Return on Investment of Public Support to SMEs and Innovation in Poland

Functional Analysis Technical Note

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ACRONYMS

BDS – Business development services
BGK – National Economy Bank
BSI – Business Support Institution
CPR – Common Provisions Regulation
EC – European Commission
EIB – European Investment Bank
ESIF – European Structural and Investment Funds
EU – European Union
ERDF – European Regional Development Fund
IA – Implementing Authority
MA – Managing Authority
M&E – Monitoring and evaluation
MFF – Multiannual financial framework
MIiR – Ministry of Investments and Development
MNiSW – Ministry of Science and Higher Education
MPiT – Ministry of Entrepreneurship and Technology
NACE – Statistical Classification of Economic Activities in the European Community
NCBR – National Center for Research and Development
NGO – Non-governmental organization
OECD – Organization for Economic Co-operation and Development
PARP – Polish Agency for Enterprise Development
PFR – Polish Development Fund
POIR – Smart Growth Operational Program
R&D – Research and development
RIS3 – Research and innovation strategies for smart specialization
ROI – Return on investment
S3 – Smart specialization strategy
SME – Small and medium-sized enterprises
STI – Science, technology and innovation
TA – Technical Assistance
TO – Thematic objective
TOR – Terms of reference
VAT – Value added tax
WB – World Bank

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PROJECT OVERVIEW

A "Smarter Europe" is a top priority of the European Union (EU), the core of which is innovation, economic transformation, and more competitive small and medium enterprises (SMEs). These themes account for a huge part of EU spending in the past, present, and (likely) future programming periods. Despite high expenditures, impacts on the economy often appear modest or are not well understood. EU, national, and regional policymakers want to know where and how to invest to get the highest return on investment (ROI).

This project responds to a request from the European Commission to develop and pilot methodologies to measure and improve innovation and SME support instruments. Poland was selected as the pilot country, since it is the largest recipient of EU funding, and has a rich set of support measures and implementing bodies. Drawing on the World Bank's framework for *Public Expenditure Reviews in Science, Technology, and Innovation*, the project starts by examining the inputs to the innovation ecosystem, including economic priorities, government policies, and support instruments. It then analyzes the functioning of the support instruments, and ultimately the impacts on firm performance (that is, the return on investment / effectiveness). A combined understanding of these different dimensions gives public authorities a view into where and how innovation and SME support mechanisms can be improved. To our knowledge, this is the most comprehensive and robust analysis of EU support to SMEs and innovation to date.

1. **Needs assessment and portfolio mapping analysis**

A brief overview of Poland's innovation ecosystem was prepared to understand the country's needs and policy priorities. This "needs assessment" highlights the main weaknesses in innovation-related outcomes and challenges in Poland compared to its regional and aspirational peers. Examples of the identified challenges relate to the productivity growth of new firms, the sophistication of production and exports, and firms' capabilities (for example, management skills).

The characteristics of all the current (2014–2020) innovation and SME-related EU and nationally funded instruments were then mapped. At the national and regional levels, 182 support measures—corresponding to about €21 billion—were mapped across 14 dimensions, including: objectives, beneficiary types, support mechanisms, implementing bodies, and others. The 11 largest instruments account for half of all funding, while the remainder is split between 171 instruments. The combination of the needs assessment and the portfolio mapping permitted an analysis of the 'policy mix'. The policy mix analysis compares whether the current set of support instruments is aligned with Poland's innovation-related and strategic needs and priorities, and seeks to identify potential gaps and overlaps. Four recommendations are offered:

- Reduce fragmentation and overlap between support instruments, including through increased coordination between national and regional authorities
- Consider narrowing the focus of regional instruments to adapt to local conditions
- Improve support for management and export capabilities, and young firms
- Improve the use of evidence when choosing support mechanisms

2. Functional analysis

The functional analysis examines how the design, implementation, and governance of selected support instruments in the current EU financing perspective compare to international best practices. It aims to identify how the functionality of support instruments could be adjusted to increase the return on investment of public support. Through a series of semi-structured interviews with the managers of 21 support instruments (primarily at the regional level), detailed information on 31 dimensions of instrument design, implementation, and governance was obtained. Examples of good practices in instrument design include the identification of products and outputs, and the consideration of relevant stakeholders. Examples of good practices in instrument implementation include efficient application and selection processes, as well as project and instrument closure procedures. Additionally, the functionality of the two national instruments, which were included in the functional analysis, appears somewhat better than the regional ones covered by the study. Identified challenges relate to the improvement of:

- Coordination between national and regional programs
- Flexibility in the design and implementation of instruments (particularly at the regional level)
- Instrument justification, and aligning instrument design with the desired systemic change
- Operational planning, particularly with respect to better targeting instruments toward firms where the impact of public support is likely to be the highest

3. Return on investment / effectiveness analysis

An ex post impact evaluation of the 2007–2013 EU-funded innovation and SME-related support instruments was undertaken. In partnership with Statistics Poland, the direct impact of the support was estimated using firm-level data and a difference-in-differences (DID) with propensity score matching approach. Indirect/spillover effects were estimated as well. Multiple estimation models were used to make the analysis as robust as possible. The analysis provides evidence on the impact of different types of support on: firm revenues, profits, exports, value added, research and development (R&D), and productivity as well as, ultimately, on the return on investment (ROI) of public support.

The analysis found positive impacts on firm employment, sales, value added, and exports. This result is consistent across the different estimation models. In contrast, there is mixed evidence on the impact on productivity, depending on the productivity measure used. However, productivity impacts were higher for firms in the manufacturing sector. Lastly, there is minimal evidence that the programs affected investments (either physical assets or R&D) and profits. These findings are broadly similar to earlier studies, such as GUS (2015), which examined the impact for a more limited set of programs or firms. The estimated impact from the support measures translates to an estimated average cost per job gain that compares favorably to available estimates of programs in other countries. Support measures emphasizing R&D, innovation, exports, and access to markets appear significantly more cost-effective in job creation than programs with small capital grants or those focusing on access to finance.

A **Summary Report** brings together the findings from the different pieces of the analysis. It provides insights on where and how innovation support mechanisms could be adjusted to improve the return on investment during the upcoming EU financial perspective (2021–2027). It also offers some considerations for the application of the methodology in the future, both in Poland and other countries. Key messages concern:

- Designing and targeting instruments to maximize impact (based on clear needs assessments), including a smarter approach to supporting young firms, exports, small firms, and firm capabilities
- Reducing inefficiencies (fragmentation and overlap, for instance) and improving coordination and learning

Technical Notes detailing the full methodologies and findings were prepared for each of the three dimensions. The subject of this Technical Note is the **Functional Analysis.**

INTRODUCTION

What makes some innovation support instruments more successful than others? Policymakers and academics around the world struggle with this question. One way to answer it is through "functional analyses" of support instruments. The World Bank has developed functional analyses to compare the design, implementation, and governance of instruments to good international practice and identify areas for improvement.

The functional analysis complements the other dimensions mentioned above of the *Return on Investment* project by providing more granular insights into how instrument performance could be improved. The functional analysis is also consistent with the European Commission's interest in receiving timely information to contribute to the ongoing design of the upcoming financial perspective.

This document describes the functional analysis methodology and presents the results from reviews of selected innovation support instruments conducted during June-September 2018. The unit of the analysis is an individual support instrument, which is defined as a measure (pol. *działanie*) or, if available, a sub-measure (pol. *poddziałanie*)[1]. The analysis covered 19 regional and 2 national instruments. The instruments were chosen to cover a range of instrument types and geographies, as well as based on counterpart interest. Examples of findings include:

- 5 instruments (2 national and 3 regional) stood out as having a number of best practices, e.g. on program origin, beneficiary selection process, budget resources, organizational features, and process monitoring. The experiences from these instruments could offer lessons for other instruments in Poland, as well as other countries in the EU and around the world.
- Instrument design—particularly for the other 16 instruments—could be potentially improved in the following areas:
    - Detailed analysis of market failure and consideration of alternative instruments to address the identified failure.
    - Improved targeting to reach participants that are most likely to benefit from the intervention.
    - Breakdown of required inputs at the instrument rather than priority axis or operational program level.
    - Better alignment with local context; budget allocations (e.g. R&D support) can be misaligned with local absorption capacity due to concentration by thematic objectives.
- Instrument implementation could benefit from better human resource management. Limited alignment of incentives and performance, as well as constraints on remuneration, make it difficult to retain experienced employees both in implementing and managing authorities.

[1] Not all measures are further broken down to sub-measures. Decision on dividing interventions into measures and sub-measures depends on the managing authority.

- Implementation effectiveness is constrained by external regulations, such as public procurement laws, competitiveness principles, and VAT regulations. High-level coordination could remove these constraints or mitigate their effects.

This note is organized as follows. The first part describes the methodology behind the functional analysis. The second part presents the aggregate results of the analysis based on data from 2 national and 19 regional instruments in Poland. The third part draws lessons and presents recommendations, which depending on the subject are addressed to both the European Commission and Polish institutions (managing authorities and implementing bodies). The 9 annexes present further details on the findings and recommendations.

1. FUNCTIONAL ANALYSIS METHODOLOGY

The functional analysis examines how the design, implementation, and governance of selected support instruments in the current financing perspective (2014-2020) compare to good international practices. It can be used to understand and improve the implementation of support instruments and inform future design. Additionally, functional analyses create a platform for collecting information on best practices related to implementation of EU co-financed STI support instruments in Poland. Such experiences could help improve similar instruments in other Member States.

Functional analysis is not an evaluation of manager's performance, as there is no attribution of responsibilities to individuals. Many issues are structural, relating to rules and processes that are external for people involved in management of support instruments. Recommendations related to these rules and processes could potentially contribute to refinement of regulations before the upcoming financial perspective. Functional analysis is also not an impact evaluation, but a complementary tool that helps to better interpret impact results and understand the connection between instrument functionalities and outcomes.

The functional analysis is linked both with the portfolio mapping (point 1 in the Project Overview above) and return on investment / effectiveness analysis (point 3). The selection of instruments for functional analysis is based on the country context and innovation system, as well as the mapping of the full portfolio of innovation support instruments. Functional analysis helps understand how the ROI of different instrument types could be improved, for instance with better targeting. This is especially important for innovation-related support, since some of the expected impacts are longer term and can only be measured after a few years of implementation.

To gather information about each instrument, document reviews were complemented by interviews with representatives of managing authorities and implementing bodies. 31 areas of public management were analyzed along three dimensions: design, implementation and governance (Figure 1). The design dimension covers 14 areas, implementation 13, and governance the remaining 4.[2] The analytical protocol allowed the collection of detailed information about each instrument via semi-structured interviews conducted by the World Bank team with the managers and employees of departments responsible for the design and implementation of selected instruments. Each interview was performed by at least two interviewers who scored the instrument, relying on the scoring matrix and the review of pertinent documentation, on a scale of 1 – 5. Higher scores indicate closer proximity to international best practices. Grading details are described in Annex 1.

[2] An interview protocol and a scoring matrix based on best practices that were developed in a previous application of the methodology was used here, with important enhancements for the Polish context.

Figure 1. Subjects covered in the functional analysis

DESIGN	IMPLEMENTATION	GOVERNANCE
Instrument Origin	Learning and Adjustments	Programs Relationship
Instrument Justification	Solicitations	Institutions Relationship
Instrument Relationship	Eligibility Criteria and Application Information	Interaction of Jurisdiction Rules and Regulations (Internal)
Instrument Objectives	Application and Selection Processes	Interaction of Jurisdiction Rules and Regulations (External)
Alternative Instruments	Instrument database and information on participants	
Logical Framework	Project closures	
Inputs	Budget and financial resources	
Activities	Instrument management and organization quality	
Products/Outputs	Roles and Autonomy	
Main beneficiaries	Staff and training	
Selection criteria	Incentives	
Audiences	Process monitoring	
Expected Outcomes and Impact	Monitoring and Evaluation	
Monitoring and Evaluation		

Source: World Bank analysis

Scores in each category are based on the results of World Bank and academic research on best practices in science, technology, and innovation (STI) support instruments. A brief description of each topic of analysis is provided in Table 1.

Table 1. Description of functional analysis topics

Design	
Program Origin	Degree of formality of the process of instrument origination, together with information about continuity with previously implemented programs. Linkages with strategic objectives relevant to a particular policy area.
Program Justification	Quality of underlying diagnosis and its fit to a specific instrument. Reference to market failures as problems that justify interventions. Scope and robustness of quantitative analysis performed to determine assumptions of proposed activity.
Portfolio Relationship	Consideration of an instrument with regard to all other related instruments. Identification of potential conflicts, complementarities or overlaps.
Program Objectives	Existence of explicit objectives and goals that connect an instrument to desired higher-level systemic changes. Degree of measurability and achievability of stated objectives.
Alternative Instruments	Presence of analysis and justification for use of instrument compared to other possible instruments (ideally based on comparative criteria such as efficiency and effectiveness, cost-benefits ratios, and context appropriateness) to eliminate market failure.

Logical Framework	Quality of model representing how an intervention is supposed to work, including how inputs, activities and outputs lead to outcomes and impacts.
Inputs	Degree of formality in planning inputs, including administrative and operational costs. Inputs should be consistent with logical framework and include all resources needed to achieve objectives.
Activities and Products/ Outputs	Explicit and complete list of activities and products/outputs. Consistency between inputs, activities, and outputs (e.g. all activities have a purpose and can produce desired outputs).
Main Beneficiaries	Alignment of identified beneficiaries with instrument logic. Groups of beneficiaries identified to maximize program success (beyond generic demographic categories), with explicit targeting criteria provided.
Selection Criteria	Consistency with instrument objectives. Existence of selection mechanism to capture the target population with potential higher impact. Mechanism is transparent, simple and easy to understand.
Audiences	Completeness of a list of stakeholders, excluding direct beneficiaries, that are expected to receive spillover benefits of an instrument. Identification of proper methods of interactions with them.
Expected Outcomes and Impact	Alignment with logic of an instrument and connection to the system level. Identification of outcomes and impacts with observable and measurable results and specified indicators for assessment. Existence of criteria for tracking the evaluation of the program. Degree of connection between impacts and broader R&D strategy of the country or region.
Monitoring and Evaluation	Quality of M&E system and its integration into an instrument (e.g. provision of baseline for future impact assessment). Quality of indicators and methods of data collection.
Implementation	
Learning evidence during implementation	Process of identifying and implementing changes to improve instrument performance. Degree of formality of learning process documentation.
Solicitations	Methodology for planning new calls for proposals that were not specified during the design stage; justification of new calls. Consistency of number of calls with the logical framework and objectives of an instrument.
Eligibility Criteria and Application Information	Efficiency of established criteria in reaching target population and mechanisms for its ongoing modification. Transparency of criteria and public availability of information about applicants (to degree allowed by general privacy regulations).
Application and Selection Processes	Speed, transparency and responsiveness of mechanisms used for application processing. Quality of experts responsible for selection of projects, their degree of independence and transparency of their recruitment. Appeal and conflict resolution mechanisms.
Program database and information on participants and applicants	Quality of database system that keeps track of participants, projects, follow-ups, outputs and other components of an instrument. Usage of collected information to make adjustments to solicitations themselves, increase responsiveness to participants' concerns, and contribute to general improvement of management and design of a program.
Project closures	Presence of comprehensive completion/closing report both on the instrument and beneficiary level. Quality of post-closure communication

	and scope of gathered information after completion that are required to measure impact.
Budget and financial resources	Adequacy of budget and financial resources for full implementation of an instrument. Financial accountability mechanisms in place, including for subcontracted entities.
Program management and organizational quality	Organizational structure enabling effective flow of information and minimization of external and internal pressures during implementation of a program. Presence of high-quality performance review system with appropriate indicators.
Roles and Autonomy	Clarity in definition of roles within implementing bodies with procedures to introduce changes. Degree of flexibility in management structure to respond to significant challenges and resolve conflicts.
Staff and training	Adequacy in level of training and experience of managers together with quality and number of staff. Existence of training and contracting tools to improve staff quality.
Incentives	Presence and use of clear and explicit criteria for assessing staff performance with linked awards and consequences for poor performance.
Process monitoring	Quality of internal process monitoring system with clear indicators. Application of information from monitoring system to maintain the quality of management. Effective procedures related to sharing data with higher authorities.
Monitoring and Evaluation	Continuity of operation of M&E system, procedures for adaptation and improvement of indicators over time. Presence of impact assessment system and revision based on its results.
System Governance and Relationship among programs	
Programs Relationship	Degree of competition, communication and integration with related instruments. Mechanisms to resolve overlaps.
Institutions Relationship	Quality of coordination mechanisms with related public and private institutions. Documentation of cooperation in design process with other institutions.
Interaction of Jurisdiction Rules and Regulations (Internal response)	Type and scope of actions undertaken to leverage positive or mitigate negative factors resulting from regulatory constraints. Knowledge of legal environment related to functionality of an instrument. Presence of adaptive actions of an instrument according to regulatory limitations.
Interaction of Jurisdiction Rules and Regulations (External constraint)	Degree in which general legislation leverage or inhibit impact of an instrument and possibilities for modification of such obstacles.

2. RESULTS OF THE ANALYSIS

This section presents the results of the functional analysis for 19 regional and 2 national instruments in Poland. Out of all EU co-financed STI support instruments implemented in Poland, 80% are managed by regional authorities and they account for 40% of the total budget[3]. The selection of analyzed instruments reflect this division. The national instruments include:

- *Fast Track* (1.1.1) from the National Center for Research and Development (NCBR).
- *Grants for pro-innovative services offered by Business Support Institutions* (measure 2.3.1) from the Polish Agency for Enterprise Development (PARP).

Instruments implemented on the regional level are varied in terms of managing authorities, forms of support, and policy objectives. The sample of regional instruments was determined taking into account this diversification and includes:

- Łódzkie region: *Enterprise R&D infrastructure* (1.2.1) and *Business R&D projects* (1.2.1).
- Dolnoślaskie region: *Innovative firms* (1.2) and *Product and services development in SME* (1.5).
- Lubuskie region: *Research and innovation* (1.1) and *Development of entrepreneurship* (1.2).
- Podlaskie region: *Business R&D projects and support of the transfer of knowledge, innovations, technologies and commercialization of results of R&D projects* (1.2) and *Voucher for research services* (1.3).
- Podkarpackie: *Industrial research, development works and their implementation* (1.2) and *Grants for SMEs* (1.4).
- Lubelskie region: *Support for targeted research* (1.2), *R&D infrastructure in enterprises* (1.3).
- Wielkopolskie region: *Strengthening of the innovative potential of enterprises* (1.2), *Financial instruments for improvement of the competitiveness of the region* (1.5.1).
- Świętokrzyskie region: *Grants for organization of events promoting regional economy* (2.4), *Credits for general development of SMEs* (2.6).
- Pomorskie region: *Expansion through innovation - financial instruments* (1.1.2), *Support for Business Support Institutions* (2.4.2/2.4.3).
- Kujawsko-Pomorskie region: *Capital instruments for innovative SMEs* (1.6.1).

Interviews with representatives of managing and implementation authorities were done face-to-face from May to November 2018.

[3] Information about the number of STI instruments managed by regional and national agencies originates from the portfolio mapping component of the *Measuring the return on investment of public support to innovation* project.

2.1 Aggregate national and regional results

Table 2 shows the summary of average scores for the 2 national instruments and Table 3 shows averages for the 19 regional instruments. For each instrument, the average score was calculated for the 31 elements of the three dimensions – 14 elements of design, 13 elements of implementation and 4 elements of governance. Given that there are no priors about which of the different elements of the analysis are more critical for effectiveness, unweighted averages of the scores are used for each individual category. Then, all the instruments were averaged to obtain an overall estimate for the portfolio of instruments and calculate various descriptive statistics.

Scores indicate distance between currently used solutions and global best practices in respective areas. The interpretation of the results is based on the following classification (the higher, the better):

1. Perfunctory actions that substantially inhibit implementation of the instrument;
2. Solutions inconsistent with global best practices, but enable implementation of instrument;
3. Solutions of average quality, sufficient for achieving the main objectives of interventions;
4. High quality actions, however, with space for further improvement;
5. Full compliance with state-of-the art practices, which position the instrument to maximize possible impact.

Scores are based on a matrix of best practices developed by the World Bank and further refined for Poland (see Appendix 1 for more details). For each category, a description of requirements for assigning a particular score was developed to maintain coherence across interviews.

The average score across all 21 instruments is 3.5, which means that an average instrument in the sample is of above-average quality, leaning to high quality, however with room for further improvement. The two national instruments' scores indicate high quality actions (see Table 2), especially in the area of implementation where the results are close to state-of-the-art practices. The variation of results across the 19 regional instruments is higher. Some instruments perform close to the top score (see column Max in Table 3), but there are also a few dimensions where some instruments have below average quality (see column Min in Table 3), meaning that there are factors that hinder efficient implementation of support. The higher variation across regional instruments compared to national instruments is expected given that analytical capabilities on the voivodship level have to be divided into 11 thematic objectives and budgets (including technical assistance) for each instrument are substantially smaller than at the national level.

Table 2. Summary of average scores of 2 national instruments

	Mean	Median	St. Dev.	Min	Max
1. Design	3.5	3.5	0.1	3.4	3.6
2. Implementation	4.3	4.3	0.0	4.3	4.3
3. System Governance and Relationship among programs	3.5	3.5	0.4	3.3	3.8
Overall	3.8	3.8	0.0	3.8	3.8

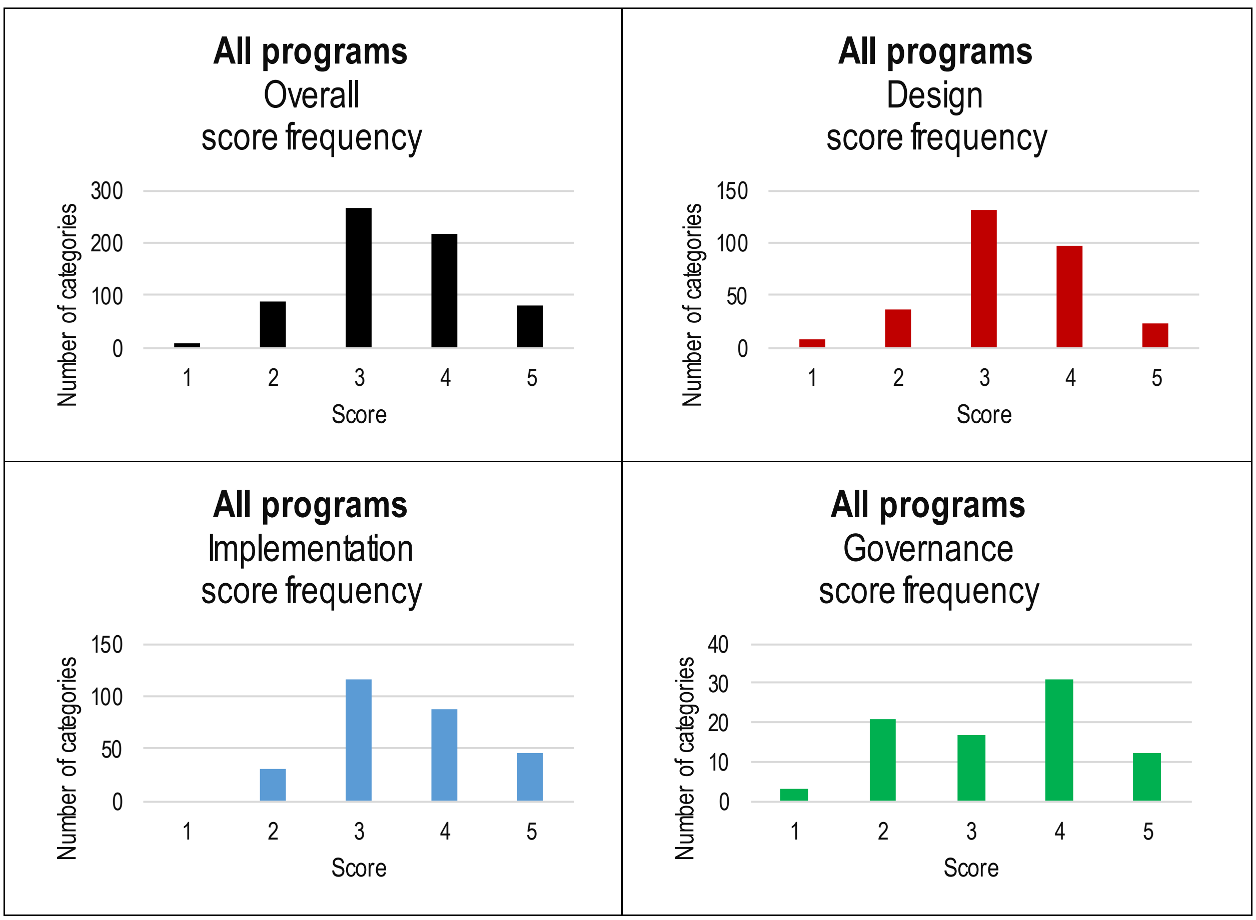
Table 3. Summary of average scores of 19 regional instruments

	Mean	Median	St. Dev.	Min	Max
1. Design	3.3	3.3	0.3	2.7	3.8
2. Implementation	3.4	3.5	0.3	2.9	4.1
3. System Governance and Relationship among programs	3.3	3.3	0.4	2.8	4.0
Overall	3.4	3.4	0.3	2.9	3.7

Note: Score range: 1-5, where 5 means best practice. There are 31 categories under 3 dimensions: 14 under Design, 13 under Implementation, 4 under Governance. Min and max indicate, respectively, the minimum and maximum average value of the dimension among all instruments. E.g. in the second table, the maximum value of 4.1 for implementation means that for the instrument closest to the global best practice, the average of the 14 implementation dimension scores was 4.1.

The histograms in Figure 2 show the distribution of categories' scores within each dimension. The implementation dimension does not have any extreme low scores, which means that across 21 instruments there are no categories that substantially inhibit instrument implementation. The governance dimension has the greatest dispersion and exhibits a bimodal distribution with a group of high scores, especially regarding the capacity of staff to navigate constraints of rules and regulations, and another group of lower scores, particularly related to external regulations that the implementing bodies are unable to influence.

Figure 2. Frequency graphs of scores of 21 national and regional instruments



The radar diagrams (Figure 3) indicate scores in each of 31 categories across all instruments. Five of the 31 categories have an average above 4 (close to a top score), which indicates that nearly all instruments both at the national and regional level are close to best practices in that category.[4] The high score in the category "Interaction of Jurisdiction rules and regulations" indicates that both managing authorities and implementing bodies are aware of the internal and external rules and regulations governing instruments and are able to navigate these constraints well. Examples of very good practices from the design dimension include the identification of products and outputs and the consideration of relevant stakeholders. Products and outputs are clearly listed, and all agencies created procedures for tracking indicators and establishing milestones. The list of stakeholders and consultation processes are identified at an early stage and include non-beneficiary parties such as business associations or academia. The application and selection process and project closure are particularly highly rated in the implementation dimension. The application and selection processes are agile and transparent, and usually follow best practices: use of expert panels, possibility of introducing minor corrections to applications and a clear mechanism for appealing and conflict resolution. All instruments have a structured process for project and program closure. Performance in these categories is influenced by the governmental and EU Regulations, which reflect best international practices.

Another five categories received "close to high practice" marks, with the average above 3.7 across all instruments: i) instrument origin, reflecting formal process of instruments formation and use of past experiences, however with often limited room for adjustment due to regulations, ii) and iii) portfolio relationship and program relationships, indicating good complementarity of instruments within managing authorities, with varying awareness of instruments implemented by other institutions, iv) clear monitoring and evaluation design at the program level, and v) usually sufficient and stable long-term budgets to implement the intervention, however sometimes exceeding feasible absorption levels (especially for business R&D) and sometimes insufficient to hire an adequate number of employees.

Areas with the greatest need for improvement include some categories governed or affected by regulations. For example, lack of formalized incentive systems, especially linked to the performance of particular instruments, is often due to the general rules of human resource management in Marshall Offices (*category*: incentives). The outcome indicators regulated by the EU do not facilitate connecting outcomes with higher-level objectives (*category*: expected outcomes and impact). External regulations, such as competition rules regarding state aid and public procurement laws, create significant constraints on agencies and likely negatively impact on implementation effectiveness. Moreover, regulations could help with more comprehensive consideration of alternative instruments to address market failures, especially for grants (*category:* alternative instruments) and with consideration of methods to identify a target population and fine-tune selection criteria (*category:* selection criteria). Finally, many implementing bodies would benefit from improving process monitoring.

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[4] Categories which obtained high scores across all programs are:

- Design:
  - Audiences (4.7 out of 5.0); Products/Outputs (4.5);
- Implementation:
  - Project Closures (4.9); Application and Selection Process (4.5);
- System Governance and Relationship among programs:
  - Interaction of Jurisdiction Rules and Regulations (Internal) (4.3).

Figure 3. Average score of national programs per category

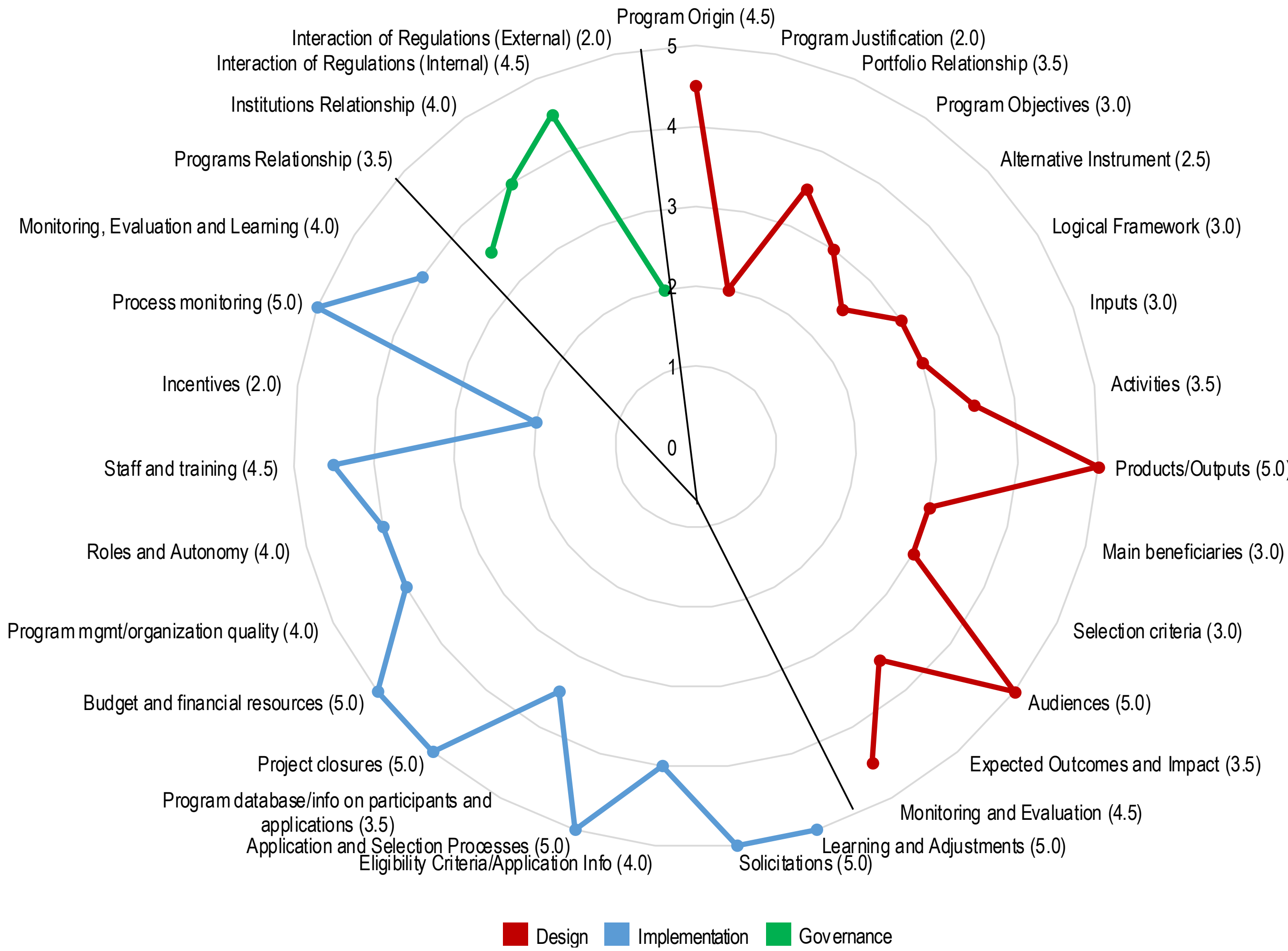
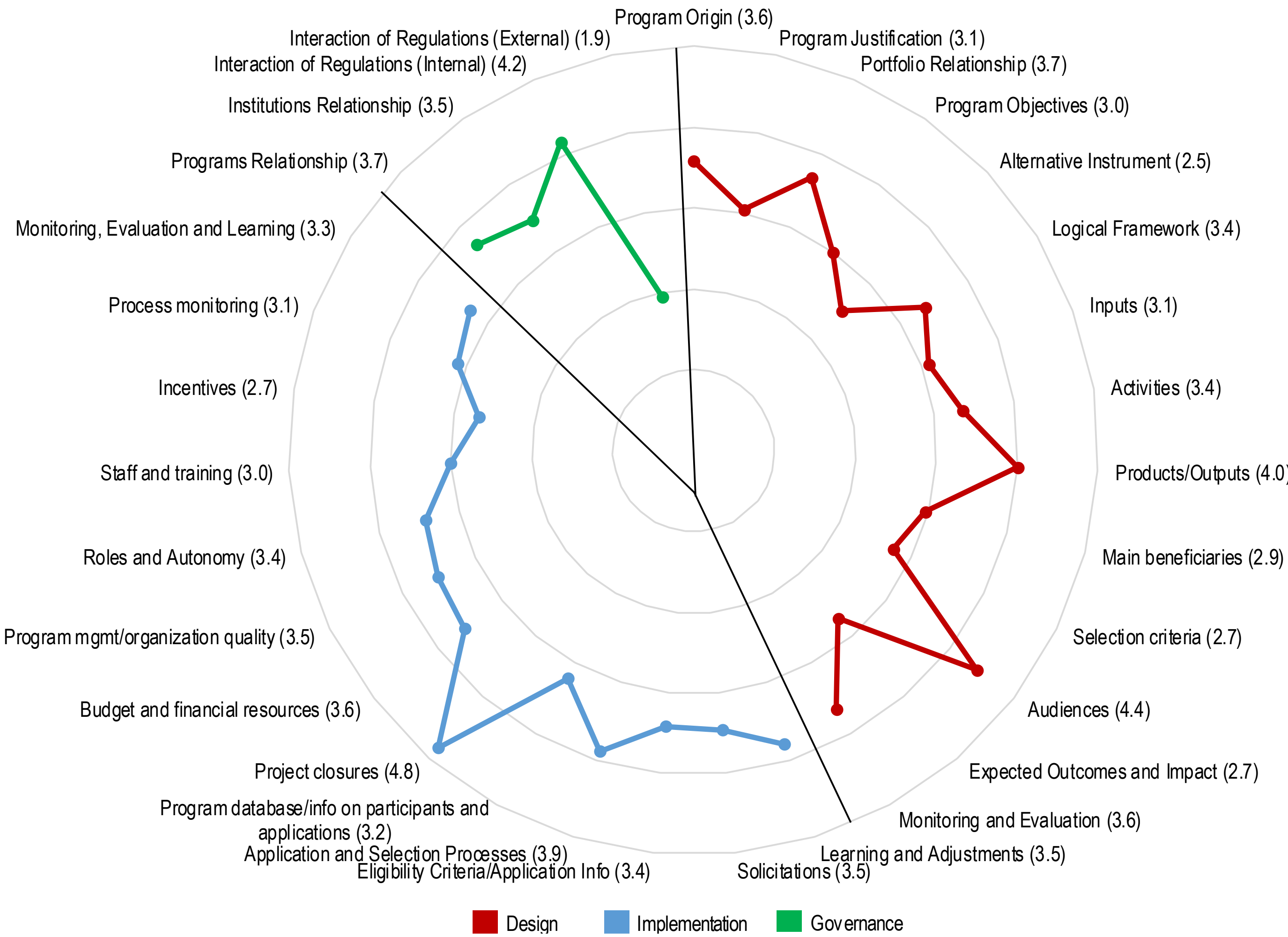


Figure 4. Average score of regional programs per category



Note: The graph lists the average scores across all instruments for each of 31 categories, across the three dimensions of instrument design, implementation and governance.

2.2 Systemic and idiosyncratic patterns of performance

One of the objectives of the functional analysis is to identify systemic (i.e. similar across all instruments) and idiosyncratic performance patterns. Despite differences in types of instruments and agencies, the results of the analysis are similar across the board in many categories. Two main reasons behind this situation were observed. First, EU and national regulations leave limited space for discretionary decisions in many Design and Implementation categories. Second, the perceptions of authorities engaged in EU co-financed firm support programs appear to be aligned on many topics. Categories that exhibit the most systemic performance across all instruments are listed in Table 4. Improvement in these areas likely requires modification of regulations.

Table 4. Categories with the most systemic performance

High scores (≥ 3.7)	Low scores (≤ 3.0)
Design	
• Products/Outputs	• Instrument Objectives • Selection Criteria
Implementation	
• Project Closures • Application and Selection Process	• Incentives
Governance	
• Interaction of Jurisdiction Rules and Regulations (Internal)	• Interaction of Jurisdiction Rules and Regulations (External)

Source: World Bank analysis

Several categories are characterized by high differentiation of performance. Idiosyncratic performance categories include Instrument Origin and Justification, Alternative Instruments, Learning and Adjustments, Solicitations, and Staff/Training. Top performing instruments in idiosyncratic categories constitute a collection of best practices that could be used by managers of other interventions to improve performance. Details on the methodology of detecting patterns of systemic and idiosyncratic performance are described in Annex 10.

The following section contains a detailed description of the rationale for the score in each category. It also indicates regulations that affect each category. The implications of these observations are discussed in the concluding section.

2.3 Detailed comments per category

Despite differences between managing authorities and implementing bodies, the results of the analysis are similar across the board in most categories. This situation may result from the fact that the EU and national regulations leave limited space for discretionary decisions. Additionally, functional analysis results are largely based on the perception of people engaged in the design and implementation of support instruments, and opinions on many topics could be coherent among them. In selected categories, the two national instruments (along with three regional instruments) responded better to limitations resulting from the legal framework than most regional ones. A description of categories with the biggest differences in results between the national and regional levels is presented in Annex 3.

Lower regional level scores in several categories are likely due to the fact that analytical capabilities in voivodships have to be divided into 11 thematic objectives. On the other hand, national agencies are responsible for carrying out interventions in only two areas – Thematic Objective (TO) 1 (R&D) for NCBR and Thematic Objectives 1 (R&D) and 3 (SME support) for PARP. Across regions, the share of the budget earmarked for TO1 ranges from 4.5% to 14.3% and for TO3 from 6.4% to 16.1%[5].

The subsections below summarize the findings by category (or group of categories sharing similar characteristics), including indications of best practices and areas for improvement. Additionally, references to relevant legal acts have been included where the course of action is strongly determined by European regulations or the Partnership Agreement.

2.3.1 Design

1.1 Instrument Origin | Average score: 3.7
Common Provisions Regulation: Articles 10-12 and Annex I, Articles 89, 99
ERDF Regulation: Article 1
Partnership Agreement Chapters 1.2.2, 1.3.1

The process of instrument formation is formal, but often leaves little room for adjustments to the context. The majority of analyzed instruments originated in response to EU requirements and were not always aligned with the diagnostics. For some interventions, managing institutions took into consideration experiences from the previous financial perspective and adjusted instruments accordingly. However, not all voivodships were involved in advanced R&D or dedicated financial instruments prior to 2014. In the majority of regions, financial instruments were part of instruments focused on Business Support Institution (BSI) support (except for regions that participated in the JEREMIE initiative).

A strong foundation for the instruments appears rare. However, all interventions are aligned with regional and national strategic documents (in particular with the Strategy for Innovation and Efficiency of the Economy – Dynamic Poland 2020). Exceptionally strong consideration of instrument origin was made by NCBR, which conducted a structured analysis of the needs of the Polish innovation ecosystem. NCBR also tested different variations of the instrument design before the roll-out of the final version.

[5] Information about the share of STI policy in the total budgets managed by regional agencies originates from the portfolio mapping component of the *Measuring the return on investment of public support to innovation* project.

Instruments implemented by PARP are also based on results of economic analyses, performance of past interventions, and experiences from pilot programs (for which more details are described in Annex 8Annex 8 Origination of a few regional instruments is also strongly supported by underlying economic analysis.

1.2 Program Justification | Average score: 3.0

Common Provisions Regulation: Articles 14, 55, Article 37 and Annex IV
Partnership Agreement: Chapter 1.2.1

Diagnostics supporting the creation of grant (i.e. non-returnable) instruments come from ex-ante evaluations, an obligatory document prepared before the beginning of the new programming period. These documents aim to determine whether there is a justification for public intervention and whether the intervention will contribute to the achievement of development goals. However, each ex-ante evaluation covers an entire operational program.[6] As a result, these documents are not directly fitted to particular instruments and provide limited justification for how a given action would address an expected market failure (which is usually not defined in ex-ante evaluations). Ex-post evaluations of instruments from the previous financial perspective, as well as regional development strategies have also been used for program justification.

A separate ex-ante assessment is prepared for financial instruments per EU requirements, which is a prerequisite before MA decisions on the share of the budget earmarked for returnable support.[7] For all returnable interventions, so-called *financial gaps* are calculated, providing a rationale for the design.[8] A shortcoming of this analysis is that the methodology is similar for all instruments, regardless of their purpose—from STI support to thermo-modernization of residential buildings—resulting from EU Regulations[9]. However, compared to non-returnable support, returnable instruments usually have stronger justifications.[10]

1.3 Portfolio Relationship | Average score: 3.7

Common Provisions Regulation: Articles 13, 96

[6] National instruments are part of Smart Growth Operational Programme, which combines interventions only in the area of TO1 (Business R&D) and TO3 (SME support). In this situation, the justification presented in ex-ante evaluations significantly supports design of the instruments.

[7] Article 37(3) of the Regulation (EU) No 1303/2013 specifies that *"It [Ex-ante assessment] shall, in any event, be completed before the managing authority decides to make programme contributions to a financial instrument"*.

[8] Financial gap calculations are challenging because it is difficult to create a counterfactual scenario. Relying on data from respondents on how much they would like to borrow if the financial conditions were better is likely to overestimate the size of the gap. Conversely, estimations based on the amount of credit applied for but not received are likely to underestimate the size of the gap. Therefore, financial gap calculation should be viewed with caution.

[9] Article 37(2) of the Regulation (EU) No 1303/2013 specifies scope of the ex-ante assessment, whereas Article 39(4)a includes details of estimation of financing gap that is the basis for determining value of financial contribution to returnable support instruments.

[10] Ex-ante assessments of financial instruments in, among others, Pomorskie and Świętokrzyskie region clearly refer to the concept of market failure and provide a justification for intervention.

Partnership Agreement: Chapter 2.1.2

Instruments are designed to be complementary within regional programs. The national-level agencies also look at their instruments as a portfolio; thanks to their responsibilities and budget size, they can specialize. The role of the instrument as part of the larger system seemed best understood at NCBR, where the complementarities with other agencies were clearly articulated.

Awareness of programs implemented by other institutions or levels (national/regional) varies between managers of different instruments. A few regions and NCBR considered actions undertaken by other agencies of the national STI support ecosystem. On the voivodship level, several instruments are often designed by the same group of people which makes it easier to consider the portfolio of interventions as a whole. However, among some agencies, acknowledgement of overlapping instruments appears rudimentary. Such a situation results in the duplication of instruments, e.g. for R&D support, resulting in inefficiencies.[11]

1.4 Program Objectives | Average score: 3.0
Common Provisions Regulation: Article 9, 26-28
ERDF Regulation: Articles 2- 3, 5
Partnership Agreement: Chapter 1.2.2

There are concrete and (usually) measurable objectives with targets. However, these are often generic and oriented toward administrative accountability rather than connected directly to strategic objectives. Examples of such metrics include the number of supported entities or value of disbursed financing. The ex-ante evaluation is supposed to make this connection, but the connection is weak in practice.

Performance targets are often considered to be instrument objectives. The EC provides a set of pre-defined indicators, out of which MAs choose ones that are most suitable for a particular instrument.[12] Although tracking the individual impact of the majority of instruments is difficult due to their relatively low size, the objectives of all instruments should be logically connected with systemic changes. Most indicators are related to products of the intervention, not to expected changes in the economy. This situation was common across all reviewed instruments.

1.5 Alternative Instruments | Average score: 2.5
Common Provisions Regulation: Articles 66-68 and Annex IV

In most cases, consideration of alternative instruments was limited. Most analyzed non-returnable instruments were designed with little or no analysis of other possible instruments to address the market failures. The exception is ex-ante assessments of financial instruments, which usually try to a) answer why activities undertaken by the private sector could not fill the identified *financial gaps,* and b) look at

[11] Information about examples of overlaps in instruments originates from the portfolio mapping component of the *Measuring the return on investment of public support to innovation* project.
[12] A list of Common Output Indicators, that are used by MAs also in considerations related to program objectives, is specified in the Annex I of the Regulation (EU) 1301/2013.

various financial instruments that could achieve the same target. Considerations of alternative instruments in such documents are usually of high quality.

Some agencies considered alternative instruments through an analysis of differences in applicants' behavior between returnable and non-returnable interventions. The results, which indicate a strong preference among applicants for returnable support, helped to increase complementarity in the schedule of calls. In several regions, managing authorities refrain from launching financial instruments until a significant share of the budget for grants are disbursed.

1.6 Logical Framework | Average score: 3.3
Common Provisions Regulation: Article 19 and Annex XI, Article 37, Article 95 and Annex X
Partnership Agreement: Chapter 1.2.3 and Annex I

Partially articulated logical frameworks are required by the European regulations in the ex-ante evaluations of entire operational programs and not specific instruments.[13] However, there are no restrictions on preparing logical frameworks on the instrument level. This applies generally to the instruments designed at both national and regional levels. Usually, left side components (inputs) of logical frameworks are identified adequately with an implicit design of the remaining parts. Preparation of logical frameworks is mostly perceived as a formal necessity (required by the EC), not a useful tool in the design process. Logical frameworks tend to be created by research companies responsible for the entire evaluation, usually with limited involvement of MAs. Thus, even when explicit models are part of the documentation, they are rarely used in practice by policymakers or implementing bodies.

1.7 Inputs | Average score: 3.1
Common Provisions Regulation: Article 18 and Annex VII, Articles 90- 92
ERDF Regulation: Article 4
Partnership Agreement: Chapters 1.2.3, 1.4.3, 1.4.6, 1.4.7

1.8 Activities and Products | Average score: 3.4
Common Provisions Regulation: Article 39, 115-117, 132
Partnership Agreement: Chapter 5.6

1.9 Outputs | Average score: 4.1
Common Provisions Regulation: Articles 20-22 and Annex II
ERDF Regulations: Article 6 and Annex I
Partnership Agreement: Chapter 2.4

Inputs are not explicitly catalogued and linked to the causal mechanism of individual instruments. They are usually designed under a general administrative umbrella that provides resources for the whole operations of managing authorities and implementing bodies. In the design stage, consideration of

[13] Article 55(3) of the Regulation (EU) 1303/2013 sets the requirement for inclusion of logical frameworks (Point (f) specifies it as appraisal *"how the expected outputs will contribute to results"*) in the ex-ante evaluation of the program.

inputs is necessary to negotiate with the EC an appropriate value of technical assistance, while the quality of the underlying analysis varies among agencies. Some MAs limit it to a direct estimation of a percentage share of the whole program for the administrative budget. Others explicitly identify the majority of inputs, which is a good practice that other agencies could learn from.

All instruments have the main activities required for successful implementation of the program clearly listed (e.g. solicitations, promotion activities, consultations). Some are shared by various instruments under one priority axis. Some gaps remain in less critical areas, and for some interventions, identified activities are not fully aligned with inputs and outputs. An insufficient catalogue of inputs and activities in the design phase results in the need to make ad-hoc adjustments during implementation, which may reduce efficiency.

Products, on the other hand, are specifically listed and all MAs created measures for tracking and establishing milestones. This is largely due to the EU Regulations that require the use of precise product/output indicators. On the national level, NCBR and PARP created additional product/output indicators above those specified by regulations, preceded by a structured process of linking them to expected impact.

Bank Gospodarstwa Krajowego (BGK, a state development bank) is responsible for implementing financial instruments, acting as a fund of funds, in 15 out of 16 ROPs. The design of inputs, activities and products in returnable instruments is determined by managing authorities in investment strategies, which include characteristics of offered products and management procedures. BGK supervises the quality of the documentation and proposes changes if necessary. However, some MAs indicated that the modifications suggested by BGK tend to impose uniform elements of instrument design with limited regard to local specifics. An analysis of financial products implemented under returnable support instruments is included in the *Portfolio Mapping and Needs Assessment Technical Note*.

1.10 Main beneficiaries | Average score: 3.0

Common Provisions Regulation: Article 9
ERDF Regulation: Article 5

1.11 Selection criteria | Average score: 2.8

The pool of beneficiaries is specified generically. Instruments support R&D projects that fit into Smart Specialization Strategies (S3), which in many cases are very broad. When targeting is indicated, it only refers to a general group, such as SMEs. A small subset of instruments was designed for more specific recipients, such as new enterprises (younger than 2 years) or spin-offs/spin-outs. There are no commonly used mechanisms for targeting firms that could contribute the most to success of the intervention.[14]

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[14] One of instruments implemented by PARP (Measure 2.5 *Acceleration Programs*, which was not a subject of the Functional Analysis) includes two-stage targeting. First, an applicant must operate within sectors identified as smart specialization. Second, each potential beneficiary is obliged to align the project proposal with up to three subjects from the *List of Key Areas of Specialization*, such as biotechnology, cybersecurity, smart city and internet of things. This approach promotes more innovative projects compared to projects generally fitting within S3.

The eligibility and selection criteria built into the design are clear, coherent and transparent. However, there is no consideration of methods to identify a target population and fine tuning the selection criteria with it. The situation is similar across the board, except for MAs that included rudimentary provisions aimed at reaching optimal members of the target group (e.g. offering higher co-financing levels for companies that will disseminate knowledge created as a result of project implementation or will establish cooperation between large firms and SMEs).[15]

Anecdotal evidence from some of the interviews suggested a risk-averse attitude toward project selection, which stands in contradiction to the uncertainty of results inherent in R&D projects. Relatively low-risk projects are preferred over high-risk ones mostly because of the consequences related to unsuccessful enterprises (e.g. the need for returning of financing) and legal uncertainty in the area of durability, indicators and their impact on eligibility.[16] Such consequences make it more difficult to achieve program objectives and create additional bureaucratic burden for implementing bodies.

1.12 Audiences | Average score: 4.5

Common Provisions Regulation: Article 5

All agencies showed a high level of advancement regarding consideration of non-beneficiary stakeholders. There are consultation mechanisms based on EU Regulations, which require participation of local business associations and academics in monitoring committees. Moreover, selected MAs and IAs engage non-beneficiary audiences to an even greater extent and encourage local business and academic stakeholders to show a proactive attitude.

1.13 Expected Outcomes and Impact | Average score: 2.8

Partnership Agreement: Chapter 1.3.2

There are explicit and measurable outcome indicators. However, not all of them are directly related to the expected changes in the system and enable impact assessment due to obligations arising from the EU regulations[17]. MAs are required to track a particular set of product and outcome indicators and tend not to collect additional metrics. Indicators defined in EU regulations seem mostly internal to instruments themselves and support fulfillment of controlling functions. The number of supported entities or value of provided grants are examples of outcome metrics that do not indicate how performance of instruments are linked to achieving policy objectives. Furthermore, the relationship of impacts across national and regional instruments is not explicitly considered. The perception of

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[15] Article 28 of the Commission Regulation (EU) No 651/2014 defines conditions entitling for higher co-financing rates in SME innovation support and determines optionality of their fulfilment.

[16] Regulatory uncertainty related to impact of unsuccessful high-risk R&D projects on program performance, seems to be mostly the result of varying legal interpretations of the European Commission and unpredictable findings of the European Court of Audit, who often do not take into consideration specifics of R&D projects during control proceedings.

[17] Article 27(4) and Article 96(2) of the Regulation (EU) No 1303/2013 sets the conditions for outcome indicators, that include financial, output and result indicators with no requirement of establishment of impact indicators. The list of indicators for the ERDF instruments is specified in the Article 6 / Annex I of the Regulation (EU) No 1301/2013.

expected impact does not reach beyond direct products of the intervention.[18] The connection with high-level objectives of the innovation policy framework remains vague. Selected counterparts highlighted that in the settlement process the EC focuses on the performance framework statistics, which are not related to economic impact, but rather to efficiency in disbursing funds.

1.14 Monitoring and Evaluation | Average score: 3.7
Common Provisions Regulation: Articles 47-49, 59, 110, 114
ERDF Regulation: Article 6 and Annex I

There is a monitoring and evaluation system by design which enable the tracking of changes resulting from the support provided. However, many of M&E indicators are of limited usefulness for impact analysis, which often seems to be designed at the program level (or subset of interventions in a particular area) and not the instruments themselves. Considerations related to the design of impact analysis methodologies are mostly left to external providers of evaluation services as part of the ex-ante evaluation schedule. In most agencies, the design of an instrument lacks appropriate data collection procedures for subsequent impact evaluation. However selected Implementation Agencies collect additional information for the purpose of impact evaluation from the beginning of the operation of the instrument (e.g. on-going questionnaires among unsuccessful applicants).

2.3.2 Implementation

2.1 Learning and Adjustments | Average score: 3.6
Common Provisions Regulation: Article 23
Partnership Agreement Chapter 2.6.1

Agencies at the national level have systematic and documented systems of learning from experiences to improve their operations, even in the short to medium term or from one solicitation to the next. However, the situation varies among regional institutions. All but one of them implemented some changes to on-going instruments, however modifications differed in scope and degree of formality. In most cases, the learning process is unsystematic and related documentation is rudimentary or does not exist.

The majority of adjustments regard minor improvements with no long-term implications and are focused on ensuring formal compliance with regulations or making application procedures more favorable for applicants (with limited changes focusing on other areas, e.g. improved targeting of beneficiaries).

Lower scores in a number of implementation categories among regions result from the fact that analytical capabilities on the voivodship level have to be divided into 10 thematic objectives, compared to national institutions (NCBR, PARP) that are specialized in specific policy areas (similar to the above findings in the Design dimension). However, there are also best practices on the voivodship level that could serve as a basis for improvement in regions with the biggest challenges.

[18] As specified above.

2.2.1 Solicitations | Average score: 3.6

There is a formal requirement of publishing solicitation plans for the following year by the end of October of the preceding year, which ensures a basic clarity of the system. The pre-agreed plans are changed ad hoc in some regions, but generally remain stable over time. Adjustments to solicitations on the regional level are generally aligned with changing needs, but there appear to be gaps in documentation and the quality of the decision process. Regional IAs also do not always align the number of solicitations with demand for funds in previous competitions.

The solicitations in the two national instruments are planned and carried out in a more systematic manner, which is likely partially a consequence of NCBR and PARP specialization. Adjustments are well-justified and documented and are reactions to both signals from the applicants and analysis of gathered statistics. For instance, rolling applications were introduced to increase flexibility for entrepreneurs.

2.2.2 Eligibility Criteria and Application Information | Average score: 3.5
Common Provisions Regulation: Article 65

2.2.4 Program database and information on participants, applications | Average score: 3.2
Common Provisions Regulation: Annex XII
Partnership Agreement: Chapter 4.5.1

Standards of the publication of application information and documentation of implemented changes are of high quality, mostly as a result of EU Regulations. The complexity of the selection criteria of non-returnable instruments leads to firms needing to hire consultants to complete applications. This creates a market of consultants, which reduce the efficiency of the STI support instruments. The organization of application procedures are heavily dependent on EU regulations, which are external to implementing institutions.19 In the case of financial instruments, the bureaucratic burden is lower.

There is an information system for tracking project financials, but it is not clearly designed to improve the management of the instrument. In some agencies (incl. NCBR) most of the project reporting is done on paper, which limits its usefulness, whereas other agencies have unsuccessfully tried or managed to develop their own tailor-made database solutions.20 EU and national regulations precisely define what information on applicants should be collected and published. Related procedures are transparent, but in the majority of cases databases are not utilized for adjusting the mechanics of instruments.

2.2.3 Application and Selection Process | Average score: 4.0

[19] For example, Regulation (EU) No 1303/2013 Annex XI defines ex-ante conditionalities that have to be fulfilled throughout the duration of the implementation period or Article 65 that defines eligibility and durability conditions.
[20] As of April 2019, NCBR is preparing to introduce a fully electronic progress reporting tool for beneficiaries. The system will apply to all projects co-financed after its introduction with plans to include some currently implemented projects.

Partnership Agreement: Chapter 5.2.1

In the national and most regional instruments, the application and selection processes are agile and transparent. There is good evidence of best practice, such as use of expert panels, possibilities of introducing minor corrections to ongoing applications, assessment of documents in a timely manner, and clear mechanisms for appealing and conflict resolution. A few regional agencies struggle with some parts of the selection process. Challenges with the recruitment of quality experts to review applications seem to be the most common shortcoming. Another example concerns extension of the process due to staff shortages or the timing of solicitations (e.g. accumulations of numerous calls in a short timeframe).

There are two stages to the application assessment process: formal and merit. In the current financial perspective, regulations allow for an appeal of the merit part, but not the formal one. However, in contrast to the previous financial perspective, implementing bodies are allowed to request the correction of minor deficiencies in the application during the formal stage of assessment.[21] This is a best practice, and it limits the need for an appeal process.

2.2.5 Project closures | Average score: 4.9
Common Provisions Regulation: Articles 42-45, 122, 141

There is a structured process for project and program closure and follow-up to gather information from beneficiaries after the end of the project. Closure criteria are fully specified by the EU regulations, including provisions of post-closure access to information in the agreements between implementing bodies and beneficiaries of the funds. These procedures are examples of best practices in the management of STI support projects.[22]

2.3.1 Budget and financial resources | Average score: 3.7
Common Provisions Regulation: Articles 41, 93-94, 129-131
Partnership Agreement: Chapter 5.3.1

Budgets are disbursed on the basis of a 7-year framework. The framework is an example of best practice because it provides predictability of financing over time. On the national level and in selected regions, the overall values of budgets are adequate to achieve expected policy goals. However, financial allocations to individual thematic objectives in many regions appear not to take into consideration local characteristics. Especially in the case of less developed parts of Poland, allocations for business R&D exceeded feasible absorption levels. According to regional authorities, this occurred mostly due to pressure from the EC (thematic concentration), even when the region presented results of analyses highlighting their R&D limitations. Due to improvements in the Polish labor market, some implementing bodies have insufficient financial resources to hire enough employees. The process required to modify

[21] Article 43(1) of the *Law of July 11, 2014 on the rules of implementing programs in the field of cohesion policy financed in the financial perspective 2014-2020*, implementing bodies are allowed to ask for correction of minor shortcomings in the application with providing applicants with 7 days for re-submission of the documents.
[22] Articles 42-45 of the Regulation (EU) No 1303/2013 define activities related to project closures in financial instruments. Article 122 concerns project closures in case of project failure and bankruptcy of the beneficiary. Article 141 sets procedures related to closure of operational programs.

the value of the technical assistance budget is time consuming and every decision in this area must be accepted by the European Commission. Such procedural rigidity reduces flexibility of program implementation.

2.3.2 Program management and organization quality | Average score: 3.6

Common Provisions Regulation: Articles 4, 50-51, 122-125, Annex IV
Partnership Agreement: Chapters 2.5.1, 5.1.1

Implementation of innovation support instruments requires a significant degree of flexibility. In the first half of the financial cycle there is a high demand for assessment of applications, whereas in the second part, most efforts are switched to monitoring and settlement of projects. On the national level and in selected regions, organizational structures are efficient and regularly adapted to the functionality of the program to reflect the changing dynamics of the implementation cycle. Some employees are redirected from one department to another to guarantee appropriate capacity in various functional areas of program implementation. Mechanisms of organizational improvement can be of low quality, especially in Marshal Offices, partly as a result of rigid civil service regulations and lack of structured monitoring processes.

Few institutions monitor organizational adequacy with proper effectiveness indicators. The most sophisticated level of monitoring is gathering information on the performance of whole departments, which provides limited usefulness for management improvements.[23] The exception is PARP, which gathers feedback on management quality of all instruments through the *Barometr Innowacyjności*—an on-going evaluation of support schemes based on surveys carried out among beneficiaries of individual measures.[24]

2.3.3 Roles and Autonomy | Average score: 3.5

Common Provisions Regulation: Articles 29, 38, 72-74, Annex XIII

The organizational structure of IAs is defined by the MA and all changes must be authorized by it. Adaptation is possible, but the process can be cumbersome, reducing the autonomy of the office in charge of implementation of the instrument. Despite that, roles and autonomy within and between implementing and managing authorities of half of analyzed instruments are defined in line or close to best practices. Management of financial instruments is vulnerable to additional challenges. Because implementation of returnable interventions must be performed by financial institutions such as the BGK

[23] The Ministry of Investments and Economic Development twice a year prepares the report on "Administrative potential of the institutional system for the fulfillment of the Partnership Agreement in the area of Cohesion Policy" which contains information about employment and salaries in all institutions engaged in management of EU funds in Poland. However, data collected in the report is suitable for high-level oversight purposes with little potential for supporting improvement of organizational quality.

[24] The results of the *Barometr Innowacyjności* evaluation of instruments implemented in the previous financial perspective, together with a description of the methodology, can be found at:
http://www.ewaluacja.gov.pl/strony/badania-i-analizy/archiwum-2004-2015/barometr-innowacyjnosci-ewaluacja-on-going-dzialan-po-ig-skierowanych-do-przedsiebiorstw-dzialania-14-41-332-42-44-541-61-81-i-82-po-ig-edycje-2011-2014/.

and EIB, the capacity to introduce changes is limited[25]. An imbalance in negotiation powers (in favor of financial institutions) also lowers the efficiency of conflict resolution mechanisms. Managing authorities are responsible for the overall success of the program, so in case of any disputes with financial institutions, the pressure to reach a solution tends to prevail over working towards a fair resolution.

2.3.4 Staff and training | Average score: 3.1

Common Provisions Regulation: Articles 58-59, 118-119
Partnership Agreement: Chapter 1.4.7

2.3.5 Incentives | Average score: 2.6

Human resources are tight in almost all agencies, with the biggest bottlenecks visible during application review periods. Because of the economic recovery, private sector wages in Poland have improved, making them more competitive compared to relatively stagnant salaries in the public administration. This makes it difficult to recruit staff of appropriate quality and quantity. Some agencies renegotiated technical assistance budgets with the EC to allow salary increases, which even if successful, do not catch up with wages offered by the private sector. As a result, employee rotation and lack of applicants for job offers pose serious challenges. Additional limitations in setting salaries result from national and regional civil service regulations. These regulations set maximum remuneration levels at given positions, regardless of department and thematic scope of work.

Most agencies offer reasonably wide training opportunities, but because of the lack of appropriate incentives, their use remains limited. Except for initial instruction, further training tends to be voluntary and is not connected to progress of one's career path. The standard training planning model is based on a survey asked once a year among employees about their training needs and preferences. The scale of temporary contracting is limited. The vast majority of staff are employed on the basis of long-term agreements. However, a few regions offer fixed-terms contracts until the end of the current budgetary perspective (up to 2023).

The system of rewards and incentives is mostly informal and not tied to the performance of particular instruments and/or employees. They are handled on a one-to-one basis by direct supervisors. The decisions on budget for bonuses and pay rises are often discretionary and made by external parties (e.g. voivodship boards) with little recognition of performance in the preceding period. Standardized biennial employee evaluation procedures are in use in all agencies (as specified in national regulations) but are often discretionary. The situation might be improved by establishing standard criteria to evaluate employees, which would provide clarity for both managers and employees. Career paths are short (no prospects for promotion after a couple of years) thus providing few incentives for staff.

2.3.6 Process monitoring | Average score: 2.3

Common Provisions Regulation: Articles 20-22, 40, 52-53, 111-113, 126-128 and Annex II

[25] According to Article 38(4)c of Regulation (EU) 1303/2013, a MA may implement loans or guarantees directly; only equity instruments require the engagement of intermediaries. However, managers of regional instruments indicated that it is required to cooperate with an external entity that perform the role of fund of funds. Managers mentioned also that there was no such obligation in the previous financial perspective.

Partnership Agreement: Chapters 5.1.1

There is a business process improvement system in place on the MA level. All IAs are obliged to report information periodically and collected data is used for adjustments. However, the resulting process changes are of varying quality. On the national level, the system seems to be more efficient with regular adjustment meetings within the framework of cooperation between PARP, NCBR and Ministry of Investment and Economic Development (which acts as a managing institution). Similar processes are not present in most of the regions. In some voivodships, process monitoring is perceived only as a vehicle for compliance with the EU and national law.

2.4 *Monitoring, Evaluation and Learning | Average score: 3.3*
Common Provisions Regulation: Articles 40, 46, 50-51, 56-57
Partnership Agreement: Chapters 5.4, 5.5.1, 5.5.2

In almost all agencies, M&E operates systematically but is not implemented at the instrument level, but rather at the overall program or priority axis level[26]. A substantial amount of data is collected on an on-going basis, but it does not translate into creation of a solid basis for impact evaluation, which limits the feasibility and usefulness of midterm or ex-post evaluations. NCBR appears to undertake additional efforts to analyze the impact of their instruments on a disaggregated basis. However, only one NCBR instrument (with the highest value of all mechanisms in the 2014-2020 financial framework) was the subject of a functional analysis. Thus, positive conclusions related to M&E practices of Measure 1.1.1 may or may not apply to other areas of NCBR activity. Similarly with PARP, the quality of M&E appears higher than at the regional level. For PARP mid-term evaluations, impact analyses using propensity score matching and difference-in-difference methodology are being carried out at the level of individual instruments (each of the sub-measures separately), including SG OP 2.3.1. Additionally, feedback from beneficiaries is gathered through the *Barometr Innowacyjności* on-going evaluation.

2.3.3 System Governance and Relationship among programs

3.1 Programs relationship | Average score: 3.7
Common Provisions Regulation: Article 11, Annex I
Partnership Agreement: Chapter 2.1.2

Ex-ante evaluations cover some of the ground on instrument complementarities. However, all agencies except one exhibit insufficient consideration of potential complementarities and competition with other instruments. Complementarities seem to be managed informally rather than with explicit criteria and mechanisms. Only the Podlaskie region managed to analyze relationships with other programs based on a structured process, capturing also potential interactions with activities undertaken by private entities (described in more detail in Annex 2). Other agencies do not consider private actors in the innovation ecosystem or do it in a provisional way. Even in the case of financial instruments, the impact of subsidized credits on the financial market and comparison of services offered by commercial banks is

[26] Evaluation procedures defined in European and national regulations concern whole programs, not individual instruments. However, the evaluation plans of some agencies include individual instruments impact studies.

not performed in a comprehensive fashion. This situation translates to lower efficiency of the instruments and potential crowding-out effects.

3.2 Institutions relationship | Average score: 3.5

Common Provisions Regulation: Articles 4, 10, 11, 15, 27, 52, 96, 117, 123, 128 and Annex I
Partnership Agreement: Chapters 2.1.1, 2.1.3

In general, there is a competition rather than cooperation in the area of R&D support instruments between regional and national programs. Regional agencies signal that programs managed by NCBR and PARP offer streamlined application procedures and fund bigger projects. Voivodship institutions could not match these practices because of regulatory restrictions or lower operational capacity (resulting from lower headcount and responsibility for management of other priority axes of regional operational programs). National institutions do not follow any demarcation line, which in the current financial perspective is informal, e.g. by lowering the minimum value of the project that could be supported. Formally, coordination of mutual activities is performed at the ministerial level in the Department of Regional Operational Programs. In practice it is more dependent on informal contacts between employees of different institutions, and the scale of communication varies from agency to agency. Lubelskie region is leading in terms of regional-national cooperation, establishing a joint instrument in the region together with NCBR focused on the photovoltaic sector. Similar joint projects with NCBR are also being implemented by Dolnośląskie, Łódzkie and Śląskie voivodships. While joint projects are an example of best practices in the field of institutions relationship, coordination in general does not include strategic-level thinking. Shortcomings of the present coordination bodies are described in Annex 5.

Regional agencies highlight difficulties in cooperating with the National Economy Bank (BGK) in managing financial instruments. Some regional authorities feel that BGK tries to impose its own standardized procedures and program mechanics, which do not always reflect the specific needs of the region. The interaction among agencies on the national level is more explicit. There are high-level weekly meetings within the Interdepartamental Group for Innovation led by the Ministry of Entrepreneurship and Technology with the participation of PARP and NCBR. Working- and organizational-level coordination are performed within the structures of the Polish Development Fund.

3.3 Interaction of Jurisdiction Rules and Regulations (Internal) | Average score: 4.2

Partnership Agreement: Chapter 1.2.2

All agencies seem well positioned to navigate the constraints of rules and regulations with systematic approaches to the MA and the EU Requirements. All of them adjust internal procedures to ensure legal compliance in a way that streamlines implementation of instruments as much as possible. Additionally, agencies organize information meetings for applicants and beneficiaries aimed at disseminating knowledge on compliance with regulations. Some institutions seem to have more difficulties in overcoming the restrictions than others. The highest capacity in this area was exhibited by the national, Lubelskie, and Podlaskie instruments. For example, NCBR created extensive manuals supporting entrepreneurs in navigating the most frequent legal problems. Awareness of limitations stemming from European and national legislation is broad, however there are no structured processes to elevate feedback from agencies and firms to the policymaking level. Every region highlighted similar regulations that are most troublesome for implementation, regardless of the form of instrument.

3.4 Interaction of Jurisdiction Rules and Regulations (External) | Average score: 2.0
Common Provisions Regulation: Articles 24-25, 142-147
Partnership Agreement: Chapter 2.6.1

There are significant constraints imposed on agencies resulting both from national and EU Regulations. These are difficult to change and limit the potential success of the instruments, including:

- State aid regulations imposing the need for selection of suppliers on a basis of public tenders by beneficiaries;
- Necessity for beneficiaries to carry out purchasing processes in an analogous way as defined in the public procurement rules;
- Thematic concentration (ringfencing) regulations;
- Rules related to implementation procedures (performance framework, certification of funds);
- A number of regulations regarding financial management of EU funds, e.g. N+2 rule;
- Principles of remunerating and organization of public administration employees.

Some institutions highlighted also a lack of particular regulations as a major constraint in their operations, including:

- Late and incomplete rules regarding cooperation between voivodships and National Economy Bank (BGK) in the area of management of financial instruments;
- Regulations on VAT in EU projects;
- Rules on dealing with the financial support for research projects that have not reached their goals.

3. RECOMMENDATIONS

<table>
<tr><th>Problem/Challenge</th><th>Recommendation</th><th>Implementation considerations</th></tr>
<tr><td colspan="3">1. COORDINATION BETWEEN NATIONAL AND REGIONAL PROGRAMS</td></tr>
<tr><td>

Competition rather than coordination between national and regional programs creates inefficiencies:
See Portfolio Mapping exercise for information on instrument overlaps.
Scope to learn from best practices within both national and regional programs:

Many best practice examples across MAs/IAs in Poland (see Annex 2),
Large variation in the quality of design and implementation of programs (see Annex 3),
Bureaucratic procedures on the national level are usually less burdensome than on regional one and likely result from differences in interpretation of

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Establish innovation policy coordination mechanism, e.g. through “Innovation Excellence Center”. Potential roles of center include:

Advisory work and dialogue platform for coordinating instruments and avoiding overlap across national and regional programs,
Exchange of information on best practices related to instrument design and implementation (including on interpretation of regulations, usage of experts for application reviews, etc.),
Analytical inputs to instrument design and preparation of (non-binding) opinions on instrument design proposals (related to recommendation 3 below on justification and alignment with systemic change).

Options for institutional set-ups for an Innovation Excellence Center include:

Within Ministry of Investment and Economic Development,

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Due to its inter-ministerial role, the center would require a strong mandate to perform its coordination role, including clear legal basis.
The functions of an innovation excellence center would have to be carefully defined to avoid overlap with existing institutions.
Strong analytical capacity of the center would be critical.

</td></tr>
</table>

regulations (see Annex 4), ○ Current platforms for national-regional dialogue have some shortcomings (see Annex 5).	○ Independent body linked to a higher authority, e.g. Prime Ministry or Innovation Coordination Council, ○ Any institutional set-up should have strong connection to the regions. • Inputs for the design of a center and international examples are in Annex 6. • Consider limiting overlap and increasing specialization of implementing bodies for the upcoming financing perspective.	
2. FLEXIBILITY IN DESIGNING AND IMPLEMENTING INSTRUMENTS[27]		
• Overarching principle is that regions should have flexibility to finance their regional objectives, as long as they are based on solid rationales and market failures. • Perceived lack of flexibility relates to difficulties shifting funds between thematic objectives, rigidities related to public procurement rules for selection of intermediaries for financial instruments (see Annex 7), etc.	• Make it easier to shift funds between instruments and objectives to take into account evolving demand and updated needs assessments (see recommendation below on improving needs assessments). • Encourage piloting of new support instruments (Annex 8 describes PARPs piloting experience with InnoLab). • Increase flexibility to amend TORs for financial instruments intermediaries after they have been procured.	• Limited capacity of MA/IAs to prepare evidence-based rationales for instrument adjustments and piloting.

[27] Increased flexibility of implementing and designing instruments has been proposed by the EC. Common Provisions Regulation (2018/0196 (COD) in Article 14.2 indicates, that the member states will be required to conduct a mid-term review to decide on the design and targets of the programs for the last two years of 2021-2027 perspective.

3. JUSTIFICATION AND ALIGNMENT WITH SYSTEMIC CHANGE		
• Instrument design not based on comprehensive needs assessment, understanding of market failures, or consideration of alternative instruments (in many cases). • Instrument objectives are not clearly linked with systemic change metrics; rather they focus on narrower outputs and outcomes. • Tendency to focus on meeting disbursement targets, rather than achieving systemic change in the smartest way possible.	• Innovation Excellence Center might provide support to implementing bodies and managing authorities to improve (and periodically update) needs assessments, instrument justification, and design. • Aforementioned Innovation Excellence Center could provide analytical frameworks and perform or help regions with their analyses. The Center could also collect data through surveys to better understand the symptoms of innovation underperformance in each region. The Center could leverage international knowledge on innovation support analytical frameworks (Annex 6[28]) and serve as a source of knowledge and best practice for other countries. • Consider developing online tool where authorities could specify symptoms, problems, and systemic change objectives. It would then generate a list of possible instruments with pros and cons for each.	• Limited capacity, budget, and time to conduct ex-ante assessments under current perspective. Assessments often seen as a box-checking exercise rather than a useful tool for instrument design. • EC appears to be moving away from requirement for ex-ante assessments in next financing perspective. • Innovation Excellence Center would have to develop top analytical capacity and push global best practice.
4. OPERATIONAL PLANNING		
• Lack of strategies to target instruments to firms where the	• Understand ROI for different types of support and beneficiary groups.	• IAs struggle to obtain enough quality applications to absorb the current

[28] Annex 9 contains a framework for market failures and choice of support instruments.

return is likely to be the highest. Targeting currently based on (broadly defined) S3 and firm size, likely due to focus on disbursement targets. • Likely scope to improve efficiency of internal processes through better process and input cost monitoring.	• Proactively market instruments to beneficiary groups with higher ROI. • Experiment with other targeting mechanisms, e.g. working with representatives from selected S3's, staged financing where beneficiaries that are successful in an initial low-cost stage then receive additional funding (e.g. Singapore's Spring program). Innovation Excellence Center could potentially help with targeting experimentation. • Introduce instrument-level process and input cost monitoring systems.	innovation funds, meaning little incentive to increase targeting[29]. • Piloting targeting approaches now could prepare for future changes in innovation support budgets. • Lack of international evidence on targeting best practices. • Evidence-based targeting in Poland could become global best practice; this would require building analytical capacity of IAs (and potentially support from an Innovation Excellence Center). • Process and input cost monitoring system would require IT system upgrades, especially given that some IAs still use paper documents.

[29] The utilization rate for Thematic Objective 1 (innovation) is half that of TO 3 (support of SMEs): disbursement equals 5.6% (commitments 32%) vs 11.4% (commitments 77%). Calculated on a basis of information from Cohesion Data (https://cohesiondata.ec.europa.eu/), data as of January 11, 2019

Annex 1. Description of functional analysis scores per category

Source: Public Expenditure Review methodology – Functional Review of Policy Instruments scoring matrix after piloting in Poland

Category	Score	Description
		DESIGN
1.1 Program Origin	1	Developed without due process in an ad-hoc manner or by the mere influence of a particular person without a legitimate connection to strategic objectives or general policy.
	2	Process is rudimentary and use of evidence in the origination process exists but is mostly perfunctory (e.g. use of "piloting" as excuse for lack of attention to origination due process and use of good evidence).
	3	There are some arguments with a measure of validity and some connection with the strategic objectives of the policy. Process is formal but not fully congruent with the specificity of the policy area (e.g. evidence-based policy not fully deployed and open to legitimacy concerns)
	4	The process is formal with no legitimacy concerns but generic leaving little room for specificity of the policy area (e.g. excessively top-down and little role of stakeholders or stakeholder information). Use of evidence is present but not fully deployed.
	5	It must be founded with all mentioned elements.
1.2 Program Justification	1	No sound rationale for government intervention is given. It is mostly assumed.
	2	An informal rationale that implicitly justifies government action exists but lacks articulation and evidence.
	3	A diagnosis that refers to market failures exists, but it lacks sufficient evidence and does not address all dimensions of the problem.
	4	There is a diagnosis and market failure are specifically mentioned but the quality is not state of the art.
	5	A high-quality diagnosis that identifies the market failure using evidence at the level of the state of the art in the policy area.
1.3 Portfolio Relationship	1	There is no clear account of which programs are similar, in the same domain that may offer either opportunity for complementarities or the threat of undermining each other.
	2	Vague notion of the policy domain without an awareness of design implications.
	3	There is awareness of similar and complementary programs, but account remains informal and attention to them is not articulated explicitly.

Category	Score	Description
	4	The design explicitly acknowledges the role of the policy mix and its relevance for the instrument but lacks specifics on the ways it affects it.
	5	There is full awareness of other programs that are duplicating or offering synergies and the design has built in ways to safeguarding against the former and integrating the latter.
1.4 Program Objectives	1	There is neither implied nor clear objectives.
	2	Objectives are implicit, low level (not connected to the system level) and not clearly measurable.
	3	There are explicit objectives, but they are either generic, lacking specificity and measurability or, If measurable, they are low level and not connected to changes expected in the system and/or have no specific targets for what is measured.
	4	There are explicit objectives, coherent with the justification and have at least some attempt to link with system level changes. Quality of measures and/or targets may not be optimal.
	5	Explicit and articulated objectives, coherent with the program justification and tied to the system level changes expected from the intervention. They are clear, measurable with concrete target levels.
1.5 Alternative Instrument	1	No justification of the advantages of the specific mode of intervention (instrument) and no consideration of alternative programs
	2	There is awareness of the possibility of alternatives, but they have not been seriously considered in the design.
	3	There is justification of the mode of intervention (instrument) used and only informal consideration of alternatives.
	4	There is an explicit justification of the instrument, but the argument shows weaknesses when compared to best practices in the policy domain.
	5	Coherent and high-level justification of the selection of the instrument taking under consideration global best practices for the specific needs and context.
1.6 Logical Framework	1	Not considered as a tool of policy/instrument design.
	2	Some elements of the logic model are present in the design but mostly informally and lack completeness.
	3	The overall argument that a logic model represents is found in the design, but the model is not explicitly developed.
	4	An explicit logic model is present in the design but some of its components are not fully or clearly developed and its utility may be doubtful.
	5	A full explicit logic model with high quality components representing a feasible instrument is present in the design.

Category	Score	Description
1.7 Inputs	1	There is no explicit cataloguing of inputs for the instrument/program.
	2	Implicit awareness of obvious inputs (e.g. program budgets) is present but no effort to systematize them as part of the logic of the instrument has been made.
	3	There is an awareness of more than the obvious inputs (e.g. including shared and non-financial resources) and their role in the logic of the program/instrument, (i.e. their alignment with objectives and outcomes). However, they lack explicit and full articulation.
	4	An effort at explicit identification of inputs has been made but it lacks specifics or administrative cost accounting for the instrument.
	5	All inputs are clearly identified, budgeted and inside a logic framework, including specific administrative cost accounting for the program/instrument.
1.8 Activities	1	Activities are not properly identified nor connected to the rationale of the instrument. There may be routine activities that are more obviously connected to administrative custom and inertia than the purpose of the intervention.
	2	Only obvious critical activities are identified, though not formally listed nor clearly linked to necessary inputs.
	3	Many activities that are clearly necessary are identified and connected to inputs. However, the list is incomplete and the implications of this are not understood.
	4	A good catalogue of activities with its link to inputs and objectives exists but there may be some gaps, or it is not fully integrated into the design process.
	5	A full and explicit cataloguing of activities has been carried out within the design process with documentation showing how they are necessary to achieve desired objectives.
1.9 Products/Outputs	1	No clear identification of products/outputs or their role in the logic of the instrument.
	2	There is implicit identification of some obvious products/outputs, but they are not systematically connected to the logic of the instrument.
	3	There is an explicit identification of obvious products, but it is incomplete and not sufficient to understand their role in logic of the instrument. They are not operationalized or measurable.
	4	There is an explicit identification of most products/outputs with some systematization (relation to logic of instrument). However, it reveals some gaps and not all may be operationalized and measurable.
	5	There is an explicit and complete identification of products necessary to fulfill the logic of the instrument, with a clear specification of how they lead to outcomes and impacts.

Category	Score	Description
1.10 Main beneficiaries	1	Ambiguity or lack of clarity in the identification of beneficiaries.
	2	Implicit identification of beneficiaries with rudimentary arguments for their selection in the population.
	3	Explicit identification with systematic eligibility criteria but lacking understanding of the specific boundaries of the beneficiaries' pool and no consideration of targeting for optimal results.
	4	Explicit identification of beneficiaries with well-developed eligibility criteria but lacking a systematic and fully justified strategy for targeting the optimal segment of the beneficiaries' population.
	5	Explicit, coherent with the objectives, and clear strategy to reach the target group (i.e. "sweet spot") of beneficiaries for optimal results of the instrument.
1.11 Selection criteria	1	Criteria are not fully coherent with potential loopholes and low transparency. Not appropriate for targeting the desired population.
	2	Criteria have some useful features in selecting beneficiaries but lack mechanisms to insure credibility of its fairness and does only a fair job in reaching the desired population.
	3	Coherent criteria, straight forward and with good transparency. Nevertheless, the design does not explicitly aim to maximize the capacity of reaching the target group for optimal results.
	4	Clarity, coherence and transparency are well developed. The design for targeting exists but could be improved.
	5	Clear, coherent and transparent selection criteria. Also, capable of selecting the population with greater impact
1.12 Audiences	1	Lack of knowledge or consideration of audiences or stakeholders other than direct beneficiaries.
	2	Implicit awareness of non-beneficiary stakeholders but no consideration of the consequences for instrument design.
	3	Some non-beneficiary audiences mentioned as a design factor but few channels or early strategy to reach them are considered.
	4	Design includes non-beneficiary stakeholders with some means of engagement, but gaps still exist.
	5	Design accounts for non-beneficiary audiences and their role is factored into the instrument with systematic ways of engagement.

Outcomes	1	Outputs and impact are neither coherent or measurable

Category	Score	Description
	2	Explicit but not fully coherent and measurement limited to perfunctory indicators.
	3	Explicit and coherent, but incomplete, possibly not fully observable and measurable or wrongly defined and no relationship with other policies
	4	Explicit, coherent, observable and measurable but not fully integrated with other policies inside and outside the sector. Generally, not used as performance measures to potentially terminate participation on evidence grounds.
	5	Explicit, coherent, observable and measurable, fully integrated with other policies inside and outside the sector. Used as performance measures to potentially terminate participation on evidence grounds.
1.14 Monitoring and Evaluation	1	No formal monitoring process
	2	Only a conceptual mention of M&E is considered in the design. No design of an M&E system is included.
	3	Some basic monitoring with a core sets of indicators, but not complete or strong enough M&E for the objectives and goals of the program (e.g. relies purely on external M&E system with no consideration of specific instrument needs)
	4	M&E system in place with some gaps in adjustment to the specific needs of the instrument and/or in the quality and completeness of KPI.
	5	M&E system in place, well connected with the program and quality KPI

Category	Score	Description
		IMPLEMENTATION
2.1 Learning evidence during implementation	1	No learning processes. Repetition of tasks reveals organizational inertia.
	2	Minor identification of obstacles and problems with little or no effort to make changes.
	3	Some informal learning and ad-hoc adjustments. Lacks documentation and longer-term applications of lessons.
	4	Learning process has elements of systematic identification of problems and documentation of solutions. Remains small in scale and limited in application.
	5	Developed learning process which is applied in the design improvement with systematic and formal documentation used for long term improvement.
2.2.1 Solicitations	1	There is no connection between the number of solicitations, the key objectives of the program and potential for needed changes.

Category	Score	Description
	2	Some ad hoc adjustments with informal justification.
	3	Solicitations and adjustments are aligned with the program, but justification seems insufficient, not clearly connected with the program's objectives.
	4	Adjustments to solicitations are done with documented justification but gaps in quality of justification and documentation system exist.
	5	Adjustments to solicitations ware made with full justification aligned with program objectives and systematically documented.
2.2.2 Eligibility Criteria and Application Information	1	Selection criteria are not well suited to generating applications from the target population. The process lacks transparency and information on applicants is not gathered. There are no procedures to disseminate information about successful applications.
	2	There is a rudimentary articulation of eligibility with the features of the target population, focusing more on control requirements than in effecting the change intended by the instrument. The requirements remain unclear and put a heavy burden on applicants leading to additional costs for preparing and submitting proposals.
	3	The selection criteria are coherent with the features of the target population but lack transparency in their implementation and limited use of background information on potential applicants. Public disclosure of selection results is not sufficient. Burden on applicants is lighter but not optimal.
	4	Transparent selection process, coherent with target group, and information of the candidates is used to improve and adapt future selection criteria. In addition, information on candidates selected and amount of money assigned is gathered but not fully diffused. Burden on applicants is reduced but still higher than optimal.
	5	Transparent selection process, coherent with target group, and information of the candidates is used to improve and adapt future selection criteria. In addition, candidates selected, and amount of money assigned to them is informed to the public. Burden on applicants is within reasonable limits generally not demanding investment of additional resources to submit applications.
2.2.3 Application and Selection Proc.	1	Process is slow, lacking transparency. Award decisions do not have clear justification and there are no appeal mechanisms.
	2	Process is mostly transparent and agile but has vulnerabilities. Committees have informal criteria and composition is not always optimal. Appeal mechanisms are existent but impractical.

Category	Score	Description
	3	Process has adequate transparency but has variable responsiveness. Justification of award decisions is given but not abundant. Committees are mostly appropriate, but lack guarantees for full legitimacy. Appeal process is informal and variable.
	4	The process is transparent, agile and responsive, with clear appeal and conflict resolution channels. Award decisions are variable in the quality of their justification and committees are set up with practices regarding expertise and conflicts of interest that have gaps in consistency.
	5	The process is transparent, agile and responsive, with clear appeal and conflict resolution channels. Award decisions are fully justified, and committees are set up with best practices regarding expertise and conflicts of interest.
2.2.4 Program database	1	There is no gathering of information about applicants and participants.
	2	Information gathering is rudimentary, incomplete and not used for improvements.
	3	Information gathering is systematic but incomplete and use is discretionary. It lacks follow up with participants after the conclusion of projects.
	4	Systematic and fairly complete Information gathering system. Follow up system is rudimentary and used for management improvement has gaps.
	5	Information and follow up system in place, used for management improvement.
2.2.5 Project closures	1	There is no information relating to project closure.
	2	Final reports are rudimentary and perfunctory. No post-closure communication.
	3	Final report is formally required, and closure criteria given but requirements are ambiguous, and reports are not very useful. There is no requirement for post-closure reporting of results.
	4	Closure criteria and reporting are fully specified with, but reports have variable quality and post-closure results information requirements are not optimal.
	5	Closure criteria and reporting are fully specified with high quality reports and post-closure results information requirements.
2.3.1 Budget and financial res.	1	Resources are insufficient and there is low capacity to control budget execution, which is done under bureaucratic rules that undermine the functionality of the instrument.
	2	Resources are limited but not completely inadequate. Execution and control is done poorly.

Category	Score	Description
	3	Financial resources seem adequate, but execution and control are not fully aligned with the instrument functionality.
	4	Adequate financial resources but control and execution mechanisms have gaps or vulnerabilities.
	5	Adequate financial resources with proper control and execution mechanisms in place.
2.3.2 Program management and organization quality	1	Organizational structure doesn't facilitate good management of the instrument and is vulnerable to external pressure. No means of adjustment are present.
	2	Organizational structure is somewhat difunctional while allowing for fundamental functions and still vulnerable to external pressure. No adjustment mechanisms.
	3	Organizational structure is mostly operational but has shortcomings and lacks adjustment mechanisms. Vulnerability to external pressure is not highly significant.
	4	Appropriate organizational structure that allows information flow and minimizes external pressures. Organizational improvement is contemplated but not fully implemented.
	5	Appropriate organizational structure that allows information flow and minimizes external pressures. Monitoring of organizational adequacy using indicators.
2.3.3 Roles and Autonomy	1	Role definitions are not clear producing role stress. There are no clear mechanisms to adapt to change on the basis of own professional judgment. Inflexibility to change or manage conflict.
	2	Role definitions are perfunctory and unable to eliminate role stress. Reliance on own professional judgment is partial and adaptation and change remain difficult.
	3	Roles are specified though somewhat incompletely with reduction of role stress. Some mechanisms to introduce changes exist, but there seems to be little flexibility to adapt.
	4	Clear definition of roles eliminating role stress and allowing for professional judgment to operate legitimately. Mechanisms are in place to manage change and conflict resolution though gaps remain.
	5	Clear definition of roles eliminating role stress and allowing for professional judgment to operate legitimately. Mechanisms are in place to manage change and conflict resolution.

Category	Score	Description
2.3.4 Staff and training	1	Staff seems insufficient, lacking training and experience, and either no opportunities or reduced incentives for further training.
	2	Staff is having inadequacies either due to sufficient numbers of enough people with adequate capabilities. Training opportunities or incentives are spotty and do not provide opportunities for advancement.
	3	Staff seems sufficient, with adequate profile and experience to respond to the tasks, but training opportunities or incentives are not fully formalized and offer few opportunities for advancement.
	4	Staff is sufficient and experiences and most have good quality educational background. Formal training opportunities and incentives for advancement exist but uncertainties remain.
	5	Staff with exceptional experience and high-quality educational background. Formal training opportunities and incentives for advancement.
2.3.5 Incentives	1	No clear parameters for assessing staff performance. The management does not offer neither rewards nor punishments for performance.
	2	Perfunctory and discretional staff review criteria and mechanisms.
	3	There are directives for assessing performance but no clear mechanisms for rewarding superior performance or punishing performing below expectations.
	4	The program has clear criteria for evaluating staff performance. Mechanisms for reward and punishment are uneven and not fully tied to program/instrument successful achievement of its goals.
	5	The program has well specified criteria for evaluating staff performance. The management has clear mechanisms which seem meaningful for rewarding good/punishing bad performance, tied to the successful achievement of program/instrument goals.
2.3.6 Process monitoring	1	No administrative process monitoring system is in place. Administrative process Indicators are not specified. No periodic reviews, and no reporting of administrative process quality exists.
	2	Process monitoring occurs sporadically and in ad hoc fashion. Reporting is not systematic and does not inform management decisions.
	3	An administrative process monitoring system appears to be in place, albeit with a low quality of framework for assessment of its results. Reporting lags, and no effective action is taken as a result.
	4	A respectable administrative process monitoring system is in place, with some adequate measurement of indicators. The monitoring process occurs at irregular periods and sometimes informs decisions from management.

Category	Score	Description
	5	A robust administrative process monitoring system is in place, with quality measurement of indicators. The monitoring process occurs periodically and informs timely decisions from management.
2.4 Monitoring and evaluation	1	Absence of monitoring, data collection and impact evaluation.
	2	M&E is ad hoc and sporadic. Information is collected irregularly and not all levels are addressed. There is little value for informing programs and is unconnected with impact evaluations.
	3	There is an M&E program that operates with some regularity but is partial and is not used to adjust the program. There is no systematic effort toward impact evaluation.
	4	A formal M&E program is in place, but quality is not uniform, and its operation has discontinuities. It is used sporadically inform programs and is not assured of generating impact evaluations.
	5	A formal high-quality M&E program is in place that operates continuously and is used to modify programs and generates impact evaluations.

Category	Score	Description
		SYSTEM GOVERNANCE AND RELATIONSHIP AMONG PROGRAMS
3.1 Programs relationship	1	There is no awareness of the existence of programs with potential interactions or overlaps.
	2	There is some awareness of related programs, but no systematic action is taken.
	3	There is awareness of programs with actual or potential interactions and communication among them exist, but the differential role of each and/or value added is unclear.
	4	Explicit acknowledgment of program interactions with active communication and some coordination. Some issues are resolved but others remain unresolved or unattended.
	5	Explicit acknowledgment of program interactions with good communication and coordination. Potential overlaps are resolved and/or programs are combined or coordinated.
3.2 Institutions relationship	1	Lack of cooperation and/or coordination among institutions or organizations.
	2	Some informal efforts at communication across institutional boundaries. They remain sparse and sporadic.
	3	Partial coordination or collaboration mechanisms, still informal, inadequate and missing key actors of the process.

	4	Formal coordination mechanisms across some of the relevant institutions and some evidence of collaborative work. Most joint efforts remain tactical rather than strategic.
	5	Formal coordination mechanisms with evidence of collaborative work and design. Joint and coherent strategic management.
3.3 Interaction of Jurisdiction Rules and Regulations (Internal response)	1	No knowledge or understanding of legislative or regulation obstacles.
	2	There is some rudimentary understanding of the potential for jurisdiction interaction but no recognition of specific cases.
	3	There is awareness of the nature and existence of jurisdiction interactions, but no actions are taken to adapt programs.
	4	There is awareness and explicit acknowledgement of some jurisdiction interactions. Follow up actions are sporadic and mostly reactive with some effect on adaptation of the program.
	5	There is awareness and explicit acknowledgement of jurisdiction interactions. Follow up actions, some proactive and some reactive have been taken to adapt the program for optimal performance.
3.4 Interaction of Jurisdiction Rules and Regulations (External constraint)	1	Legislation and/or regulations strongly inhibit instrument effectiveness and impact and it is very difficult to change.
	2	Legislation and/or regulations inhibit instrument effectiveness but do not completely defeat its purpose. The degree of difficulty of removal is high but not impossible.
	3	Jurisdiction interactions exist that create some impediments but to some degree they are removable.
	4	Some constraints exist that affect the effectiveness of the instrument only mildly and/or removal seems feasible but not yet underway.
	5	No external obstacles exist so those that do are in the process of being removed.

Annex 2. Best practices of Implementation Agencies in Poland

Source: Interviews with representatives of MAs/IAs, review of documentation

PARP/NCBR: Quick processing of applications and participative selection processes
Decision on awarding a grant for business R&D project is made up to 90 (previously 60) days after submission of an application. In many cases, waiting time is even shorter, which in combination with on-going call for applications makes POIR 1.1.1 an example of agility and flexibility in STI support instruments. Such result was achieved thanks to acquisition of competent experts for assessment of submitted projects and putting review meetings at the center of the decision process. Participants of the review meeting include applicants, person responsible for formal assessment from the side of NCBR and independent expert responsible for merit assessment of the project. During the meeting, an in-depth discussion about the project takes place and all potential shortcomings are supplemented on the spot. This type of arrangement significantly improves information flow between implementing body and applicants and limits bureaucracy to the maximum extent. Implementation of the above model in regional programs could be hindered by limited financial (lower rates for experts) and human resources (management of numerous programs performed by the same group of people) in voivodship management authorities. However, few other institutions also include participative elements in assessment of bigger projects (e.g. PARP, Łódzkie voivodship). Similarly in PARP, assessments of applications that do not require an expert panel are made in up to 60 days. For instruments where expert panels make grant funding decisions, the process takes 90 days.

PARP/NCBR: Learning and adjustments
PARP together with NCBR analyze performance of implemented instruments and react to feedback from applicants on a regular basis. As a result, both agencies frequently amend mechanics of the instruments to increase accessibility of ESIF support for entrepreneurs. Most common changes are related to selection criteria or formalities connected with the process of obtaining EU funds, however modifications of more fundamental rules are also possible. Each new solicitation (in case of most programs – every 3 months) usually contains some new adjustments. Roll-out of a more adaptive approach to implementation of regional instruments might be challenging due to lower frequency of solicitations (usually once per year).

PARP/NCBR: Process monitoring
National agencies track amount of time and money spent on individual stages of program implementation (i.e. review of applications, project settlement, promotional activities). What is more, NCBR and PARP regularly check available administrative capacity through semi-annual surveys focusing on staff competencies, supplemented by analyses of employees' turnover and vacancies. Information on resources allocated to each process enables accountability of costs to individual instruments. Collected data could support improved estimation of returns on public investments, incorporating administrative expenses in addition to value of provided support, thus forming a sound basis for decision on which programs to continue and which to cease. Process monitoring enables also to identify administrative bottlenecks in implementation of instruments and optimize work of MAs/IAs.

BGK: Instrument database and information on participants and applications
Bank Gospodarstwa Krajowego acts as a manager of funds of funds for financial instruments implemented in 15 out of 16 voivodships. To ensure smooth implementation of instruments and streamline exchange of information between institutions engaged in the process, BGK developed

Platforma Wdrażania Instrumentów Finansowych – a tailor-made IT system for collecting and processing data on applicants and beneficiaries. Financial intermediaries are obliged to enter to the system information about all events related to financed projects within 5 days of their occurrence. The system automatically generates periodic reports, which are shared with regional managing authorities. Additionally, Marshal Offices have an observer status in the system, and can monitor and analyze implementation progress for their financial instruments on a constant basis. The system is comprehensive and detailed, e.g. including information on invoice numbers and contact data for suppliers who delivered goods or services financed by public support. Analyses from data in the *Platforma Wdrazania Instrumentów Finansowych* are also presented and discussed during meetings of managing authorities and financial intermediaries organized periodically by the Bank Gospodarstwa Krajowego.

Lubelskie and Łódzkie: Joint programs with national institutions
To support the development of specific regional specializations, some voivodships decided to join efforts with National Centre of Research and Development on creation of tailor-made interventions. Lubelskie voivodship aims to establish cluster of photovoltaic technologies, whereas Łódzkie voivodship plans to advance regional research in the area of medicine. The budget of each program is PLN 100m, equally divided between NCBR, region and private contributors. In both cases, national and voivodship institutions conduct separate calls, with NCBR targeting consortia led by research institutions and region targeting consortia led by enterprises. Both types of consortia must include research institutions and enterprises. Joint programs are operating as a part of POIR 4.1.1 "Strategic research programs for the economy" measure, which is open for extension to other regions. Joint programs create opportunities for dissemination of best practices and coordination of efforts between national and regional managing authorities (both of which are among the main shortcomings of Polish innovation support eco-system). After success of initial projects, two more voivodships decided to jointly implement instruments with NCBR – Śląskie region in the area of clean air technologies and Dolnośląskie region in the area of biomedicine.

Wielkopolskie: Closing procedures for faulty projects
Rules defining closing of programs at the end of implementation period are detailed in the Common Provisions Regulation. However, course of action in handling individual projects that are at risk of failure lie with the managing authorities. Financing agreements in all regions specify conditions in which the return of granted support is required, but financial implications of such difficulties on the budget of the intervention remain unclear. Negative implications of failure of the project are larger in case of financial instruments than in non-returnable interventions. In order to reduce potential problems, Wielkopolskie voivodship created a set of rules for management of non-performing projects that include standardized progress reviews and creation of an appropriate reserve for underperforming projects.

Pomorskie: High quality design of financial instruments
Thanks to the long history of implementation of financial instruments, Pomorskie voivodship developed a comprehensive approach towards design of such interventions. The region was one of the early adopters of returnable support programs both in previous and current multiannual financial framework. The design process of financial instruments is strongly based on lessons from past experiences and best practices developed by other managing authorities in Poland that are gathered in a structured manner. In addition, considerations about alternative instruments, which are an obligatory part of ex-ante evaluations of all financial instruments, in Pomorskie go beyond formalities and affect the design of the programs. The process of origination of the instrument is explicitly linked to strategic priorities of the region and is supported by specific diagnosis which refer to market failures as the problem.

Podlaskie, Lubelskie and Pomorskie: Engagement with audiences

All managing authorities must engage with non-beneficiary stakeholders during the course of implementation of programs. Common Provisions Regulation sets requirements for cooperation with i.a. local business associations, NGOs or representatives of academia in Monitoring Committee that is responsible for advising and approving changes in mechanics of programs. However, some regions create more participative environment for audiences and explicitly mention non-beneficiary stakeholders in the design of instruments. Examples of such attitude include a) designing measure for business services professionalization in close cooperation with regional BSIs in Pomorskie and b) partnership with independent consultants that support firms in submission of applications in promotion of instruments among potential beneficiaries in Lubelskie.

Annex 3. Comparison of design and implementation quality at national and regional level

Source: Interviews with representatives of MAs/IAs

National operational programs differ significantly from regional ones. Generally, instruments implemented on the national level are geared towards projects of higher value or higher risk that do not fit into the conditions of regional operational programs. There is no formal demarcation line in the current financial perspective, but differences in the amount of funds under management of Marshall Offices compared to nation-wide institutions effectively lead to such differentiation. The value of the biggest business R&D support instrument implemented on the national level (POIR 1.1.1 “Fast track”) is higher than the value of the whole regional operational programs of 7 voivodships. Moreover, every regional operational program covers all thematic objectives ranging from environmental protection to support of entrepreneurship, while national ones focus on specific thematic objectives.

As a result of variation in interventions implemented on both levels of governance, some best practices from national level might not be feasible to implement on regional level:

- Smaller scale of operations in regions limits labor specialization compared to national programs. Tasks of employees engaged in implementation are oftentimes changing because of needs related to solicitations. As a result, there are temporary shortages of workforce for dealing with ongoing requests which significantly extends procedures from the perspective of beneficiary;
- Lower average value of the project, with similar percentage level of technical assistance budget, translates into limited financial capacity for implementation of instruments. Consequently, in assessment of applications to STI support measures regional authorities are not able to offer as high rates for experts as national agencies;
- Necessity of designing instruments in various policy areas by the same group of employees hinders process of searching for solutions to specific problems. Excessive dispersion of competences makes it difficult to deepen institutional knowledge on particular areas of economic policy.

Best practices in Annex 2 have been collected in order to indicate directions for potential improvements, which in each case would require adaptation to local needs and organizational capabilities.

Scores indicate proximity to global best practice (from 1 to 5, with 5 being the best). The table below presents solutions, implementation of which could contribute to closing the gap between the central and voivodship levels (categories with the biggest difference in scores between national and regional levels).

	National	Regional
Design		
Program Origin	The biggest interventions on the national level are based on analyses prepared separately for individual instruments. This approach increases the probability of successful implementation of instruments compared to processes focused on the origin of whole priority axes.	
	Avg. score: 4.5	Avg. score: 3.4
Products/Outputs	A complete list of products is identified both at the national and regional levels, but attribution to individual instruments is done only at the national level.	
	Avg. score: 5.0	Avg. score: 4.0
Monitoring and evaluation	Thanks to more detailed attribution of outcomes at the national level, it is possible to evaluate the impact of individual measures rather than groups of measures or priority axes. This approach provides evidence for decisions about which activities to continue and which to cease.	
	Avg. score: 4.5	Avg. score: 3.7
Implementation		
Process monitoring	Mapping of internal processes in MAs/IAs could provide a basis for further simplification of procedures and enable calculation of return on investment for individual measures or sub-measures. Additionally, precise data on resources used by each activity would provide a basis for an accurate estimation of technical assistance budgets.	
	Avg. score: 5.0	Avg. score: 3.1
Learning and adjustments	National agencies implement changes in the mechanics of instruments more often than regional ones, in reaction to observed abnormalities and signals from applicants and beneficiaries. In addition to higher frequency of adjustments, the process of learning on the national level seems to be more structured and formal.	
	Avg. score: 5.0	Avg. score: 3.3
Budget and financial resources	The technical assistance budget is calculated as a percentage of the instrument budgets. Thanks to the higher average value of support provided by national agencies, more technical assistance (TA) money is available for work on individual applications at the national level than the regional level.	
	Avg. score: 5.0	Avg. score: 3.3
Application and selection process	Lower TA budgetary constraints on the national level translate into broader possibilities for agile organization of application and selection processes. An example of best practice at the national level is to organize expert panels with participation of applicants.	
	Avg. score: 5.0	Avg. score: 4.0
Governance		
Institutions relationship	The connection between national and regional institutions is insufficient, but national institutions coordinate activities between each other and maintain a close dialogue with the Ministry and National Economy Bank. Strategic and operational planning is essential to avoid burdensome competition and overlaps.	
	Avg. score: 4.0	Avg. score: 3.4

Annex 4. Examples of differences in administrative burden between national and regional instruments

Source: Interviews with representatives of MAs/IAs, review of documentation

Representatives of MAs/IAs pointed to the fact that a few differences in administrative burden related to European Funds results from unequal treatment of regional authorities, compared to national ones.

	National	Regional
From the perspective of potential beneficiary		
Required documents	• Operating based more on **testimonies (statements from applicants)** • Shorter period of application reviews with participation of potential beneficiary thanks to extensive access to experts • Expert reviewers in national institutions are better compensated thanks to higher TA budgets and higher average value of projects than on regional level	• Operating based more on **certificates** • Scrupulous and time-consuming verification of documents presented by potential beneficiaries before allocation of funding
Number of selection criteria	• Lower number of selection criteria, with more opportunities to improve criteria through frequent solicitations and proactive approach of Monitoring Committee	• Usually higher number of selection criteria, which are updated less frequently due to organization of one competition per year (and sometimes low activity of some members of Monitoring Committees)
From the perspective of MAs/IAs		
Scope of discretion in decision-making	• Direct channel of communication with the Ministry of Investment and Economic Development on the interpretation of legal provisions	• Perceived necessity for rigid adherence to the guidelines from the Ministry • Limited degree of flexibility in shaping mechanics of financial instruments due to necessity of implementation of public procurement law in the selection of financial intermediaries)
Activity of control bodies	• Presence of inspectors predominantly in the latter part of the financial perspective	• Continuous presence of inspectors during implementation phase of instruments, which limits resources for mgmt. of instruments • Punitive rather than advisory approach of public inspections

Annex 5. Shortcomings of current platforms for exchanging knowledge between regional and national institutions

Source: Interviews with representatives of MAs/IAs, review of documentation

There are four main contact platforms for authorities involved in design and implementation of ESIF funds in Poland. However, none of them is focused on knowledge dissemination between the regional and national levels. Details of each platform are presented in the table below.

<table>
<tr><th colspan="3">ESIF progress meeting organized by the European Commission</th></tr>
<tr><td>Composition</td><td colspan="2">European Commission (leader), all national and regional managing authorities</td></tr>
<tr><td>Frequency of meetings</td><td colspan="2">Every 12 months</td></tr>
<tr><td>Thematic scope</td><td colspan="2">Program monitoring and facilitation of negotiations</td></tr>
<tr><td>Degree of formality</td><td colspan="2">High: required by the EU regulations (Common Provisions Regulation)</td></tr>
<tr><td>Assessment</td><td>Pros:
• Gathering of all MAs at the same time (Ministry of Investment and Economic Development and 16 regional boards)
• Supplemented by on-going contact with a dedicated supervisor in the EC</td><td>Cons:
• Main topic of the meeting concerns progress reporting, not exchanging of operational knowledge
• No working-level sessions focused on dissemination of knowledge – exchange of information between MAs take place on the sidelines of the meeting
• No participation of implementing bodies</td></tr>
<tr><th colspan="3">Status meetings organized by the Ministry</th></tr>
<tr><td>Composition</td><td colspan="2">Department of Regional Operational Programs in the Ministry of Investment and Economic Development (leader), 16 regional managing authorities</td></tr>
<tr><td>Frequency of meetings</td><td colspan="2">Every 3-6 months (depending on needs)</td></tr>
<tr><td>Thematic scope</td><td colspan="2">Implementation status of ROPs (biannually). If necessary, current challenges are discussed in separate meetings (e.g. preparation for mid-term verification or discussion on performance framework)</td></tr>
<tr><td>Degree of formality</td><td colspan="2">High: The Ministry makes legally binding decisions on ROPs</td></tr>
<tr><td>Assessment</td><td>Pros:
• Supplemented by on-going contact with a dedicated supervisor in the Ministry</td><td>Cons:
• Main topic of the meeting concerns reporting on the status of regional programs
• Not all MAs are present at the same time – lack of national ones
• No participation of implementing bodies</td></tr>
<tr><th colspan="3">Knowledge exchange forum of regional IAs and/or financial intermediaries</th></tr>
</table>

Composition	16 regional Implementation Authorities	
Frequency of meetings	Every 12 months	
Thematic scope	Operational issues related to on-going implementation of instruments	
Degree of formality	Medium: bottom-up initiative of IAs with no legal background and/or meetings organized by the Bank Gospodarstwa Krajowego	
Assessment	Pros: • Focus on developing novel solutions for better implementation of ROPs and dissemination of best practices	Cons: • Meetings are not institutionalized and therefore could omit some potential participants • No participation of representatives of national and/or European agencies
Exchange of knowledge initiated by individual employees of MAs/IAs		
Composition	Variable, in most cases two managing authorities	
Frequency of meetings	Undefined	
Thematic scope	Various aspects of design and implementation of instruments with focus on operational issues	
Degree of formality	Low: there are no regulations or platforms for facilitating such activities	
Assessment	Pros: • Agile form of contact, which enables adaptation to changing needs	Cons: • Intensity of knowledge exchange depends solely on the personal connections between employees of various agencies • Limited links between national and regional actors • Lack of documentation of information gathering process limits its use by other institutions

Annex 6. Inputs for designing an Innovation Excellence Center

Sources: World Bank analysis; Kapil and Aridi (2019), *Innovation Agencies – Lessons from Emerging Economy Ecosystems;* Borowska and Iwanowski (2018), *Poland Structural Policies for Competitiveness: Position Paper Innovation Policy.*

This Annex a) describes existing institutions responsible for coordination and analytical support in the Polish innovation ecosystem and b) indicates the need for new entity and discusses potential scope of activities for such institution.

Existing innovation coordination bodies

Innovation policymaking in Poland is performed at the national and regional levels. In accordance with the subsidiarity principle, each region designs and manages innovation initiatives (Regional Operational Programs) independently from the central government (nationwide Operational Programs). In 2014-2020, EUR 13.1 billion of funds devoted to innovation are governed on the central level and EUR 9.0 billion on the regional level. Formal coordination of operational programs in the preparation phase is provided by the Department of Structural Policy Coordination at the Ministry of Investment and Economic Development. However, this Department is focused mostly on ensuring cross-compatibility of operational programs with existing national and European strategies, not on policymaking *stricto sensu*.

High-level coordination of STI policy, involving not only business support instruments but also broad horizontal topics such as higher education, business regulations and intellectual property rights, is performed by the Innovation Council. The Council is composed of heads of 7 Ministries, equipping it with considerable political power. However, the activity of the Council has been limited to date (as described below).

Policy coordination at the working level is done through weekly meetings of the Interdepartmental Group for Innovation. The group is composed of representatives from eight ministries and main policy implementation units including PARP, BGK, PFR, and NCBR. Most members of the Group at the ministerial level are specified in law by name, not by position, which limits flexibility in terms of position changes. Among the Group's achievements are the second Act on Innovation (with tax incentives for R&D) and creation of the concepts for the “Start in Poland” and “Scale Up!” programs. The group also facilitates sensitive negotiations between entities. (An example is a new regulation on energy-intensive industries, which caused controversy between the Ministry of Environment and the Ministry of Investment and Development (MIiR)).

The main challenges in coordination include:

- *Lack of horizontal coordination of policies for STI and advanced human capital*. Additionally, there is limited communication between the Ministry of Entrepreneurship and Technology (MPiT) and Ministry of Science and Higher Education (MNiSW) in setting up a coordinated policy vision, priorities, and objectives. To promote policy coordination, an Innovation Council was set up in July 2016 by the prime minister. Yet, it currently faces challenges due to difficulties in organization of its meetings. Members of the Council are specified by name, not by position. Thus, there is a problem with flexibility of the body in case of reshuffling in the government. Compared to January 2016, when the council was established, three ministers were changed and one of the ministries was dissolved (Ministry of Treasury). The council’s chairman is

Mateusz Morawiecki, who since the council's creation became PM. As of June 2018, the council had gathered only 4 times. A new solution was proposed to endorse the minister of MPiT as the new chairman. This should facilitate organization of the council's meetings.

- *Limited coordination of policies between the national and regional levels.* Interactions between the national and regional level are frequent on smart specialization, cluster policies, and investment policy. However, there are no systematic coordination mechanisms; the dialogue is at the working level (i.e. omitting regional Marshals) and primarily through personal relationships. Limited dialogue with regional Marshals is caused, among other things, by frequent political rotations at the regional level. Another challenge for coordination is the strong position of regions, who negotiate innovation policies directly with the EU, bypassing the national level. In addition, national level institutions do not have any instruments that would enforce legislation changes at the regional level.

- *Neither the Innovation Council nor the Interdepartmental Group for Innovation are equipped with dedicated secretariats or other analytical resources.* The above institutions do not provide strategic and operational support for managing authorities and implementing bodies. They serve more as platforms for dialogue, brainstorming and agreeing positions between already established governmental bodies. Preparation of reforms is the responsibility of individual Ministries and Agencies.

Possible roles of the Innovation Excellence Center

Developed economies have established coordination councils and strategic advisory councils for innovation policy. Policy coordination in advanced economies has several common elements: (i) coordination councils at the ministerial level to ensure a coherent approach in prioritizing policies, allocating resources, and assigning clear responsibilities for detailed policy and instruments design; (ii) advisory councils made up of scientists, entrepreneurs, and policy experts, to provide specific knowledge and guidance to agencies and to help shape, update and discuss national innovation strategies with relevant stakeholders.

Coordination councils facilitate alignment between policies oriented to business innovation and policies seeking to promote science and technology and advance human capital formation. They play a role in ensuring a coherent approach in prioritizing policies, allocating resources, and assigning clear responsibilities for detailed policy and instruments design. There are several distinct types of coordination councils, all of which contemplate the participation of ministers involved in policymaking for business development, science, education, and technology development. Some councils are headed by the prime minister or president of the country, and most include the participation of non-government experts. Examples of coordination councils in OECD countries are the Japanese Council for Science and Technology and the Council for Science and Technology of the UK. What is important to notice, all successful coordination councils have separate secretaries and analytical capabilities.

Advisory Councils focus on long-term issues and trends to define innovation strategies. These councils monitor global trends in key technology areas and conduct meta-evaluations of the country's innovation system and processes, leading to policy learning. Some common characteristics of advisory councils are that they: (i) have members from academia, industry and government; (ii) are included in the "innovation law" or have their own law; (iii) conduct strategic studies with mid- and long-term focus; (iv) have a secretariat of permanent employees; (v) share their position on key issues regarding development of the innovation system in the country. Advisory Councils could operate in various institutional setups. For example, Finland's Research and Innovation Council is a governmental institution headed by the prime minister, whereas The Council for Science and Technology Policy (AWTI) of The Netherlands is an independent advisory body, not connected to any ministry or department, which provides advice for the government or members of the parliament.

A recommendation for Poland is to establish an "Innovation Excellence Center" that plays both coordination and advisory roles. Possible activities/functions include:

- Consolidate existing efforts related to coordination of instruments and reduce overlap across national and regional programs:
    - Coordinate mix of direct financial support, indirect financial support (tax deductions, public procurement), nonfinancial support (university, student programs, technology transfer office, quality standards, prizes and awards);
- Establish a repository of best practices related to instrument design and implementation (including on interpretation of regulations, usage of experts for application reviews, etc.) and disseminate them;
- Provide analytical inputs to instrument design and prepare (non-binding) opinions on instrument design proposals. Provide analytical frameworks and support regions in their analyses;
- Analyze the effectiveness of implemented instruments and approaches (e.g. smart specializations, targeting approaches);
- Support MAs/IAs in linking design and implementation of instruments to strategic-level objectives;
- Collect data through surveys to better understand the symptoms of innovation underperformance in each region.
- Develop online tool where authorities could specify symptoms, problems, and systemic change objectives to generate a list of possible instruments with pros and cons for each solution;
- Pilot innovative targeting mechanisms, e.g. working with representatives from selected S3's, staged financing where beneficiaries that are successful in an initial low-cost stage then receive additional funding;
- Support the development of instrument-level process and input cost monitoring systems;
- Exchange knowledge with other countries and international entities on best practices;
- Maintain flexibility to adapt to evolving country needs and stay relevant.

Possible institutional set-ups

There are several types of coordination and advisory bodies. Some are headed by the prime minister or president of the country, and most include the participation of non-government experts. Examples include:

- Cross-ministerial or ministerial unit—Within the Ministry of Investment and Economic Development, e.g. Japanese Council for Science and Technology (Head of the Council is a member of the Council of Ministries);
- Government agency with high autonomy—Independent body linked to a high authority e.g. The Council for Science and Technology of the UK (Director of the Council is a member of the Cabinet);
- Government agency—Internal governmental think tank, providing knowledge for decision makers, e.g. the Science, Technology and Innovation Council of Canada (STIC);

- Nonprofit public-private partnership—e.g. The Council for Science and Technology Policy (AWTI) of the Netherlands.

Further analysis and stakeholder consultations would be needed to determine the best institutional set-up for Poland.

Do's and don'ts

Do's

- Equip newly created institution with separate secretary and analytical power;
- Establish the Center on the basis of an Act (not executive order or other lower-class regulations) – long term political commitment is critical to ensure the future of the agency;
- Embed responsibilities of the Center in regulations related to STI policy, otherwise the Center might not be fully functional (e.g. legal necessity of providing opinion by the Center in preparing laws regarding innovation);
- Establish clear governance and management structure that will focus on retaining capable staff and building competences;
- Include monitoring and evaluation of the performance of the Center itself (not only of supported instruments);
- Avoid overlap of responsibilities with existing institutions.

Don'ts

- Decide on personal identification for particular positions – management should be selected on the basis of a competitive process with substantive criteria;
- Limit responsibility of the Center to a particular Ministry or other institution. To develop the full potential of the Center, it should have a cross-cutting nature and be involved in both operational as well as strategic discussions related to broader STI policy (including educational and industrial policy).

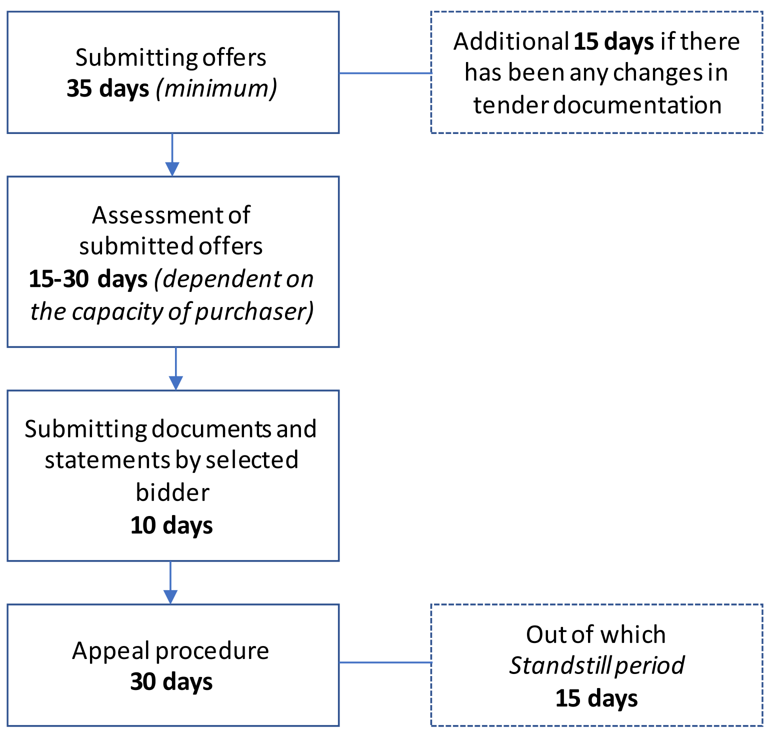
Annex 7. Impact of public procurement law on implementation of financial instruments

Source: Review of legislation

In accordance with Article 37(1) and Article 38(4) of the Common Provisions Regulation and following national regulations, managing authorities are obliged to select intermediaries for implementation of financial instruments by means of a public tender procedure. This requirement is a novelty compared to the previous financial perspective, and in the opinion of representatives of MAs/IAs constitutes a significant barrier for successful implementation of returnable support instruments. The main problem is related to a long duration of public tender procedures and the fact that even a relatively minor change in the specification of the subject of the tender requires a new procedure to be announced. Additionally, tenderers are required to make a deposit during a tender, with no guarantee of obtaining a contract.

An overview of the open tender European procedure (*pol. przetarg nieograniczony z zastosowaniem procedury unijnej*), which is the most commonly used, is presented below. On average, it takes approximately 4-5 months (including time for preparation of tender documentation and legal timeframe for all stages of the process).

Figure 5. Procedure of open tender for selection of financial intermediaries under ESIF co-financed programs in 2014-2020



Annex 8. Current experiences with pilot STI support instruments

Source: Review of documentation

A dedicated program of pilot STI support instruments is being implemented in the current financial perspective. An overview of the program is described in the table below.

2.4.1: InnoLab – Centre for analysis and piloting of new support instruments (PARP)	
Purpose and mechanics	Non-returnable grants for various projects focused on assessing or enhancing the effectiveness of public innovation support programs including: • Analyses and studies (non-competitive assignments), • Tests and pilot implementation of support instruments (competitive assignments), • Actions animating and integrating various stakeholders of the national innovation system (competitive and non-competitive assignments). As of April 2019, 10 pilot projects for enterprises have been implemented: • Design vouchers – grants for entities providing support to professional industrial designers for furniture manufacturers who have not yet produced their own collection • Electro Scaleup – start-up accelerator focused on electromobility firms • Nationwide contest "Polish Product of the Future" – annual media event with support for the commercialization of winning projects, • Scaleup – start-up accelerator focused on enhancing collaboration between start-ups and big firms • Seal of excellence vouchers – grants for feasibility and verification of potential studies for "Seal of Excellence" certified companies • Inventors' grants "Good Idea" – grants for assessing market potential of business ideas and support in search for financing opportunities • Academy of Innovation Manager – grants for improving employees' competencies in the area of creating and implementing innovations • Connect & Scale-up – series of events aiming at enhancing collaboration between large firms and start-ups • gov_LAB – educational program for local governments in the field of designing support instruments for entrepreneurs • Poland Prize – grants for financing establishment of foreign start-ups in Poland

	The value of each initiative varies from EUR 0.5m to EUR 2m. Project requirements and decision-making processes vary for each. The rationale behind Sub-measure 2.4.1 is to further promote development of innovations in the economy by improving the effectiveness of support instruments. The main objective is to create and test improved innovation support tools and enhance integration of various shareholders of the national innovation system. Sub-measure 2.4.1 is a novelty in the Polish national innovation system and has been created to systematize the creation of new instruments.
Eligibility criteria	• Private enterprises of all sizes • Research institutions • Scientists and students • Business environment institutions • Socio-economic partners • Public administration

Place in the structure of National Cohesion Strategy	Smart Growth Operational Program (EUR 8.7bn)
	• Priority Axis 2: Support for the environment and capacity of enterprise for R & D & I activity (EUR 1.0bn)
	    • Measure 2.4: Cooperation within the framework of the national innovation system (EUR 0.1bn)
	        ▪ Sub-measure 2.4.1: InnoLab – Centre for analysis and pilot implementation of new instruments (EUR 0.1bn)

Financing	Total value: EUR 49 million. • Sources mix: European Regional Development Fund – 97%, State budget – 3% Minimum participation in costs by beneficiaries varies between pilot programs.

Annex 9. Framework for market failures and choice of innovation instruments

Source: World Bank (2019 forthcoming), Instruments to Support Business Innovation: A Guide for Policy Makers and Practitioners

The annex below provides an overview of best practices in analyzing market failures and firm needs, and based on this consideration, selecting appropriate instruments. It presents approaches that could be helpful in strengthening support justification and alignment with systemic change, detected as one of potential areas for improvement in Chapter 3 of this report.

Choosing innovation support instruments: Some practical guidelines

Innovation has attributes of a public good which, once created, can be used by multiple actors at little to no cost. This can make the benefit of an innovation to the economy (i.e. the social return) higher than the benefit to the innovating firm (i.e. the private return). Different schools of thought emphasize different types of innovation policy approaches. While these approaches may lead to different combinations of instruments in the policy mix, when thinking about narrow innovation problems the policy maker needs to understand the root cause of innovation underinvestment. For example, why so few firms implement innovation or R&D projects, or why are they not utilizing online marketing and commerce?

The challenge in responding to these questions is that often several problems or “failures” could explain the innovation problem. For example, firms may underinvest in R&D because: (i) they cannot avoid the technology they develop from quickly being obtained by competitors, meaning they are unable to extract a decent return from the investment (*lack of or partial appropriation of returns*); (ii) they cannot persuade investors to finance the R&D/innovation project (*Information asymmetries*); (iii) they do not know how to manage and implement an R&D or innovation project (*underdeveloped markets or capabilities failure*); and (iv) they cannot afford to engage or coordinate with other firms/research sector in the provision of the necessary services required to perform the R&D project, e.g. testing or prototyping (*coordination failure*). The challenge for policy design is that all these failures are plausible, and it is likely that different types of firms experience different types of failures or no failure at all. Innovation policy is, therefore, a complex exercise.

Market failures that dis-incentivize private investments in innovation and prevent the social returns from being generated include: 1) partial appropriability; 2) information asymmetries; 3) coordination failures; and 4) missing markets.

1. Partial appropriability/spillovers and uncertainty: Innovation investment returns are not fully captured/appropriated by the original investor due to externalities/spillovers. Generated knowledge may be rapidly duplicated by other market actors, including competitors, at lower cost. Therefore, unless compensated (e.g. by monopoly rights created by an intellectual property system and grants for undertaking innovation), the private sector does not have sufficient incentives to invest in innovation at a level that would be socially optimal, particularly because the success of R&D efforts is uncertain.

2. Information asymmetries: Information asymmetries arise when one party of a transaction has access to relevant information that the other party does not. These information asymmetries may discourage agents from conducting market transactions despite the higher value that could be produced. Information asymmetry exists between lenders (investors) and firms and entrepreneurs in the seed and early stages of innovation development. This situation creates the so-called "valley-of-death" for innovative products—potential investors find it difficult to distinguish between new research, technologies, and entrepreneurs that are likely to succeed and those that are not. This helps explains the lack of funding for commercialization of research. Another type of information asymmetry occurs when individuals and firms are not able to distinguish between the quality of service providers (e.g. for advisory services), discouraging participation in such services.

3. Coordination (system) failures: Innovation is usually a result of multiple actors working in a highly interdependent system. Coordination failures may take the form of network failures (problems in the interaction among actors in the innovation ecosystem, e.g. researchers and firms), institutional failures (e.g. failure to configure public institutions, such as universities and research institutes, to work effectively), and framework failures (deficiencies in regulatory frameworks).

4. *Underdeveloped markets or capabilities failure*. Inputs needed to build firm capabilities, such as technical skills or business development services (BDS), are missing in some countries.

Interventions to address market failures

Interventions to encourage innovation may be classified into five areas: (i) strengthen firm capabilities; (ii) improve access to finance; (iii) help firms reach new markets; (iv) resolve regulatory obstacles; and (v) provide critical infrastructure. These interventions address the bottlenecks/market failures that hinder firm growth and incentives to innovate[30].

Interventions to build firm ***capabilities*** include programs for business support and business development services, mentoring and networking, and access to technology. Incubators and accelerators, which combine the provision of physical space with business support services, mentoring, and so on, are also a popular instrument. Programs to support access to ***finance*** include loans at concessional or market terms, grants, venture capital, and nonfinancial support (for example, networking with funders). Most countries that provide public venture capital funds also have private venture capital and private angel investors; the coexistence of public and private venture capital firms is also a feature of some high-income economies. Efforts aimed at improving access to ***markets*** could potentially be used more frequently, if export and trade promotion interventions are included as part of the intervention package. Targeted ***regulatory*** interventions involve the creation of new regulatory structures or incentives, e.g. for equity financing, collaboration, and new platforms for trade and finance. An example is tax incentives—such as exemptions, reductions, or credits—that lower the risk for angel investors (as in Malaysia). Finally, some targeted interventions focus on improving ***infrastructure,*** for example, through technology parks or free or special economic zones. The services involved may range from basic

[30] Based on the conclusions from the portfolio mapping and needs assessment components of the *Measuring the return on investment of public support to innovation* project, there appears to be room for improvement in Poland especially on (i) strengthening firm capabilities and (iii) helping firms reach new markets.

infrastructure (energy, water, roads, access to ports, and so on) to high-grade manufacturing technology, educational installations, and access to labs. A recent analysis of 54 interventions in 14 countries done by the World Bank[31] finds that there is no clear pattern on the choice of interventions across countries and GDP per capita, population, or the entrepreneurial ecosystem ranking of the country (using the Global Entrepreneurship and Development Index).

Listed below are some insights to help with the choice and design of policies and minimize the risk of government failure. These come from the existing literature and international practice and are expected to part of the World Bank's forthcoming innovation policy instruments guide.

1. Equating expected results with innovation constraints. Map the type of innovation outcome that you want to improve (i.e. improving R&D, adopting new technologies...) with the problem or 'failure' that undermines it (see next section for some examples). Consider:

a. There may be different 'failures' for different types of firms, so different instruments could be needed, and each instrument may not work for all firms (targeting)

b. What is the main cause of underinvestment in the innovation project? How do we know that this is the root cause (what are the symptoms)?

Table 5 below summarizes some of the market failures and the possible innovation policy instruments.

Table 5. Market failure and some insights on instrument choice

Failure	Problem	Options	Detail
Knowledge spill-overs and address lack of appropriation of returns on innovation	Firms underinvestment because of the risk of diffusion to the sector will prevent them from recouping its costs, or projects present potential for high knowledge spillovers and high potential impact in the economy	Tax incentives or grants may be preferred	• Low externalities/ spillovers on existing R&D/ innovators – tax incentives • Very high externalities may demand a grant. This can be blended with a loan to finance some components such as fixed assets – machines
Information asymmetry between innovators and investors that constraints financing	Commercial banks not funding innovation projects that seem relatively low risk and that potentially offer appropriate returns. Investors nor investing in new ventures	Loans and guarantees, and equity should be preferred	• If the problem only screening, use of loans or guarantees may not require subsidized interest rates • If the problem is lack of control of what they can do with the loan, impose

[31] These countries include: Angola, Brazil, Colombia, Côte d'Ivoire, Ghana, India, Jamaica, Jordan, Malaysia, Mexico, the Philippines, Senegal, South Africa, and Turkey. For a summary of the work, see Grover, Medvedev and Olafsen (2019).

			co-payment rates • Early stage may require equity investment. Can be blended with tax credits for investors
Low capabilities accumulation/ overconfidence (lack of self-awareness or bounded rationality)	Firms do not perceive the value of innovation that would yield an economic return or does not have the capabilities to design and implement innovation projects	Some technical assistance and advisory are required either directly through existing networks of advisors or via financial instruments directed to finance technical assistance	Advisory can be blended in loans and grants as well, either by financing it directly, or by providing complementary advisory services (i.e. firm diagnostics that would create awareness, convince owners and guide investments to areas of high returns)

2. ***Improving targeting for increased effectiveness***. Attracting the right participants to benefit from the policy is important along different dimensions:

a. *Maximize additionality of impact.* The best projects may have direct access to the financial market and imply little additionality of public support.

b. Screen out bad projects. Highly uncertain and low return projects will result in negative expected returns to public investment.

c. *Select the combination that maximizes efficiency and additionality.* Consider the combination of projects selected that maximize value for money, not only those that are better.

3. ***Dealing with heterogenous financial needs.*** Maximize finance by asking applicants to reveal their true financing needs and adjust copayment rates to what is revealed.

The most likely starting point for policy makers when thinking about innovation policy is to try to address a specific innovation “problem”; the underperformance of specific innovation outcomes, e.g. low R&D, not enough technology adoption, low commercialization of research. Table 6 summarizes how commonly used instruments can be used to address the most frequent innovation “problems” and their corresponding solutions. The World Bank’s innovation policy instruments guide provides more detail on each of these instruments. These are stylized examples, and each country and innovation system will have its own unique features, problems, existing policies and institutions, economic and industrial histories. As noted above, there is a danger in copying from other jurisdictions without local assessments and customization. The instruments proposed in the table below offer a starting point to address different innovation problems.

Table 6. Common problems and potential solutions

Problem	Instrument (Institutions)	What for?
Problem 1. Low general innovation performance due to low capabilities	Business advisory (BAS) Technology Extension Services (TES) NQI Supplier development programs Cluster Vouchers	Capabilities building (management) Capabilities building (technology) Quality and standards Collaboration
Problem 2. Use of old and outdated technology/ low technology adoption (Technology problem 1)	Business advisory (BAS) Technology Extension Services (TES) Technology Centers Loans Grants	Capabilities building (management) Capabilities building (technology) and transfer Finance Finance and appropriation
Problem 3. Weakness in technology generation and commercialization (Technology problem 2)	Technology transfer Technology Centers Technology Extension Services (TES)	Technology transfer Capabilities building (technology) and transfer
Problem 4. Low number of young innovative ventures	Incubators (BAS) Accelerators Equity	Capabilities building Capabilities building and scale up Finance and scale up
Problem 5. Lack of collaboration leading to poor quality business innovation	Clusters/Networks Vouchers Grants Technology transfer instruments	Coordination and mindset Mindset and incentives Incentives and finance University-industry
Problem 6. Sum-optimal investment in R&D	Grants Loans Tax incentives	Finance and appropriation Finance Incentives and appropriation

Elements of good innovation policy instruments design: Some dos and don'ts

Once the range of suitable instrument(s) for the diagnosed problem has been identified, it is helpful to understand the characteristics of each of the instruments along the following dimensions:

- Definition – the concept of the instrument, history, and trends.
- Rationale – what market and system failures are addressed and how.
- Target group – identification of the main beneficiaries or stakeholders related to this instrument.
- Elements for optimal instrument design –what design issues should policy makers pay attention.
- Strengths – what strengths the instrument has, especially in comparison with others.
- Potential drawbacks and risks.
- Elements for optimal instrument design.
- Evidence of impact – context, beneficiaries, design, implementation, effectiveness, and other issues.

- Key “must have” for replicability – enabling conditions and competencies required.
- Dos and Don’ts when implementing these instruments.

Evidence on the success of different instruments is summarized below. Given the homogeneous nature of the evidence reviewed (in geographic terms, since most of the evidence on innovation policy focuses on OECD countries), and the fact that each national system of innovation is different and shaped by the local context and institutions, it is important that policy makers look critically at each of the profiled instruments and reflect on whether the necessary conditions for implementation are in place.

There is a great deal of emphasis on ***financial incentives*** to build ***firm capabilities***. Direct instruments in this space include vouchers, grants and matching grants, equity financing, and public procurement. Indirect interventions include fiscal and tax incentives and loan guarantees. The use of these instruments is warranted by market failures that reduce firm incentives to innovate, upgrade management, or find new markets for products. These instruments encourage firms to undertake activities they would otherwise not do. Vouchers, for example, aim to stimulate demand. Successful voucher programs combine relatively low-value awards with simple application procedures and minimal administration costs. Grants, equity financing, fiscal incentives, and loan guarantees address credit market imperfections and incomplete appropriability of undertaking certain projects, and usually follow a competitive process. Finally, public procurement programs address similar market failures through a “demand pull” mechanism, by having the government act as lead buyer.

A few studies have explored the relative effectiveness of grants as direct instruments compared with indirect instruments such as tax incentives, and the potential relationships between them (Table 7). The studies suggest that either grants or tax incentives might perform better depending on factors such as firm characteristics and the nature of projects supported. The results of the studies tend to be sensitive to the data used, e.g., Grilli and Murtinu’s (2012) key finding might only apply to new technology-based firms. When compared to tax credits, grants show greater additionality in R&D expenditure in the medium to long term (Becker 2005), particularly for young knowledge intensive firms (Busom et al, 2014). However, grants also present higher propensity for crowding out effects when compared to loans or tax incentives (Crespi and Maffioli, 2014).

Table 7. Effectiveness of grants relative to other instruments

Study	Context	Finding
Guellec *et al.* (2003)	17 OECD countries	Direct grants and tax incentives are substitutes, i.e. increasing the level of tax reduction support would compromise the effectiveness of grants.
Bérubé and Mohnen (2009)	Canada	Firms that benefited from both grants and tax incentives introduced more new products and achieved more success in commercialization than firms who only benefited from tax incentives.
Becker (2015)	Synthesis of previous studies	Tax credits have a significant effect on R&D expenditure mainly in the short run, whereas grants have a positive effect in a medium to long run.
Carboni (2011)	Italy	Tax reduction appears more effective, with an average treatment effect of 1163 EUR (t-value = 2.59), compared with 690 EUR (t-value = 1.58) for grants.

Grilli and Murtinu (2012)	Italy	For new technology-based firms (NTBFs) "selective R&D subsidies outperform other types of schemes".
Busom *et al.* (2014)	Spain	Grants are better suited than tax incentives to encourage young, knowledge-based firms to engage in R&D.
Crespi and Maffiol (2014)	Latin America	Grant schemes appear to be more effective in encouraging new innovators and stimulating collaborations, although the risk of crowding-out effects is higher with grants than with loans or tax incentives.

Many factors determine the effectiveness of **grants** schemes, for example:[32]

- Competition-based grants generally outperform entitlement-based grants.
- Competition-based grant schemes remain subject to the risk of "picking winners" and other selection bias.
- The amount of co-financing required from beneficiaries show a nonlinear relationship with effectiveness.

Some literature explores whether and how firm characteristics shape the effectiveness of grants in generating input additionality. The existing evidence suggests more additionality in smaller and more experienced firms, and in low-tech sectors. Stronger input additionality results have been achieved in smaller firms than larger firms, as well as among those firms with richer R&D experience, and with intellectual property registration (i.e. greater capacity for appropriability). However, input additionality from grants was observed to be lower for high tech firms than for low tech firms.

Evidence on the additionality of innovation outputs (new products, new ventures, or patents) and outcomes (sales, productivity, or employment) of grant schemes is relatively limited compared with that on input additionality. The academic literature offers little evidence on outputs triggered by grants such as sales related to new products and new start-ups (see Clarysse et al. 2009). Program-specific evaluations have been mostly focused on straightforward outcome measures such as gross value added (GVA) and employment. The few existing studies have found some evidence of positive impacts on introducing new products, employment, and productivity. Those studies claim that there are significant increases in sales, employment, and GVA triggered by the interventions of programs such as the U.K. Collaborative R&D program and the Chilean FONTAR. Evidence on productivity and cost effectiveness is more limited.

The evidence is generally positive about the effectiveness of grants in promoting innovation, especially regarding its effectiveness in generating input additionalities. However, the existing evidence falls short on offering precise lessons to relate effectiveness to specific program modalities beyond some selection criteria. Grants often assumes a simplistic input-output relationship between innovation investment and outcomes, while the reality is much more complex given the various influences on whether innovation is commercially successful, or on firm level productivity.

[32] See forthcoming World Bank innovation policy instruments guide for more detail.

Common complaints made about poorly designed and managed grant programs include:

- *Poorly marketed*, such that potentially eligible firms are not aware of the assistance, or a group of serial grant applicants frequently reappear.
- *Unclear eligibility and selection criteria.*
- *Lengthy and opaque* application and decision-making process.
- *Burdensome reporting*. Too frequent, and in some cases requiring pointless information and costly in relation to the funding available.

Potential results of these shortcomings include: a) target firms either do not know about the initiative or do not bother engaging; b) SMEs hire expensive consultants to prepare for their applications which diverts resources away from their intended purpose; c) the most eligible firms do not receive support; and d) both recipient firms and the government waste time and resources in processes that add little value.

Governments need the capability to design and implement programs that can avoid these pitfalls. For example, an implementing body should be able to simplify and reduce application costs and raise awareness among the most suitable participants. Likewise, if delivery is to be non-burdensome, then considerable automation of grant application, selection and management is preferred (e.g. through smart forms, online applications, reporting, payments, standardized contracts etc.). Authorities must be able to first assess whether applications are eligible (i.e., do they meet the criteria), then manage technical review processes (ideally done by independent experts). There also needs to be transparent decision-making processes free from political interference. Finally, monitoring and evaluation and learning also require significant capabilities from policy makers and adequate processes that collect the right information without over-burdening recipients during the project. Processes should also enable information to continue to be gathered post project. Table 8 provides some dos and don’ts in designing grants.

Table 8. Some dos and don’ts in designing grants

Do	Don’t
• Consider alternative designs of grant schemes, defined by choices made for features such as size, duration, matching rate and target group (individual versus group). • Within the same broad target group, e.g., SMEs, firms can in fact be very diverse and suffer from different market and system failures. Defining attributes such as size, R&D intensity, and financial constraints can shape the firms very differently. • Evaluate the extent of market/ systems failure and potential additionality on beneficiaries. • Ensure political commitment, funding predictability, and political continuity. • Design agile and simple application processes to lower the admin burden on firms.	• Don’t assume that grants are the right instrument to adopt. Policy makers need to constantly reflect on new dynamics and patterns of innovations and the emergence of new funding models. • Don’t expect grant programs to generate impacts immediately. Outcomes from grant schemes need a considerable period to manifest. Longer-term impacts on productivity and the economy might only become apparent after 3-5 years of granting. • Don’t design complex (and costly) application processes. High costs of entry may deter the firms most in need and create a captive market for firms nod necessarily in need, but that are able to cover the sunk cost of application process, or that are building a parasitic consultancy market around applying

	for grants. • Don't collect too much irrelevant information from clients and have burdensome reporting regimes and slow decision-making and disbursement processes. • Don't assume a collaboration grant program will automatically induce effective collaboration between target organizations.

Voucher schemes aim to address capability failures faced by smaller firms by inducing behavioral changes towards more proactive learning and sustainable collaboration with knowledge providers. They also tend to address information asymmetry: SMEs are not always aware of what solutions are available to help them adopt new technologies or products, and when they are aware, do not always trust the quality of potential providers. Knowledge providers, especially universities and research institutions, do not always understand the needs of SMEs or have incentives to develop solutions for this segment. More importantly, voucher schemes can signal "good" providers and when brokerage is also offered, they can help matching the SME with the appropriate provider, addressing these information asymmetries.

Despite the increasing popularity of vouchers in many countries, the bulk of the existing evidence draws upon evaluations and surveys of voucher programs in Europe. Evaluations mostly address two types of output additionality: project additionality and economic impacts. Table xx5 synthesis the results of some studies studying the impact of innovation vouchers on overall outcomes. The samples are small, and the results are context-dependent, making the generalizability of the findings low.[33]

Table 9. Output additionality of voucher schemes: Some evidence

Project additionality	Economic impacts
• Austrian scheme: 35 percent full additionality; 45 percent partial additionality; 20 percent no additionality • Creative Credits: 80 percent full additionality • Dutch national scheme: 80 percent full additionality; 10 percent no additionality; 10 percent unused • Scottish scheme: 55 percent full additionality, 40 percent partial additionality, 5 percent no additionality	• Northern Ireland program: approx. FTEs and approx. GBP 8.3 million GVA generated • Scottish scheme: immediate impacts: GBP 27,044 GVA and 1.9 FTEs; estimated potential future impacts: GBP 3,566,876 GVA and 230 FTEs • Creative Credits: short-term additional sales of GBP 514,000, i.e. approximately GBP 3,430 per voucher

Vouchers tend to be effective at stimulating behavior change, but evidence of sustained impact is mixed. Thus, vouchers may help build a pipeline of innovators to participate in more complex support programs. By comparison, grants are generally effective in producing intended outcomes (for example,

[33] Except for the Creative Credits evaluations, the selected evaluations only address immediate outcomes of voucher schemes. The selected studies also fall short on assessing the added value in an objective way. The data employed is overly reliant on self-reporting from stakeholders and mainly without a control group.

business innovation) and encouraging firms to invest their own resources in the process—and competition-based grants generally outperform entitlement-based grants. Table 10 below offers some recommendations, based on the evidence on the output, input and behavioral additionality from using innovation vouchers.

Table 10. Some dos and don'ts in using innovation vouchers

Do	Don't
• Before deciding to use voucher schemes, take stock of the supply and demand of innovation-related knowledge services. • Make the scheme demand-led by providing the vouchers to the SMEs. • Design simple application and selection procedures that have lower entry costs than matching grants. This is critical given the target population of non-innovative SMEs. If oversubscribed, use randomization or transparent selection mechanisms. • Define clearly the range of services that are covered by the voucher (i.e. prototyping) and eligible costs. • Increase SMEs' awareness of the voucher schemes through proactive advertising and outreach activities. • Set up brokerage services throughout the policy cycle to smooth the implementation process. These can be effective in increasing the quality of matches. • Conduct random verification of identified collaborative projects to minimize the risk of fraud. • Conduct systematic data collection to enable policy evaluation, learning and improvement. Use random audits to monitor.	• Don't overcomplicate the procedure for potential voucher recipients. Although there are needs for data collection, schemes should use brokerage and random audits to simplify processes. • Don't leave the list of potential service providers open. Instead, define clear requirements and, if needed, provide a list of accredited providers. • Don't ignore the potential roles of knowledge providers. For instance, they are able to handle most of the paperwork involved to ease the burden on SMEs. • Don't overstretch the scope of voucher schemes. Although they can support a wide range of activities, their limited scope helps to simplify procedures and control costs. • Don't expect the development of large innovation projects. Vouchers are an instrument to encourage behavioral change through small projects.

Fiscal incentives usually have a positive impact on outcomes (for example, higher R&D investment and greater probability of developing new products for R&D tax credits) with effects becoming stronger in the long run, but the evidence is mixed when it comes to productivity. Some studies found no statistically significant impact, while Caiumi (2011) found that the Italian R&D tax incentive scheme induced positive productivity growth; with higher impact for firms on the lower bound of the productivity distribution. Findings on the relative effectiveness of grants versus tax incentives is mixed, although evidence from developing countries shows that smaller firms may be less likely to participate in tax incentives. Table 11 offers some hints in designing R&D tax credit as an instrument for innovation policy.

Table 11. Dos and don'ts in designing R&D tax credit

Do	Don't
• Minimize the bureaucratic burden for applicants by simplifying the procedures and shortening the time needed for approval of eligible expenses. • Offer a carryover facility to add flexibility for young companies – and refunds for small firms, which might not generate cash flow for some time after the investment has been made. • If capacity allows, tailor the scheme to favor R&D activities with high potential for knowledge spillover, such as wage bills for researchers, given their labor mobility. • If capacity allows, provide optional immediate refund for small companies to encourage a higher participation rate. • Conduct systematic and rigorous impact evaluations to learn about and to continually justify implementation of the scheme.	• Don't create compliance uncertainty for prospective participants. running a voluntary compliance verification process can enable firms to pre-approve expenditure categorization to reduce uncertainty and to ensure compliance. • Don't create unpredictability with the term of the scheme – policy makers need to commit to tax incentives schemes for at least five years (but probably more) if they are to change business R&D behaviors. • Don't give disproportionate discretion to public officials in the selection of eligible incentive applications. In addition, do not provide excessive auditing functions to ministries that could withdraw tax incentive relief for firms.

Loans and loan guarantees are instruments for debt financing to support business innovation, typically targeting SMEs, although large firms can also be targeted. For **loan guarantees**, studies show positive but weak effects on outcomes (for example, R&D spending) and similarly weak support for increases in firm sales and productivity. Government-backed early-stage **equity** investment is a relatively new policy tool. Although it is rapidly gaining acceptance in developing countries, evidence regarding improved access to finance, exit rates or values, and increased sales compared with private funds is mixed. When the impact is positive, it tends to be linked to private co-participation in the scheme. Finally, evidence shows that **public procurement** programs help participants generate new intellectual property and contribute to new firm creation, but effects on employment vary and are limited to the short term.

The literature on the impacts of subsidized **loans** on firm R&D often treats loans as one of several instruments (in addition to grants etc.) and remains limited in explaining the loan design features. Examples of such studies include the Turkish Technology Development Foundation of Turkey program (TTGV) (Özçelik and Taymaz, 2008), the Spanish Centre for the Development for Industrial Technology (CDTI) soft loans (Huergo and Moreno, 2014), the Brazilian Development Bank (BNDES) Innovation Credit scheme (Machado et al., 2017), and the subsidized loans scheme (Measure 2.1b) of the Italian Piedmont Regional scheme *Documento Unico di Programmazione* (DOCUP) (Cannone and Ughetto, 2014). Targeting of the schemes might be an issue. For example, Cannone and Ughetto (2014) report that larger and profitable firms have a higher probability of being selected by the agency. OVE (2017) reported that different programs in Brazil are often highly intertwined and reach the same firms. While 30% of beneficiary firms received support from more than one program, they received 53% of the total treatments. Table 12 offers some examples of studies on the economic impacts of loan schemes.

Table 12. Economic impact of loans schemes

Study	Context	Finding
OVE (2017)	Brazil, BNDES card scheme (pre-approved low-interest credit line targeting SMEs – including equipment)	Recipients were not associated with higher labor productivity in the manufacturing or retail sectors, in contrast to 3% increase for services sector (at 90% significance level, compared to the control group). In the manufacturing sector, being treated by BNDES Card was correlated with a 22.7% increase in capital productivity at a 5% level of statistical significance, through no associated increases in TFP were found. Single-treated recipients of BNDES Card in the manufacturing sector were more likely to see a decrease in wages of 3.2% compared to the control group.
Huergo and Moreno (2014)	Spain, CDTI soft loans program	Participation in the CDTI loan system has direct positive effects on the profitability of obtaining product innovations and applying for patents. However, this direct effect is absent with respect to process innovations.

The reliance on policies such as matching grants or other financial incentives are based on the (often empirically untested) assumption that the main obstacle to firm upgrading is poor access to capital. However, firms may also face difficulties in collaborating and accessing new markets and new technology, as well as other challenges that require a more comprehensive mix of instruments. For example, **inducement instruments** and recognition awards are nonmarket incentive mechanisms to encourage additional efforts by participants to address a specific market failure.[34] They share some similarities with financial incentive mechanisms but transfer the risk of failure from the government to participant firms. Because prizes and awards cannot offset institutional and capability weaknesses, these instruments are unlikely to work well if businesses are financially or technically constrained from making the needed investments. Table 13 summarizes some of the studies on the economic impacts of inducement instruments.

Table 13. Economic impact of inducement instruments for innovation

Study	Context	Finding
KEI (2008)	Innovation prizes programs during 18th-21th century	Many of the inducement schemes in history led to milestone inventions which advanced the science and technologies across many sectors such as agriculture and food, automotive, space technology, energy, medicine and architecture etc. Not all inducement schemes were successful, but they offer some advantages over grant schemes in terms of engaging unconventional innovators and overcoming the costs of

[34] Inducement instruments – prizes, competitions, crowdsourcing and hackathons – aim to trigger contestants' additional effort to address specific problems/challenges set beforehand. Inducement prizes aim at the development of an innovative solution by external parties.

		monopolies.
Brunt *et al.* (2011)	UK competitions 1839-1939	Impacts of prizes in stimulating more patented innovations were observed. If the prize money was doubled for a given field, 33 percent more patents were granted in the same field in subsequent years. Prizes encouraged competition and medals were more important than monetary awards.
Nicholas (2013)	Japan in Meiji era	Prizes provided a strong boost to patents, especially in less developed prefectures, and they also induced large spillovers of technical knowledge in prefectures adjacent to those with prizes, relative to distant control prefectures without prizes. Linking competition expenditures with the expected market value of patents induced by the prizes permits a cost-benefit assessment of the prize competitions to be made.
Zivin *et al.* (2018)	USA, experiment	The study differentiates between those participants (students) who self-select into innovative activities and those who are willing to undertake only after receiving an additional incentive for doing so. The study finds that while induced participants have different observable characteristics than those that were 'innately' drawn to the competition, on average, the success of induced participants was statistically indistinguishable from their self-selected counterparts and encouragement does not change this result.

Technology, extension support, and advisory services programs advise firms on process improvements, workforce training, supply chain development, customer acquisition, exporting, technology transfer, etc. Some of the better-known examples include the Manufacturing Extension Partnership in the United States, Fraunhofer Institutes and Steinbeis Centers in Germany, Japan's Kohsetsushi Centers and Productivity Centers, and SPRING and A*STAR in Singapore. These initiatives can help firms:

- Resolve information asymmetries regarding their own capabilities (for example, firms often do not seek out consulting services because they do not know what they are missing);
- Address shallow markets (for example, the quality of available consulting services may vary, and firms may have difficulties distinguishing between potential suppliers; extension programs often provide some consulting in-house and use their networks of private sector providers for others); and
- Improve access to technology or services that firms may not be able to purchase on their own (e.g. prototyping and 3D printing).

The impact of such interventions on sales, employment, and productivity tends to be positive, although constant adaptation and changes in design of these programs makes attribution difficult.

Incubators and accelerators support the development and scaling of growth-oriented, early-stage businesses by providing access to physical space, advisory services, mentorship, and sometimes access to finance for a predefined period (typically one to five years for incubators, and three to six months for accelerators). Their services are offered either stand-alone or embedded in science and technology parks, clusters, and technology transfer intermediaries. As with other instruments, most of the evidence on the effectiveness of these initiatives is from high-income countries. Studies suggest that incubated firms can be successful in generating additional revenue and employment, although the impact on innovation (for example, patents) is insignificant. Accelerators can be successful in increasing company survival rates, revenue, and (more modestly) employment growth, as well as improving deal flow in the regional ecosystems, although the evidence is even more limited than for incubators. Although incubation and acceleration programs exist in agribusiness, healthcare, and other industries, the tech sector remains the primary focus.

Annex 10. Detecting systemic and idiosyncratic patterns of performance

Performance in a given category could vary significantly across instruments or remain relatively stable. High variance of scores indicates areas where low-performing instruments could learn from top-performing ones. Very low variance suggests that there are common processes governing the category, and improvement in these areas likely requires modification of external regulations.

To detect both systemic and idiosyncratic patterns of performance, standard deviation and distribution of scores needs to be calculated for each category. Quartiles of standard deviation of average scores set boundary values for pattern groups. Pattern groups include categories that are characterized by similar degrees of differentiation of scores. The potential for improving strongly systemic categories lies in improving horizontal regulations. Improvement in strongly idiosyncratic categories requires implementing best practices developed by top-performing institutions. Categories in moderately systemic and moderately idiosyncratic groups could benefit from both approaches, with potentially greater improvements from implementation of solutions suitable respectively for strongly systemic and strongly idiosyncratic groups.

Table 14. Pattern groups in Polish STI support instruments

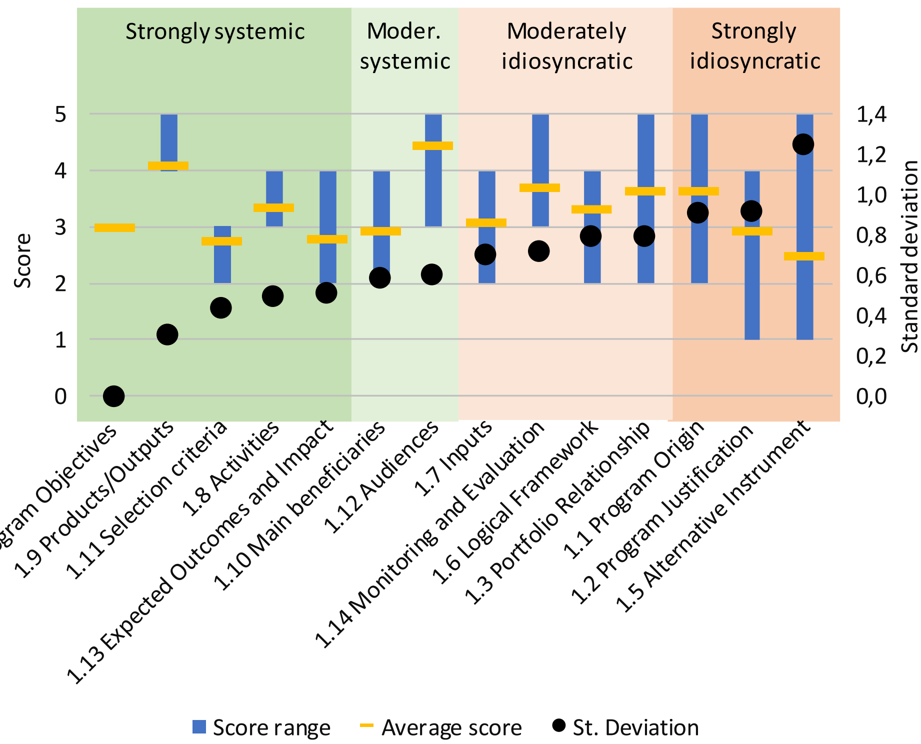
Pattern group	**Range of quartiles of st. deviations**	**Boundary values in Poland**	**Average score**
Strongly systemic	<0; Q1)	0.590 (Q1)	3.45
Moderately systemic	<Q1; Q2)	0.700 (Q2)	3.34
Moderately idiosyncratic	<Q2; Q3)	0.902 (Q3)	3.55
Strongly idiosyncratic	<Q3; 3)	N/A	3.31

Source: World Bank analysis

In general, no link between pattern groups and quality of performance was identified. Average scores in all groups are similar to each other, with less than 10 percent difference between the best and worst performing groups. However, differentiating by pattern groups sheds light on ways to improve performance.

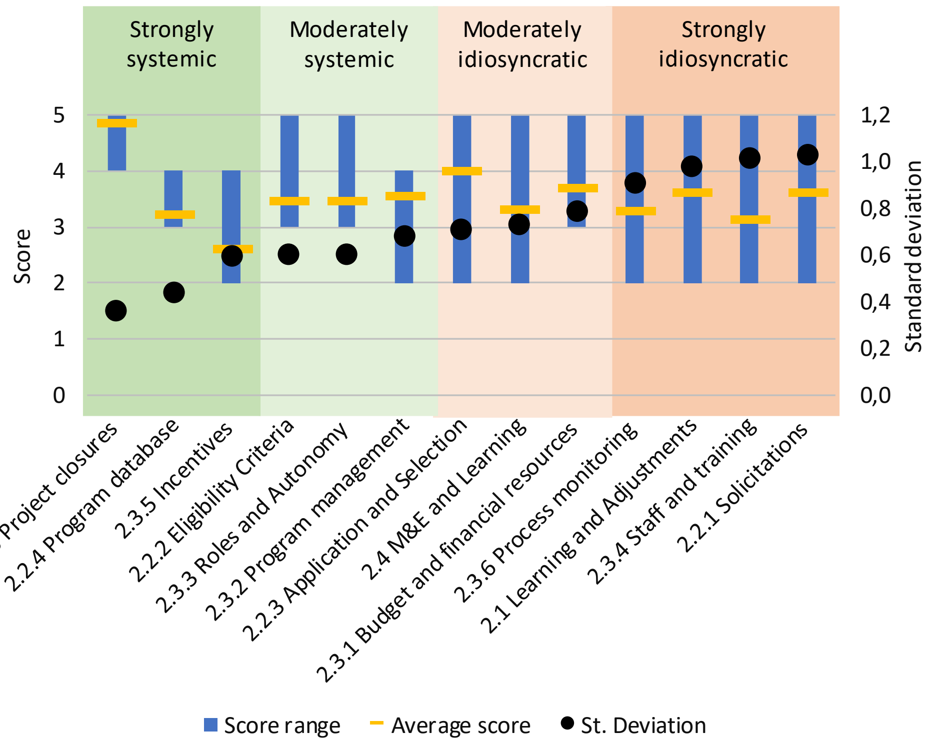
Categories of design dimension exhibit more systematic pattern of performance. Actions undertaken by MAs/IAs in later stages of design process (1.4 and 1.8-1.14) are largely defined by EU Regulations, compared to initial stages of design process (1.1-1.7 except 1.4) which are subject to discretional decision of individual agencies. In implementation, idiosyncratic categories prevail over systemic ones, with no clear source of division. As expected, performance in governance categories related to external regulations is systemic, whereas scores of relationship between institutions and programs are strongly idiosyncratic.

Figure 6. Average score and score deviation in design category



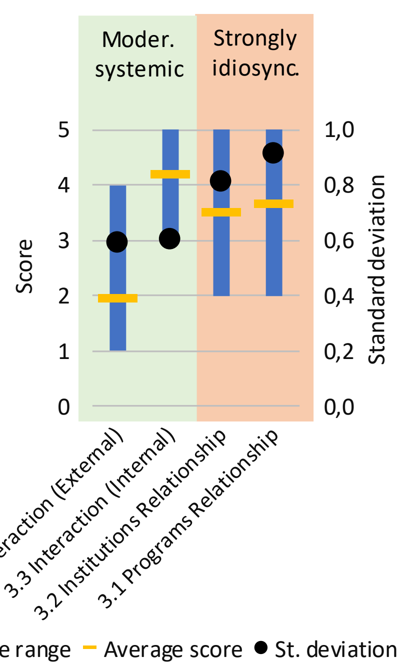
Source: World Bank analysis

Figure 7. Average score and score deviation in implementation dimension



Source: World Bank analysis

Figure 8. Average score and score deviation in governance dimension



Source: World Bank analysis

BIBLIOGRAPHY

Becker, B. (2015). Public R&D Policies and Private R&D Investment: A Survey of the Empirical Evidence. Journal of Economic Surveys, 29(5), 917–942

Berube, C., & Mohnen, P. (2009). Are firms that receive R & D subsidies more innovative? Canadian Journal of Economics, 42(1), 206–226

Borowska, I., Iwanowski, D. (2018). Poland Structural Policies for Competitiveness: Position Paper Innovation Policy

Brunt, L., Lerner, J., & Nicholas, T. (2012). Inducement Prizes and Innovation. Journal of Industrial Economics, 60(4), 657–696

Busom, I., Corchuelo, B., & Martínez-Ros, E. (2014). Tax incentives... or subsidies for business R&D? Small Business Economics, 571–596

Caiumi, A. (2011). The Evaluation of the Effectiveness of Tax Expenditures - A Novel Approach: An Application to the Regional Tax Incentives for Business Investments in Italy, OECD Taxation Working Papers, No. 5, OECD Publishing, Paris.

Cannone and Ughetto. (2014). Funding Innovation at Regional Level: An Analysis of a Public Policy Intervention in the Piedmont Region. Regional Studies. Vol. 48 No.2. pp 270-283

Carboni, O. A. (2011). R&D subsidies and private R&D expenditures: evidence from Italian manufacturing data. International Review of Applied Economics, 25(4), 419–439

Clarysse, B., Wright, M., & Mustar, P. (2009). Behavioral additionality of R&D subsidies: A learning perspective. Research Policy, 38(10), 1517–1533.

Crespi, G. A. and Maffioli, A. (2014). Design and Evaluation of Tax Incentives for Business Innovation in Latin America, Lessons Learned After 20 Years of Experimentation

Grilli, L., & Murtinu, S. (2012). Do public subsidies affect the performance of new technology-based firms? The importance of evaluation schemes and agency goals. Prometheus, 30(1), 97–111

Grover, A., Medvedev, D., Olafsen, E. (2019 - forthcoming). Instruments to Support Business Innovation. A Guide for Policy Makers and Practitioners

Guellec, D., & Van Pottelsberghe De La Potterie, B. (2003). The impact of public R&D expenditure on business R&D. Economics of Innovation and New Technology, 12(December 2014), 225–243

Huergo and Moreno, (2014). National or international public funding? Subsidies or loans? Evaluating the innovation impact of R&D support programmes

ImApp. Pag Uniconsult. (2014). Ocena ex-ante dla instrumentów finansowych w ramach Regionalnego Programu Operacyjnego dla województwa pomorskiego na lata 2014-2020

Kapil, N., Aridi, A. (2019). Innovation Agencies – Lessons from Emerging Economy Ecosystems

KEI (Knowledge Ecology International). (2008). Selected Innovation Prizes and Reward Programs

Machado, L., Martini, R.A., Gama, M., (2017). Does BNDES Innovation Credit Boost Firms' R&D Expenditures? Evidence from Brazilian Panel Data

Ministry of Economy. (2013). Strategy for Innovation and Efficiency of the Economy "Dynamic Poland 2020"

Ministry of Economy. (2014). National smart specialization strategy.

Nicholas, T. (2013). Hybrid innovation in meiji, Japan. International Economic Review, 54(2), 575–600

OVE (Office of Evaluation and Oversight). 2017. Assessing firm support programs in Brazil

PSDB, Regio Group. (2014). Ewaluacja ex-ante Programu Operacyjnego Inteligentny Rozwój 2014-2020 – Raport końcowy

Özçelik, E., Taymaz E. (2008). R&D support programs in developing countries: The Turkish experience, Research Policy, 37, 258-275

World Bank Group. 2017. *Lessons from Poland, Insights for Poland : A Sustainable and Inclusive Transition to High Income Status.*

WYG PSDB. (2013). Ocena ex-ante instrumentów finansowych Regionalnego Programu Operacyjnego Województwa Świętokrzyskiego na lata 2014-2020

Zivin, J. S. G., & Lyons, E. (2018). Can Innovators Be Created? Experimental Evidence from an Innovation Contest. Nber Working Paper Series