  - Application of project evaluation criteria that will give preference to: development at the application stage of a strategy for the use of research results, partnership projects with entities that are key to delivering the objectives of the strategy, projects that plan to involve a variety of partners - both businesses and institutions - in the process of implementing the results, projects, the results of which are applied in the public sector (e.g. guidelines, methodologies, technological solutions for public institutions).

NCBR
National Centre for Research and Development

Information about the 'Applied Research' Programme

Years of implementation:
2019-2024

Budget:
EUR 77.65 million for projects

Programme objective:
To increase the quality of applied research in Poland by strengthening research cooperation between Poland and Norway

4 calls

CALL	BUDGET	NUMBER OF APPLICATIONS	NUMBER OF PROJECTS	VALUE OF THE GRANT
POLNOR 2019	EUR 49.7 million	74	38	PLN 229.5 million
POLNOR CSS	EUR 11.7 million	17	6	PLN 54.6 million
SGS 2020	EUR 5.7 million	334	31	PLN 26.1 million
IdeaLab	EUR 10.4 million	6	6	PLN 47.9 million

In response to the outbreak of war in Ukraine, a simplified **support mechanism** was introduced **Scheme: Support for Ukrainian researchers**

It allowed for the **inclusion of Ukrainian scientists** in already ongoing projects under POLNOR 2019, POLNOR CSS and IdeaLab

There were 5 rounds under 1 call. 14 grant agreements were signed.

NCBR
National Centre for Research and Development

Programme effects

EFFECTS

1. International cooperation and public-private partnerships
2. Increasing the quality of research and visibility in the international environment
3. Support for research careers, especially for young researchers and women
4. Stimulating innovation, development of new products, technologies and solutions

1 International cooperation and public-private partnerships

- **50 projects in partnership** with a foreign entity.
- Involvement in projects of **leading universities and scientific entities from Poland and Norway** (including internationally active entities).
- Support for 14 **Ukrainian researchers** under the Support for Ukrainian researchers mechanism.
- **The scientific-industrial nature of** a large part of the project consortia (40 partnership agreements were between research organisations and Polish/Norwegian companies).

2 Increasing the quality of research and visibility in the international environment

- More than **770 scientific publications** that contribute to **improving the quality of research and the international visibility of Polish science**. Half of the publications have been or will be published in journals with an IF index higher than 2 and 13 with an IF index higher than 10.
- Effective **promotion of the achievements of Polish research in the international arena** (7 out of 10 conferences at which research results were presented had an international character).

3 Support for research careers, especially for young researchers and women

- Involvement of more than **1,700 researchers** (1,393 from Poland and 329 from abroad; women accounted for 44% of project staff).
- Support for **women in the** SGS call **in technical, male-dominated industries** (as only a female scientist could be a project promoter in SGS 2020 projects).
- **30 projects** led by **young researchers** who have gained **the opportunity to accelerate** their scientific **development** through **international contacts and direct collaboration** with more experienced scientists.

4 Stimulating innovation, development of new products, technologies and solutions

- Development of **170 new products/technologies**.
- **73 applications for intellectual property protection filed**. 9 out of 10 of these are for patent protection, 8 out of 10 are applications filed in Poland.
- **Solutions ready for implementation** in half of the projects - some results have been implemented, others are in the pipeline.

NCBR
National Centre for Research and Development

Long-term impact of the Programme

Personal benefits for project promoters

- Development and acquisition of **new competence** in project management
- Development of **teaching** and research **competences**
- Increase in position, **prestige and visibility** within the scientific and research community
- Increased **ability to work** with partners from different sectors and countries
- Increased self-**confidence od teh researchers** in the scientific research dimension

Benefits for beneficiaries

- Increased **recognition and positioning** in the social and scientific research environment
- Easier networking with new partners
- **Access to laboratories**, equipment and apparatus owned by partners
- **Improving cooperation between** representatives of science and business
- **Increase in market potential of** companies (consortium partners)
- **Increase in revenue** associated with effective implementation of results

Socio-economic benefits

- Tangible **benefits for society** resulting from implementations (**solving problems** in the areas of health, environment, transport, food, quality of life) - both in business and in public services.
- **Improving public awareness** in various areas of life - e.g. environment, health, mobility, through extensive dissemination activities of project results.

Sustainability of cooperation between consortia members

- **45% of project promoters are already collaborating** with Norwegian partners on further research projects; another 45% plan to do so in the future.
- The beneficiaries declared that they had submitted **64 joint proposals** (while the Programme assumed that this indicator would reach 6).

Continuation of projects in other programmes

- Work on the results of the projects is overwhelmingly already underway or will **continue**.
- 91 follow-on **projects** from The 'Applied Research' Programme were developed (proposals submitted or under development), including 28 proposals to **Horizon**.
- Applications are/will primarily be submitted in calls organised by **NCBR and NCK**.

2 Introduction

Context of the study - brief characteristics of the 'Applied Research' Programme

The 'Applied Research' Programme was implemented under the EEA and Norway Grants. The total **budget of the Programme** was EUR 81 million.

The aim of the Programme was to increase the quality of applied research in Poland by strengthening scientific and research cooperation between Poland and Norway, developed on the basis of an equal partnership between Polish and Norwegian research organisations and enterprises .[1]

The programme was intended to prepare project **beneficiaries**, project partners and researchers **for further research cooperation under** the European Framework Programmes for Research and Technological Development and Demonstration Activities and, where appropriate, for cooperation in other European programmes and initiatives. In this context, the Programme was to contribute to the development of the European Research Area.

As indicated in the Guidelines, the Programme should **generate benefits at several levels: Programme Operator, project beneficiaries, project partners, and researchers**. According to the assumptions, the main **products are to be the results of research, including scientific publications or submitted IPR applications**.

Eligible applicants/beneficiaries forming a project consortium under the 'Applied Research' programme:

- research organisations,
- entrepreneurs,
- in the IdeaLab call also any public or private, commercial or non-commercial entity, as well as NGOs.

The programme was implemented through 4 instruments/calls:

1. Competitively selected research projects: POLNOR 2019

Applications were submitted by Polish-Norwegian consortia consisting of at least one Polish and one Norwegian entity. The consortium also had to include at least one entrepreneur from Poland or Norway. The application was submitted on behalf of the consortium by the Project Promoter, which was the Polish entity formally responsible for project implementation.

Thematic scope of the call:

- health and social care
- industry and information technology
- energy, transport and climate
- food and natural resources
- social and economic development

[1] 3rd edition of the EEA and Norway Grants [accessed 12.09.2024].

- unmanned vehicles

There were 38 projects, with a total of 74 applications. The budget for the call was EUR 49.7 million.

2. Research projects selected in the POLNOR CCS 2019 call

Applications were submitted by Polish-Norwegian consortia consisting of at least one Polish and one Norwegian entity. Consortia could be formed by organisations conducting research and disseminating knowledge, but there was no obligation for an entrepreneur to participate in the consortium (nevertheless, companies were members of consortia in two projects). The application was submitted on behalf of the consortium by the Project Promoter, which was the Polish entity formally responsible for project implementation.

The scope of the call: carbon capture and storage.

There were 6 projects and a total of 17 applications. The budget for the call was EUR 11.7 million.

3. Small Grant Scheme 2020

Applications were submitted by single entities operating in Poland. The call did not provide for the participation of consortia. Each submitted application had to include one person fulfilling the role of project manager (Principal Investigator). Due to the nature of the call, this role could only be performed by a female scientist representing applied engineering and technical sciences, including:

- civil engineering,
- electrical engineering, electronics, information engineering,
- mechanical engineering,
- chemical engineering,
- materials engineering,
- medical engineering,
- environmental engineering,
- environmental biotechnology,
- industrial biotechnology,
- nanotechnology,
- other engineering and technical sciences.

There were 31 projects and a total of 334 applications. The budget for the call was EUR 5.7 million.

4. IdeaLab

IdeaLab is an innovative formula for generating research projects through interactive, intensive workshops with participants from different disciplines and backgrounds and a team of external experts (mentors and stakeholders).

As a result, new approaches to research challenges on a specific topic were developed. The IdeaLab workshop took place from 2-6 March 2020 in Otwock and was organised by NCBR. Proposals submitted in the 2020 call were developed on the basis of the project idea created during the IdeaLab workshop in consortia formed during this workshop and submitted on the 'project-idea form'.

Projects had to be implemented by consortia consisting of at least one Polish and one Norwegian, Icelandic or Liechtenstein entity. In the end, the consortia consisted exclusively of Norwegian

partners (mainly research institutes and universities). The project promoter (the entity signing the agreement on behalf of the consortium) appointed a project manager (Principal Investigator) who was a researcher from one of the Polish institutions.

Focus: Cities of the future: services and solutions

Six projects were implemented and a total of six full applications were submitted. The budget for the call was EUR 10.4 million.

5. Scheme of Support for Ukrainian Researchers

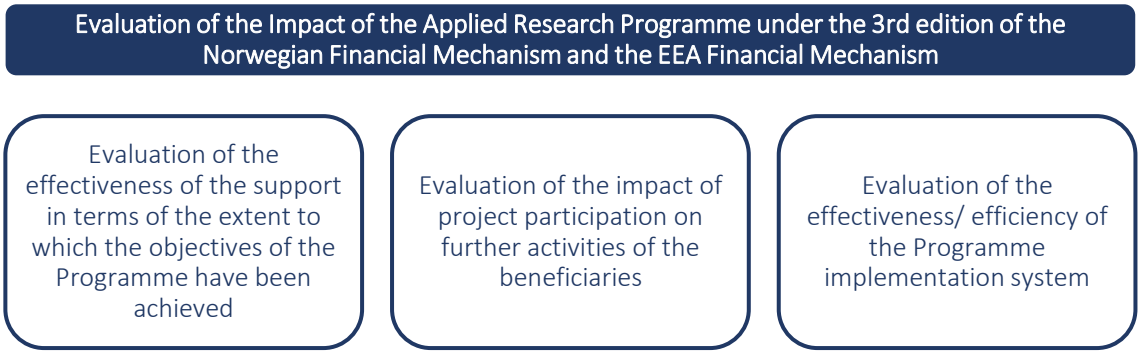
After the start of the Russian aggression against Ukraine, the National Centre for Research and Development, as Operator of the 'Applied Research' Programme implemented under the EEA FM and NMF 2014-2021, announced a Scheme of Support for Ukrainian Researchers under the Fund for Bilateral Relations.

The aim of the proposed project was to provide immediate and effective support to Ukrainian researchers affected by the armed conflict through a simplified support mechanism Scheme: Support for Ukrainian researchers, which was intended to enable Ukrainian researchers to join Polish-Norwegian project teams and continue their scientific activities.

Objectives of the study, research methods used and data sources

The ex-post evaluation study of the „Applied Research" Programme under the 3rd edition of the Norwegian Financial Mechanism and EEA Financial Mechanism 2014-2021 was conducted in order to assess the course of the Programme implementation and the impact of selected external and internal factors on the degree of achievement of the anticipated effects of the Programme. The evaluation was also intended to provide information on the Programme implementation and management system and mechanism itself, and opportunities or areas for potential improvement.

Scheme 1 Main objective and specific objectives of the evaluation

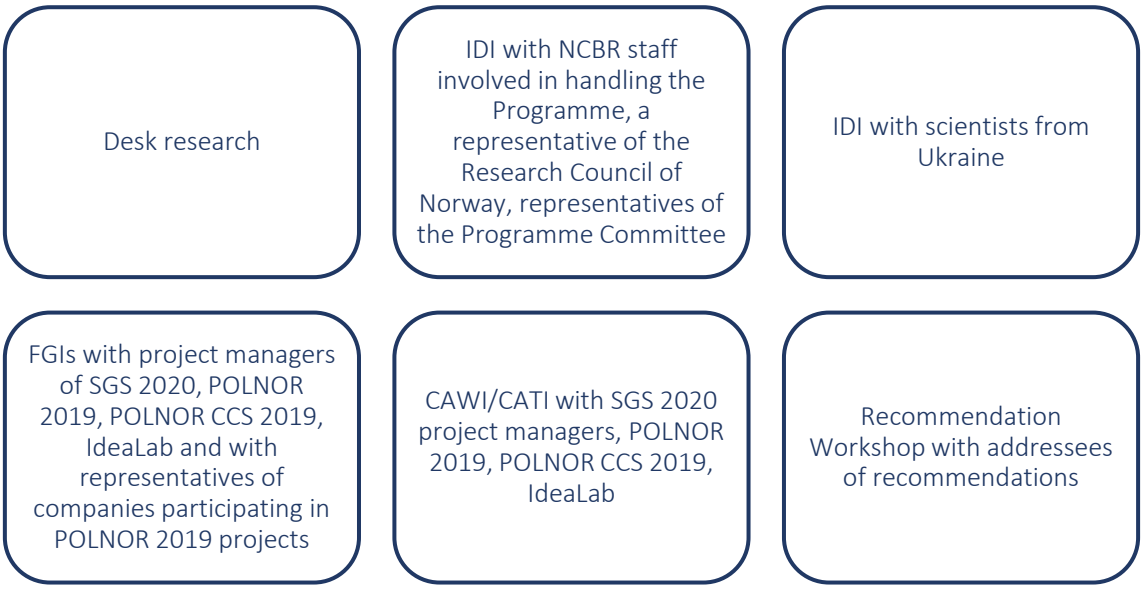


Source: own study.

Research methods and techniques used in the study

The evaluation used a range of qualitative and quantitative research methods, techniques and analytical techniques with a significant role for the examination of the data found.

Scheme 2 Research methods and techniques used in the study



Source: own study.

Both **recommendations** and suggestions for changes are presented in the report **- they are marked in dark blue**. Recommendations are additionally presented in a table of conclusions and recommendations.

The report uses the information contained in the project progress reports as at 11 and 20 September 2024, including the final reports of projects received by the Programme Operator by that date. In addition, information from a further two final reports received by the Programme Operator by 18 October 2024 has been included. This means that values of achieved indicators presented in this report are not final because at the time of preparing this study the final project reports were still prepared/corrected.

3 Evaluation of the effectiveness of the support in terms of achieving the programme objectives

MAIN CONCLUSIONS

Project results

- The effects of the projects can be divided into four main categories: international cooperation and public-private partnerships; enhancing research quality and international visibility; supporting research careers, including especially young researchers and women; and developing innovation, new technologies and knowledge transfer.
- Leading universities and scientific entities from Norway (including internationally active entities) participated in 50 project consortia.
- A large proportion of the project consortia were of a scientific-industrial nature (40 agreements were concluded with companies).
- The visibility of Polish science has been enhanced by numerous publications containing the results of conducted research (one in three is a joint publication by Polish and Norwegian partners), most of which have been prepared in English.
- Many more researchers participated in the projects (more than 1.7 thousand) than planned in the Programme (525, including 420 from Poland), and support for young researchers (they managed 30 projects) and women (more than 750 female researchers from Poland and Norway received support) is particularly important.

Factors influencing project outcomes

- Both internal factors (related to the implementation system and rules) and external factors (factors independent of the Programme's management and implementation system) had an impact on the implementation and achieved results of the projects.
- Internal factors mostly had a positive impact on project implementation and results. These factors included: rules for project application and implementation, well-chosen research areas and precise project selection criteria, administrative support from research institutions.
    - Particularly positive - in terms of ensuring the achievement of the projects' objectives - was the impact of the mechanism for additional co-financing of projects by means of exchange rate differences.
- External factors overwhelmingly had a negative and limiting effect on project implementation, but the countermeasures taken (by beneficiaries and the Programme Operator) were quite effective in minimising their impact on the final results. Most difficulties, at the implementation stage, were caused by the COVID-19 pandemic, the war in Ukraine and the associated increase in inflation.
    - In addition, some beneficiaries struggled with regulatory and legal changes, staffing issues, communication and organizational problems within project teams, technical problems and equipment failures.

Determinants of the implementation of project results

- The feasibility of implementing project results is influenced by, among other things, financial factors (commercialisation of results requires significant investment, especially in

the case of technology and materials projects), legal and administrative requirements or the need to match current market needs.

- Difficulties related to IPR regulation were not common in consortium projects. In this area, procedural, but also cultural differences in the approach to IPR protection in Poland and Norway are of great importance. Norwegian partners have greater expert potential in this area.

3.1 Level of achievement of programme objectives and results achieved

Categories of project effects

Based on the research and analysis carried out, a categorisation of **the main types of effects** that occurred as a result of the Programme projects was carried out.

International cooperation and public-private partnerships

- Effects related to building and strengthening international cooperation between Polish and foreign partners (from Norway).
- Establish and develop public-private partnerships to promote collaborative research, technology transfer and strengthen links between research institutions and businesses.
- Strengthening the links between research, innovation and education through the exchange of experience, best practice and joint educational activities.

2. raising research quality and international visibility

- Improving the quality of research results and increasing the international visibility of Polish science through joint publications in prestigious journals.
- Promoting the achievements of Polish research internationally, which contributes to increasing the reputation and recognition of Polish scientific institutions.

3. support for research careers, especially for young researchers and women

- Supporting the development of research careers at different stages, from obtaining a doctoral degree to achieving professorial titles.
- Actively engage young scientists and promote greater participation and role of women in science, especially in technical sciences.

4. development of innovation, new technologies and knowledge transfer

- Stimulating innovation, developing new products, technologies and solutions with commercial or social potential.
- To support the transfer of knowledge and technology between science and industry, including support for small and medium-sized enterprises engaged in research and development activities.
- Increasing the integration of research, innovation and education to create a coherent ecosystem conducive to the development of modern science and the knowledge economy.

International cooperation and public-private partnerships

The three calls implemented under the Programme provided for partnership projects. As a result, **50 projects were realised in partnership with a foreign entity**. At the Programme design stage, the number of such projects was estimated at a minimum of 53 (thus the degree of achievement of the target value of the indicator will be 94%). SINTEF[2] and the Norwegian University of Science and Technology (NTNU)[3] are among the most important Norwegian partners, involved in many environmental and technological research projects. The Norwegian Institute for Air Research (NILU)[4] and the Norwegian Institute of Bioeconomy Research (NIBIO)[5] have played a key role in environmental and sustainable resource management projects, supporting Polish entities in advanced environmental analyses and bioeconomy technologies. Other Norwegian universities have also been involved in project consortia, e.g. OsloMet - Oslo Metropolitan University, University of Stavanger, University of Bergen, which have contributed to the quality of the projects and supported the development of research and methodological strategies, helping to produce results with high implementation and scientific potential.

Six Norwegian partners (most frequently involved in projects) participated in the implementation of 29 projects from the POLNOR, POLNOR CCS and IdeaLab calls, which accounts for more than half of all implemented projects from these calls. These entities have thus made a significant contribution to the projects, but also to the development of Polish-Norwegian cooperation in the field of R+D.

[2] It is one of the largest research and development institutes in Scandinavia, based in Norway (the head office is in Trondheim, but offices operate throughout Norway - in Oslo, Bergen, Tromsø, Narvik, Mo and Rana, Steinkjer, Verdal, Ålesund, Raufoss, Kongsberg, Porsgrunn, Arendal, Hirtshals and abroad in Brussels). It was founded in 1950 and is involved in a wide range of research and innovation projects, working closely with industry and the public sector. It operates as a non-profit research foundation. Its aim is to contribute to the development of society through research in life sciences, technology (including construction and civil engineering) and health and social sciences. It employs more than 2,200 staff. SINTEF shares research facilities and laboratories with the Norwegian University of Science and Technology (NTNU).

[3] NTNU is an international university with its headquarters in Trondheim and campuses in Gjøvik and Ålesund. NTNU's main focus is on science and technology, and it offers a variety of vocational study programmes and a wide range of academic offerings, also including humanities, social sciences, economics, medicine, health sciences, pedagogical sciences, architecture, entrepreneurship, artistic disciplines and artistic activities. The university's roots go back to 1760, when Det Trondhiemske Selskab (Trondheim Academy) was founded. A merger in 2016 made NTNU the largest single university in Norway (the three universities located in Trondheim were then merged into NTNU).

[4] NILU is an independent, non-profit climate and environmental research institute founded in 1969. It is a highly qualified research institute with a leading competence profile in the fields of atmospheric composition, climate change, air quality, environmental pollution, health impacts, sustainable systems, the circular economy and digitalisation.

[5] NIBIO is a state-administered body, reporting to the Minister of Agriculture and Food. It was established in 2015 as a result of the merger of Bioforsk, the Norwegian Institute of Agricultural Economic Research (NILF) and the Norwegian Forest and Landscape Institute. It is headquartered in Ås, but the institute has several regional units and a branch in Oslo. NIBIO researches and provides knowledge on food and plant production, the environment, maps, land use, genetic resources, forests, business, business and social economics. Through research and knowledge creation, the institute aims to contribute to food security, sustainable resource management, innovation and value creation in value chains for the food, forestry and other bio-industries.

Table 1 Norwegian partners that have most frequently entered into project consortia under the Programme

Name of partner	POLNOR	POLNOR CCS	IdeaLab	Total
SINTEF	7	4	-	11
Norwegian Institute for Air Research (NILU)	3	-	3	6
Norwegian University of Science and Technology (NTNU)	4	1	-	5
Norwegian Institute of Bioeconomy Research (NIBIO)	4	-	-	4
OsloMet - Oslo Metropolitan University	2	-	2	4
University of Stavanger	2	1	1	4

Source: own elaboration based on data provided by the Contracting Authority (list of concluded contracts).

Although the same actors acted in different projects, most often the members of the project teams were different people. As part of the mid-term evaluation of the Programme[6] the composition of consortia was analysed in detail. The authors of the report then came to the conclusion that different teams/people from the same institutions collaborated in different projects within the Programme. Moreover, these teams also varied between successive editions of the Programme. The programme therefore attracted and supported new researchers all the time. This in turn means, among other things, that the pool of researchers developing their competence to work in an international environment has expanded all the time.

During their research, project managers emphasised that cooperation with foreign partners, had significantly enriched their professional contacts. Thanks to this cooperation, it was possible to establish new relationships that create the potential for further, long-term cooperation at European and global level. Teams that previously had no experience of international projects gained the opportunity to work with renowned institutions, which increased their international visibility and opened the way for future research projects under programmes such as Horizon Europe.

The POLNOR, POLNOR CCS and IdeaLab projects have enabled Polish teams to establish lasting relationships with Norwegian partners, resulting in further research plans and new project ideas. International cooperation with Norway, as well as the opportunity to exchange experiences with each other, has proved beneficial for relationship building and mutual understanding of research standards.

International cooperation has enabled Polish teams to access advanced technologies and research methods used by Norwegian partners, especially in areas such as environmental technologies, microfluidics or CO capture technologies$_2$. Teams conducted research mainly in their own units/laboratories, on their own equipment, using internal resources. The results of tests, studies and experiments were consulted on an ongoing basis and knowledge was shared. There were cases where partner resources were used to carry out tests/research. In some projects under POLNOR CCS and IdeaLab, Polish teams were able to use equipment and resources (including laboratory resources) of Norwegian partners (e.g. induction furnaces or a pilot furnace for the process of carbothermic reduction of manganese ores), which contributed to an increase in the quality of research and acceleration of R&D work. Cases where Polish equipment and resources (including laboratory resources) were used were less frequent, but also occurred (e.g. Norwegian partners

[6] Report from the study "Evaluation of the "Applied Research" Programme". - final report, EGO, LB&E, Warsaw 2023.

conducted tests of anti-icing devices in the wind tunnels of the Warsaw University of Technology). Through participation in the projects, Polish teams have also gained experience in modern methods of research project management and international cooperation.

40 projects were realised in consortia which included enterprises (38 in POLNOR and 2 in POLNOR CCS). The Programme assumed that 45 such projects would be realised, but in the POLNOR CCS and IdeaLab calls there was no obligation to include enterprises in the consortia (thus the rate of achievement of the target value of the indicator will be 89%). Consortia included large Norwegian companies, which contributed resources and technologies useful at further implementation stages and supported projects from the industrial and commercial side, providing knowledge of real market requirements and technological opportunities Examples include.

- Aquateam COWI AS (participation in 3 projects from the POLNOR call) - a consulting company specialised in water and wastewater engineering and the waste management sector. It has the status of a research institution and focuses on applied research and consultancy;
- Eramet Norway AS (participation in 1 project from POLNOR call) - a company active in the metal industry, specialising in the production of metal alloys, e.g. those required for urban infrastructure (using manganese, nickel and mineral sands) or energy transformation (using lithium, nickel and cobalt);
- Elkem ASA (participation in 1 project from POLNOR call) - the company is one of the world's leading suppliers of advanced silicon-based materials (in the areas of renewable energy, electric vehicles, healthcare and construction). It also produces silicones, silicone products and carbon solutions. It employs around 7,400 people at 30 production sites worldwide.

Companies from Poland were also involved in the projects (33 companies in total). Two of them were project leaders from the POLNOR call:

- Port of Gdynia Authority S.A. (project leader with the acronym MPSS) - one of the leading ports in the southern Baltic Sea. It is a modern all-purpose port, specialising in handling general cargo, including mainly unitised, containerised and ro-ro cargo, based on a network of multimodal connections with the hinterland, regular short sea shipping lines and ferry connections;
- redoxme AB sp. z o.o. (project leader with the acronym UPTURN) - a division of the Swedish company Redoxme AB from Norrköping (the division is located at the AGH Energy Centre in Kraków). The company supplies laboratory equipment that enables simultaneous *in-situ* measurements of a range of signals (electrochemical, optical, thermal and others) on thin films and membrane materials.

Two Polish companies were involved in more than one project:

- Aquanet S.A (participation in 2 projects from the POLNOR call) - is the largest company in Wielkopolska involved in the collection, treatment and supply of cold water, collection and treatment of sewage, as well as the provision of water, sewage and rainwater management services. It operates in Poznań and the surrounding municipalities (providing services to almost 900,000 residents),
- Pure Biologics S.A. (participation in 2 projects from the POLNOR call) - is a biopharmaceutical company focused on the discovery and development of biological drugs and extracorporeal therapies. It operates in the fields of immuno-oncology, autoimmunity

and neurological rare diseases, conducting research using proprietary technology platforms to select active molecules - antibodies and aptamers.

Significant contributions to the[7] projects were made by the companies: ForstX Sp z o.o. (manufacturer of food lyophilisers), AIUT Sp. z o.o. (supplier of advanced robotics and automation systems), MuoviTech Polska Sp. z o. o. (sustainable solutions for geothermal energy), Tecna Sp. z o.o. (manufacturer and supplier of business software), Kambu Sp. z o.o. (manufacturer and supplier of dedicated IT systems).

Under projects from the POLNOR call, companies cooperating with research institutes had the opportunity to test initial technological solutions and prototypes, which facilitated their initial adaptation to market needs. Cooperation with private companies in projects from the POLNOR CCS call made it possible to gain access to specialised infrastructure that public institutions lacked, and to acquire technological resources and industry knowledge. Private partners provided access to their laboratory infrastructure and technical support, which accelerated the implementation of the projects' research.

By working with companies, some projects have reached a stage where prototypes could be developed and tested under market-like conditions. Private partners were able to test the prototypes and assess their usability. In particular, projects related to energy and environmental technologies (POLNOR CCS) have achieved significant results in terms of testing prototypes.

Partnerships with the private sector have created lasting relationships that increase the potential for commercialisation and continued collaboration beyond the end of the project. The companies involved in the projects were interested in the further development of the technologies and were considering their implementation. In some cases, preliminary negotiations related to implementations are already taking place after the projects have ended, with business partners indicating the possibility of further product development based on the results of NCBR projects (POLNOR).

Improving research quality and international visibility

The completed projects resulted in publications using the results of the research carried out within the projects. Although joint publications were not always easy to achieve, many researchers indicated their relevance and planned further publications after the completion of the projects. Joint publications with Norwegian partners were particularly important for the visibility of the projects and for raising the prestige of the research results.

More than 770 scientific publications have been produced or are in the pipeline as a result of the projects:

- Almost 7 in 10 of all publications are the result of projects carried out as part of the POLNOR call.

[7] The value of the consortium's share of the project value was at least PLN 2 million.

- 1 in 3 publications (in each call for proposals) is a joint publication (i.e. prepared in cooperation between persons involved in the projects on the part of the Polish and Norwegian partners).
- 3 out of 4 publications have already been published (including almost 8 out of 10 publications from the POLNOR call).
- English is the dominant language of publication, with 6 out of 10 having been or will be published in this language (including 8 out of 10 from the SGS call).
- 6 out of 10 publications are or will be available in open access, significantly increasing their impact and knowledge transfer (more often publications from IdeaLab and POLNOR CCS calls than POLNOR and SGS).

Approximately half of the publications have been or will be published in journals with an Impact Factor (IF)[8] higher than 2. The predominant themes of the articles are: renewable energy and thermal processes, process modelling and research methods, sustainability and CO_2 . 13 articles have been published in journals with an IF index higher than 10. Key review journals are assumed to have such an index. Articles have been or will be published in the following prestigious journals: Joule, Applied Catalysis B: Environmental, Blood, Bioactive Materials, Nature Protocols, Renewable and Sustainable Energy Reviews, Journal of Hazardous Materials.

Projects financed under the Programme enabled researchers to participate in numerous **conferences abroad**, which contributed to increased visibility of Polish teams on the international arena (7 out of 10 conferences at which research results obtained in the project were presented had an international character). As it was pointed out, universities and research institutions do not always have the resources to send their researchers to conferences, so the Programme funding made it possible to present the results more widely in international forums. Of particular importance is that these were often conferences of high prestige, with many researchers/participants. Such conferences include:

- IEEE International Conference on Big Data, organised periodically by the Institute of Electrical and Electronics Engineers (a non-profit organisation of electrical and electronics professionals);
- The International Biometerology Congress, held periodically, brings together specialists from around the world, focusing on interdisciplinary research on the interaction between atmospheric processes and living organisms - plants, animals and humans;
- World Geothermal Congress (Beijing) - a prestigious event on geothermal energy;
- EURA 2023, organised by the European Urban Research Association, covering the topic of urban adaptation to climate change;

[8] Impact Factor (IF) is an index that measures the average number of citations per article published in a journal over the previous two years. It is calculated annually by Clarivate Analytics and serves as an indicator of the quality of scientific journals, reflecting their impact on the academic community. The higher the IF, the greater the recognition and citability of articles published in a journal, which often indicates its prestige in a particular scientific field.

- ESA Living Planet Symposium 2022 - in the area of environmental research and remote sensing.

Cooperation with Norwegian partners enabled knowledge transfer, including learning the methodologies used in international projects. In turn, the interdisciplinarity of the projects (especially in the area of environmental protection and photocatalysis) has helped the teams to learn how to approach problem solving from different perspectives (POLNOR, POLNOR CCS). Thanks to the possibility to conduct joint research with foreign institutes of a high scientific level (such as SINTEF, NTNU, among others), the research carried out in Poland has gained in quality. Researchers emphasised that access to Norwegian resources and joint analyses and substantive discussions had a positive impact on their scientific workshop.

Support for research careers, especially for young researchers and women

A total of projects were supported:

- 1393 researchers from Poland (women accounted for 43%),
- 329 foreign researchers (women accounted for 47%).

For both groups, these values are approximately 1.5 times higher than initially assumed in the projects (at the planning stage) and more than 3 times higher than assumed in the Programme (within the target values of the indicators).

The SGS call supported women in technical industries that are traditionally considered 'male'. In projects from this call, the role of project manager (Principal Investigator) could only be filled by a female scientist. For example, one female steel researcher highlighted that participating in the project enabled her to implement her research plan and gain new competences, which strengthened her professional position in a male-dominated industry.

30 projects under the Programme were led by young scientists. In the POLNOR call, the term "young scientist" was used for persons conducting scientific activity with a doctoral degree, from the attainment of which less than 7 years had elapsed, employed in the system of higher education and science (e.g. in a university, in the PAS, in a research institute). In the SGS call, "young scientists" were also understood (in addition to those indicated above) as doctoral students or university teachers (i.e. persons who do not hold a doctoral degree but are employed in the higher education and science system).

The projects allowed the young researchers to establish international contacts, which was crucial for their development. The POLNOR and IdeaLab projects gave participants the opportunity to travel to Norway and work on research together with foreign teams. It was emphasised that the personal contacts with scientists from other countries were invaluable and contributed to the quality of their research work and provided the opportunity to publish joint articles.

In the SGS and POLNOR projects, many young scientists, including PhD students, had the opportunity to conduct research that formed part of their theses and dissertations. One example is a student who participated in the catalysts work, whose undergraduate thesis won prizes at national competitions. Such achievements have significantly raised her scientific level.

The programme allowed for a relatively flexible recruitment of young researchers, which would not have been so easy in projects funded by other sources (e.g. NSC grants). It allowed more young researchers to be involved, funding for their travel to conferences and professional development through direct collaboration with more experienced scientists. The projects included, among other

things, short-term internships abroad, which enabled young researchers to work at renowned institutions. In the IdeaLab project, for example, the researcher established a partnership with a prestigious research centre in Catalonia, which contributed to long-term collaboration and opened the door to further research projects internationally. Projects have often been interdisciplinary, allowing young researchers to develop in different fields and exchange experiences with researchers from other sectors, such as agriculture or the environment (mainly IdeaLab call projects).

Development of innovation, new technologies and knowledge transfer

The projects have developed 170 new products/technologies. To date, 73 applications for intellectual property protection have been filed (more than half of them in 2024). 9 out of 10 of these are for patent protection, 8 out of 10 are applications filed in Poland.

Half of the surveyed project managers (n=62) assessed that the project resulted in results/solutions ready for implementation (more often in POLNOR and IdeaLab calls). In 4 cases, project results have been implemented (POLNOR), while in 23, activities on implementation are underway or planned.

According to group interviews with project managers, one project developed a prototype of a high-pressure milk storage apparatus, a solution that is particularly valuable for breast milk banks. The project requires further automation development, but has allowed the team to develop a unique technology that can be applied on a large scale (SGS). One team has developed novel hydrogen storage and transfer materials for use in hydrogen-related infrastructure. The results of the project were so promising that a company was established in a business incubator to commercialise the results obtained (SGS).

As part of POLNOR projects, solutions have been developed that can be immediately implemented by industrial partners without large financial outlays. For example, solutions for the management of waste materials have started to be used in the daily business operations of one of the project partners with the acronym SNIT[9] , confirming their readiness for commercialisation.

3.2 Determinants affecting project outcomes , including implementation of results

Both internal factors (related to the implementation system and rules) and external factors (factors independent of the Programme's management and implementation system) had an impact on the implementation and achieved results of the projects.

Internal factors influencing effects

Internal factors mainly had a positive impact on project performance. The Programme's mid-term report[10] gave high marks to **the rules for applying for and implementing projects**, including eligibility, the selection of the themes of calls and the timing of implementation. However, attention was drawn to insufficient **administrative support from research institutions**, which overburdened project managers and distracted them from their substantive tasks. Similar conclusions appeared in an

[9] Shortcut nitrification in activated sludge process treating domestic wastewater - key technology for low-carbon and clean wastewater treatment (project leader - Wrocław University of Technology).

[10] Study report "Evaluation of the "Applied Research" Programme". - final report, EGO, LB&E, Warsaw 2023".

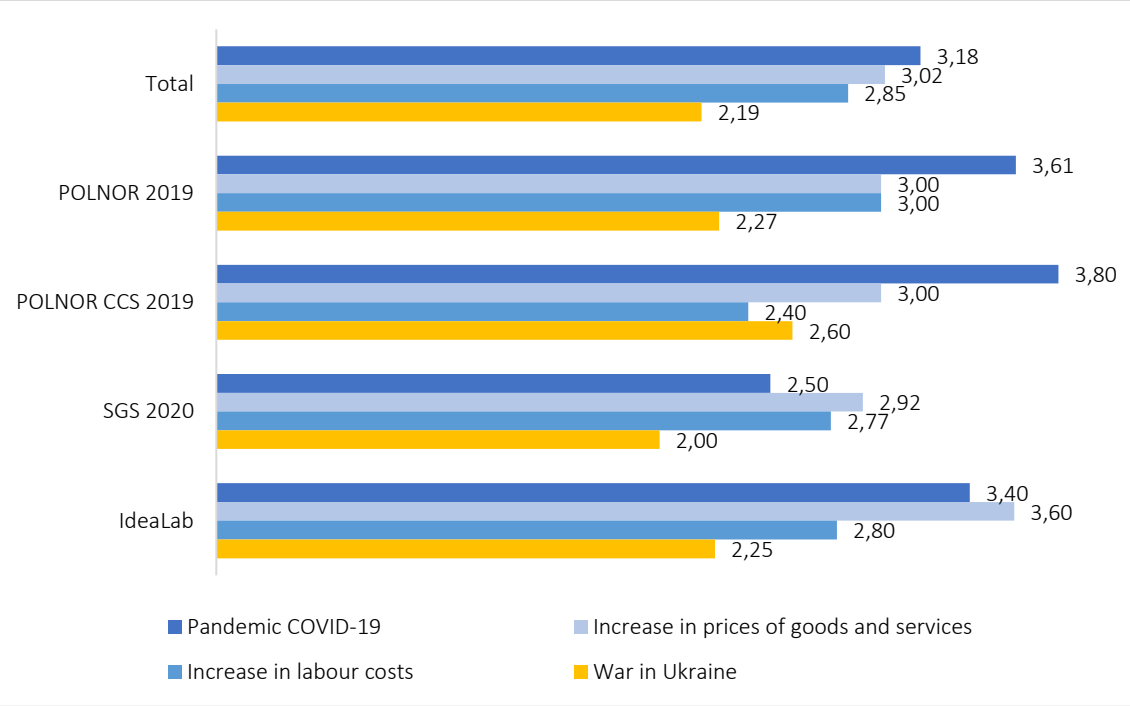
earlier NCBR evaluation report, where **the application selection, implementation and project settlement stages** were positively evaluated. The evaluation of the EEA and Norway Grants 2009-2014 also emphasised that the effectiveness of the interventions was strengthened by **well-chosen research areas and precise project selection criteria**. A positive factor was the **flexibility of provisions in the programme documentation**. The documentation allowed detailed solutions to be adapted to the needs of the beneficiaries, which increased the effectiveness of project implementation[11] . One of the key issues for the success of the project was the **appropriate selection of partners, preparation of a detailed schedule** and **effective communication within the consortium**[12] . For more information on the assessment of internal factors, see Chapter 5 of the report.

External factors influencing effects

In the 2023 Annual Programme Report[13] , **the COVID-19 pandemic** was identified as the most important factor affecting project and Programme implementation. Also according to the beneficiaries, **the COVID-19 pandemic and the increase in prices of goods and services** had the greatest negative impact on project implementation. Less important were factors related to the **increase in labour costs** and **the war in Ukraine**. The differences between the calls in this respect are quite pronounced. IdeaLab projects were most affected by the increase in the prices of goods and services and the COVID-19 pandemic, which also had the greatest negative impact on projects in the POLNOR 2019 and POLNOR CCS 2019 calls. The war in Ukraine had the least impact on the project performance of 3 of the 4 calls - with the exception of POLNOR CCS 2019.

[11] Evaluation of the effects and management and implementation system of the EEA Financial Mechanism 2009-2014 and the Norwegian Financial Mechanism 2009-2014, IDEA Instytut sp. z o.o., Policy & Action Group Uniconsult Sp. z o.o., Warsaw 2017.
[12] Vademecum of knowledge on international research projects subsidised by NCBR, NCBR, Warsaw 2021.
[13] ANNUAL PROGRAMME REPORT FM14-21, Poland 2023

Chart 1 Please indicate to what extent the following factors had a negative impact on the project (mean 1-4)



Source: own compilation based on quantitative survey with project managers, n=62. The chart shows the averages. Respondents rated each factor on a scale from 1 (no impact at all) to 4 (high negative impact).

Pandemic COVID-19

The COVID-19 pandemic had an impact on both Programme and project implementation. The 2020 Annual Programme Report indicated that **the Programme Operator (hereafter PO) had to adapt Programme implementation to the new circumstances**. Changes included, among others: the organisation of online meetings; the use of electronic qualified signatures and electronic version of documents; improvements to the electronic application system - based on the experience of past calls, the PO implemented some improvements to the system to make it more transparent for applicants, e.g. the validation of the application by the applicant before submitting the project application was simplified.

The COVID-19 pandemic had both negative and positive impacts on projects. **The negative impact** manifested itself through, among other things:

- **Restrictions on access to laboratories and experimental work** - in many projects, the pandemic forced a switch to remote working, which limited the possibilities for laboratory research, e.g. a limited number of staff could work the same shifts (SafeFoodCtrl project).
- **disruption to supply chains, limited access to raw materials, supplies and equipment** such as reagents or laboratory equipment - for example, in the FrostWave project, the pandemic caused delays in the supply of refrigeration system components, necessitating a reorganisation of the schedule (there were delays in running experiments). Similarly, in the CerChamber project, the pandemic disrupted the availability of key materials, forcing a modification of the list of raw materials needed and an extension of the project.
- **Problems with the awarding of tenders,** including **the selection of subcontractors -** e.g. in the QualityBerry project there were delays in the implementation of tenders or requests for

tenders on the Competitiveness Database platform (in accordance with the provisions of the 'Public Procurement Law') due to the lack of offers from companies for the supply of the procured products (certain plant protection products, biologicals and fertilisers) and the need to repeat these procedures. This was probably caused by delays in the import of products from abroad by potential contractors or the instability of prices for these products due to the COVID-19 pandemic. In turn, the LEPolUAV project experienced the need to repeat tenders for the selection of subcontractors, which significantly delayed UAV production. As a consequence, tasks related to system integration, testing in the laboratory and in a suitable environment were also delayed.

- Disruptions in participant recruitment - in clinical and health research projects (e.g. RHEUMA), the pandemic caused delays in patient recruitment, requiring extensions to schedules.
- impediments to international contacts - the pandemic made it impossible to organise international visits and workshops, which affected, among other things, knowledge sharing and networking between partners.
- impediments to interpersonal contact - many project teams had to move meetings to online spaces, which initially hindered communication and collaboration. In turn, the deterioration in the health of team members affected research activity and the timeliness of the work carried out.
- Increased project costs - the pandemic contributed to an increase in the price of materials and components and a decrease in their availability, necessitating budget shifts in projects.

The limitations indicated above, e.g. in travel and access to infrastructure, hindered collaboration and the realisation of trip-related indicators. It is worth noting that, in many cases, the duration of the pandemic was to initiate effective collaboration between partners or even to start the research phase. In many projects, restrictions hampered the knowledge dissemination process, with the cancellation of conferences and a long-standing reluctance to organise mass events (including scientific conferences). In the 2022 Annual Programme Report, the PO indicated that since the lifting of the COVID-19 pandemic restrictions, measures had been taken to encourage beneficiaries to plan bilateral visits, which was expected to intensify bilateral relations in projects and result in joint future initiatives. The lifting of pandemic restrictions also had an impact on the final outputs (outputs and outcomes) of the projects - as the restrictions blocked the possibility of achieving some of the indicators, such as the indicator 'Number of women scientists travelling abroad for research'.

Most of the problems encountered, in turn, translated into delays in the schedules of tasks and, as a result, into longer implementation times for entire projects. It is worth emphasising that, in response to the occurring problems in the timely implementation of projects, the PO most often accepted proposed changes to project schedules.

On the other hand, a positive impact of the COVID-19 pandemic was also identified, which manifested itself, for example:

- the development of new opportunities arising from digitisation. These opportunities were both in the ways of collaboration (working remotely allowed project teams to develop new ways of working together, which can continue to be used after projects have ended) and in the way research is conducted (e.g. in response to pandemic constraints, the RHEUMA project implemented remote solutions for patient monitoring and online data collection - which not only ensured the continuity of projects, but also created new opportunities for their development).

- an increase in the representativeness of the data collected - e.g. in the RHEUMA project, the change of partners from a few hospitals in one region to facilities from different cities increased the diversity of the data collected, which had an impact on the quality of the results.
- drawing more attention of beneficiaries to the possibilities of using the results, including their implementation in the area of e-commerce.

War in Ukraine

The war in Ukraine also had an impact on the projects implemented - primarily a negative impact. It manifested itself through, among other things:

- a significant increase in inflation, which in practice meant an increase in the price of electronic products and components, raw materials, operating costs, labour costs, energy prices - all of which forced budget changes, reductions in original purchasing plans and the abandonment of some research activities. For example: in the HyStor project, the significant increase in material prices was the reason for partnering with new research entities to procure these raw materials as part of the research, rather than purchasing them as standard on the market; in the HumMilkPres project, raw material prices increased so significantly that the budget had to be revised and the technical specification of one important piece of equipment had to be reduced; in the CerChamber project, consumable prices increased so much that less critical items were dropped from the list of planned purchases in favour of the most critical ones.
- Disruptions in supply chains, timing of work and services by subcontractors - the war disrupted supply chains, which translated into delays in the procurement of materials and components required for research (e.g. in the HAPADS, HyStor, VariaT, CerChamber, AGaStor projects). Access to spare parts has also been a problem, resulting in prolonged maintenance and repair of key research equipment.
- the risk of cyber attacks - an example is the CoMobility project, where the contractors reported a cyber attack on their platform a few weeks before the planned start of data collection in schools. This limited the availability of information made available on the site and delayed ongoing research activities.
- problems in collaborating with Ukrainian researchers - an example is the MoReSiC project, where the Ukrainian researcher to join the team was unable to travel out of Ukraine due to war-related constraints. Working with him remotely was a challenge and - apart from some simulation studies delivered late - his contribution to the project was limited. Eventually, in October 2023, this scientist stopped contacting the MoReSiC team without delivering a report, which meant that two other team members had to take over the task.

The war also affected the piloting of the local decarbonisation process implemented by the GreenHeat project. The situation became more complicated when the municipal unit in Legionowo, responsible for improving the city's air quality, granted coal subsidies in 2022 at the request of the government. As a result, residents were very reluctant to make any decisions about their heat sources. The war in Ukraine and the resulting ad hoc government interventions (e.g. coal subsidies) and significant delays in the introduction of expected changes to Polish law (e.g. allowing the creation of energy communities or virtual prosumers) had a negative impact on project implementation. These factors resulted in a noticeable increase in uncertainty on the part of the various stakeholders and a reduction in the variety of technical and formal models available for new

heating solutions. In response to this, the conditions for decarbonisation scenarios were reconstructed, taking into account technical, social and economic aspects.

The war in Ukraine, like the COVID-19 pandemic, therefore translated into significant increases in project costs and changes in project schedules. In response to this, some beneficiaries made appropriate changes to their cost estimates to generate additional savings to finance the rising costs of other tasks. In turn, the Programme Operator introduced **a mechanism of additional funding for the POLNOR, POLNOR CCS and IdeaLab projects to support the projects.** The additional funding was possible due to significant depreciation of the zloty (PLN) against the euro (EUR) which generated exchange rate surplus in the "Applied Research" Programme. The aim was to mitigate the risks faced by the projects, which arose from the multiple crises related to the war in Ukraine, the COVID pandemic and inflation. Indeed, these risks were beyond the control of the beneficiaries and were impossible to foresee at the time of project applications. Information from the final reports of the projects shows that these additional funds allowed, among other things:

- purchase of more expensive materials, components and specialised equipment;
- reallocating funds between budget categories to align spending with new needs and changing priorities (funds allowed, for example, alternative technologies and solutions that were more costly but necessary to achieve objectives);
- maintaining the high quality of research and final products, despite the difficulties associated with higher costs.

All of this ultimately allowed the projects to continue and be successfully completed, including achieving their objectives.

Other factors

Regulatory and legal changes/policy decisions were also a factor negatively affecting project implementation. Changes in legislation concerning, for example, data protection, pharmaceutical regulations or environmental protection required adjustments to procedures and documentation, which often increased the cost and time of implementing activities. In some cases, project teams had to devote additional resources to legal consultations and training.

- Projects in the area of Renewable Energy Sources (RES) (mainly IdeaLab) have encountered difficulties with their positive perception and investor/consumer interest as a result of the presence of negative media messages about RES, also suggesting less political and financial support for RES.
- In the RHEUMA project, changing legislation on medical records and data protection requirements required the GoTreatIT® platform to be adapted to the new standards.
- The temporary slowdown of some projects was influenced by the amendment to the Act on Science and Higher Education. The amendment introduced, among other things, changes in the classification of fields and disciplines (assignment of a discipline to a field, changes in the names of disciplines: automation, electrical engineering, electrical engineering and space technology; civil engineering, geodesy and transport). These changes have

necessitated new declarations by those conducting and participating in the conduct of scientific activities .[14]

There were also **personnel/staffing problems** during the project implementation phase. These were related to the absence of team members for health reasons, personnel changes (e.g. staff turnover in project teams), problems finding team members with preferred experience/qualifications, and problems finding qualified people to replace them. In knowledge-intensive projects, on the other hand, replacing key individuals was time-consuming and costly. In addition, changing personnel required the deployment of new staff, which impacted on the pace of task completion. In some cases, teams therefore used a replacement system or engaged external experts. For example, in the GalvaNiB project, 4 people left the team and 1 was on maternity leave. In response to this, it was necessary to recruit and add new people with the required competences and qualifications to the team. The NITROsens project had been intensively searching for a candidate for the position of co-researcher - a master's student - specialising in chemistry, electrochemistry or materials engineering for a long time. Despite advertisements in online student forums and the distribution of posters, it was not possible to recruit such a person. As a result, there were additional delays in the project, which eventually led to the recruitment of a PhD student.

Another factor identified was **communication and organisational problems** within project teams. Communication problems resulted from the different solutions used on the part of the leader and partners when implementing projects of a similar type. Few problems related to the general organisation of work in projects were also identified - mainly excessive administrative burdens or difficulties in organising a stable administrative service.

As the projects carried out were highly specialised, **technical problems and equipment failures** were also not uncommon. In turn, failures of key research equipment affected delays in the implementation of experiments and often entailed additional costs that required changes to the budget. Repairs, in turn, were time-consuming and sometimes impossible due to the lack of available spare parts. In some cases, teams had to rent external equipment or outsource analyses to other institutions.

Determinants of the implementation of project results

In-depth interviews with project managers revealed that the following factors, among others, influence the ability to implement project results:

- **Financial factors**: Project managers during the interviews indicated that the commercialisation of the results required significant investments, especially in the case of technology and materials projects. In projects related to metallurgy or hydrogen storage, the scale of investment was up to PLN 30 million, making implementation difficult without financial support;
- **Legal and administrative requirements**: Procedures related to technology approval, obtaining water permits, and environmental regulations were significant administrative

[14] Amendments to the Act - Law on Higher Education and Science, in the context of the classification of fields and disciplines and staff declarations , accessed 22.11.2024.

barriers. One example was carbon capture technology, which required both public approval and stringent legal requirements;

- Tailoring to market needs: Industrial partners were key in aligning project results with actual market needs. Companies participating in consortia provided information on commercial requirements, which helped researchers to refine the technology.

The results of the quantitative survey (with representatives of projects under the POLNOR, POLNOR CCS and IdeaLab calls) indicate that difficulties related to the issue of intellectual property management were incidental (30 out of 38 respondents did not diagnose such a problem). In one project the problem arose at the stage of signing the consortium agreement (POLNOR), in three at the stage of project implementation (POLNOR, IdeaLab) and in three after project implementation (POLNOR, POLNOR CCS, IdeaLab). The main reasons cited for the difficulties were:

- unequal involvement of partners in the development of intellectual property (5 out of 7),
- Difficulties with IPR allocation (attribution of rights to specific research results to specific partners/individuals (3 out of 7),
- Insufficient knowledge of intellectual property management (3 out of 7),
- Difficulties in identifying which research results and how they can be disseminated (3 out of 7).

During the in-depth interviews with project managers, several factors emerged that condition the issue of intellectual property rights in consortium projects, especially international ones:

- The regularisation of IP was often delayed due to differences in procedures between the Polish and Norwegian partners and the need to refine the distribution of rights after project completion. In one case, the clarification of IPR rights delayed implementation by several months;
- In some consortia, the approach to IPR was flexible and the arrangements between partners were based on mutual trust, which avoided disputes and facilitated the process of settling rights after the end of the project;
- There are cultural differences in the approach to IPR. While Polish teams often took a more formal approach to IPR negotiations, Norwegian partners approached the subject with more freedom and were less focused on rigid contractual provisions. This was particularly evident in projects where they were working with Norwegian companies, such as Eramet, who, although actively looking after their interests, were open to flexible arrangements;
- Polish partners were usually used to solutions applied in European projects (e.g. in the Horizon Europe programme), where each partner retains the right to the results they have developed themselves. This was not the case in Norwegian projects, where the focus was on joint achievements, resulting in the need for additional negotiations and arrangements after project completion;
- Norwegian partners often employed IPR experts, which facilitated their negotiations, whereas Polish institutions, especially academic institutions, did not always have such specialists at their disposal. This difference in access to specialists was particularly evident in the case of Norwegian companies, which were free to negotiate contract provisions.

Many projects ended at TRL 4-5 or lower, meaning that solutions require further R&D to reach full commercialisation readiness. Project managers highlighted that it can take up to a decade to fully

implement innovations, especially in technology-intensive sectors. Further development and scaling of solutions are key to full commercialisation.

4 Programme impact assessment

MAIN CONCLUSIONS

Sustainability of partnerships and continuation of projects

- 91 follow-on projects from the „Applied Research" Programme (proposals submitted or under development), including 28 proposals to Horizon. 83% of these projects are continuing projects with a Norwegian partner.
- High sustainability of consortia from the "Applied Research" programme (only 4 out of 49 promoters do not plan further cooperation)
- High sustainability of cooperation with partners (45% of promoters already cooperate with partners from Norway; another 45% plan to do so in the future)
- Continuation or plans to continue all projects in other programmes, mainly Horizon Europe, EFME, as well as calls organised by the National Science Centre
- Direct linkage of subsequent projects to the solutions developed in the "Applied Research" programme (continuation of research and implementation of technologies in an advanced form)

Impact of projects on the capacity of scientific teams

- Significant impact of projects on the scientific standing and potential of project coordinators (increased prestige, development of competences in international project management, strengthening of interdisciplinary skills and development of international networks)
- High relevance of the experience from the „Applied Research" Programme for preparing Polish teams for more complex, international projects, increasing application potential, strengthening relations with foreign partners
- High relevance of experience from the „Applied Research" Programme in applying to Horizon Europe (similarity of implementation rules between the two programmes, gaining knowledge and experience in implementing international projects)

Strengthening the capacity of the actors involved

- Increase in the Programme Operator's organisational and competence capacity as a result of cooperation with the Research Council of Norway and regular workshop meetings with research programme operators from other countries.
- Increased recognition and improved image of project beneficiaries in the social and scientific research environment.
- It is easier for project beneficiaries to establish various types of cooperation with completely new entities and institutions.
- Ability to use the research infrastructure and services at the disposal of individual consortia partners to carry out their own research work.
- Strengthening cooperation between the science and business sectors.
- An increase in the business position of companies that are part of project consortia (possibility to expand their business areas and enter new markets more easily).

Social benefits

- Improving public awareness in different areas of life - project beneficiaries undertook numerous activities to involve different stakeholders in the projects and to spread and improve awareness, including public policy makers, representatives of the education sector, business or the general public.
- Measurable benefits for society resulting from implementations (solving problems in the areas of health, environment, transport, food, quality of life).
- Dissemination and exploitation of project results (further promotion of results to scientists/researchers, policy makers or educators; formulation of guidelines/recommendations/proposals for legislative changes based on the results obtained; further research and development of new solutions based on the results obtained).

Economic benefits

- Gradual implementation of the resulting solutions in business and public services.

Factors that reinforce the effects of projects in the long term:

- Financial factors (seeking sustainable funding for continued research and technology development, diversification of funding sources, commercialisation of products and technologies)
- Economic factors (diverse forms of commercialisation of results, integration with other systems available on the market, scalability and adaptability of the technology under different conditions)
- Social factors (positive public perception of the project's results, sustained interest in the project in the scientific community, wide promotion in the business sector)
- Environmental factors (highlighting environmental benefits)
- Institutional factors (development of strategies or detailed plans for continuing research and activities beyond the end of the project, strong institutional support and cooperation between partners)

Factors that threaten the long-term effects of projects:

- Financial constraints (lack of sufficient funds to continue activities after projects have been completed, high competition for research grants, high research and technology development costs, compulsory participation of industry in grant calls acting as a barrier to scientific projects with high financial risks)
- Economic constraints (high volatility of markets e.g. energy, rapid pace of technological change, market scepticism towards new technological solutions)
- Environmental constraints (high environmental requirements)
- Institutional constraints (political changes in local government, instability in regulatory systems, risk of staff turnover and loss of expertise, the requirement to form large international consortia and to commit significant own resources, low awareness of intellectual property issues among scientists)

4.1 Evaluation of the effects of the Programme in the long term

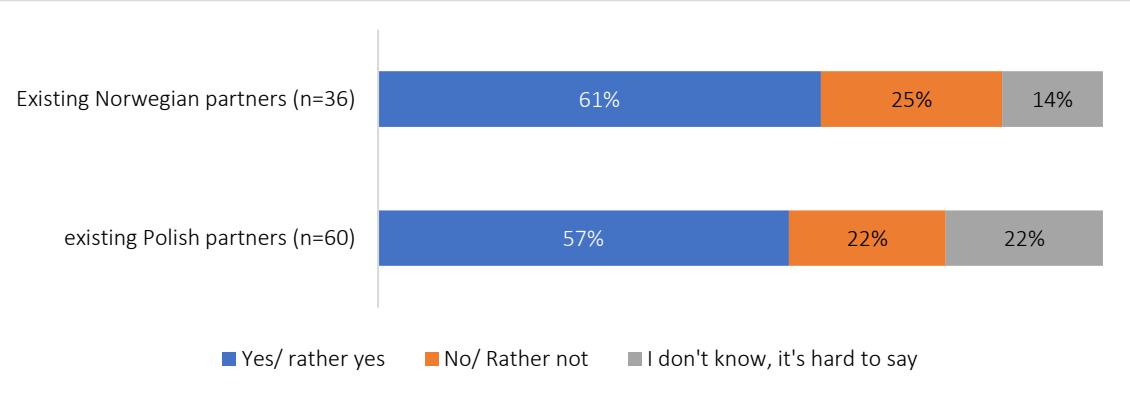
Further cooperation between partners

The sustainability of consortia formed in projects is high. Almost all promoters implementing partnership projects who declared in their project reports that they had submitted, or were planning

to submit further grant applications, planned to do so with an existing partner. Only 4 out of 49 indicated that the planned project does not include existing partners. In total, there were 58 projects planned in partnership indicated in the final reports. Among these projects, almost all (57) envisaged the participation of a partner from Norway.

The conclusion that consortium members plan to engage in further cooperation after project completion is also confirmed by the results of the quantitative survey. Most respondents involve or plan to involve Polish or Norwegian partners in future projects.

Chart 2 Is/will an existing Norwegian/Polish partner be involved in the follow-up project from the Applied Research Programme?



Source: own compilation based on quantitative survey with project managers.

Of the partnership project managers surveyed, 45% declare that they are already working with partner(s) from Norway on further research projects, and a further 45% have plans to do so - considering the further future (without indicating specific follow-up projects from the Applied Research Programme). It can therefore be expected that 90% of partnership projects this cooperation will continue.

The cooperation is aimed at developing advanced technological solutions and strengthening research capacities through international partnerships in research and development projects. The main areas of further cooperation include:

1. **Sustainability and clean technologies** - Work on modelling methods for dynamic systems, hydrogen and CO_2 storage, geothermal, borehole heat and the use of drones in environmental monitoring. The partners plan to further develop technologies that foster environmental protection and ecological transformation.
2. **Air quality improvement and pollution research** - Cooperation includes research on air quality monitoring systems, the application of air quality data in spatial analyses, and efforts to improve environmental conditions in cities.
3. **Health and biotechnology collaboration** - Research projects on new materials, proteins with antifungal properties, biomedicine and FGF receptors. The partners are also planning joint PhDs and research projects that support the development of biomedical science and improve public health.
4. **Adaptation to climate change and sustainable urban development** – Continuation of projects related to the adaptation of cities to climate change through biodiversity-based solutions, as well as the development of digital twin technology for urban infrastructure.
5. **Innovation in water and aquaculture** - Projects on water and wastewater sector transformation, recirculating aquaculture systems and recovery of raw materials from wastewater and waste.

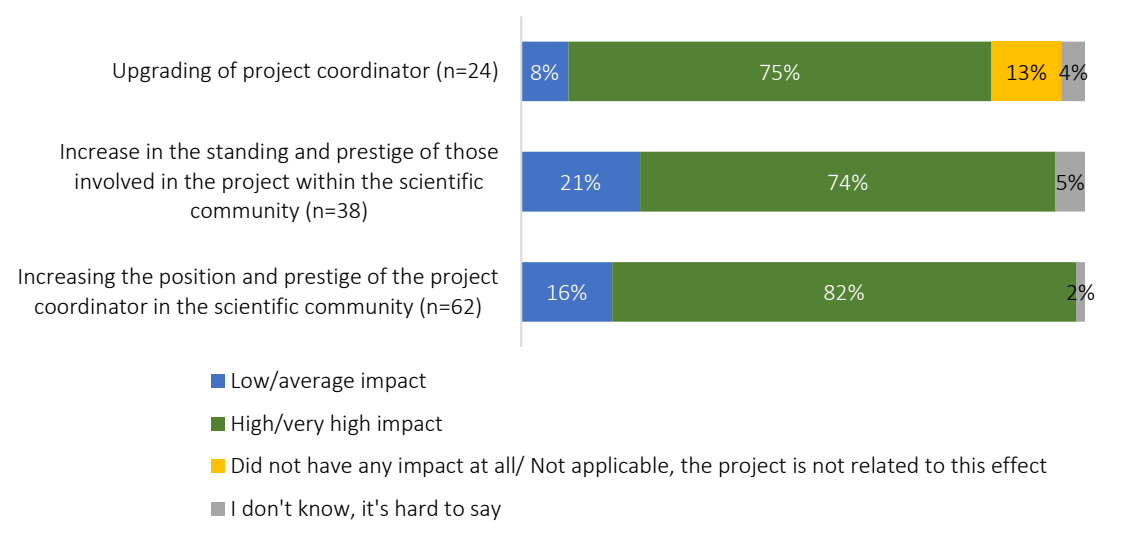
6. **New technologies and materials** - Research into certified reference materials, new technologies for biomedical engineering, as well as technologies for raw material recovery and energy storage.
7. **Development of basic research and scientific** publications - Preparation of joint scientific publications, project proposals and exchange of knowledge and experience in various research methods. Cooperation also includes short-term scientific exchanges .[15]

In the quantitative survey, **only two promoters indicated that the collaboration with the Norwegian partner would not continue**. The reason in the first case, is the reduction of the Norwegian team, but the promoter himself does not exclude joint projects with other research teams from Norway. The second promoter decided not to continue the cooperation with the Norwegian research team due to significant differences in terms of cost and efficiency in the implementation of project activities. Already during the planning stage of the project, budget-related difficulties arose, including discrepancies regarding labour costs and salaries, due to the high cost of living in Norway. After project completion, the beneficiary assessed that the expenses incurred were not proportional to the value of the results obtained. This problem, also raised by other researchers from international consortia, points to the challenges of engaging Norwegian partners. The high cost of their participation makes it possible to carry out activities of greater scope with partners from other countries for the same amount.

Impact of projects on scientific standing and enhanced prestige within the scientific community

The projects have had a significant impact on the standing and prestige in the scientific community - both of the project coordinators and of the project team members. In the case of the SGS, the projects have also translated into an increase in the academic rank of the female coordinators.

Chart 3 Please evaluate to what extent your project has had the following effects: an increase in prestige and standing in the scientific community and an increase in your degree?



Source: own compilation based on quantitative survey with project managers.

[15] Summary based on open-ended responses to the question in the quantitative survey about what the cooperation with Norwegian partners will involve.

Leading an international project in the „Applied Research" Programme has had a significant impact on **increasing the prestige and standing of project coordinators**. By cooperating with foreign partners, the coordinators have increased their visibility in the scientific community, which has translated into better cooperation opportunities, invitations to new research initiatives and participation in international conferences. One of the promoters of the POLNOR CCS project indicated that being involved in a project that required cooperation with recognised Norwegian institutions had raised his reputation in the academic community. One of the promoters of the IdeaLab call, on the other hand, said that his project, which was not very 'scientific' because it was aimed at applying solutions in market conditions, was initially met with scepticism from the scientific community. However, the results of the project were very much appreciated and the coordinator himself gained a reputation as a pioneer in difficult projects. According to this coordinator, the way IdeaLab projects are implemented differs from standard grant projects at Polish universities. For this reason, the university did not always support the project sufficiently.

Participation in the projects allowed the **preparation of new scientific publications and presentations at international conferences**, which significantly enriched the scientific output and strengthened the expert position in the field by the programme participants. The requirements for the projects (in terms of number of publications, events, conferences) had a direct impact on the output and scientific reputation of the project coordinators and participants. The requirements encouraged publication in recognised journals, which fostered academic career development and could potentially accelerate promotion to a higher academic rank. E.g. one coordinator of the IdeaLab project, who was in the process of being habilitated, indicated that her publications resulting from the project were an output that fitted into her habilitation process and enhanced her chances of becoming a professor.

The benefits for coordinators and team members also included the **development of international project management skills** and gaining experience in administering complex research projects. Participation in the projects allowed them to establish valuable contacts with scientists from other countries, and the opportunity to work in an interdisciplinary environment and exchange knowledge with experts with different specialisations broadened their research horizons and enabled them to develop their skills for collaboration in interdisciplinary endeavours.

For a large proportion of the SGS project coordinators, the project was the first step towards commercialisation of research results, which required them to **assimilate completely new knowledge**. Understanding the process of preparing research products for commercialisation, as well as their first attempts to establish cooperation with industry, increased their awareness of market requirements and legal aspects, including the protection of intellectual property rights.

POLNOR CCS project coordinators also pointed to the effect of developing **leadership competences**, which had a positive impact on the ability to mentor younger researchers, PhD students and team members.

According to the interviews with the promoters, coordinating a project (SGS call) or participating as a team member (other calls) was particularly meaningful for the **young researchers** - for some it was the first opportunity to coordinate such a project themselves. Thanks to this experience, their position in the scientific community as desirable members in subsequent research teams has increased.

The scientific development of young scientists was favoured by the rules of implementation of the Programme. According to POLNOR promoters, **the rules were much more flexible in terms of employing such people** compared to the programmes implemented by NSC. The promoters were

able to employ young researchers under different rules, which gave them more freedom in building teams and engaging people with the right competences. Thanks to this flexibility, young researchers were able not only to participate in the implementation of the project, but also to benefit from numerous professional development opportunities, such as travel to conferences, longer research stays with foreign partners or collaboration on international publications.

Participation in the SGS project was also influential **in gaining experience at each stage of the project life**, which was important in preparing the coordinators for subsequent projects. The financial and time scale of the SGS project was optimal in terms of testing their strengths and gaining such experience. The application process was tailored to the needs of the female participants. All female coordinators participating in the survey declared that they had prepared the grant application completely on their own. The completion of the projects was a source of personal satisfaction for them. Despite the difficulties associated with limited budgets and formal requirements, interviewees expressed pride in the results achieved and satisfaction at being able to conduct research that could have a real impact on the development of technology and science.

In the SGS call, the aim of **advancing the scientific advancement of female coordinators** (as well as other team members) was effectively pursued. For some female coordinators, the SGS projects were crucial to the completion of their habilitation. One highlighted that the research carried out in the project provided the material and results that were essential for the preparation of her habilitation dissertation. Participation in the project also allowed scientific papers to be published and results to be presented at conferences, which further strengthened the body of work needed for habilitation.

Some of the project teams included PhD students whose research work within the project contributed to **the completion of their doctoral theses**. For example, one PhD student completed her research and defended her PhD with distinction, presenting the results obtained through the SGS project. The project also provided inspiration and support for the doctoral students' further activities, enabling them to publish their results and participate in conferences, which strengthened their scientific output.

Overall, SGS projects have played a key role in enabling young researchers to become **independent** researchers. The coordination of the projects has helped them gain experience in research management and building their own teams. The projects also provided some of the scientists with internships abroad and established collaborations with prestigious research centres abroad. These experiences enriched their knowledge and research skills and positively influenced their position in the academic community.

It should be emphasised that **the SGS call stands out from other NCBR initiatives** and has no equivalent in other programmes or offerings of the institution. First and foremost, SGS is dedicated exclusively to women conducting research in fields where they are least represented, especially in applied technical sciences. In each project, the project leader must be a woman scientist, with the aim of supporting their research career and increasing women's participation in these areas. According to the female project coordinators, this is an important boost. They add that a strength of the call is that it did not impose specific research topics, provided that the projects fell within the category of engineering and technical sciences according to the OECD classification. This gave participants the freedom to choose their research area, which encourages innovation and diversity in projects.

Strengthening the capacity of the actors involved

When analysing the long-term impact of the Programme and the projects, attention was paid to the benefits accruing to the Programme Operator itself and to the benefits that accrue/will accrue to both the entities that implemented the projects (scientific entities /companies) and the recipients representing the broader socio-economic environment.

Cooperation with the Research Council of Norway and cyclical workshop meetings with operators of research programmes implemented in other countries have **resulted** in the **Programme Operator acquiring additional knowledge, experience, and learning about solutions recognised as good practices** in the implementation of international programmes. The conducted surveys indicate a steadily **growing organisational and competence potential of the** Programme **Operator** - it is, among other things, the sum of experience gained from the implementation of previous editions of the Programme.

One of the important and highlighted benefits from the point of view of project developers is certainly the **increase in visibility in the social and scientific research environment**.

- Some of the companies in the consortia have only begun to be associated and identified in their environment through the prism of research and innovation development[16] - this was due, among other things, to their presence and presentations at various meetings, conferences, seminars. One company, thanks to its participation in the project, was placed on the global map of microfluidics[17] .
- The entities implementing the projects actively involved various types of stakeholders (public institutions, NGOs, scientific entities, industry enterprises, potential recipients / target groups of future solutions) in their activities already at the project implementation stage - thus building their image and acceptance of the planned results. Such activities included, e.g. consultations on the specifics of the designed solutions - aimed at adapting them to the needs of the recipients / industry, consultations on the shape of the solutions ensuring their possibly broad implementation, cooperation in the area of promoting desired behaviours and solutions (e.g. ecological), cooperation in the organisation of seminars / lectures / workshops - educational or promotional events.

Increased recognition and research and business standing, in turn, translates **into benefits related to easier establishment of cooperation with new entities and institutions** (not being consortium partners). Such cooperation takes different forms and concerns different areas - not only those related to the topics of completed projects.

- Beneficiaries (project developers) cooperate/establish closer cooperation with entities/ institutions, which, as indicated above, were already involved in various project activities (e.g. consultations, promotional activities, testing of prototype solutions) at the implementation stage. As an example, the contractor of one of the IdeaLab projects established closer cooperation with the Żory municipality (it was in this municipality that

[16] This benefit was pointed out by company representatives during the group interview.

[17] By participating in an international project, the company gained access to technology and knowledge that allowed it to innovate in its field. It has put itself on the microfluidics map, meaning that its solutions have started to receive global attention, both in an industrial and research context.

the pilot aquaponic installation was built under the project). The municipality authorities recognised the potential of the aquaponic farms[18] in the context of sustainable development and improving the quality of life of local residents. After negotiations, the project contractor signed an agreement with the city of Zory to relocate the farm to the city and conduct further educational and promotional activities there. The city intends to build a large aquaculture park. In another IdeaLab project, cooperation is underway with the City of Warsaw, which has expressed interest in the 'Neighbourhood with Climate' game. Ultimately, the city wants to use the game to verify the effectiveness of solutions proposed by residents as part of projects submitted in the participatory budget and to encourage developers to introduce pro-environmental solutions.

- The interviews also highlighted an increase in the number of cooperation proposals from entities (scientific, research, companies) with which no activities had been conducted so far. Such proposals are received by both scientific entities and companies and concern, inter alia, the possibility of jointly preparing project proposals and applying for external funding.
- In the interviews it was also pointed out that individual partners started to establish cooperation with entities that were new to them and with which one of the project partners had already cooperated before (this means that members of the project teams recommended each other to establish cooperation with completely different entities). An example of this is the IdeaLab project, in which one partner - thanks to the recommendation of another team member - established and continues to cooperate with a research centre in Spain.

The cooperation established so far between the various partners also brings **benefits in terms of the possibility of continuing to use (usually for a fee) the laboratories, equipment and instruments** owned **by the** individual partners, as well as **the services provided by their staff**. Thanks to the projects, members of the teams were able to familiarise themselves with the entire research offer available to consortium partners. It was pointed out that the added value is access to research services and infrastructure of high quality and unique in the country - allowing research and analysis in completely new areas. It is worth emphasising that these benefits apply to both companies and scientific entities - as entities from both sectors have resources of mutual interest.

The above benefits also indicate **a progressive improvement in cooperation between representatives of science and business** - such a benefit is particularly evident in projects from the POLNOR 2019 call, where the participation of companies in consortia was obligatory. This effect was confirmed not only in the in-depth interviews with representatives of scientific units and companies, but also in the quantitative survey - 13 out of 23 surveyed managers confirmed that existing business partners are involved in projects that are a continuation of the „Applied Research" Programme projects.

The companies involved in the projects also declared the **occurrence of more tangible benefits that relate to the development of their potential**. The projects have enabled the companies to gain valuable experience, especially in cooperating with international partners and co-managing R&D

[18] The aquaponic farm is an innovative solution that can address many of today's challenges, such as sustainable food production, saving water resources and reducing environmental impact. By integrating different production methods into a single system, the solution can support the development of local communities, improve the availability of healthy food, and shape new careers and entrepreneurship in cities.

projects. The increase in potential is also the result of the acquisition of new and the development of existing substantive competencies of the employees of these companies. All of this, in turn, translates **into a stronger business position in the respective industries, expansion of the areas of operations and the ability to enter new markets more easily and confidently**.

Social benefits

Beneficiaries undertook numerous activities to involve various stakeholders in the projects and to spread and improve awareness among the general public - including public policy makers, representatives of the education sector, business or civil society. In one project, workshops were organised for schoolchildren to familiarise them with the research techniques, equipment and laboratories used and, as a result, spark their interest in science in general. During these meetings, the basics of experimental work, research topics and project objectives were also explained. The research approach and results of the project were also presented to seniors who are particularly vulnerable to bacterial infections and food poisoning. The mechanisms of antimicrobial resistance and the importance of proper antibiotic use were explained to them. Seniors were able to listen to lectures, but also visit the laboratories of the project providers. Another project organised meetings with farmers, administrations and companies involved in information technology in agriculture - promoting applications that help monitor crop growth and manage supplies and sowing plans. Still another example is the involvement of local authorities, municipal companies, energy suppliers and community organisations in the development and implementation of decarbonisation strategies at the local level. In many projects, social media communication activities were carried out to communicate the results of the projects (and to this end, cooperation was undertaken with NGOs working in the thematic area). All of these activities therefore have broad **societal benefits related to improving awareness in different areas of life** - e.g. environment, health, mobility, agriculture, etc. Improved awareness among the public and public decision-makers also provides **an opportunity to bring about positive changes in the future - including more effective dissemination and implementation of the solutions that the projects have produced**.

Further **societal benefits can accrue from the planned dissemination and further use (other than implementation) of project results.**

- For many projects, it is planned to prepare further publications and scientific articles on the projects' results to be published and used by other scientists/researchers. Another planned way to disseminate the results is to participate in further national/international conferences or seminars where the results will be presented.
- Some of the projects plan to run seminars and workshops aimed at potential users of the results / people who may decide to put them into practice (e.g. city authorities interested in developing sustainable mobility) and to prepare educational material aimed, for example, at teachers / educators who will be able to use the knowledge gained in their work.
- In several cases, guidelines/recommendations have been produced to be used to indicate proposals for changing the law at central and local level (an example is the emerging guidelines on wind turbine noise, which are intended to be the basis for regulatory proposals for monitoring and predicting wind turbine noise).
- The results of some of the projects will be the basis for further research, which is/will also be the subject of new project proposals (e.g. research into mobility, residents' transport decisions, wellbeing of the elderly, counteracting antibiotic resistance).
- The results of some of the projects are/will be used to develop new applications, tools or prototypes, which will be validated, tested and further developed in subsequent projects

(e.g. applications supporting agriculture, SmartFood technologies, prototypes of AGVs, i.e. Automated Guided Vehicles).

Economic benefits

In the long term, the economic benefits of **the gradual implementation of the solutions generated by the projects** will become increasingly apparent**.** The implementation of project results **can take the form of commercialisation, as well as their use in public services**. For example, in some IdeaLab projects, consortia members were public administration units or NGOs, i.e. partners that could potentially implement the developed solutions in their public activities.

There was no requirement among the calls conditions to implement project results. Among other things, the implementation of research results is facilitated by the development of a strategy or detailed plans for the continuation of research and activities after the completion of the project by the beneficiaries - which took place in several projects. **It is recommended to introduce into the calls conditions criteria encouraging the beneficiaries to develop already at the application stage such a strategy, which may cover both commercialisation and implementation in the public sphere**. Therefore, it is worth awarding projects in which at the application stage a strategy for using research results is presented, including additionally the involvement of various partners - both entrepreneurs and institutions - in the implementation process. It is worth rewarding projects that will bring the greatest social benefits - whose results are applied in the public sector (e.g. technological solutions for public institutions).

As already indicated in the report - half of the surveyed project managers (n=62) assessed that the project has produced results/solutions that are ready to be implemented, in 4 cases the project results have been implemented, while in 23 the activities on their implementation are carried out or planned.

Already **completed implementations of**[19] include:

- fifth-generation smart heat and cooling networks, including geoenergetics. One project resulted in the ability to drill at a lower cost and deeper by developing pipes with increased strength, unattainable with polyethylene pipes;
- automation and robotisation, e.g. in Industry 4.0 (one project developed a prototype of a next-generation AGV that enables human support in production processes, support in machine maintenance or automation of picking/unloading in warehouses and production areas - the beneficiary in the final report indicated that this solution could already be used in e-commerce, pharmaceuticals or light picking in many assembly processes);
- green urban transport (the results of one of the projects were used by a business partner to extend the functionality of its products, this company also launched a web service for the assessment and visualisation of transport pollution, which can be used by different urban logistics stakeholders. In addition, a guide was implemented to provide decision support at the policy level with regard to the development of sustainable city logistics systems. This guide focuses on the development of sustainable city logistics plans for Polish and Norwegian cities);

[19] The following information is taken from the final reports of those projects for which the quantitative survey indicated that implementation of the results had already taken place.

- a new technology for the production of certified reference materials (CRMs) for silicon materials (as a result of the project, new CRMs were introduced to the market as a direct response to market needs, as there were no CRMs of suitable certified composition and high metrological quality on the market).

The results of the projects that are planned for implementation (after various measures have been taken[20]) concern, for example, :[21]

- climate change adaptation in cities, including tools to support climate-smart land use planning (e.g. one-stop-shop model for local decarbonisation, Inconada app to support local and regional authorities in land use planning and management, taking into account current and projected land use changes),
- the development of sustainable, safe agriculture and food - promoting innovative methods of urban food production, sustainable farming systems and minimising environmental impact, ways of safe food storage (e.g. urban aquaculture technologies - urban water farms; alternative substrates based on wood fibres to reduce greenhouse gas emissions; new technology for storing berries and producing innovative snacks to add variety to the diet and provide essential health-promoting ingredients; technology for producing organic organic fertiliser from sheep's wool),
- sustainable building materials and technologies - the use of fire- and water-resistant materials in the construction industry or the development of renewable materials (e.g. bio-coke as a greener alternative to coking coals; wood fibre panels that are lightweight, fire- and water-resistant),
- technologies for the automotive and aerospace industries - developing lightweight, durable materials or improving the efficiency of industrial processes (e.g. magnesium alloy wheels, barrier coatings for hydrogen tanks to ensure proper hydrogen storage for the aerospace industry),
- closed-loop economy - utilising industrial waste, minimising the loss of raw materials and promoting recycling (e.g. membrane techniques for the recovery of rare earth elements, catalytic ozone technology for the treatment of textile waste water),
- data management and modelling - decision support in administration and industry (e.g. noise monitoring systems for wind farms).

The implementation of the results, in turn, will entail further benefits - first and foremost financial for those responsible for implementation, but also social (as the implementations will mean concrete effects for society at large, e.g. in the form of solving problems in the areas of health, environment, transport, food, quality of life, etc.).

[20] Including, e.g.: pilot implementations/demonstrations and validation of technologies/solutions, modification of existing production processes or purchase of additional equipment, attracting business partners and investors, developing standards/guidelines for safe and effective use, adopting appropriate legal regulations, undertaking education and information activities aimed at end stakeholders (including those deciding on the use of solutions in public services), adapting solution specifications to mass production capabilities and market needs.

[21] The following information is taken from the final reports of those projects for which the quantitative survey indicated that activities are being carried out/planned to implement the results.

Factors for sustaining the effects of projects in the long term

Based on the final reports of the projects, as well as interviews with project coordinators and representatives of institutions involved in the implementation of the Applied Research Programme, it is possible to identify factors that are important for strengthening the effects of the projects in the long term and factors that limit, or may be a barrier to, these long-term effects. These factors were divided into financial, economic, social, environmental and institutional.

Factors that reinforce the effects of projects in the long term:

Financial factors:

1. Seeking ongoing funding for continuing research and technology development. In this respect, the activity of the research teams is very high, with the vast majority of projects either continuing with further projects or planned.

2. Diversification of funding sources. The main source of funding is EU programmes, e.g. Horizon Europe, but promoters are looking for funding more widely - also from their own universities, or from the private sector. In one project, for example, the continuation of research was included in the scope of work carried out by the university. In several projects, public-private partnerships and partnerships with municipalities (in particular IdeaLab projects) are potential sources of co-financing for ongoing research. In one POLNOR project, the promoter sees an opportunity in obtaining funding through public-private partnerships with pharmaceutical companies to further develop and commercialise the results.

3. Commercialisation of products and technologies developed by the projects. All projects are oriented towards commercialisation. The promoters' declarations show that the solutions financed under the „Applied Research" Programme are ready or almost ready for commercialisation - in the business sector as well as in the public (local government) sector - thanks to the support.

Economic factors:

1. Diverse forms of commercialisation of results. Promoters offer, or plan to offer, developed technologies and products in the form of licences with industrial partners, directly to specific audiences, e.g. research laboratories, companies, households, creating spin-offs, or through public-private partnerships.

2. Integration with other systems. Two projects (POLNOR and IdeaLab) highlighted the importance of integrating the project outputs (platform/application) with other systems - other urban sustainability platforms and smart city technologies, or agricultural management systems - to increase the usability and impact of the project.

3. Scalability and adaptability of technologies under different conditions. An important factor in the light of rapidly changing market requirements and expectations is the flexibility of the technologies and products developed in projects. Promoters, being aware of this, design them to be scalable, easily adaptable to different conditions and enriched with new features that can attract new users.

Social factors:

1. Positive public perception of project outcomes. For solutions in areas such as urban development, medicine, environmental protection, an important success factor is the positive public attitude to the proposed new solutions. Therefore, promoters undertake

activities to build public awareness of the benefits of new technologies (conducting educational and promotional campaigns in social media and on websites, cooperation with the media, organising technology demonstrations, information brochures and educational materials). Some projects used a user-centric design approach in designing solutions - a participatory co-design approach ensured that the technologies developed met the real needs and preferences of the end users.

2. Maintaining interest in the project within the scientific community. Continuation of activities carried out during the project, i.e. publication of results in peer-reviewed scientific and professional journals, presentations at international conferences, participation in science festivals and technology dissemination events).

3. Extensive promotion within the business sector. Promoters undertake a range of activities to familiarise the business sector with the solutions and to convince entrepreneurs of the benefits of further developing and implementing these solutions. Therefore, promoters participate in trade fairs and industry events, organise meetings with entrepreneurs to present technologies and products, prepare and distribute technology offers aimed at companies, and organise workshops and training courses for companies in the sector demonstrating the practical implementation of technologies.

Environmental factors:

1. Highlighting environmental benefits. An important element of the information and promotional activities undertaken by promoters is to clearly communicate the environmental benefits of implementing new technologies to users. This has a positive impact on the perception of the technology and, in the next step, on the image of the companies and local authorities that will implement it.

Institutional factors:

1. Develop strategies or detailed plans for the continuation of the research and activities after the end of the project. The drivers for sustaining project outcomes are the detailed plans developed by the promoters. These plans, which sometimes take into account different scenarios, define the next action steps in key areas such as sources of funding, exploitation of project results, commercialisation assumptions, dissemination of results and communication management. One project developed an intellectual property plan that includes licensing agreements and patent protection.

2. Strong institutional support and cooperation between partners. A factor perceived by promoters as crucial to achieving long-term project benefits is the building of sustainable cooperation with project partners.

Factors that threaten the long-term effects of projects:

Financial constraints:

1. Lack of sufficient funding to continue activities after projects are completed. According to the promoters, a key challenge for the future is to secure stable and sufficient funding for ongoing research and product development. Applying for new projects does not always yield the expected results, so they are taking steps to diversify their sources of funding.

2. High competition to win research grants, which can limit access to financial resources.

3. High research and technology development costs. Project promoters, especially in the area of medicine, point to the significant barrier posed by the high cost of clinical trials. An additional challenge is the stringent legal and regulatory requirements associated with bringing medical products to market.

4. Mandatory industry participation in grant calls. The need to include an entrepreneur in a consortium in some grant calls is a barrier to scientific projects, especially those where there is a high degree of uncertainty about the potential financial benefits. Such a requirement hinders innovative but less commercial ventures.

Economic constraints:

1. High market volatility, which may limit investment in the technologies developed in the projects. The energy market was cited by promoters as particularly uncertain, including potential increases in electricity prices and changes in the renewable energy market.

2. Rapid pace of technological change. A challenge for promoters and a threat to project performance is the need for constant innovation and optimisation of technology to meet the demands of competition and the market. An unfavourable factor in this context is the dependence on external sources of funding, e.g. grant calls, which take a long time to resolve.

3. Market scepticism towards new technological solutions, especially in highly regulated industries where the implementation of novelties is a particular challenge. In this context, the broad catalogue of promotional activities carried out by promoters targeting different sectors - business, education, society - should be evaluated positively.

Environmental constraints:

1. High environmental requirements, e.g. related to CO limits$_2$, which may slow down the implementation of the technology.

Institutional constraints:

1. Political volatility in local government, which can lead to a revision of development plans and strategies. This factor is particularly relevant in the case of technologies whose potential adopters are, for example, cities (mainly applicable to IdeaLab projects).

2. Lack of stability in regulatory regimes that may affect the speed of implementation of new solutions. Project promoters highlight the risk of limiting the future use of project outputs due to possible legislative changes, e.g. in medical, environmental and safety protection. Of particular uncertainty is the planned regulation of the use of artificial intelligence. Evolving regulatory frameworks and ethical considerations related to this technology may significantly hamper the acceptance and implementation of developed solutions. Uncertainty is also raised by possible changes in local regulations, e.g. in cities. In response to these challenges, one of the promoters is actively working with policy makers.

3. Risk of staff turnover and loss of expertise in the institutions, which may negatively affect the continuation of activities.

4. Limited access for small teams in some grant calls. The requirement to form large international consortia and the commitment of significant own resources can be a barrier, particularly for smaller teams (e.g. SGS) and projects without foreign partners.

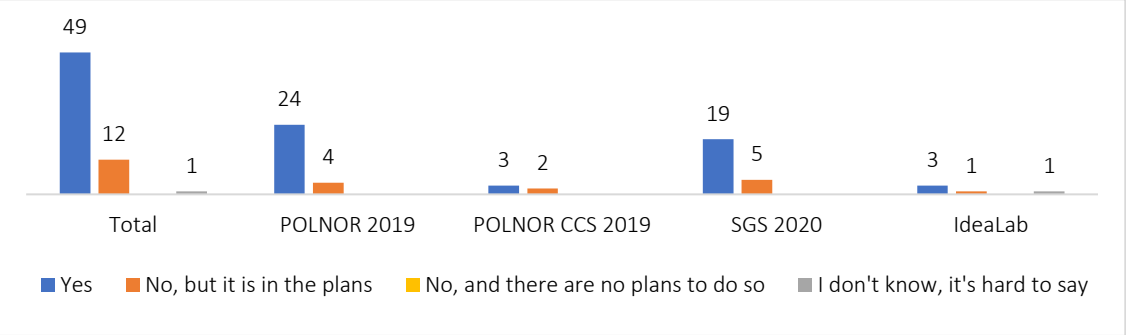
5. **Low awareness of intellectual property issues**. According to the representatives of the Research Council of Norway, scientists often do not attach importance to property rights, while industrial partners place particular emphasis on securing their rights and interests, which may delay or hinder cooperation. In addition, the knowledge of Polish scientists regarding the protection of intellectual property rights is often lower than that of foreign partners, which may lead to difficulties in securing research results to their advantage.

4.2 Assessment of the impact of the Programme on further activities of the beneficiaries

Continuation of projects in other programmes

All projects are or will be continued. Only 2 people out of a total of 62 surveyed were not yet sure about this. The majority of projects have already taken action - project applications have been submitted to other programmes or are in the pipeline.

Chart 4 Is the project's research work (or elements of it) continuing?



Source: own study based on quantitative survey with project managers (n=62).

Further projects develop or will develop solutions from projects carried out in 'Applied research', which is driven by the desire to continue the research started and to implement the technologies developed in a more advanced form.

Already at the stage of project implementation in the Applied Research Programme, the beneficiaries indicated the directions of project continuation in their reports. In more than half of the projects (in 49 out of 81 projects), at least one application for a project continuation from the Programme has been submitted or is planned. One of the POLNOR projects indicated as many as 7 continuation projects.

Table 2 Number of projects in the „Applied Research" Programme where at least one application for a follow-on project has been or is planned to be submitted

Call	Number of projects in the „Applied Research" Programme	Number of projects in which promoters declared that they will continue their activities	Total number of follow-on projects	Value of follow-on projects [EUR]	Value of projects that have received funding [EUR].
POLNOR	38	32	61	145 922 946	44 533 239
POLNOR CCS	6	2	2	500 000	500 000
IdeaLab	6	3	6	17 764 828	1 412 543

Call	Number of projects in the „Applied Research" Programme	Number of projects in which promoters declared that they will continue their activities	Total number of follow-on projects	Value of follow-on projects [EUR]	Value of projects that have received funding [EUR].
SGS	31	12	22	17 722 115	788 113
TOTAL	81	49	91	181 909 889	47 233 895

Source: own compilation based on data from final reports, as at 11.09.2024.

Of the 91 follow-on projects, more than half (58) are partnership projects.

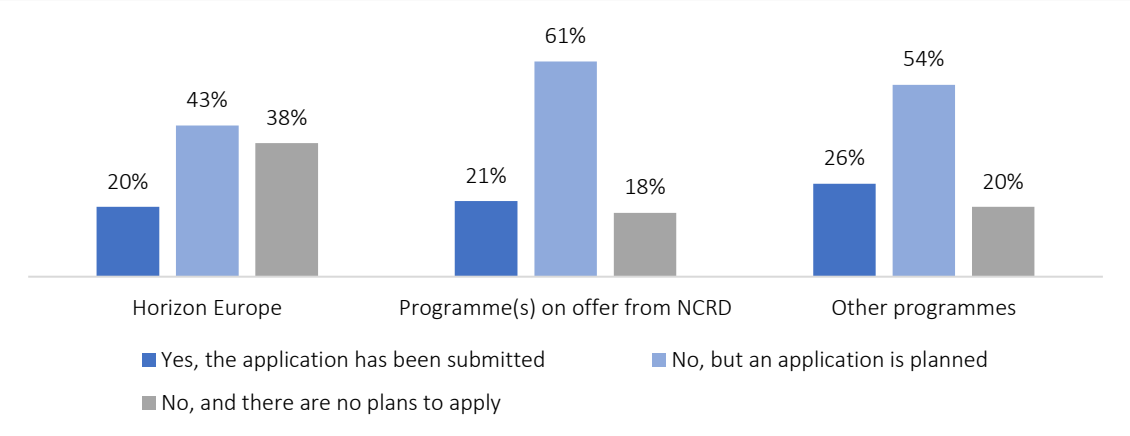
The value of all projects is almost €182 million, of which 20 projects worth more than €47 million have been awarded funding and a further 25 projects worth €52.7 million are pending.

At POLNOR, promoters mainly applied to calls in Horizon Europe (26 out of 61 projects), as well as calls organised by the National Science Centre (10 projects). At IdeaLab, promoters tried to use a wide variety of programmes co-financed by EU funds, depending on the thematic scope of the project. The selected programmes support research and innovation projects that aim to accelerate the ecological and energy transition, the development of sustainable cities or international cooperation in environmental activities.

SGS projects found their way mainly into calls organised by the National Science Centre (10 projects out of 22). One was submitted to Horizon Europe.

In the quantitative survey, respondents indicated an even broader catalogue of programmes in which they continue or intend to continue their existing research work than in their project reports. Above all, promoters were interested in programmes from the NCBR's offer. There is also great interest in the Horizon Europe programme.

Chart 5 Has your unit (project leader) applied, or is it planning to apply, for a project that is a continuation of a project from the 'Applied Research' programme?



Source: own compilation based on quantitative survey with project managers (n=61).

A detailed analysis of the interest in the programmes on offer from NCBR (apart from the Horizon Europe calls) indicates that promoters are mainly interested in applying to **EFME** - SMART Path calls, which aim to support R&D and implementation projects carried out by enterprises, consortia of enterprises and scientific entities. The programme enables complex projects that cover different stages of innovation, tailored to their individual needs. The specifics of this programme suit **POLNORD**'s project promoters best.

Among the national programmes, the promoters see an opportunity to continue the project in particular in the **Leader** programme, which aims to support young scientists in developing their skills in managing research teams and conducting independent research and development projects. The programme, like the Applied Research Programme, allows funding for research and development work that can be applied in economic practice. Such a continuation is consistent with one of the objectives of the 'Applied Research' Programme, which was the scientific development of young scientists - Leader supports scientists who want to develop their managerial skills and take on leadership roles in R&D projects. Therefore, the greatest interest in this programme is among **SGS** promoters.

Some of the projects fit into **strategic issues for the development of the country**, as evidenced by the number of 14 projects whose promoters have submitted or plan to submit an application for funding to **strategic programmes**, financed by national funds - Nutritech II, New Technologies for Energy, HYDROSTRATEG and GOSPOSTRATEG.

SGS project coordinators indicated that from the point of view of their potential and needs, NCBR's offer is moderate, as it is mainly aimed at large research teams, international consortia, and additionally, e.g. an own contribution is required or cooperation with enterprises, which have to engage their own resources. This does not quite suit the specifics of small SGS projects. This is why the Leader programme is best suited to the needs of the coordinators of these projects.

Among international programmes, the European Commission's co-financed **M-ERA.NET** programme, the European Research and Innovation Funding Network, which aims to support international R&D projects in the area of advanced materials and processing technologies, has the highest number of indications. Promoters are also interested in the **Swiss-Polish Cooperation** Programme, which funds, among other things, scientific cooperation projects, research projects and academic exchanges between institutions from Poland and Switzerland.

The indications for the other programmes are mainly due to the thematic scope of the projects, e.g. energy and natural resources, nutrition, agriculture, environment, medicine.

Table 3 Programmes to which promoters have applied or plan to apply for a project that is a continuation of a project from the 'Applied Research' programme

Programme	Number of indications
European Funds for the Modern Economy, including:	**16**
SMART path	14
BRIdge UP	2
National programmes, including:	**28**
Leader	11
Nutritech II - Nutrition in the light of the challenges of improving societal well-being and climate change	5
New energy technologies	4
HYDROSTRATEG	4
Neon	2
GOSPOSTRATEG	1
Defence and security programmes	1
International programmes, including:	**42**

Programme	Number of indications
M-ERA.NET	7
Swiss-Polish Cooperation Programme	5
Clean Energy Transition Partnership	4
ERA4Health	3
INNOGLOBO	3
EuroHPC (Energy efficiency R&I Call)	2
Transforming Health and Care Systems	2
Driving Urban Transitions (DUT)	2
Polish-Turkish Cooperation	2
EUREKA	2
ERA-NET TRANSCAN-3	2
ERA NET Co-Fund ICT-AGRI-FOOD	2
Innovative SMEs	1
Water4All	1
Rare Diseases	1
Poland-Taiwan cooperation	1
CORNET	1
Neuron Cofund 2	1

Source: own study based on quantitative survey with project managers (n=50).

Complementarity of NCBR's offer to the "Applied Research" programme

NCBR's offer is coherent and complementary to the 'Applied Research' Programme. One of the objectives of the study was to assess the complementarity of NCBR's offer, i.e. the POLNOR 2019, POLNOR CCS 2019, Small Grant Scheme 2020, IdeaLab calls with other NCBR programmes - either from the current offer or whose calls were announced in parallel during the period of the 'Applied Research' Programme, in terms of the presence of synergies, linkages or duplication. Based on a review of the calls of the “Applied Research Programme”, the main research areas and thematic scope of each call were identified. These were then compared with the thematic scope of other international NCBR programmes, including:

- European Union Framework Programme for Research and Innovation 2021-2027 'Horizon Europe',
- 2nd edition of the Swiss-Polish Cooperation Programme,
- Poland (NCBR) - South Korea (KETEP) research collaboration,
- Polish-Taiwanese cooperation,
- INNOGLOBO programme,
- Polish-Turkish cooperation,
- ERA initiative.

Based on the results of the pre-selection, calls with the greatest potential for complementarity or synergy with the „Applied Research" Programme were selected. These calls were further fully evaluated taking into account all dimensions such as thematic scope, type of participants and funding opportunities. The results of this analysis are summarised below, while the full list of calls compared, together with a detailed evaluation, can be found in Annex 1 of the report.

Legend:

Yes
Not

Table 4 Is the call complementary to the „Applied Research" Programme in terms of thematic area, type of beneficiary, implementation assumptions and can it be a continuation of projects from the Programme

Lp.	Programme/Call	POLNOR	POLNOR CCS 2019	SGS	IdeaLab
Horizon Europe					
1	CETPartnership, Joint Call 2024 (3rd call)				
2	3rd Call in the framework of the Water4All Partnership - JTC Call 2024				
3	DUT Call 2024 call as part of Driving Urban Transitions				
4	THCS (JTC Call II 2024)				
5	Chips JU Call 2024				
6	Sustainable Blue Economy Partnership (2nd call)				
7	ERA4Health (NanoTecMec 2024 call)				
8	ERA4Health (NutriBrain 2024 call)				
9	CETPartnership, Joint Call 2023 (2nd call)				
10	2nd Call in the framework of the Water4All Partnership - JTC Call 2023				
11	DUT Call 2023 call as part of Driving Urban Transitions				
12	EJP RD (5th call 2023)				
13	EP PerMed , JTC2024 (1 call)				
Other programmes/contests					
14	Research cooperation Poland (NCBR) - South Korea (KETEP) - 2nd call.				
15	XII Polish-Taiwanese call				
16	VI Polish-Turkish call				
17	4th call under the INNOGLOBO Programme				
18	ERA-NET CO-FUND ICT-AGRI-FOOD (3rd call 2024)				
19	M-ERA.NET 3 Call 2024				
20	ERA-NET TRANSCAN-3: Sustained collaboration of national and regional programmes in cancer research				

Source: own elaboration

The widest range of complementary calls is for POLNOR, both within Horizon Europe and the other programmes. This is due to the versatility of this call, which covered several very broad scientific fields. Furthermore, both POLNOR 2019 and the complementary programmes under consideration are open to participation by Polish research organisations as well as companies and homogeneous

or mixed groups of these entities. Both factors mean that the research work carried out in POLNOR 2019 can be continued and developed in calls that are mainly geared towards the implementation of industrial research and development work.

Quite a high complementarity with the calls under discussion is shown by the IdeaLab programme. Its themes focus on important problems related to improving the quality of life in cities through the use of information technology and innovative energy solutions.

POLNOR CCS 2019 covers a much smaller thematic scope than POLNOR 2019, so its complementarity with the calls under discussion is spotty. It is primarily concerned with the development and practical application of energy transition technologies, including CO capture and storage .[2]

It is difficult to assess the complementarity of the Small Grant Scheme 2020 due to the vaguely defined scope of possible projects. Therefore, potential complementarity can be sought primarily with calls with equally broad themes.

Impact of the „Applied Research" Programme on the potential for further projects

As a result of the projects under the 'Applied Research' programme, the following results have been achieved, building the potential for further projects:

- Preparing Polish teams to carry out further international research and implementation initiatives - The programme enabled the acquisition of experience in managing complex international projects, which prepared scientists to compete in more demanding European calls, such as Horizon Europe (management skills, increased knowledge of legal and financial requirements, 'warm-up' before more complex projects);
- Increased competitiveness in applying for subsequent grants - especially important for younger researchers in their first role as leaders of research teams; the effect is to increase the credibility of the coordinator as a credible applicant (funding institutions often prefer researchers with experience in managing international projects, seeing them as more competent and proven leaders);
- Establish and strengthen relationships with partners from Norway and other European research entities - international networks have proven to be crucial in building consortia for new projects (this is relevant in the context of the results of another study[22] , which indicates that building international relationships at universities is primarily done through personal contacts between researchers);
- Achieve a level of technological readiness of solutions suitable for development in subsequent projects - this makes it easier for researchers to apply for further funding for implementation projects where a more advanced degree of technological readiness (TRL) is required;
- Increased international visibility and prestige of research teams - participation in the Programme, publications of research results and participation in international conferences

[22] For: "Evaluation of the quality and effects of the implementation of Priority Axis III of the OP WER - Higher education for the economy and development, including a study of changes in the management of the educational process thanks to ESF support", Ecorys, Evalu, 2024.

have made Polish teams more recognisable in the scientific community, which in turn attracts new cooperation partners and facilitates applications for further research grants;

- Development of interdisciplinary skills (especially IdeaLab and POLNOR) thanks to the opportunity to work in teams from different disciplines - crucial in the implementation of subsequent large and complex projects where the integration of different research approaches and methods is necessary; Especially in IdeaLab projects, working on complex, multifaceted problems, often beyond a single discipline, broadened scientific horizons and allowed interviewees to discover new areas of research.

5 Evaluation of the effectiveness and efficiency of the implementation system

MAIN CONCLUSIONS

Implementation of the Programme

- The overall assessment of the procedures governing the Programme service system is positive.
- Difficulties in implementing the Programme, from the perspective of the institutions involved in its operation, were related to:
    - funding system (including converting allocations from EUR to PLN and vice versa, and combining allocations from two Funds),
    - the temporary lack of a comprehensive IT system to support projects and the Programme,
    - incompatible deadlines for the preparation/transmission of annual reports on the implementation of the Programme and annual reports on the implementation of projects,
    - insufficient staff on the part of the Programme Operator and staff turnover.
- The institutional system involved in operating the Programme was mostly assessed as comprehensible, transparent, adequate and effective.
    - However, problems were identified regarding the role, tasks and responsibilities of the Programme Committee. The rationale for remedial action in this regard was identified.
- NCBR's activities, including the solutions applied under the Programme, in terms of encouraging and motivating beneficiaries to apply to Horizon Europe were found to be effective.

Project implementation

- The process and rules for applying for funding under the Programme were positively evaluated.
    - In particular, the method of project selection/development used in the IdeaLab call was considered highly effective and useful.
- The reporting system has had an overwhelmingly positive impact on the effectiveness of project monitoring and management.
- The conditions for settlement projects and the scope of eligible expenditure were mostly considered adequate.

- The information and publicity requirements were found to be mostly adequate for the scope and scale of the projects.
- The supplementary funding mechanism has effectively responded to the challenges of rising project costs and rising inflation - despite the administrative burden on the Programme Operator's part.
    - The Mechanism not only supported the beneficiaries and the achievement of the projects' objectives, but also helped to maximise the use of the Programme budget.
- Support for beneficiaries by representatives of the Programme Operator - despite staffing limitations - was at a high level and had a positive impact on the effectiveness of project implementation.
- Cooperation with foreign partners was assessed positively by the representatives of the Polish entities in the project consortia.

Programme operation

When evaluating the Programme's handling system from the perspective of the actors involved in the process, attention was paid primarily to the procedures and solutions for managing and implementing the Programme. **Their overall assessment was positive**. Nevertheless, the research conducted identified problem areas, which are presented in this chapter.

One of the difficulties in the process of operating the Programme was the **funding system**. The allocation was made in EUR, contracted and settled by the beneficiaries in PLN, and finally settled by the Programme Operator again in EUR. This generated difficulties, due to exchange rate differences, mainly for the Operator. The Programme allocation was converted according to the then-current EUR/PLN exchange rate, so both the savings from projects and the amount resulting from exchange rate differences had to be managed appropriately - but in such a way that no over-contracting took place. The aim of such management, however, was to ensure the highest possible level of utilisation of the allocated allocation. In practice, exchange rate fluctuations made it possible to finance additional expenditure in projects (as discussed later in this chapter). However, the situation could have been reversed - if the exchange rate had been 'unfavourable' at the time of closing/accounting for the Programme, it would have been necessary to finance the difference from national funds.

The report being a summary of the implementation of the EEA Financial Mechanism and the Norwegian Financial Mechanism 2014-2021 in Poland[23] and the report on the evaluation of the effects and the management and implementation system of the EEA Financial Mechanism 2009-2014 and the Norwegian Financial Mechanism 2009-2014[24] highlighted the problems related to **the lack of possibility of over-contracting** in the implemented programmes. This significantly hindered the full use of available funds - especially project savings occurring in the final period of programme implementation, when it was no longer possible to carry out further calls. The authors of the reports rightly **recommended including - in the system of implementation of subsequent programmes - a**

[23] Summary and conclusions from the implementation of the EEA Financial Mechanism and the Norwegian Financial Mechanism 2014-2021 in Poland, Bluehill sp. z o.o., Warsaw 2024.

[24] Evaluation of the effects and management and implementation system of the EEA Financial Mechanism 2009-2014 and the Norwegian Financial Mechanism 2009-2014, IDEA Instytut sp. z o.o., Policy & Action Group Uniconsult Sp. z o.o., Warsaw 2017.

mechanism of over-contracting, i.e. signing contracts for an amount exceeding the available allocation of calls, taking into account future savings in programmes.

The fact that **the Programme was financed by two Funds** - the Norway Grants and the European Economic Area (EEA) Grants - also proved to be a challenge during implementation. This made it difficult and delayed the conclusion of agreements within the IdeaLab call, where 3 EEA-funded agreements were concluded first, and only after obtaining additional funding from the Norway Grants was it possible to fund a further 3 projects. **The problem turned out to be the procedures making it impossible to combine resources from both Funds under a single grant** - information obtained from the Programme Operator showed that non-standard solutions had to be applied at the time to overcome this challenge. In the end, 6 projects were co-financed. It is worth noting, however, that such a limitation was removed when the rules for the implementation of the additional cofinancing mechanism were created. Indeed, this was a period when both donor countries and the Programme Operator were trying to develop and implement flexible solutions to deal with extraordinary external problems (COVID-19 pandemic, inflation). In view of the experience indicated, it is suggested that permanent solutions be introduced in future programmes to enable and facilitate the pooling of financial resources from both funds for project co-financing.

A significant obstacle (both for the Operator and beneficiaries) was the **lack of a comprehensive IT system for project management[25] and the Programme**. According to the information obtained, the LSI system was functioning in NCBR, but international programmes were not initially covered by it. However, this situation changed during the Programme implementation period.

Additional administrative burdens - both for the Programme Operator with limited staff resources and for the beneficiaries themselves - were also provided by **the reporting requirements on the implementation of the Programme**. The problem was that these requirements were not adjusted - in terms of deadlines for preparation and submission of documents - to the reporting requirements at the project level. On the one hand, annual reports on the implementation of the Programme were prepared and submitted by 21 January each year. However, these reports had to present data on the progress of indicators (i.e. aggregated data from the level of all implemented projects). In addition, these reports - before being submitted to the National Contact Point at the MFRP - were consulted with the Programme Committee. On the other hand, beneficiaries submitted interim (annual) reports up to 60 days after the end of the reporting period - so in practice they had until the end of February each year to do so. Consequently, the Programme Operator's staff had to make an additional request to the beneficiaries to provide data on the material progress in a timely manner (independently of the work on the preparation of annual reports), monitor the process of sending the responses, combine the data and count the values of achieved indicators. The report, which is a summary of the implementation of the EEA and Norway Grants 2014-2021 in Poland[26] , also pointed out the difficulties related to the submission of semi-annual reports as well as quarterly summaries to the National Focal Point in the MFRP. Both types of reporting documents had to be submitted by the same deadline (i.e. 31 January, 31 July) and, at the same time, the financial data in the semi-annual report had to be consistent with the amounts resulting from the quarterly statements. It is suggested to simplify the reporting system at the Programme level in the future. It

[25] A description of the weaknesses of the LSI from the beneficiaries' perspective is presented in the following section.

[26] Summary and conclusions from the implementation of the EEA Financial Mechanism and the Norwegian Financial Mechanism 2014-2021 in Poland, Bluehill sp. z o.o., Warsaw 2024.

is also recommended to ensure that the deadlines for reporting by the Programme Operator are compatible with the deadlines for reporting by the beneficiaries.

With regard to the management and operation of the Programme, no difficulties were identified with regard to the role and responsibility of the Programme Operator, the Research Council of Norway, the MFRP National Focal Point and the Financial Mechanisms Office in Brussels. The role of the Programme Operator was assessed particularly positively - as a mature and developed institution both in terms of content and organisation. The Programme Committee was also involved in the operation of the Programme. The report of the mid-term evaluation of the Programme[27] identified problems concerning the role, scope of tasks and responsibilities of the Committee. Interviews with various stakeholders conducted as part of this evaluation highlighted similar issues and the need for changes in this respect. Representatives of the Committee highlighted, among others:

- Limited influence of the Committee on the design of the Programme, implementation rules and strategic changes to the Programme directions/objectives. Key decisions on the procedures and strategic directions of the Programme were mainly taken between the Programme Operator, the MFRP National Focal Point, the Financial Mechanisms Office in Brussels and the Research Council of Norway, but without the involvement of the Committee. This is because the Committee was established after the adoption of the rules and scope of implementation of the Programme. It had no real possibility to formulate its own strategic recommendations during the Programme implementation phase.
- Unclear accountability in the proposal evaluation process. The evaluation and selection of projects was carried out by reviewers (the evaluation process ended with a so-called consensus report). Committee members expressed the need for greater influence at least in the evaluation of projects with divergent/extreme assessments by reviewers and projects on the borderline of funding. In the re-appraisal process of such projects, it would make sense for the Committee to appoint another reviewer to give a binding assessment.
- Lack of networking with other Programme Committees. Committee members pointed out the need to exchange experiences with Programme Committees from other countries. Such cooperation could provide valuable insights into improving the efficiency and effectiveness of the implementation and work of the Committee.
- Insufficient number and frequency of Committee meetings. This limited the ability to fully monitor the progress of projects and the Programme.

The above reservations and demands are largely due to the fact that the role and tasks of the Committee were not properly defined and communicated to the Committee members in the initial period of the Programme implementation. Committee members did not have full knowledge of what exactly was expected of them, what tools they had at their disposal and what the limits of their actions were. This was also confirmed by the opinions presented by representatives of the Programme Operator, who pointed out that, by assumption, the Committee's role was to be purely advisory, and not controlling or strategic for the implementation of the Programme. Despite the challenges and difficulties encountered, the role and actual activities of the Committee were

[27] Study report "Evaluation of the "Applied Research" Programme". - final report, EGO, LB&E, Warsaw 2023"

appreciated by the representatives of the surveyed entities involved in the Programme implementation.

Considering the identified problems and discrepancies, **it is recommended to introduce changes in the shape and role of the Committee in the next editions of the Programme**. It seems that the most **optimal solution would be to resign from the Programme Committee in its current form and replace it** - analogically to other programmes under Grants[28] - with **a Project Selection Committee (Selection Committee) and a Cooperation Committee**. The Project Selection Committee could be composed of thematic experts with the same profile as the existing members of the Programme Committee. The task of the Selection Committee would be to review ranking lists and recommend projects for funding under the Programme. The Cooperation Committee would be composed mainly of representatives of the Programme Operator and partners from donor countries. Representatives of the National Focal Point from the MFRP, the Financial Mechanism Office and the Royal Norwegian Embassy in Poland could also have their representation in the Committee. The Cooperation Committee would advise the Programme Operator on the preparation and implementation of the Programme (inter alia, as regards the preparation of the concept, call criteria and content of the calls for proposals, review of the progress of the Programme and modifications to the Programme).

IdeaLab project selection mechanism

IdeaLab is an innovative way of generating research project ideas combined with real-time expert evaluation. A key element of this method was an interactive and intensive 5-day workshop with about 30 participants from different disciplines and backgrounds and a team of external experts (mentors) and stakeholders, which was organised to generate ground-breaking, interdisciplinary research project ideas on services and solutions for cities in 2040.

The aim of the workshop was for participants to prepare initial proposals. Participation in the IdeaLab workshop did not guarantee project funding. In order to apply for funding, preliminary research project proposals had to be developed after the IdeaLab workshop into full proposals and submitted to the call. Only research ideas developed during the IdeaLab workshop that received a positive evaluation by the expert panel could successfully pass the formal evaluation in the subsequent call.

Managers of completed IdeaLab projects were asked to evaluate this mechanism. All FGI participants **positively evaluated the idea, the way it was organised and implemented, as well as the results obtained thanks to it**. Particularly highly rated were:

- **Rules of recruitment and subsequent participation in the workshops** - it was possible to participate in the workshops regardless of one's scientific achievements. This is because the IdeaLab formula placed emphasis on the potential and creativity of participants (research ideas and approaches were rewarded and evaluated throughout the workshop cycle). The principles of the call thus opened the way to development for people who had great difficulty in obtaining grants and subsidies from other sources (such as those in which a person's achievements or the prestige of the scientific unit from which the applicant comes counts);

[28] For example: Environment, Energy and Climate Change Programme

- the methodology of workshops and classes - although some elements of the methodology seemed unclear to the participants at the very beginning (the purpose they were supposed to serve was not clear), at the end they felt that it all created a coherent and well-thought-out whole from a methodological point of view. Some of the interviewees admitted that they use the workshop techniques they have learned (e.g. research by design) in their teaching work with students;
- professional preparation of the entire workshop formula, the high professional level of the classes conducted and the participants themselves, including above all external experts. It is also worth mentioning that the subsequent support of external experts at the implementation stage of the funded projects was highly appreciated - this support was reflected in the high quality of the projects;
- creating a space for networking and establishing contacts, exchange of ideas - the IdeaLab formula, on the one hand, made it possible to meet representatives of different entities, different disciplines, to get to know their ideas and point of view on the same research problems (according to the agreed thematic scope). On the other hand, this formula also made it possible to establish contacts, create partnerships with representatives of entities and units of high international reputation and prestige. According to the beneficiaries, without this type of workshop they would not have had the opportunity to establish cooperation and create project consortia with such renowned research entities;
- freedom in the selection of people/entities for the project teams - the workshop organiser did not interfere in any way with the composition of the teams formed. It was up to the idea managers/coordinators and the subsequent members of their teams to decide whether and whom to involve next in the ongoing work and whom to exclude from the project team.

Participation in the workshop was considered to be a new and important research experience, which translated into further personal as well as scientific research development of the participants. Admittedly, most of them started the series with more or less defined project ideas/solutions related to the thematic scope of the call, but during the workshop these ideas changed dramatically / evolved in a completely different direction - precisely under the influence of interaction, discussion, substantive work with others.

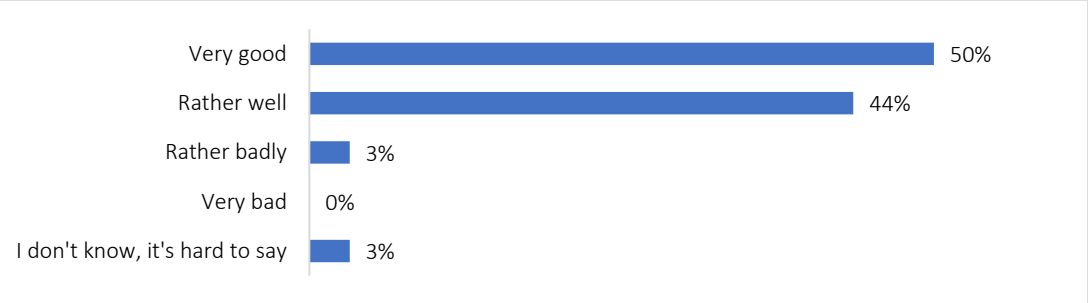
Participants in the group interview, however, drew attention to the aggravating and at times too intensive schedule of activities, workshops and networking meetings, which also took place in the evenings - after the workshops/activities had ended. Respondents were not entirely clear whether attendance at all networking meetings was compulsory or whether non-attendance was to be taken into account in the final evaluation of teams and individuals. Intellectual property issues were also highlighted - some people had concerns about whether their ideas and solutions could be 'picked up' by other workshop participants, and whether they were adequately protected in this regard by the organiser and the procedures in place. However, it seems that mutual trust was necessary in such cases. In turn, as the survey showed, the effect of the workshop was precisely to increase trust in other researchers (which was probably also due to the fact that no intellectual property violations were ultimately identified).

Given the particularly positive evaluations of the IdeaLab call's project selection mechanism, it is suggested that it be used more widely in future editions of the Programme. This type of mechanism can also be successfully applied in other R&D support programmes, e.g. for finding new solutions for public services.

Rules for applying for, reporting on and accounting for projects

Programme beneficiaries were overwhelmingly **positive about the whole process of applying for funding** under the „Applied Research" Programme - "rather good" and "very good" evaluations were expressed by 94% of the respondents. Positive evaluations of the process were also presented in the mid-term evaluation report of the Programme .[29]

Chart 6 Overall, how would you rate the overall process of applying for funding under the Applied Research Programme?

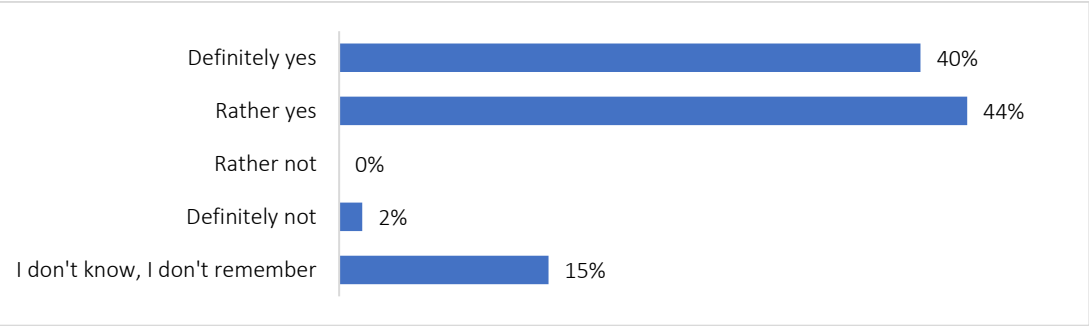


Source: own compilation based on quantitative survey with project managers, n=62.

The positive assessment of the application phase is also indicated by the fact that all participants in the quantitative survey admitted that they had prepared the grant applications themselves, together with the required attachments. This was due to clear and comprehensible documentation and a small number of attachments.

The manner of project selection, including the applied selection criteria, was positively evaluated - 84% of the surveyed project managers considered that both elements had a positive impact on ensuring the achievement of the Programme objectives. It is worth emphasising that the process of applying and assessing projects was designed on the model of calls within Horizon Europe Programme (as the aim was to familiarise Polish entities with such a structured application process).

Chart 7 In your opinion, did the criteria and method of selection of proposals adopted in the „Applied Research" Programme allow for the selection of projects corresponding to the objectives of the Programme?



Source: own compilation based on quantitative survey with project managers, n=62.

The majority of surveyed Programme beneficiaries (57%) **positively assessed the reporting system in terms of the impact of the adopted procedures on the effectiveness of project monitoring and**

[29] Report from the study "Evaluation of the "Applied Research" Programme". - final report, EGO, LB&E, Warsaw 2023.

management. Nevertheless, according to 37% of respondents, the system needs to be changed in the future. Project managers indicated (in the quantitative survey and in-depth interviews) various types of difficulties with the operation of this system. Objections included:

- Reporting system (local information system - LSI) - the system was found to be difficult and unintuitive for users; entering information in it required a lot of time each time. It was noted that the actual number of characters in some fields of the progress reports was smaller than declared in the instructions and that the system incorrectly counted the values of indicators cumulatively.
- Problems with receiving notifications from the LSI regarding the need to make changes to interim reports - some respondents indicated that they did not receive notifications when objections were raised by only one of the project officers (substantive or financial). They were only sent by the system when both project officers reported the need for changes.
- Overly detailed scope of interim reports (both substantive and financial) - Difficulties were generated particularly by financial reports, not least because rounding of amounts resulted in summation errors. [30]
  In addition, the need to submit both detailed annual financial reports and payment claims was considered particularly burdensome.
- The scope and number of annexes required - creating these in the LSI was often a difficult task.
- Ambiguous descriptions in the reporting reports - beneficiaries had problems understanding and interpreting the instructions contained in particular fields. As a result, there were cases of transferring the content between the fields of the progress report a couple of times - in response to comments made by project officers.
- The time it took from the submission of the first version of the progress report to the acceptance of the report by the Programme Operator - according to the beneficiaries, the verification of the progress reports on the part of the PO took too long.
- Changes to the required reporting information by the Operator already after the conclusion of the grant agreement.

Project partners also highlighted the difficulties arising from their lack of provision of access to the LIS. This had a negative impact both on the scale of the burden on the leaders (who had to enter all the data themselves into the LIS) and on the efficiency of the project partners' activities. Partners were not fully aware of what data from their documents had been entered and in which fields of the system - making it difficult, for example, to carry out final audits of projects. Partners highlighted problems in understanding auditors' questions on various variables/fields from the LSI system to which they did not have access. The problem of lack of access to the LSI for foreign partners was also identified by interviewees representing stakeholders from Norway - in their view, such access would make each entity responsible for the quality of the data they enter.

The results of the quantitative and qualitative research with managers also provided information on other concerns about the project process. The process of requesting changes to projects proved to be a major burden. It was noted that at the application stage, a detailed budget was prepared with

[30] This problem was also highlighted by the authors of the study report entitled 'Summary and conclusions of the implementation of the EEA Financial Mechanism and the Norwegian Financial Mechanism 2014-2021 in Poland'.

cost estimates for the various elements of the project along with justification for incurring each cost. This resulted in a project starting with dozens or hundreds of budget items that were subject to modifications at the implementation stage for various reasons (this should be considered a normal situation for research projects). All such changes required an indication of where the funds were being moved from and a justification. This, in turn, meant that such changes could not be described by those dealing with administrative things in projects - as changes in costs were linked to the planning of research work. As a result, it was the project manager who had to deal with administrative/financial tasks, thus having less time for substantive research work. Filling out change requests also proved to be a problem. Attention was drawn to the lack of clear instructions on what exactly should be described/indicated as the area to be changed and where information should be provided in Polish and in English in the application. As a result, the process of preparing project amendments via the LSI was found to be unintuitive and time-consuming. The lengthy process of concluding annexes to funding agreements was also a significant problem . [31]

The survey also identified the **problem of an excessive number of different types of controls in projects** - this problem was particularly emphasised by interviewees representing the Norwegian side. Additional objections concerned the manner in which audits were carried out at beneficiaries by an external entity hired for this task by NCBR. Both in the quantitative survey and during the group interviews, there were opinions about improper behaviour of controllers, who not infrequently already at the beginning of the control assumed the thesis of beneficiaries' guilt, and the further process of control was only to find evidence confirming such a thesis. The respondents drew attention to the desired function of the control - they emphasised that the effect of the control should be recommendations as to what and how to change/improve in the project, and not only pointing out mistakes and possible imposing penalties on the beneficiary.

With this in mind, **it is recommended to reduce the reporting burden on project promoters**. To this end, it is possible - firstly - to simplify the template for the annual financial reports or to completely abandon the obligation to submit them - in a situation where payment applications are submitted independently anyway. Secondly, it seems reasonable to give all project partners access to the local IT system.

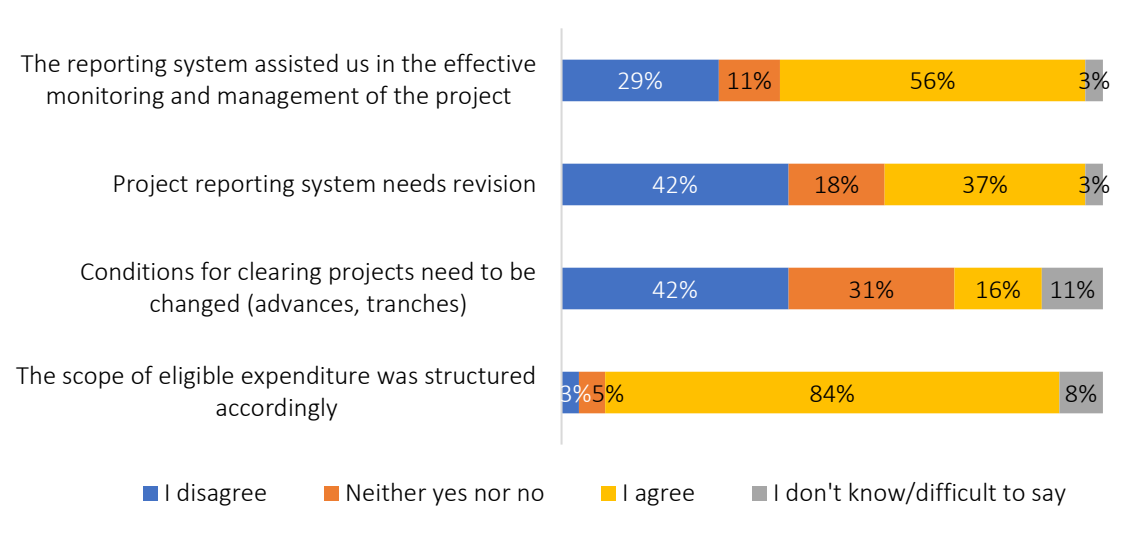
In addition, **it is suggested that additional changes/improvements be made to the reporting system**. These could include, but are not limited to:

- simplification of the IT system - the modules for preparing and submitting periodic reports,
- providing more detailed guidance on how to complete periodic reports,
- more efficient reporting on whether interim reports have been accepted or need to be corrected,
- reducing the amount of information required in substantive annual reports.

When analysing the conclusions concerning the evaluation of the IT system, it is worth bearing in mind that also at the stage of the mid-term evaluation of the Programme significant problems and reservations concerning this system emerged. Representatives of the Programme Operator were already aware of such deficits and had taken remedial measures. However, it will be possible to evaluate these changes only after some time

[31] However, this was due to staffing constraints on the part of the Programme Operator - as discussed further in the chapter.

Chart 8 Please indicate to what extent you agree with the following statements concerning the reporting system and the rules for clearing projects



Source: own compilation based on quantitative survey with project managers, n=62.

The surveyed project managers **were** overwhelmingly **positive about the conditions for settlement projects and the scope of eligible expenditure**. Nevertheless, individual difficulties and problems in this area were identified, for example:

- the need to annex contracts whenever changes are made to equipment purchased for research,
- the need to duplicate in the final reports (in the financial part) all the expenditure that has already been presented in the annual reports,
- Complicated planning process for advances and tranches - some beneficiaries faced financial problems during project implementation due to inadequate planning of advances and tranches in the schedule,
- too many categories of eligible costs and too strict rules for shifting costs between these categories.

Representatives of the Programme Operator also drew attention to **problems in the settlement of costs under the support mechanism Scheme**: Support for Ukrainian researchers. According to the assumptions, the settlement of costs was to take place on a lump sum basis[32] . From the information obtained, however, it appeared that such a method of accounting proved problematic for entities that were scientific units. These entities - despite such a flexible solution - submitted to the Programme Operator detailed accounts of costs together with invoices confirming them and made refunds of unused funds (despite the fact that this was in no way required by the procedures of implementation of this mechanism).

[32] The grant was intended to cover the costs of employing a Ukrainian researcher affected by the armed conflict on Ukrainian territory. Level of funding - up to 100% of eligible project costs for organisations conducting research and disseminating knowledge. Costs settled on a flat rate basis, at the following rates: monthly total employment costs per FTE: up to EUR 2,000; other monthly costs (consumables, travel etc.): up to EUR 500.

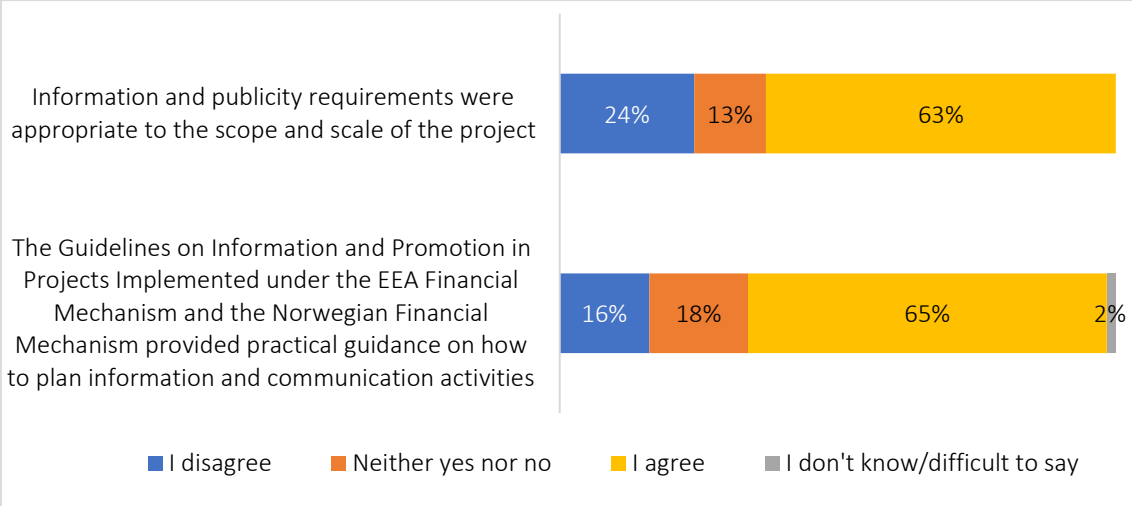
On the basis of the data collected, it can be indicated that changes are required, among others.

- disbursement rules - requests for advances paid in tranches could be changed to one payment in full,
- the catalogue of eligible costs - it would be useful to separate direct expenditure on the purchase of fixed assets as a separate category,
- Procedures for making transfers in project budgets - these should be made more flexible and the scope for changes/shifts in budgets requiring the annexing of contracts should be limited.

Information and publicity requirements

The information and publicity requirements were mostly considered adequate for the scope and scale of the projects - however, 25% of the surveyed managers had a different opinion. The majority of respondents agreed with the statement that the Guidelines for information and publicity in EEA and Norwegian Financial Mechanism projects provided practical guidance on how to plan information and communication activities.

Chart 9 Please indicate to what extent you agree with the following statements about information and publicity requirements and guidelines



Source: own compilation based on quantitative survey with project managers, n=62.

The research identified isolated concerns in the area of information and promotion, including, for example:

- too late provision of information on the necessity and requirements for promoting and informing about projects - it was pointed out in the in-depth interviews that for some time beneficiaries were not sure whether and to what extent they were supposed to apply the provisions of the Guidelines on information and promotion in projects implemented under the EEA Financial Mechanism and the Norwegian Financial Mechanism,
- introduction of changes to the aforementioned Guidelines in the course of the implementation of the projects[33] - taking into account the changes required, among other

[33] The original version of the Guidelines was effective as of 02.08.2019. It was modified in December 2021.

things, modification of the previously produced visual materials. Above all, it was necessary to make changes in the area of logos and information boards.

Participants in the group interviews **positively evaluated the support from the project officers on the side of the Operator, who helped to clarify doubts and resolve** whether specific visual materials meet the requirements of the Guidelines.

Mechanism for additional funding of projects

The mechanism of additional co-financing allowing for support to projects was assessed positively by all the respondents - both beneficiaries and representatives of institutions involved in servicing the Programme. It was considered to be a practical **solution that effectively responded to the challenges of increasing project costs and rising inflation.** Thanks to these measures, it was possible to secure the implementation of project assumptions and to support beneficiaries in covering rising costs.

It is worth noting that **the additional funding** for the POLNOR 2019, POLNOR CCS and IdeaLab projects **not only supported the beneficiaries and the achievement of the projects' objectives, but also helped to maximise the use of the Programme budget** (optimal spending of the available funds in euros). Uncertainty due to exchange rate differences was a significant challenge, however, which the Programme Operator had to take into account when allocating additional funds to beneficiaries. The exchange rate fluctuated widely, which made it very difficult to predict what the exchange rate would be at the moment of accounting for the Programme allocation (the allocation was granted in EUR, spent in PLN and accounted for again in EUR). Therefore, by making a decision to allocate such additional funds (a surplus resulting from the fact that there were favourable exchange rate differences in a given period), the Programme Operator agreed to take a potential risk of overcontracting the allocation and the need to make up this deficit from national funds.

The strengths of the mechanism used include **its smooth introduction in response to extraordinary conditions and the efficient implementation of the process of assessing applications** for additional funds. Representatives of the institutions involved in handling the Programme emphasised that the application of such a solution for the first time in an international programme was an innovative move and required the creation of procedures from scratch, which, despite its high level of complexity, was carried out efficiently.

However, the launch of the mechanism was a significant administrative burden - above all for the Programme Operator's staff. Firstly, it was necessary to prepare all the procedures for its implementation. Secondly, it was necessary to assess the submitted amendment requests for additional funds by external experts. Thirdly, the granting of a decision on additional funding meant the procedure and conclusion of new annexes with beneficiaries. These tasks were a burden first of all due to the already limited organisational and human resources involved in servicing the Programme. It was for this reason, among others, that it was not decided to extend additional support to SGS 2020 projects - moreover, the value of projects in this call was significantly lower than in other calls, so the effectiveness of such support would have been negligible.

A further burden on the Operator's staff resulted from the fact that **some beneficiaries returned unused funds at final accounts** (they had to be cleared/accounted for by the Operator's staff). This situation may have indicated insufficient planning or over-requesting of funds by some beneficiaries, raising concerns about the effectiveness and efficiency of the financial management of the projects by the scientific units. It was suggested that some beneficiaries may have merely applied for additional funds as a precautionary measure - even though they were not necessary to complete the tasks and achieve the intended outcomes. However, in the opinion of the beneficiaries themselves,

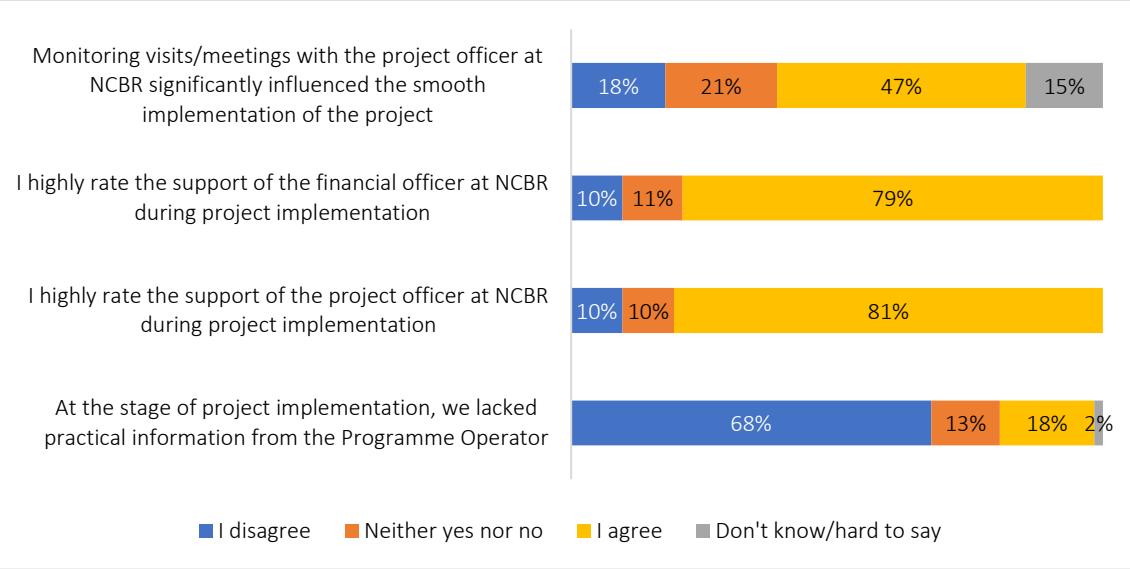
the necessity to return the unused funds is both the result of too late conclusion of annexes and transfer of funds, as well as problems encountered in the settlement of tender procedures (such delays would not allow the implementation of some tasks within the period of expenditure eligibility).

Despite the difficulties, **it is suggested to consider the possibility of using a similar mechanism in the future.** However, the use of such a mechanism should depend on the occurrence of at least two factors. First, the Programme Operator must have adequate funds (e.g., from exchange rate differences or from savings, including non-use of part of the funds by beneficiaries). Secondly, such a mechanism should be used only in special cases, e.g. in the situation of a significant increase in the cost of implementing projects in a short period of time.

Support from the Programme Operator

The conducted surveys (quantitative and qualitative) with project managers allow concluding that **the support from the Programme Operator's representatives was at a high level and had a positive impact on the effectiveness of project implementation**. These assessments are similar to those presented in the mid-term evaluation report of the Programme.

Chart 10 Please indicate to what extent you agree with the following statements regarding the importance of support from the Programme Operator to ensure successful project implementation



Source: own compilation based on quantitative survey with project managers, n=62.

Despite such positive evaluations, **isolated difficulties and reservations were identified** in the area of beneficiary support from the Operator, including:

- long response times by project officers at NCBR to questions/concerns raised and requests for changes to projects submitted,
- long time for project officers at NCBR to verify and sign documents/addenda,
- changes taking place on the side of project officers - these people changed several times during the course of the projects and each time they needed time to get to know the projects they were to be in charge of
- lack of practical and operational guidance on how budgets can be made more flexible and adapted to the research results achieved,

- lack of details on how to carry out and account for audits,
- lack of detailed information on how projects are annexed.

The analysis of the results of the mid-term evaluation of the Programme leads to the conclusion that **the main problem of the Programme Operator was the insufficient number of persons acting as project officers and the ongoing changes of persons performing these functions**. On the other hand, the beneficiaries appreciated the personal involvement of the project officers and other positive aspects of cooperation based on partnership, mutual trust and clear communication.

Conclusions concerning personnel problems were also confirmed in interviews with representatives of the Operator itself. The interlocutors drew attention to the necessity to involve a considerable number of employees in servicing the Programme - as this resulted from the obligation to provide two types of project officers for each project (responsible for content-related and financial servicing separately). In addition, during the implementation period there were problems related to significant staff fluctuation - which was mainly due to positive changes in the economic environment, including a progressive increase in wages in the economy with a simultaneous lack of increases in the public sector. In the report summarising the implementation of the EEA Financial Mechanism and the Norwegian Financial Mechanism 2014-2021 in Poland[34] , attention was drawn to the fact that **Programme Operators additionally engaged - in the implementation of various tasks related to the operation of the programmes - employees of other organisational units, while their salaries were not financed from the Mechanisms' funds**. Such assistance was provided by substantive employees from the so-called support units (e.g. dealing with coordination, supervision, settlements, control, promotion or legal services). This seems to be a correct practice in view of the temporary increase in the scale of tasks related to servicing the Programme and projects (e.g. in the period of calls for proposals and application assessment, or in reporting periods). Therefore, **it is suggested - to the extent possible and in justified cases - to apply this type of solutions also by the Operator of the next edition of the "Applied research" Programme.**

Cooperation with foreign partners

As the results of the quantitative survey with project managers showed, the completed projects had a high and very high impact on strengthening cooperation with foreign partners (indicated so by 95% of respondents, n=62). At the same time, 90% of respondents admitted that they are still working or planning to work with such partners. This means that **the evaluation of the cooperation that has taken place within the framework of the „Applied Research" Programme is positive**. Representatives of both project managers and companies participating in POLNOR 2019 projects emphasised **good relations with partners, adequate communication, high levels of trust and mutual respect**.

Similarly to the mid-term evaluation of the Programme, interview participants again admitted that **Norwegians are certainly less flexible than Poles when it comes to modifying or changing a predetermined action plan - because they operate according to assumptions, contract provisions and procedures**. This was assessed by Polish project managers as a professional approach to work, but when they expected more commitment than initially planned - as less flexible. Any request to

[34] Evaluation of the effects and the management and implementation system of the EEA Financial Mechanism 2009-2014 and the Norwegian Financial Mechanism 2009-2014, Bluehill sp. z o.o., Warsaw 2024.

perform a task had to be formulated formally and well in advance in order to be completed on time. These circumstances may have influenced some project managers to judge the involvement of the Norwegian partner as insufficient.

A positive assessment was given to the high professional competence and commitment of those involved in scientific and research work. On the other hand, the efficiency of administrative and organisational matters on the Norwegian side was rated lower. A lower rating in this area is probably a result of the fact that on the part of the Polish partners, the project manager was often personally responsible for administrative and organisational matters, while on the part of foreign partners, these were usually separate organisational units within the structure of these entities. It is worth noting, however, that this separation of substantive and administrative tasks was optimal from the point of view of substantive involvement in R&D work. It is also a solution that Polish managers would like to pursue in the future.

The interviews highlighted **the difficulties arising from the fact that Norway is not in the EU**, which means that there is no freedom of movement/exchange of goods. Instead, it was not uncommon for projects to have to transfer various types of material between Polish and Norwegian entities. Each time this required the fulfilment of specific customs requirements and the preparation of certain documents - such obligations generated difficulties especially for employees of scientific entities.

Encouraging applications to the Horizon Europe Programme

One of the objectives of the Programme was to prepare beneficiaries to apply to further international programmes, including Horizon Europe (HE) partnerships. Therefore, the Programme Operator undertook activities to encourage and motivate Programme beneficiaries to apply to HE.

The main incentive measure was the continuous (annual) monitoring of the indicator 'Joint applications for further funding'. Beneficiaries had to indicate in their annual and final reports, for each further funding request submitted, information such as: the name of the programme to which they are applying; the names of the partners; whether the request is submitted jointly; the amount of the budget; the status of the request (submitted, funded, rejected).

An interesting **example of the Programme Operator's action to encourage beneficiaries to apply was the organisation**, together with the Research Council of Norway, of **the conference 'EEA & Norway Grants contributions to EU Missions on Adaptation to climate change including societal transformation and Climate-neutral and smart cities' on** 21-22.11.2023. It was dedicated to the synergies between Horizon Europe missions and programmes under the Norway and EEA Grants. The aim of the event was to showcase the opportunities to apply for funding in Horizon Europe calls, including those launched under the Urban Mission and Mission - Climate Change Adaptation. The evaluation of the conference was not unequivocal. Some participants in the in-depth interviews indicated that some of the proposals and information were primarily aimed at large institutions, consortia or government agencies - limiting their usefulness for smaller organisations, including universities and research institutes.

It is worth noting that **the rules for applying to the Programme were created taking into account the rules of HE calls.** The aim was to provide an opportunity for applicants to familiarise themselves with the rules applied in international programmes and to make it easier for them to apply later in these initiatives.

In addition, **the International Cooperation Department works closely with** [the National Contact Point (NCP),](#) which plays a key role in supporting Polish entities in applying for international programmes, including Horizon Europe Partnerships. The Point's activities focus on providing comprehensive

information, advice and training to increase the participation of Polish institutions in European research and innovation projects. Examples of the types of activities carried out by the NCP:

- Information on calls and programmes: The NCP regularly publishes updates on open calls for proposals, application deadlines and conditions of participation.
- One-to-one consultancy: NCP experts offer consultancy to institutions interested in participating in Horizon Europe, helping to identify suitable calls and interpret formal and substantive requirements.
- Training and workshops: Regular training courses on preparing project proposals, project management and grant accounting are organised, improving participants' competences in applying for and implementing projects.
- Partner search support: NCP facilitates international cooperation by organising brokerage meetings and providing tools for finding potential project partners.
- Publication of educational materials: Guides, handbooks and webinar recordings are available on the NCP website as a valuable resource for learning about the programmes and the application process.
- Mentoring initiatives: Programmes such as ERC Mentoring support researchers in preparing proposals to the European Research Council by offering one-to-one support from experienced mentors.
- Support for beginners: For institutions and researchers starting out with Horizon Europe and other international programmes, the NCP offers dedicated materials and training to help them understand the programmes and the application process.
- Updates and communication: Through newsletters, social media and direct contact, the NCP provides up-to-date information on changes, new initiatives and upcoming events.

Representatives of the International Cooperation Department and NCP representatives engage with each other in their activities - e.g. webinars, conferences, training courses. The so-called horizontal contact points, which form a network of contact points, also cooperate with the NCP. These points play a key role in supporting universities and other research institutions in Poland in their participation in Horizon Europe. They act as local information and advisory centres, helping to prepare project applications, establish international cooperation and manage projects. This creates synergies and provides Polish entities with a broad and comprehensive spectrum of information - including funding opportunities, call dates and formal requirements related to Horizon Europe.

The qualitative research conducted with project managers and business partners confirmed a high level of familiarity with the activities of both the NCP (interviewees emphasised, for example, the high level of usefulness of the Manager's Academy) and the horizontal contact points. Beneficiaries additionally suggested that NCBR should also organise cyclical meetings with the participation of representatives of entities that have obtained funding and, above all, implemented projects from international programmes (presentation of success stories).

The effectiveness of the actions taken to encourage and motivate people to apply to Horizon Europe was rated highly - this is shown in particular by the very high (relative to assumptions) value of the indicator 'Joint applications for further funding'. It was assumed in the Programme that the indicator would reach a value of 6 at the end of implementation, while in reality beneficiaries reported having submitted 64 joint applications.

6 Conclusions and recommendations

Number	Proposal	Recommendation Method of implementation	Address
1	The rules in force for funding and accounting for the Programme made it difficult to make full use of the allocated allocation. The allocation was made in EUR, contracted and settled by the beneficiaries in PLN, and finally settled by the Programme Operator again in EUR. This generated difficulties due to exchange rate differences. The Programme allocation was converted according to the then current EUR/PLN exchange rate. It was therefore necessary to manage both the savings from projects and the amount resulting from exchange rate differences in such a way that no over-contracting took place - procedures did not allow for such a situation. (p. 52-53)	**Recommendation:** It is recommended that arrangements are put in place to ensure more effective use of the financial allocation made at Programme level. (p. 52-53) **Method of implementation:** Prepare and submit a proposal for amending the procedures for the implementation of future programmes financed by the EEA and Norway Grants. Such a proposal should concern including in the procedures a situation of over-contracting of the allocation (at the level of the whole Programme allocation), i.e. concluding agreements for an amount higher than the available allocation. The maximum possible level of over-contracting (e.g. 105% of the allocation) should be determined at the Programme level and be based on the previous implementation experience.	Programme Operator
2	Problems were identified regarding the role, tasks and responsibilities of the Programme Committee. The role and tasks of the Committee were not properly defined and communicated to the Committee members in the initial period of the Programme implementation. Committee members were not fully aware of what exactly was expected	**Recommendation:** It is recommended that changes be made to the shape and role of the Committee in future editions of the Programme. (pp. 54-55) **Method of implementation:** Prepare and submit a proposal for a change which will concern the abandonment of the Programme Committee in its current form and its	Programme Operator

Number	Proposal	Recommendation Method of implementation	Address
	of them, what tools they had at their disposal and what the limits of their actions were. In turn, according to the assumptions, the Committee's role was supposed to be advisory and not strategic in the Programme implementation process. This affected the assessment of the Committee's effectiveness and usefulness. (pp. 54-55)	replacement by: Project Selection Committee (Selection Committee) and Cooperation Committee. The Project Selection Committee could be composed of thematic experts with the same profile as the existing Programme Committee members. The Cooperation Committee would be composed primarily of representatives of the Programme Operator and partners from donor countries. Representatives of the National Focal Point from the MFRP, the Financial Mechanisms Office and the Norwegian Embassy in Poland could also have their representation in the Committee.	
3	The reporting system at project level was a source of significant administrative burden for beneficiaries and project partners. The obligation to submit detailed annual financial reports at the same time as submitting payment claims was burdensome. Problems for partners (in terms of efficiency of operations) and excessive burdens for project leaders (including managers) were also the result of lack of access to a local IT system for project partners. (pp. 57-59)	**Recommendation:** It is recommended to reduce the reporting burden for beneficiaries and project partners. (pp. 57-59) **Method of implementation:** 1/ Prepare and submit a proposal to simplify the template for the annual financial reports or to dispense with the obligation to submit them altogether (when payment claims are submitted anyway). 2/ Giving access to the local IT system to all project partners.	Programme Operator
4	Awareness of intellectual property issues among Polish project teams is insufficient. According to the representatives of the Research Council of Norway, scientists often do not attach importance to	It is recommended to include in the next edition of the „Applied Research" Programme a type of support involving the organisation of training courses on intellectual property management and/or consultancy services for project teams in response to individual needs. (pp. 45)	Programme Operator

Number	Proposal	Recommendation Method of implementation	Address
	property rights, while industrial partners place particular emphasis on securing their rights and interests, which may delay or hinder cooperation. In addition, the knowledge of Polish scientists regarding the protection of intellectual property rights is often lower than that of foreign partners, which may lead to difficulties in securing research results in their favour. (pp. 45)		NCBR Focal Point
5	There was no requirement among the call for proposals conditions to implement project results. At the same time, the results of the projects have a high implementation potential - half of the surveyed beneficiaries assessed that the implementation of the project resulted in solutions ready for implementation; a large part of them are already implemented. The implementation of research results is fostered, among other things, by the development of strategies or detailed plans for the continuation of research and activities after the end of the project by the beneficiaries - which was the case in several projects. On the other hand, sufficient funding for the continuation of activities is a constraint. (p. 40)	**Recommendation:** It is recommended to introduce into the call for proposals conditions criteria encouraging beneficiaries to develop already at the application stage a strategy for the exploitation of research results, which may cover both commercialisation and implementation in the public sphere. This should be coupled with an assessment of the appropriateness of the selection of project partner(s) in terms of their relevance to achieving the objectives of the exploitation strategy. (p. 40) **Method of implementation:** Application of project evaluation criteria that will give preference to: • development at the application stage of a strategy for the use of research results, • partnership projects with entities that are key to delivering the objectives of the strategy for the use of research results,	Programme Operator

Number	Proposal	Recommendation Method of implementation	Address
		• projects that plan to involve a variety of partners - both businesses and public institutions - in the process of implementing the results, • projects, the results of which are applied in the public sector (e.g. technological solutions for public institutions). It will be necessary to introduce mechanisms for monitoring the use of project results after their completion (e.g. post-project sustainability reports).	

7 Annexes

7.1 List of abbreviations and glossary

List of abbreviations

Abbreviation	Development
AGH	AGH University of Science and Technology
AGV	Automated Guided Vehicles
R+D	Research and development activities
CATI	Computer Assisted Telephone Interviewing
CAWI	Computer-assisted web interviewing
CRM	certified reference materials
EEA	European Economic Area
ERA	European Research Area
EFME	European Funds for a Modern Economy
FGI	Focus group interview
HE	Horizon Europe
IDI	Individual in-depth interviews
IF	Impact Factor
NCP	National Contact Point
LSI	Local Information System
FM	Financial Mechanism
EEA FM	European Economic Area Financial Mechanism
MFRP	Ministry of Funds and Regional Policy
NCBR	National Centre for Research and Development
NSC	National Science Centre

Abbreviation	Development
NGO	Non-governmental organisation
NIBIO	Norwegian Institute of Bioeconomy
NILF	Norwegian Institute for Agricultural Economics
NILU	Norwegian Institute for Air Research
NMF 2014-2021	Norwegian Financial Mechanism 2014-2021
NTNU	Norwegian University of Science and Technology
OECD	Organisation for Economic Cooperation and Development
PO	Programme Operator
OsloMet	Oslo Metropolitan University
RES	Renewable energy sources
PAS	Polish Academy of Sciences
IPR	Intellectual Property Rights
TRL	Technology readiness level
UAV	Unmanned aerial vehicles, commonly known as drones

Glossary

Abbreviation	Explanation
AGaStor	The acronym for the project entitled: Advanced Gas and Carbon Dioxide Storage in Aquifer
Bioforsk	Norwegian Institute for Agricultural and Environmental Research
BRIdge UP	Action 'BRIdge UP' under FENG Priority II 'Innovation-friendly environment'
CerChamber	The acronym for the project entitled: Development of ceramic and ceramic composite combustion chamber fabrication
CETPartnership	Clean Energy Transition Partnership international programme
CoMobility	The acronym for the project entitled: Co-designing Inclusive Mobility (CoMobility)

Abbreviation	Explanation
CORNET	International Programme, CORNET Initiative COllective Research NETworking to support and develop sectoral research with a special focus on the role of SMEs
COVID-19	infectious respiratory disease caused by infection with SARS-CoV-2 virus
Driving Urban Transitions (DUT)	The Driving Urban Transitions (DUT) Partnership is an intergovernmental research and innovation programme addressing key challenges of urban transitions.
ERA NET Co-Fund ICT-AGRI-FOOD	Programmes International Programme, a programme to support the use of ICT in the development of European food systems
ERA4Health	International Programme, ERA4Health Partnership Supporting the European Research Area in Health
ERA-NET TRANSCAN-3	International Programme, Programme for Sustainable Cooperation of National and Regional Cancer Research
EUREKA	partnership International Programme European Partnership for Innovative SMEs
FrostWave	The acronym for the project entitled: Development of novel microwave-assisted freeze-drying unit combined with natural working fluid-based refrigeration system for agriculture and marine foods
GalvaNiB	The acronym for the project entitled: New electroless Ni-B/B and Ni-B/MoS2 composite coatings with improved mechanical properties
GOSPOSTRATEG	Strategic Research and Development Programme 'Social and Economic Development of Poland under the Conditions of Globalising Markets' - GOSPOSTRATEG
GoTreatIT®	software for visual overview of already completed or ongoing treatment
GreenHeat	The acronym for the project entitled: GREEN HEAT - towards collaborative local decarbonization
HAPADS	The acronym for the project entitled: Highly Accurate and Autonomous Programmable Platform for Providing Air Pollution Data Services to Drivers and Public

Abbreviation	Explanation
HumMilkPres	The acronym for the project entitled: Storage of human milk in unfrozen state under high pressure-subzero temperature conditions - new method of preservation
HYDROSTRATEG	Strategic programme Hydrostrateg 'Innovation for water management and inland navigation'
HyStor	The acronym for the project entitled: Improving the Efficiency of Hydrogen Storage Vessels through Novel Oxide Coatings
ERA	European Research Area, an initiative of the European Union to integrate scientific and technological capacities in the European Union
INNOGLOBO	INNOGLOBO programme enabling Polish entities to establish R&D cooperation (in a wide range of thematic areas) with foreign partners from those countries of the world with which Poland has diplomatic relations
Innovative SMEs	International programme, a programme to support projects carried out by small and medium-sized research companies
KETEP	Korea Institute of Energy Technology Evaluation and Planning
Classification OECD	Classification of scientific fields and disciplines according to the Organisation for Economic Co-operation and Development
LEPolUAV	The acronym for the project entitled: Long-endurance UAV for collecting air quality data with high spatial and temporal resolutions
M-ERA.NET	EU funded network which has been established to support and increase the coordination of European research programmes and related funding in materials science and engineering
MoReSiC	The acronym for the project entitled: Modularized, Reconfigurable and Bidirectional Charging Infrastructure for Electric Vehicles with Silicon Carbide Power Electronics
MPSS	The acronym for the project entitled: Marine port surveillance and observation system using mobile unmanned scientific entities
Neon	Grant programme to support research and development activities of the Polish refining and petrochemical industry
Neuron Cofund 2	International Programme, a programme to support the development of collaborative research in neuroscience, neurology and psychiatry in partner countries

Abbreviation	Explanation
NITROsens	The acronym for the project entitled: Voltammetric detection of nitro-explosive compounds using hybrid diamond-graphene sensors: field monitoring of emerging contaminants in the Baltic Sea region
Nutritech II	Programme of the National Centre for Research and Development for research and development projects related to nutrition in light of the challenges of improving societal well-being and climate change
QualityBerry	The acronym for the project entitled: Improving plant quality and economy for a more sustainable and efficient berry production.
EJP RD	International Programme, EJP RD Programme (European Joint Programme on Rare Diseases)
RHEUMA	The acronym for the project entitled: The Polish Norwegian research collaboration to increase quality of health care and improve health outcomes of children and adult patients with rheumatological diseases
SafeFoodCtrl	The acronym for the project entitled: Sustainable and safe food production by novel control strategies of bacteria in the food chain
SINTEF	Research Institute based in Norway
SNIT	The acronym for the project entitled: Shortcut nitrification in activated sludge process treating domestic wastewater - key technology for low-carbon and clean wastewater treatment
SMART Path	The activity 'SMART Path' under the FENG Priority I 'Support for entrepreneurs'
UPTURN	The acronym for the project entitled: Microfluidic cells for high-throughput multiple response analyses
VariaT	The acronym for the project entitled: Variability of arctic river thermal regimes in a changing climate
Water4All	International programme of the European co-funded partnership Water4All supporting research and innovation projects to improve water security in the long term

7.2 Bibliography

a) ANNUAL PROGRAMME REPORT FM14-21, Poland 2023.
b) Evaluation of the effects and the management and implementation system of the EEA Financial Mechanism 2009-2014 and the Norwegian Financial Mechanism 2009-2014, Bluehill sp. z o.o., Warsaw 2024.

c) Evaluation of the effects and management and implementation system of the EEA Financial Mechanism 2009-2014 and the Norwegian Financial Mechanism 2009-2014, IDEA Instytut sp. z o.o., Policy & Action Group Uniconsult Sp. z o.o., Warsaw 2017.
d) Evaluation of the quality and effects of the implementation of Priority Axis III of the OP WER - Higher education for the economy and development, including a study of changes in the management of the educational process thanks to ESF support, Ecorys, Evalu, 2024.
e) Summary and conclusions from the implementation of the EEA Financial Mechanism and the Norwegian Financial Mechanism 2014-2021 in Poland, Bluehill sp. z o.o., Warsaw 2024.
f) Report from the study "Evaluation of the "Applied Research" Programme". - final report, EGO, LB&E, Warsaw 2023.
g) NCBR website on the 3rd edition of the EEA and Norway Grants, [https://www.gov.pl/web/ncbr/iii-edycja-funduszy-norweskich-i-eog].
h) Environment, Energy and Climate Change Programme website, [https://www.gov.pl/web/klimat/operator-programu-oraz-partnerzy].
i) Act of 13 January 2023 amending the Act - Law on Higher Education and Science and certain other acts, Amendment of the Act - Law on Higher Education and Science, in the context of the classification of fields and disciplines and statements of employees, [https://www.gov.pl/web/edukacja/nowelizacja-ustawy---prawo-o-szkolnictwie-wyzszym-i-nauce-w-kontekscie-klasyfikacji-dziedzin-i-dyscyplin-oraz-oswiadczen-pracownikow].
j) Guidelines for Research Programmes. Principles for the design and implementation of programmes in the programme area 'Research', [https://www.eog.gov.pl/strony/zapoznaj-sie-z-funduszami/podstawy-prawne/pozostale-wytyczne/wytyczne-dotyczace-programow-badawczych/].
k) Vademecum of knowledge on international research projects subsidised by NCBR, NCBR, Warsaw 2021.

7.3 List of tables and charts

7.4 Recommendation table in XLS file

Separate Excel file

7.5 Methodology - descriptive version

Separate file

7.6 Annexes documenting the course of the study

Separate files