



WORLD BANK GROUP



# POLAND STRUCTURAL POLICIES FOR COMPETITIVENESS



POSITION PAPER  
INNOVATION POLICY





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## List of abbreviations

<b>ARP</b>	Industrial Development Agency	<b>MPiT</b>	Ministry of Entrepreneurship and Technology
<b>BERD</b>	Business Enterprise Sector Expenditure on Research and Development	<b>NCBR</b>	National Centre for Research and Development
<b>BGK</b>	National Economy Bank	<b>NCN</b>	National Science Centre
<b>BSI</b>	Business support institutions	<b>NMS</b>	New Member States
<b>CEAPP</b>	Center for Evaluation and Analysis of Public Policies of Jagiellonian University	<b>OPI</b>	National Information Processing Institute
<b>CEE</b>	Central and Eastern Europe	<b>OPIE</b>	Operational Program Innovative Economy 2007-2013
<b>ERDF</b>	European Regional Development Fund	<b>OPSG</b>	Operational Program Smart Growth 2014-2020
<b>ESIF</b>	European Structural and Investment Funds	<b>PAIH</b>	Polish Investment and Trade Agency
<b>EU</b>	European Union	<b>PARP</b>	Polish Agency for Enterprise Development
<b>GDP</b>	Gross Domestic Product	<b>PFR</b>	Polish Development Fund
<b>GERD</b>	Gross Expenditure on Research and Development	<b>R&amp;D</b>	Research and Development
<b>GvERD</b>	Government Expenditure on Research and Development	<b>R&amp;D&amp;I</b>	Research, Development and Innovation
<b>GUS</b>	Central Statistical Office	<b>RDI</b>	Research and Development Institute
<b>HERD</b>	higher education institutions expenditure on research and development	<b>SEZ</b>	Special Economic Zone
<b>IPR</b>	intellectual property rights	<b>SME</b>	Small and Medium Sized Enterprise
<b>KUKE</b>	Export Credit Insurance Agency	<b>SoE</b>	State Owned Enterprise
<b>MiE</b>	Ministry of Investment and Economic Development	<b>SPV</b>	Special Purpose Vehicle
<b>MoF</b>	Ministry of Finance	<b>SRD</b>	Strategy for Responsible Development
<b>MoSHE</b>	Ministry of Science and Higher Education	<b>TFI</b>	Investment Fund Company
		<b>TFP</b>	Total Factor Productivity
		<b>VC</b>	Venture capital

## EXECUTIVE SUMMARY

Since 1989, Poland's remarkable economic performance has led to an unprecedented improvement in living standards. The country has been the fastest growing economy in Europe and worldwide (among countries at a similar level of income) and has immensely benefitted from EU membership. Access to structural funds has helped enhance the country's human and physical capital and connect Polish citizens and firms with the rest of Europe.

The Strategy for Responsible Development (SRD), the government's main policy document, acknowledges Poland's achievements and identifies reindustrialization, innovation, and efficiency in the administration as key priorities for the country's future development.

One of the Strategy's specific objectives is to increase the innovativeness of Polish enterprises in domestic and foreign markets. The SRD recognizes that the large influx of EU funds dedicated to research and innovation has had a limited effect on the propensity to innovate of local companies, whereas innovation is crucial to boost productivity growth going forward. Important reasons are low levels of expenditure in R&D and higher education, weak capital markets and gaps in the protection of intellectual property rights (IPR).

This Position Paper takes stock of recent developments in innovation policy in Poland. It primarily focuses on the SRD's priorities and identifies topics of potential engagement between the World Bank and the Government. The proposed thematic areas have been identified based on discussions with government representatives, ongoing World Bank activities in Poland and desk research. The topics are grouped under four broad areas: A) public research & development institutes (RDIs); B) innovation policy coordination; C) fiscal incentives; D) monitoring and impact evaluation (Table A).

In the area of **public research & development** institutes the World Bank could help improve the institutional setup of RDIs. The objective would be to achieve research excellence and greater synergies between research and teaching activities. World Bank experience in Europe with the Croatia Science and Technology Projects and the Innovation Serbia Project could serve as valuable examples.

In order to help improve **coordination of innovation policy**, the World Bank could assist with the design and implementation of new coordination mechanisms, including through existing entities, such as the Innovation Council. The World Bank could leverage its global expertise in strengthening the capacity of institutions, including their functions, mandates, monitoring and evaluation frameworks, reporting practices, budgets, boards, etc.

Several tools have been introduced in Poland to stimulate innovation through **fiscal incentives**, including a generous tax relief for R&D. An in-depth analysis of fiscal incentives could be pursued to investigate the impact of already introduced reforms. Recently, the Bank has evaluated the effectiveness of the lump sum depreciation policy in Poland. In the future, the analysis could be expanded to other fiscal mechanisms, such as the R&D tax incentives introduced in 2018.

Comprehensive **monitoring and impact evaluation** is essential to successful innovation policy. The Bank is currently leading a technical assistance project in Poland assessing the impact of innovation interventions during the period 2007-2013. The results from this assignment present an opportunity to design a comprehensive evaluation methodology that could be applied across government programs.

Table A. Potential World Bank engagement

Reform Area	Activities	Indicative Deliverables	Possible Results
A. Reform of public research & development institutes (RDIs)	<ul style="list-style-type: none"> <li>In-depth assessment of ongoing reforms targeting RDIs and enhancement of commercialization activities</li> <li>Detailed proposal of a reform based on World Bank experience and global good practice</li> <li>Assistance in implementation of reforms targeting RDIs or the entire R&amp;D system (including scientific activities at RDIs and universities)</li> </ul>	<ul style="list-style-type: none"> <li>Fact finding report</li> <li>Set of policy recommendations</li> <li>Summary reform implementation roadmap</li> <li>Report capturing the critical risk factors associated with the planned reforms</li> <li>Framework for evaluation of reform results including proposal on key impact and performance indicators for project monitoring</li> </ul>	<ul style="list-style-type: none"> <li>New reform and regulations on R&amp;D system in Poland</li> </ul>
B. Coordination of innovation policy	<ul style="list-style-type: none"> <li>Overview of existing mechanisms and practice supporting coordination of innovation policy within and among ministries (e.g., Ministry of Entrepreneurship and Technology and Ministry of Science and Higher Education)</li> <li>Proposal of reforms that would facilitate innovation policy coordination (e.g., expanding responsibilities and capacities of existing institutions)</li> <li>Proposal of an action plan for implementation of reforms enhancing innovation policy coordination at national and regional level</li> <li>Capacity building for coordination and advisory bodies accountable for innovation policy</li> </ul>	<ul style="list-style-type: none"> <li>Fact finding report</li> <li>Proposal of reforms</li> <li>Roadmap for implementation of reforms</li> <li>Proposal for capacity building program for future coordination and advisory bodies</li> </ul>	<ul style="list-style-type: none"> <li>New regulations promoting innovation policy coordination</li> <li>Reinforcement of existing entities in charge of innovation policy coordination and strategic advisory</li> </ul>

Reform Area	Activities	Indicative Deliverables	Possible Results
C. Fiscal incentives for innovation	<ul style="list-style-type: none"> <li>• Analysis of the effectiveness of recently introduced R&amp;D tax incentives.</li> <li>• Preparation of policy recommendations based on the finding from the analysis</li> </ul>	<ul style="list-style-type: none"> <li>• Analytical report presenting results of the introduced R&amp;D incentives</li> <li>• Proposal of reforms</li> <li>• Roadmap for implementation of reforms</li> </ul>	<ul style="list-style-type: none"> <li>• Insights into the effectiveness of tax incentives across various groups of beneficiaries</li> <li>• Effective revisions of existing tax incentives</li> </ul>
D. Monitoring and impact evaluation	<ul style="list-style-type: none"> <li>• Implementation follow-up on World Bank's ongoing TA assessing the impact of innovation interventions</li> <li>• Design of a comprehensive evaluation methodology for overseeing the results and impact of government's innovation interventions</li> <li>• Setting up an action plan for implementation of new M&amp;E methodology and tools, with focus on comprehensive impact evaluation</li> <li>• Capacity building for entities responsible for new evaluation methodology and tools</li> </ul>	<ul style="list-style-type: none"> <li>• Proposal of evaluation methodology for overseeing the results and impact of government's innovation interventions</li> <li>• Proposal of an action plan for implementation of new methodologies and tools</li> <li>• Proposal of capacity building program for entities responsible for future evaluation methodology</li> </ul>	<ul style="list-style-type: none"> <li>• Detailed information on the effectiveness of government initiatives supporting innovation</li> <li>• Ability to redesign programs towards the most effective ones</li> </ul>

# INTRODUCTION

The purpose of this Position Paper is to (i) assess key interventions in innovation policy indicated in the Strategy for Responsible Development (SRD) endorsed in 2017, and (ii) identify and analyze areas that could result in the World Bank's engagement with Polish authorities.

To assess the rationale of actions defined in the SRD, the analysis starts with an overview of Poland's innovation system, including information on performance according to innovation-relevant indicators, existing programs financing innovation, the innovation governance system and the legal framework for innovation. The second section identifies areas in which the World Bank could provide technical assistance based on its global experience.

# 1. OVERVIEW OF THE POLISH INNOVATION SYSTEM

## Innovation and entrepreneurship in Poland

**Poland is a growth champion despite its low levels of innovation.** Since its transition to a market economy in 1989, purchasing-adjusted GDP per capita in Poland increased by over 250 percent, outperforming other Central and Eastern Europe (CEE) economies, as well as other countries worldwide at a similar level of income.<sup>1</sup> Economic growth was mainly driven by relatively low labor costs and advancing integration into global value chains. However, the degree of innovation of local companies remains limited. Poland is at the bottom of EU innovation rankings. Among regional peers, only Croatia, Bulgaria and Romania perform worse, while Poland's innovation performance compared to the EU-28 has not changed much since 2010. The majority of innovations introduced by Polish companies are related to product or process, while Poland has one of the lowest shares of marketing or organizational innovators in the EU (Eurostat, European Innovation Scoreboard 2018).<sup>2</sup>

**In 2010-2016 capital accumulation has been the main driver of growth.** The contributions of labor have been positive due to the cohort of baby boomers entering the market, decreasing unemployment and improvements in the workforce educational attainments. Total Factor Productivity (TFP) contributions were at a similar level as labor's (Figure 1). In order to sustain growth going forward, the role of productivity growth needs to become larger, and smart innovation policy will be crucial to boost TFP growth.

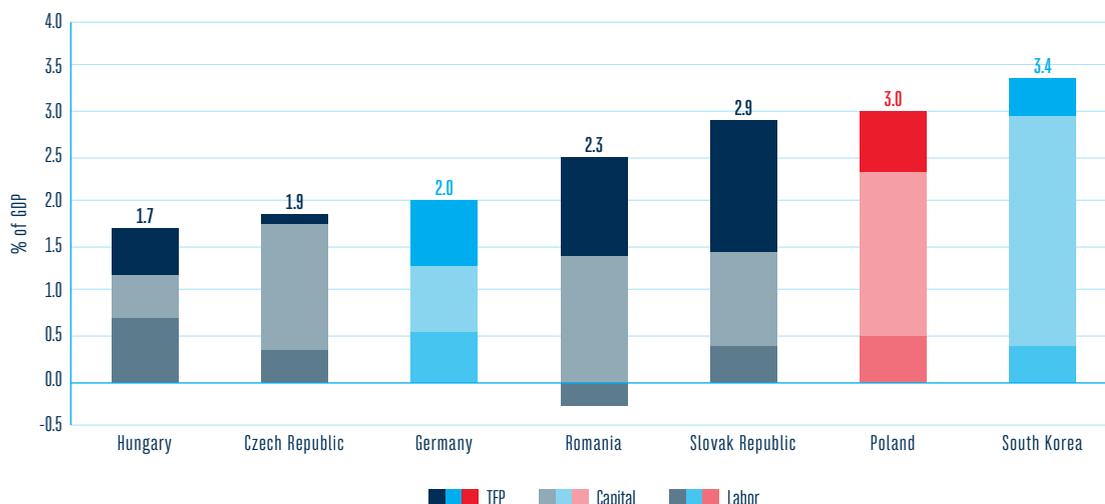
**Improvements among existing firms are leading increases in sectoral productivity.** TFP data for 2006-2014 demonstrate that, for most sectors, the main contributors to productivity growth are existing firms that increase their productivity (within), closely followed by productive firms gaining market share (between). Looking across sectors, for typically low-technology sectors (e.g. leather, textiles, wood, food) productivity grows more frequently through the between channel, whereas for high-tech (e.g. computers, el. equipment, machinery) the within channel is more important (Albinowski, Hagemeyer, Lovo, Varela, 2015).

---

1. Piatkowski (2018).

2. Deficiencies in the national quality infrastructure may be an additional drag on the innovativeness of Polish firms. The core of the challenges may be the lack of a proper quality policy. More than supporting a stronger quality management system (as defined by the Strategy for Responsible Development), Poland might need to reshuffle its National Quality Infrastructure (NQI). Such an approach would help address the shortcomings of the current system, including coordination issues. NQI is outside the scope of this paper.

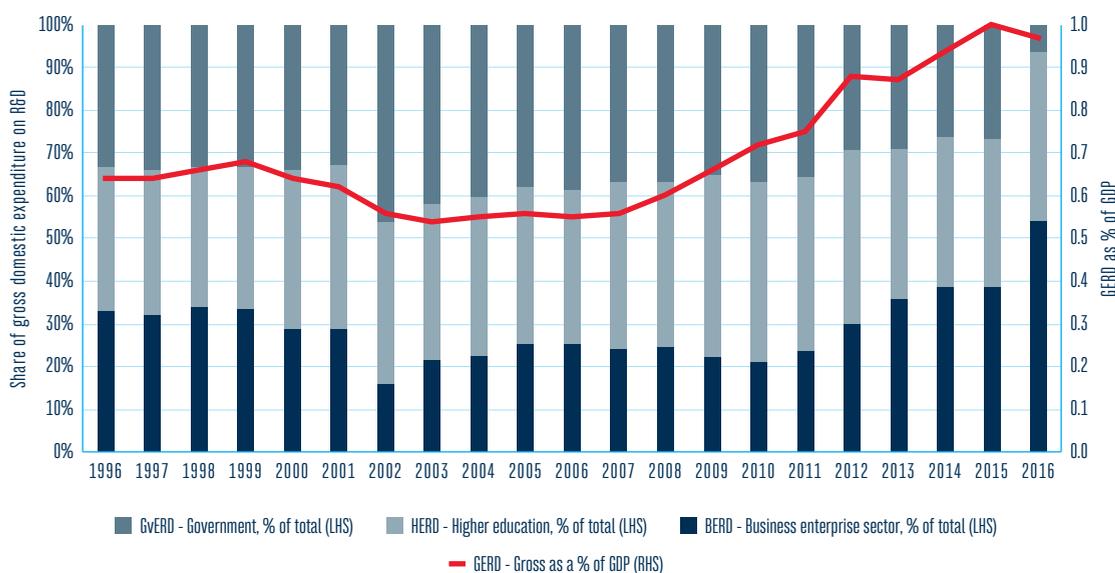
Figure 1. Contribution of TFP to GDP growth, percent, average 2010-2016



Source: The Conference Board

**Expenditure on R&D increased over the last few years, but it remains low even by the standards of the CEE region.** In 2016, Gross expenditures on R&D (GERD) were around one percent of GDP. Despite the rapid increase in the last decades, Poland in 2016 still spent less than half of the EU28 average on R&D (Figure 2). Yet, it is likely that private sector’s R&D spending before 2017 was underreported. This is because a number of enterprises, especially small ones, (i) find it difficult to properly classify R&D spending among other types of investment, (ii) are worried about tax inspection questioning their R&D accounting, and (iii) believe that accounting for R&D spending may be unprofitable from a tax point of view—R&D investment needs to be capitalized and then gradually amortized as opposed to classifying it as other operational costs that can be written off against the tax base right way (World Bank, 2015).

Figure 2. Structure of R&D expenditures by sector in Poland, 1996-2016

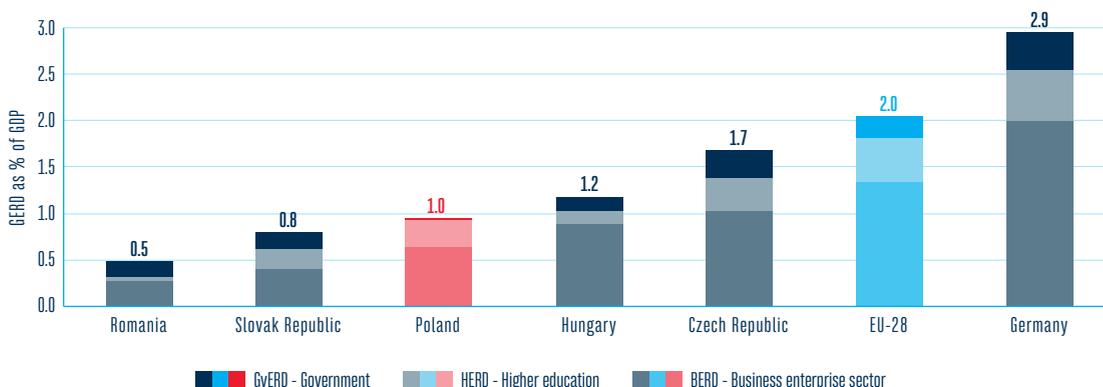


Source: Eurostat

**A low level of R&D is among the main barriers to innovation.** Important reasons behind the limited innovativeness of the Polish economy are low levels of expenditure in R&D and higher education,<sup>3</sup> weak capital markets<sup>4</sup> and gaps in the protection of intellectual property rights (IPR).<sup>5</sup> Meanwhile, entrepreneurs cite lack of financing, both from internal and external sources, as one of the most important barriers to innovation, despite the favorable financial conditions of Polish firms, whose savings reached a record value of over 20 percent GDP in 2016,<sup>6</sup> and the massive influx of EU funds focused on promoting innovation in enterprises over the last decade.<sup>7</sup>

**The increase in GERD has been supported by doubling of business expenditure on R&D over the last five years.** Currently, 66 percent of R&D investments are performed by enterprises (BERD)<sup>8</sup> – a level similar to the EU28 (Figure 3), while 32 percent is performed by universities and research institutions with limited participation of the government sector. This is a welcoming trend, given that between 2000 and 2011 BERD was accountable for less than 30 percent of all R&D expenditures.

Figure 3. R&D expenditures as a share of GDP by sector, 2016



Source: Eurostat

**Patent applications have increased but still lag behind more advanced EU countries.**<sup>9</sup> The number of patent applications per inhabitant submitted by Polish residents, to both national and foreign offices, has doubled since EU accession in 2004. This places Poland ahead of its CEE neighbors, but at a level which is still only half of the EU average and five times less than Germany (Figure 4).

3. Improving the quality of higher education and including more workers in a system of life-long learning will be essential, while boosting apprenticeships in partnership with the private sector (World Bank, 2017).

4. Poland's financial system relies heavily on banking and access to equity financing in Poland is limited compared to many High Income Countries (World Bank, 2017). Recently, development of venture capital market has been promoted by the Polish government via PFR Ventures, the VC arm of the Polish Development Fund.

5. In 2017 Poland ranked in 11th position in the protection of IPR in the Eastern Europe and Central Asia Region (Source: International Intellectual Property Index).

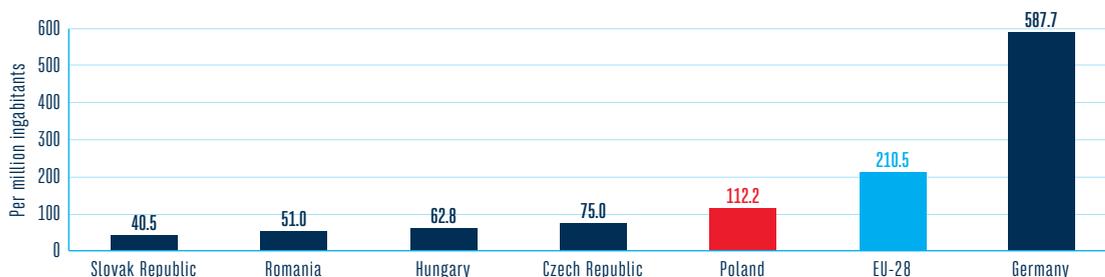
6. Narodowy Bank Polski, Raport o stanie równowagi polskiej gospodarki, April 2016, page 29.

7. With more than EUR 20 billion in total value of EU co-financed STI support programs in 2014-2020 (Source: Documentation of the Smart Growth Operational Program and Regional Operational Program).

8. In Poland, large companies account for over 60 percent of R&D expenditures and investment. They invest disproportionately more per employee: 5 times more than micro enterprise, 3 times more than small enterprises and 70 percent more than medium enterprises. The same pattern can be observed for R&D expenditures (Source: The World Bank (forthcoming). Country Needs Assessment. Poland).

9. Increase in patent applications may be partly a result of underreported R&D activities by the enterprise sector.

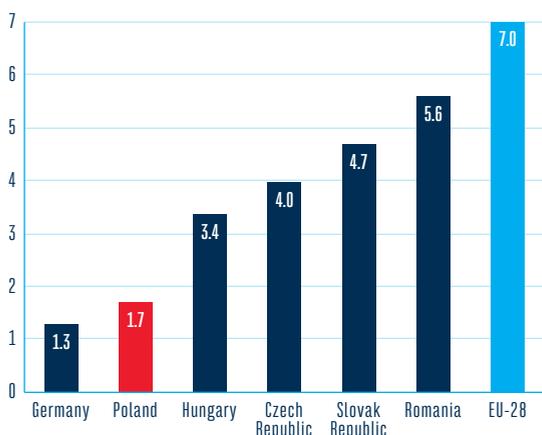
Figure 4. Patent applications submitted by residents per million inhabitants, 2016



Source: Author's calculation based on data from World Development Indicators

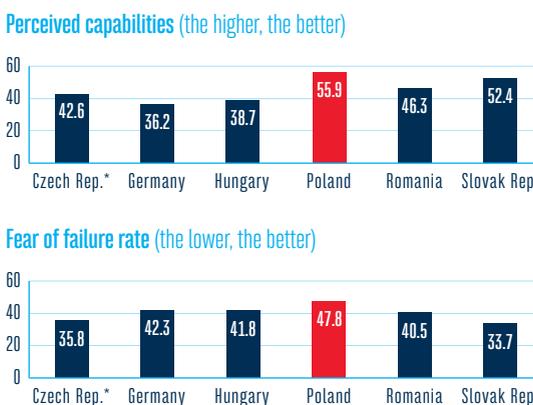
**New business formation in Poland is the lowest in the region.** Despite tripling of the number of registrations of new companies over the past decade, the ratio of new establishments to working-age population is a quarter of the EU28 average (Figure 5). Polish entrepreneurs are characterized by one of the highest fear of failure rate globally, which seems to prevail over positive perception of opportunities and capabilities (Figure 6). In terms of education level and start-up skills, Poland notes the highest results among new member states (NMS), which could serve as a basis for growth of new business formation (Eurostat, 2015).

Figure 5. New business registrations per 1,000 people aged 15-64, 2016



Source: World Development Indicators

Figure 6. Selected metrics of entrepreneurship, share of respondents, 2015



Source: Global Entrepreneurship Monitor  
Note: Data for Czech Rep. is from 2013

**The structure of enterprises in Poland is highly fragmented with SMEs representing more than 99 percent of all entities.** While the share of large companies is only 0.2 percent, they generate almost half of the revenue and employ one third of the workforce.<sup>10</sup> Typically for post-communist countries, many large enterprises are under state ownership, a tendency which has deepened with the new government. In 2017, the share of SOEs in the main stock market index exceeded 70 percent.<sup>11</sup> Polish firms coexist with more consolidated and profitable foreign companies, with many of most innovative segments of the economy, such as automotive or electronics, are dominated by foreign multinationals.<sup>12</sup>

10. Polish Agency for Enterprise Development (2018).

11. European Commission (2017), page 10.

12. Central Statistical Office of Poland (2018).

## Programs financing innovation

**Poland experienced a massive injection of EU funds for innovation since accession to the European Union in 2004.** The European Structural and Investment Funds (ESIF) have been an important source of R&D investment in both EU financial programming perspectives, i.e. 2007-2013 and 2014-2020. Solely under Operational Programs Innovative Economy (OPIE, 2007-2013) and Smart Growth (OPSG, 2014-2020), EUR 8.6 billion<sup>13</sup> per program was spent on measures targeting innovation.<sup>14</sup>

**A shift in financing of innovation took place between OPIE 2007-2013 and OPSG 2014-2020 from capital investment (technology adoption) towards business R&D.** Table 1 presents an overview of both programs. A large portion of OPSG financing was directed towards business R&D and innovative enterprises (Figure 7). The support under OPSG has been linked to smart specializations and increased access to financial instruments, including risk capital.<sup>15</sup>

**Table 1. Overview and comparison of Operational Programs Innovative Economy and Smart Growth as main programs supporting innovation in years 2007-2013 and 2014-2020<sup>16</sup>**

OP INNOVATIVE ECONOMY 2007–2013, EUR 8.6 billion from EU Structural Funds <sup>17</sup>	OP SMART GROWTH 2014–2020, EUR 8.6 billion from EU Structural Funds
Supporting the innovativeness of enterprises to a large extent in the form of purchase of ready technologies	Investments of companies in R&D and creation of innovations
Numerous support instruments for infrastructure investments in research	New infrastructure is financed to a lesser extent
Low share of instruments directly supporting the cooperation between science and business	Priority of cooperation between science and business – significantly greater focus of research projects on the needs of the economy
Limited use of financial instruments	Wider use of financial instruments (capital entries, loans, guarantees)
Support for development of BEI* potential (infrastructure, services, networking, cluster development)	Concentration of support on professionalization of innovation-oriented services provided by Business Environment Institutions
Low level of concentration of support on priority area	Focus on smart specializations
Instruments for digitization of administration, society and economy	Support for digitization under a separate program (Digital Poland OP)
Support for tourist projects	Lack of support dedicated to tourist industry

Source: OPSG

13. This amount excludes national co-financing.

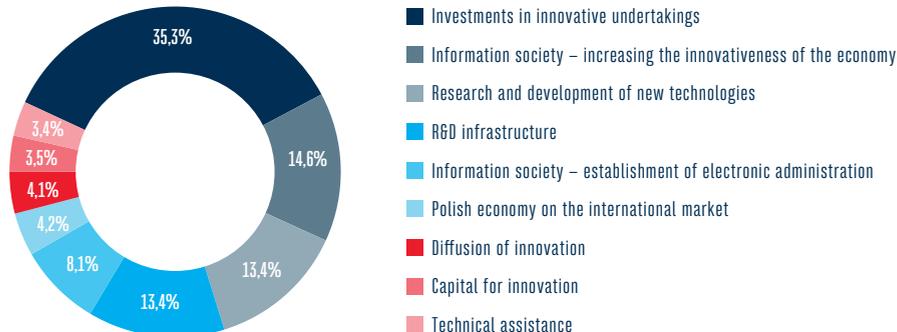
14. Given the vast amount of resources to be deployed into the economy in a timely manner, attention shall be given to the impact of the 'EU funding logic' in the design and implementation of Poland's innovation policies and institutions.

15. Ministry of Investment and Economic Development (2015). Smart Growth Operational Program 2014-2020.

16. *Ibidem*

17. In the 2007-2013 period, more than 16,000 companies and over 12,000 researchers participated in the projects supported by OPIE.

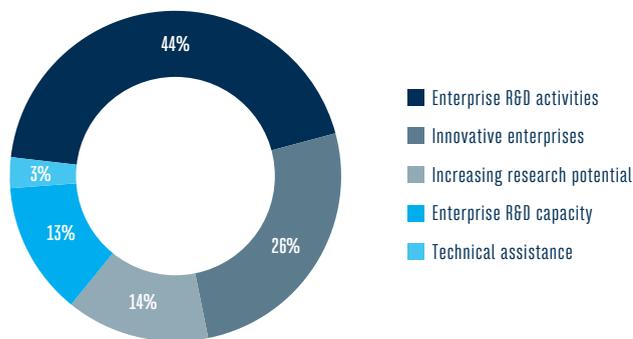
Figure 7. Distribution of the European funds in the Operational Program Innovative Economy (OPIE), 2007-2013



Source: OP IE program documents

**In OPSG, new instruments have been incorporated involving risk capital for support of new enterprises.** Measures such as seed capital, venture capital and loans were promoted to obtain funds from private investors and to address the gap in financing high-risk undertakings. Overall, out of EUR 8.6 billion for OPSG, about EUR900 million has been allocated to financial instruments (Figure 8).<sup>18</sup>

Figure 8. Distribution of the European funds in the Operational Program Smart Growth (OPSG), 2014-2020



Source: OP SG program documents

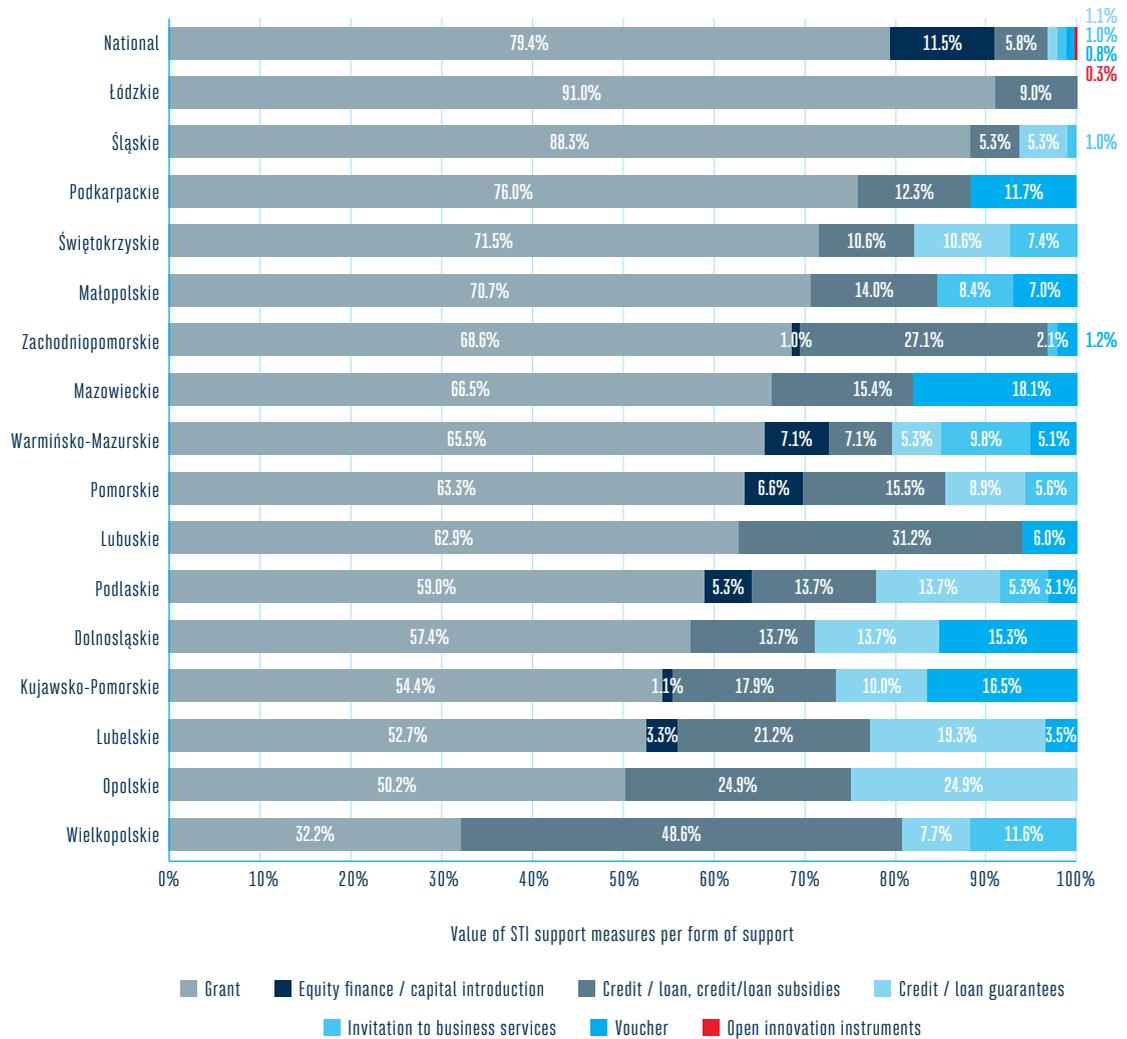
**Grants are the main instrument in the innovation policy mix.** At the national level, grants constitute approximately 80 percent of Science, Technology and Innovation (STI) support measures (Figure 9), followed by equity finance (11 percent), and credit and loans (about 6 percent).<sup>19</sup> A large variety of STI measures is observed among regions. The highest share of grants in STI support is in Lodzkie region (91 percent) while the lowest is in Wielkopolskie region (32 percent). The vast majority of support programs target SMEs rather than large enterprises (85 percent versus 15 percent at national level). Meanwhile, in terms of the objectives, STI support measures at national level are directed towards business R&D (63 percent) followed by non-R&D innovation (18 percent), R&D infrastructure (8 percent), and export promotion (8 percent).<sup>20</sup>

18. Ministry of Investment and Economic Development (2015). Smart Growth Operational Program 2014-2020.

19. R&D tax credits are not taken into consideration since the STI measures are based on Operational Programs.

20. The remaining fraction of STI measures target technology transfer.

Figure 9. Forms of STI support co-financed from the European funds, 2014-2020

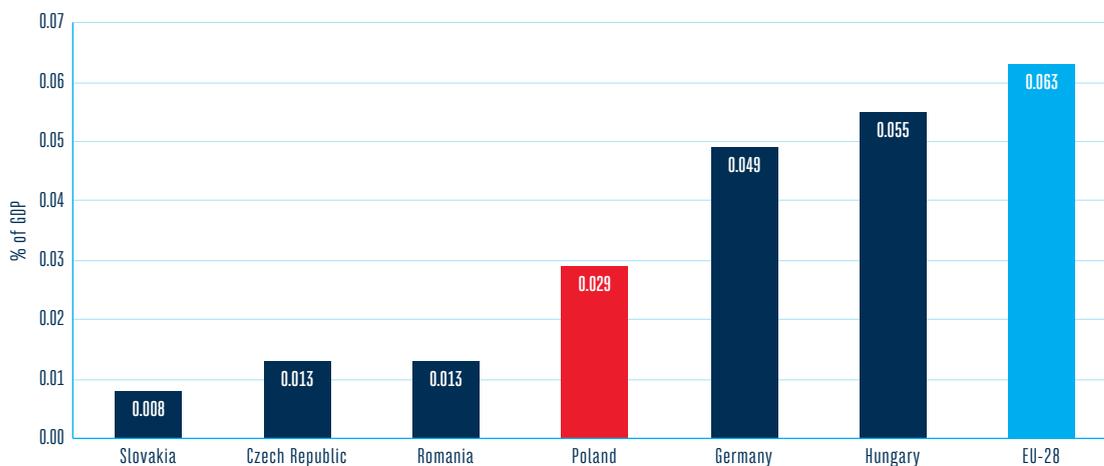


Source: World Bank based on documentation of Operational Programs

**Poland attracts the most venture capital investments in the region, whose value is expected to increase as a result of injection of public funds managed by PFR Ventures, the VC arm of the Polish Development Fund.**<sup>21</sup> In relative terms, Poland has achieved a stable share of VC investments at the level of 0.03-0.05 percent of GDP over the past few years. This result, equal to approximately 50 percent of EU average, places Poland in the middle of the pack of CEE countries (Figure 10).

21. <http://biznes.gazetaprawna.pl/artykuly/1117331,rynek-venture-capital-w-polsce-nie-jest-dobrze-rozwiniety.html>  
<https://www.parp.gov.pl/polski-fundusz-rozwoju-tworzy-najwieksza-w-europie-srodkowo-wschodniej-platforme-do-inwestowania-w-innowacje-2>

Figure 10. Venture capital investments as a percent of GDP, 2016



Source: Eurostat

## Legal framework for innovation

**Several strategic documents aim to boost innovation in the Polish economy.** Among them is the Strategy for Responsible Development (SRD) - the main national development document, which sets out basic conditions, objectives and directions of the country's development in social, economic, regional and spatial terms. One of the Strategy's specific objectives is to increase the "innovativeness of Polish enterprises in domestic and foreign markets". This is reflected, among others, in the aim of increasing R&D expenditure to 1.7 percent of GDP in 2020.

**The SRD replaced the National Development Strategy 2020 adopted in 2012.** As such, the SRD provided the framework for nine specific strategies in different thematic areas to be completed by the end of 2018. In the area of business innovation, a specific "Productivity Strategy" is under preparation by the Ministry of Entrepreneurship and Technology (MPiT).

**An important document on innovation promotion is the Innovation White Paper adopted in 2016.** The document is consistent with the SRD and has been the starting point for a package of laws on innovation. As a result, in 2016 the first law on innovation i.e., the Small Innovation Act, and in 2017 the second law on innovation were enacted. Since January 2017, the Small Innovation Act abolished income tax on intellectual property (IP) contributed to the company; provided tax deduction of the cost of obtaining a patent by SMEs; increased the amount of tax-deductible eligible costs of expenditure on R&D; extended the period in which companies may deduct costs incurred for R&D from three to six years. The second law on innovation increased the amount of tax credit for R&D to 100 percent (and 150 percent for R&D Centers), facilitated financing of start-ups, enabled creation of companies by universities and scientific institutes of the Polish Academy of Sciences to manage the research infrastructure.<sup>22</sup>

22. <http://www.nauka.gov.pl/aktualnosci-ministerstwo/druga-ustawa-o-innowacyjnosci-przyjeta-przez-sejm.html>

## Intellectual property rights

### **Polish law provides a general framework for IPR for inventions originating at universities.**

The law (the Act on Higher Education from July 27<sup>th</sup>, 2005) regulates the principles of commercializing IP originating at universities, imposes an obligation on the universities to enact detailed regulations on IP management, and sets the guidelines on division of profits. Article 86f of the Act on Higher Education specifies certain thresholds for the division of proceeds from commercialization (these limits cannot be modified by individual university regulations): (i) minimum participation of the researcher (or a research team) in profits from commercialization done by their university (or its SPV) is to be at least 50 percent of the proceeds, reduced by no more than 25 percent of the costs directly to such commercialization; (ii) university participation in the profits from commercialization received by the researcher is set at 25 percent of the proceeds received by the researcher (or research team), reduced by no more than 25 percent of the directly attributable costs incurred by the employee. Individual universities may devise specific regulations within the broad framework of national legislation.

### **Changes have been introduced to commercialization of research conducted by research organizations (process of acquisition of ownership to R&D results by researchers).<sup>23</sup>**

The Small Innovation Act (2016) addresses the facilitation of commercialization of research results. For instance, research units are required to allocate not less than 2 percent of the financial resources allocated to maintaining research potential for activities related to the commercialization of R&D. This implies that technology transfer centers should finance commercialization activities.

## Fiscal incentives for science, technology and innovation

**Numerous changes in public fiscal support for innovation were introduced in Poland over the last two years.** A joint effort of the Ministry of Finance, Ministry of Science and Higher Education and Ministry of Economic Development resulted in creation of new horizontal regulations to stimulate R&D activities by private firms. Reforms concerned tax incentives and organization of special economic zones (SEZ). The effectiveness of recent tax reforms in the area of R&D support is still to be seen. However, empirical evidence from international experience suggests a positive and statistically significant impact of tax instruments on innovation input (R&D expenditure). Box 1 presents results of tax incentives in the UK. In addition, international studies suggest the effect is more pronounced for SMEs, whereas R&D expenditures of large companies remain largely unchanged.<sup>24</sup> Figure 11 illustrates the evolution of tax incentives for R&D in Poland.

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23. Polish Patent Office (2015). Regulaminy zarządzania własnością intelektualną w szkołach wyższych w świetle znowelizowanej ustawy Prawo o szkolnictwie wyższym.

24. Bronzini and Iachini (2011).

## Box 1. Impact of R&D tax incentives in the UK

Research has been performed on UK data for the period 2002-2011 on all corporate R&D investors in the United Kingdom. The research exploited two exogenous policy reforms that took place in 2008 to quantify the impact of R&D tax incentives. By increasing the generosity of the R&D tax deduction, the reforms lowered the user cost of R&D capital for medium-sized companies, while keeping the user cost stable for larger firms that remain above the eligibility threshold to be qualified as SME for R&D purposes.

The study found that:

- R&D tax incentives have a strong positive effect on average qualifying R&D spending.
- 21 percent reduction in the R&D user cost increased qualifying R&D spending by 33 percent, suggesting about £1 of additional R&D generated per pound foregone in corporation tax revenue.
- Strong increase in R&D spending was observed in both consistent and intermittent spenders, but more strongly in consistent R&D spenders.

Young firms responded strongly by increasing their R&D spending after the reform.

Source: Guerci and Liu (2017).

Figure 11. Evolution of tax incentives for R&D in Poland

		Other costs	Salaries	Eligible costs
2006/2015	SMEs	50%	0%	<ul style="list-style-type: none"> <li>• Expenses for technology acquisition in the form of intangible assets (which may not be used worldwide for over 5 years – confirmed by an opinion issued by independent research unit)</li> </ul>
	Large firms	30-50%		
	R&D centers	30-50%		
2016 1 <sup>st</sup> Act on Innovation	SMEs	20%	30%	<ul style="list-style-type: none"> <li>• Employees' wages and social contributions</li> <li>• Purchase of commodities and raw materials for R&amp;D</li> <li>• Expertise, research and opinions bought from scientific units</li> <li>• Payments for use of research equipment</li> <li>• Amortization of intangible assets and fixed assets, excluding passenger cars, buildings and constructions</li> <li>• Costs of obtaining intellectual property (IP) protection</li> </ul>
	Large firms	10%		
	R&D centers	10%		
2017	SMEs	50%	50%	<ul style="list-style-type: none"> <li>• Purchase of specialized R&amp;D equipment which is not a fixed asset</li> <li>• Purchase of services enabling the use of research equipment for R&amp;D</li> <li>• Costs of R&amp;D carried forward as an intangible asset</li> <li>• For R&amp;D centers: Depreciation of structures, buildings and premises constituting a separate property, used in R&amp;D activities, external knowledge not from scientific units</li> </ul>
	Large firms	30%		
	R&D centers	30%		
2018 2 <sup>nd</sup> Act on Innovation	SMEs	100%	100%	<ul style="list-style-type: none"> <li>• Purchase of specialized R&amp;D equipment which is not a fixed asset</li> <li>• Purchase of services enabling the use of research equipment for R&amp;D</li> <li>• Costs of R&amp;D carried forward as an intangible asset</li> <li>• For R&amp;D centers: Depreciation of structures, buildings and premises constituting a separate property, used in R&amp;D activities, external knowledge not from scientific units</li> </ul>
	Large firms	100%		
	R&D centers	150%		

Source: World Bank Group

## Governance of the innovation system

**Innovation policymaking in Poland is performed at national and regional level.** 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 13.1bn of funds devoted to innovation are governed on the central level and EUR 9.0bn 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*.

**The management of innovation programs is fragmented across many institutions, which may result in overlaps of responsibilities and limited effectiveness.** At the national level, there are 6 main agencies responsible for implementation of programs for private sector innovation, supervised by 4 ministries (Figure 12). The Polish Agency for Enterprise Development (PARP) is responsible for managing initiatives for entrepreneurship, innovation and technology adaptation with a main focus on SME. The National Economy Bank (BGK)<sup>25</sup> acts as an intermediate body for implementation of loans for technological innovations under the OPSG.<sup>26</sup> PFR Ventures oversees public support of risk capital funding for Polish firms. Programs managed by regional Marshall Offices specified in the regional operational programs cover an entire range of objectives related to innovation support, sometimes covering similar activities as in national programs, yet with smaller eligible amount of support per project. Two additional programs are directly implemented by MPiT. POIR 2.1 is focused on the establishment or enlargement of existing R&D centers, many of which are owned by multinational companies, thus management of the program is performed by the ministerial department responsible for catering to foreign investors. POIR 3.3.2 aims to promote Polish brands on international markets and is governed by a team which is also responsible for building the image of the Polish economy abroad. The main institution for public research commercialization and technology transfer is the National Centre for Research and Development (NCBR) – an executive agency of the Ministry of Science and Higher Education. NCBR supervises and manages execution of key R&D programs that translate into innovation. In the area of financing strategic R&D infrastructure under OPSG, the NCBR acts as an intermediate body, while the National Information Processing Institute (OPI) is an implementation body.<sup>27</sup>

**The Polish Development Fund (PFR) has been created to coordinate actions of entities engaged in implementation of economic policy and includes three managing agencies of the public support system for innovation, these are PARP, BGK and PFR Ventures.** Improvements were registered in aligning policies in support of international trade, whereas the activity of PARP, BGK and PFR Ventures remained unchanged in the new setup.<sup>28</sup> Moreover, the role of the PFR in coordination of innovation policy is limited since it includes institutions responsible for managing only 22 percent of all funds for innovation up to 2020. Two years since establishment of the PFR, a strategy for this institution is still in preparation and specifics of integration of innovation policy governance remain unclear.

25. In Polish Bank Gospodarstwa Krajowego, BGK.

26. <https://www.en.bgk.pl/activities/government-target-funds/technology-credit-fund/>.

27. <http://naukawpolsce.pap.pl/aktualnosci/news%2C405177%2Cporozumienie-ncbr-i-opi-ws-finansowania-infrastruktury-badawczej.html>

28. <https://www.pb.pl/polski-fundusz-rozwoju-daje-rade-861303>, access: 23 April 2018

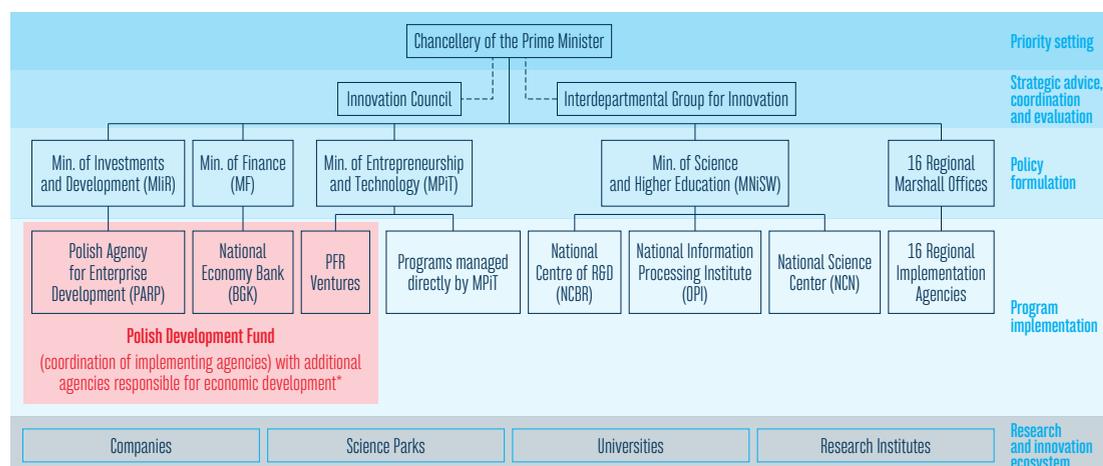
**There is uneven division of responsibilities and tasks among the innovation policy implementation institutions.** For instance, NCBR oversees 9 innovation programs worth approximately PLN 28bn, representing 30.2 percent of EU funds devoted to innovation in the 2014-2020 budgetary cycle. Alongside large institutions, there are several significantly smaller ones such as the National Information Processing Institute (OPI) running 1 program of PLN 2.5bn and 16 regional Marshal Offices, each managing initiatives worth on average PLN 2bn. Such institutional structure translates into higher administrative costs and diminished transparency of the system (Table 2).<sup>29</sup>

**Table 2. Managing agencies in the Public Support System for Innovation**

	Innovation programs managed (number)	Budget 2014-2020 (in EUR million)
16 Regional Marshall Offices	138	7,542.2
Polish Agency for Enterprise Development (PARP)	15	3,799.5
National Centre for Research and Development (NCBR)	9	6,673.5
PFR Ventures	6	1,034.1
National Economy Bank (BGK)	2	753.7
Ministry of Entrepreneurship and Technology (MPiT)	2	869.6
National Information Processing Institute (OPI)	1	562.1
<b>Total</b>	<b>173</b>	<b>21,234.7</b>

Source: Documentation of the Smart Growth Operational Program and Regional Operational Programs

**Figure 12. National Polish innovation policy framework in 2018**



Note:

PFR TFI – Investment arm of PDF specialized in creation and management of closed-end funds (including management of public retirement savings); KUKE – Export Credit Insurance Agency facilitating international transactions performed by Polish enterprises; PAIH – Polish Investment and Trade Agency supporting foreign investors in entering Polish market and creating positive image of Poland abroad; ARP – Industrial Development Agency engaged in management Special Economic Zones and provision of financial services for business development

29. World Bank (2012), page 55.

## The Strategy for Responsible Development

**The Strategy for Responsible Development, adopted by the Council of Ministers on 14 February 2017, is a key document of the Polish State for medium- and long-term economic policy.** It presents a new approach and key initiatives for implementation. The SRD's objective in innovation is to increase the "innovativeness of Polish enterprises in domestic and foreign markets". To achieve this objective, the strategy proposes interventions in national smart specializations, human and social capital, legal and institutional environment of innovative enterprises, mobilization of private R&D and commercialization, public innovative procurement and stimulating the external demand for innovations.

**The stated objective of the SRD is to "maintain a steady productivity growth through the establishment of framework conditions for a better self-organization of technological and industrial ecosystems".** This encompasses addressing market failures, reducing the gap between research results produced at scientific centers and enterprises, and building potential to absorb knowledge in companies. Specific objectives include (i) increasing public R&D expenditures and tax incentives for the business sector; (ii) organizational reforms of the scientific sector to strengthen the technological potential of the economy; (iii) support for enterprises in creation of innovative competences to improve knowledge absorption capacities. Table 3 presents the SRD's objectives and interventions, in which innovation is targeted specifically under Specific Objective 1, Area "Innovative business development".

**Table 3. Objectives and areas of intervention of the Strategy for Responsible Development**

Specific Objective 1. Sustainable economic growth based on existing and new advantages	
Areas	Objectives
Reindustrialization	Increase global competitiveness of Polish industry
<b>Innovative business development*</b>	<b>Increased innovativeness of Polish enterprises in domestic and foreign markets</b>
Small and medium-sized enterprises	Modern instruments for the development of companies; reduced development barriers to enterprise; competitive farms and producers
Capital for growth	Permanent increase in the rate of investment and its quality in the long term, with greater use of national resources
Specific Objective 2. Socially and territorially sustainable development	
Areas	Objectives
Social cohesion	Improved availability of services provided in response to demographic challenges; increased and improved use of the human capital potential in the labor market
Territorially sustainable development	Sustainable development in the country using the endogenous potentials of individual territories; strengthened regional competitive advantages based on economic specialization and new market niches; improved efficiency and quality of implementation of geographically targeted policies

### Specific Objective 3. Efficient State and economic institutions to support the growth and social and economic exclusion

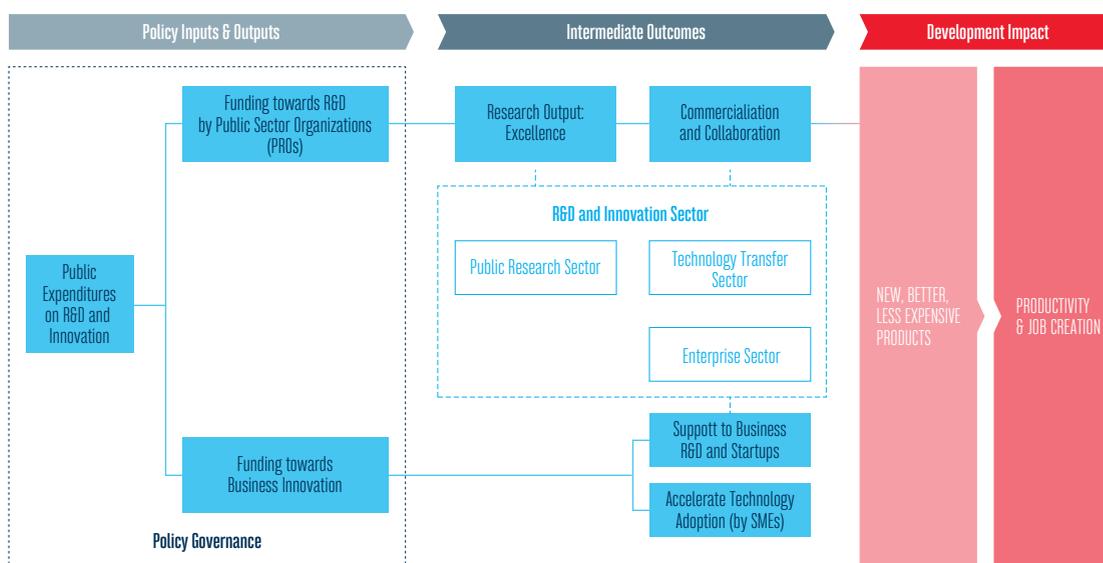
Areas	Objectives
Law in the service of citizens and the economy	Simplification of law guaranteeing better conditions for economic activities in the implementation of citizens' needs
Pro-development institutions and strategic development management	Inclusive and effective public institutions: available and open for citizens and entrepreneurs, development of an integrated development planning system
E-State	Digital service State
Public finance	Stable, efficient and sustainable public finances
Efficiency of use the EU funds	Using EU funds in a manner reflected in permanent developmental results

\*Area with a strong innovation policy component to be explored in the next chapter.

## 2. POTENTIAL WORLD BANK ENGAGEMENT

**This position paper takes stock of the current status of innovation policy in Poland.** The logical framework underlying the paper’s approach to innovation policy is illustrated in Figure 13 and highlights the link between policy, intermediate outcomes and development impact.

Figure 13. From Public expenditure and innovation to productivity growth and job creation



Source: Paulo Correa, 2014

### Priorities in SRD related to innovation

**Within the SRD Area “Innovative business development”, Specific Objective 1 “Sustainable economic growth based on existing and new advantages” five directions of intervention are listed:**

- Strengthening human and social capital in the national system of innovativeness
- Strengthening the legal and institutional environment of innovative enterprises
- Mobilizing private capital for carrying out R&D&I activity, increasing the market potential of the research carried out and the rate of commercialization of R&D results
- Stimulating the demand for innovations on behalf of the public sector
- Stimulating the external demand for innovations by increasing the capacities and tendency of companies to export and locate direct investments in foreign countries

Based on the World Bank’s experience an area of interest is the intervention b. “Strengthening the legal and institutional environment of innovative enterprises”. The remainder of this section describes the strategic projects and activities listed by the SRD under this intervention and presents the status of each of them.

**Through strategic projects the government aims to strengthen a project-based approach to policymaking.** To monitor progress, a Project Management Department was established in the Chancellery of the Prime Minister. Its role is to provide information for decisionmakers on the status of implementation of each strategic project, as well as related risks and challenges. Data about initiatives are updated monthly and evaluated for compliance with the schedule. The SRD serves as a pilot of such an approach. The Department was established in the first quarter of 2018 and at the time of writing its coverage includes all strategic projects implemented by the Ministry of Entrepreneurship and Technology (MPiT) as well as the Ministry of Investment and Economic Development (MIiR). Based on conversations with policymakers, the approach will most likely be continued. Information on the status of strategic projects listed below combines results of the desktop research and data provided by the Project Management Department, following a meeting conducted as a part of a fact-finding mission in May 2018.

**Table 4. List of Strategic Projects and Actions under intervention strengthening the legal and institutional environment of innovative enterprises**

Project	Current status	Potential for World Bank support
<b>Strategic projects outlined in SRD that can be supported</b>		
National Technological Institute (presently the Research Network: Łukasiewicz).	Advanced implementation – Draft of the Act on Research Network: Łukasiewicz (formerly National Technological Institute) was submitted to the Parliament in January 2018.	This area could be supported by the World Bank. The World Bank has vast global experience in setting up transparent and efficient governance models at national, agency and program level, and could advise the Polish government on R&D system reforms.
Amendment to the Act on promoting innovation to create a legal and institutional environment, which will further promote innovation activity, in particular, through the removal of barriers to innovation activity, as identified in the so called White Paper.	Advanced implementation – So-called two Acts on Innovation (specifically “Act on amending certain acts to improve the legal environment of innovative activity”) were signed by the President respectively in 2016 and 2017. The second Act expanded provisions of the first Act. Detailed changes in tax incentives for R&D are described in this Position Paper.	Limited scope for World Bank support. Legislation targeting innovation has been already enacted.
Intellectual property for the inventor - a project oriented towards increasing the tendency and capacity of creators and owners of inventions to protect their intellectual property (creating framework conditions, including the advisory and financial instruments) and its use in the economic activity, as well as at	Early implementation – Works on several initiatives aimed at increasing protection of the inventors’ property rights are in progress. The project of specialized IPR courts is currently in initial stage of preparation, whereas new regulations on industrial property are relatively advanced (a draft of the Act was	Limited scope for World Bank support. Government activities in the area of IPR framework are already in implementation stage.

Project	Current status	Potential for World Bank support
increasing the efficiency of the judiciary in the matters related to the intellectual property (creating specialist departments for intellectual property matters in selected district courts).	submitted to the Parliament). The first Act on Innovation (specifically “Act on amending certain acts to improve legal environment of innovative activity”) signed by the President in 2016, includes some provisions which strengthened and simplified IPR framework for inventors.	

#### Actions listed in the SRD that could be supported

Improving the coordination of innovation policy - interdepartmental, inter-institutional, and between the central and regional level.	Advanced implementation – the Interdepartmental Group for Innovation and the Innovation Council are key bodies in charge of coordination of innovation policy. The Interdepartmental Group for Innovation is operating and actively supports coordination at “working level” between institutions. However, operation of the Innovation Council in charge of innovation policy coordination at the ministerial level has been limited. Thus, it might be a favorable moment to work with the Government on the new coordination mechanisms of innovation policy (e.g. introduction of private sector stakeholders, provision of independence from the government, broadening evaluation and analytical capabilities).	This area could be supported by the World Bank. Coordination challenges have been highlighted during the World’s Bank meetings with the Government’s representatives. The World Bank has vast global experience in setting up transparent and efficient governance models at national, institutional and program level, and could advice the Polish Government on R&D system reforms.
Ensuring synergies in the operation of institutions responsible for innovation, synergies in implementation of support instruments, ensuring coherence of actions financed from domestic and structural funds, coordinating the evaluations in the area of innovativeness.	Early implementation – Integration and search of synergies in the innovation system is one of the main objectives of the Polish Development Fund (PFR). The Fund was established in 2016 and carried out numerous investments over the last two years. The actions of institutions composing the Fund did not change significantly during this period, while coordination was one of the main objectives standing behind creation of the PFR. The Fund’s strategy in the area of integration of innovation policy had not yet been published.	This area could be supported by the World Bank. The World Bank is currently assessing the impact of innovation interventions in Poland. Results from that work present an opportunity for the Polish Government to design a comprehensive evaluation methodology for overseeing the results and impact of government programs.
Legislative changes aimed at removing or modifying/simplifying the provisions restricting innovation activity and at stimulating innovation with adequate fiscal incentives and changes to the commercialization of research results.	Advanced implementation – A few new acts modifying the innovation ecosystem were signed by the President in 2016-2018. The two most important are the first and second “Act on Innovation”. Despite numerous actions that are already implemented, there is scope for further improvement. Some initiatives listed in the White Book on Innovativeness (e.g. “Innovation Box”) are still to be put into force.	This area could be supported by the World Bank. The Bank could provide analysis and advice of the results of tax incentives based on its broad expertise in that area as well as ongoing project in Poland on fiscal incentives.

Project	Current status	Potential for World Bank support
Introducing an obligation to evaluate the impact of proposed regulations on business innovativeness.	Project abandoned – Modification of legislative procedure was planned as part of the Business Constitution, but provisions regarding this area have been excluded from the final version of the document.	Limited scope for World Bank support. The government has suspended reforms in this area.
Increasing the accessibility, cost-efficiency and effectiveness of the system for protecting intellectual property rights through educational programs for schools, universities, individual innovators and companies, as well as legal and institutional changes (including the improved functioning of bodies of the public administration and of the judiciary in organizational terms), and instruments of support to facilitate the process of gaining protection for innovation projects and the enforcement of the possessed rights.	Early implementation – This action is progressing hand in hand with “Intellectual property for investor” initiative. Some solutions increasing effectiveness of the IPR framework were introduced through the Acts on Innovation, whereas others are in preparation – Draft of the Act on Industrial Property, conception of the Intellectual Property Court.	Limited scope for World Bank support. Specific technical reforms have been already initiated.

## AREA A. Public research and development institutes (RDIs)

### a. Overview of Polish research and development institutes

**The landscape of Polish RDIs is characterized by a high level of fragmentation and limited efficiency, internationalization, knowledge flows and contribution to the economy through commercialization.** 114 RDIs operate in Poland administered by 16 ministries and employing over 12,000 researchers. In addition, there are 70 research institutes of the Polish Academy of Science hiring about 8,000 researchers. Research is also performed by Higher Education Institutions (HEIs), which in general do not tend to coordinate or cooperate on research activities with the RDIs. Box 2 presents an overview of challenges for RDIs and Table 5 classifies RDIs based on quality of results. Furthermore, the existing system of quality assurance (QA) and evaluation in HEIs and research is domestically focused with limited links and alignment with international standards (European Commission, 2017).

Table 5. Classification of all Polish RDIs based on a national evaluation results<sup>30</sup>, 2013

Evaluation score	A+	A	B	C	Total
University units	23	225	451	57	756
Institutes of the Polish Academy of Science	12	42	15	1	70
Public Research Institutes	2	35	70	8	115 <sup>31</sup>
Other	0	6	5	11	22
<b>Total</b>	<b>37</b>	<b>308</b>	<b>541</b>	<b>77</b>	<b>963</b>

Source: European Commission (2017) Peer Review of Poland's Higher Education and Science System, Horizon2020 Policy Support Facility based on information submitted by Research Unit Evaluation Committee in 2017.

## Box 2. Overview of RDIs System and Challenges

- **Research system is highly dispersed:** 114 research institutes operating in Poland conduct research in almost all areas of science and report to 16 ministers.
- **The existing RDI system is sub-scale.** The system lacks economies of scale, given the limited number of strategic and sizeable projects (especially with an international component), characterized by limited communication with the marketplace, protection of intellectual property rights, commercialization of results and knowledge transfer to the economy.
- **RDIs achieve unsatisfactory results in R&D:** between 2013-2015, only 7.3 percent of RDI's revenues originated from R&D services; 37 RDIs (almost one third of all RDIs) generated higher income from rental property than from R&D sales. 32 institutes (28 percent of the total) in 2009-2015 did not obtain a single patent.
- **RDIs are not sufficiently competitive internationally:** in 2015, 35 RDIs did not obtain any international grants, and only 9 won small grants from international programs. RDIs are not actively filing applications for the EU Horizon 2020 program: of the only 36 RDIs that secured Horizon 2020 funding, 22 were involved in just one project. Only 55 researchers (less than 0.5 percent of all RDI researchers) come from abroad.
- **RDIs do not coordinate activities with R&D pursued at universities.** In many cases they compete rather than cooperate with universities.
- **Limited coordination among RDIs.** RDIs are not active in building consortia to apply for funds from the NCBR; there is neither cooperation nor coordination in R&D infrastructure investments and its effective utilization.

Source: European Commission (2017) Peer Review of Poland's Higher Education and Science System, Horizon2020 Policy Support Facility

**Participation of Polish research institutions and companies in pan-European research programs is the lowest in the EU.** Poland ranks 15<sup>th</sup> in the EU in number of participants and financial contribution in Horizon2020 programs, with 1,150 participants and EUR 280 million, respectively (data for January 2018). Considering that Poland is the sixth most populous country in the EU and has a substantial number of scientific personnel and researchers, Polish

30. The Committee for the Evaluation of Scientific Units (KEJN) categorizes research units into four groups: A+, A, B and C. The evaluation is based on four criteria: publications, capacity, third-party income and 10 'highlights' submitted by the unit. Publications both national and international determine 60 to 80 percent of a unit's total research performance. Limited consideration is given to citation impact, especially international citation.

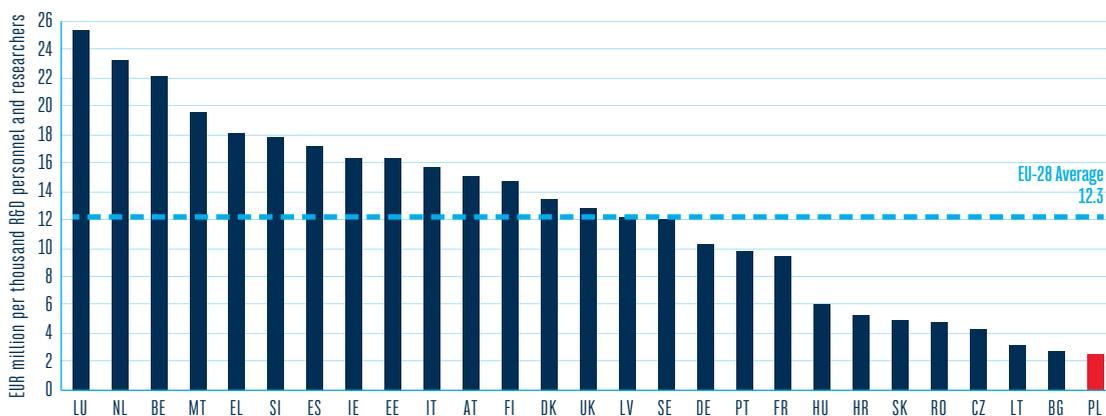
31. Discrepancy in the number of RDIs exists. Some sources indicate 114 and other 115 RDIs in Poland.

32. [http://orka.sejm.gov.pl/Druki8ka.nsf/Projekty/8-020-809-2018/\\$file/8-020-809-2018.pdf](http://orka.sejm.gov.pl/Druki8ka.nsf/Projekty/8-020-809-2018/$file/8-020-809-2018.pdf)

33. Based on an interview with the MSHE.

participation is modest. Since the application acceptance rate is comparable to the European average (12.3 percent for Poland compared to 13.6 percent for the EU28), the key reason is the low number of applications. Abundance of alternative funds for R&D from other EU-financed programs, managed by the NCRD and the NSC, which are less rigorous and easier to access than European ones is another factor contributing to low interest in the Horizon 2020 from Polish institutions.

**Figure 14.** EU contribution from Horizon 2020 program per thousand R&D personnel and researchers (EUR million), 2014-2016



Source: Eurostat

Note: Cyprus is outlier (96.2) thus it is not included in the graph

## b. Recent policy developments

The need to reform RDIs has been recognized in the SRD and acknowledged by the Ministry of Science and Higher Education (MSHE). Accordingly, one of the strategic projects proposed in the SRD is the establishment of the National Technological Institute (NIT), with the objective to strengthen the market potential of RDIs and enhance commercialization, knowledge and technology transfer. In the first draft of the bill presented in April 2017, NIT was supposed to consolidate dozens of research institutes, breaking silos and reducing the number of legal entities. Given strong resistance from within the science community, a new concept was proposed - the Łukasiewicz Research Network<sup>34</sup> - in which 36 technology R&D institutes (with around 8,000 employees and almost PLN 1.5 billion or EUR 353 million of revenues) are to collaborate within a network while retaining their legal independence. The goal of the network is to conduct research that is consistent with the national policy perspective (with reference to smart specializations) and to commercialize research results.<sup>35</sup> The Łukasiewicz Research Network is inspired by the Fraunhofer-Gesellschaft (Fraunhofer Society), a network of German institutes for applied research. Institutes with the highest technological potential have been selected to become part of the network based on prior national assessments.<sup>36</sup>

34. A potential question is how adequate the Łukasiewicz Research Network approach is for Poland. Nonetheless, the analysis of this question is out of the scope of this position paper.

35. <http://scienceinpoland.pap.pl/en/node/25444>

36. The assessment was led by MSHE and took into consideration such parameters as type of publications, type of clients, sources of income, etc. International assessment has not been pursued and is planned after 4 years since the beginning of operation of the network.

A draft of the Act on Łukasiewicz Research Network was submitted to the Parliament in January 2018 after almost one year of consultations with the scientific community. According to the draft, the network will be coordinated by the Łukasiewicz Centre, that will be created as a state-owned legal entity to plan and coordinate R&D activities led by the network RDIs. The tasks of the center are to provide funds, facilitate RDIs cooperation, and boost commercialization of R&D. The new concept aims to unify rules regarding the management of intellectual property (IP) and research infrastructure among the RDIs in the network, as well as to optimize the use of existing research infrastructure. The network also aims at consolidating the potential of Polish RDIs and enabling the creation of an environment in which career paths of researchers are assessed based on innovation and market implementation of inventions (and not so much on publications or patents applications). The Act does not specify the details on the network's coordination, management models, incentive frameworks for research staff and participation of the private sector. All the specifications will be designed by the future management team of the center appointed by the Minister of Science and Higher Education.

The draft law on the Łukasiewicz center reveals weaknesses that may result in an inefficient and expensive organization. The way of appointment of the network's management, the recruitment selection criteria, and the composition of advisory boards are not aligned with best practices. For example, although MSHE acknowledges the critical role of the network's management, who shall be equipped in managerial competences, high qualifications in commercialization of research results and development works, international experience, these requirements are not reflected in the draft bill (Table 6).

**Table 6. Areas for potential improvement in the draft law establishing the Łukasiewicz Research Network**

January 2018 draft law	International best practices
<p>The Minister of Science and Higher Education appoints the president and vice presidents of the network, while each of the institutes that will join the network will be headed by a director appointed by the president of the Łukasiewicz Centre.</p>	<p>Selection of presidents in large institutions is usually conducted via an open, merit-based and transparent selection process. Among the selection criteria are a proven track record of leadership; experience of managing large organizations (preferably with international exposure) and ability to articulate a vision of the network. The proposed management selection process does not follow global best practice, as there is a risk that the appointment has a political character. This may lead to selection of unsuitable candidates and frequent shifts in research objectives that will contribute to waste of public resources. The politically appointed president will have the authority to appoint heads of RDIs further adding to the volatility of the system.</p>
<p>The candidate for the network president must have at least 5 years of experience in managing teams.</p>	<p>More demanding criteria would be essential. The president of a network comprising over 36 separate legal entities and over 8 thousand employees should have vast experience in managing large and well-known institutions, a strong international network, and high-level managerial skills.</p>
<p>The president will have a board of advisors composed of 20 members, including 10 members of the socio-economic or financial community, five representatives from the academic community and five institute directors.</p>	<p>The advisory body could play a more relevant role if among its members were internationally recognized researchers, as well as researchers who hold international patents and have successfully commercialized their inventions. Polish Diaspora from leading global research institutions could be considered for the advisory body. Such approach would also facilitate international cooperation on strategic projects.</p>

Each of the institutes that will join the network will be headed by a director and a board. Directors will be appointed by the president of the Łukasiewicz Centre for four years (...) The board will be composed of 10 to 15 members. Not more than 40 percent of its composition will be employees of the institute. The remaining members will be appointed by the president at the request of the institute director. Entrepreneurs and universities will be the key partners for the institutes in conducting their operations.

The requirements to become a director of a RDI are very basic, for example, the candidate is required to have only 3 years of experience in managing teams, while ability to speak English is not obligatory. Given the objective of research commercialization and internationalization, it would be highly beneficial if RDI directors had experience in managing large institutions and deep networks with the private sector, Venture Capital (VC) and investors both in Poland and abroad to strategically position the RDI internationally. The size of the boards seems too large and the proposed structure is likely to be expensive. Given 36 RDIs in the network, each equipped with a board of 10 people and a board of the Network Center composed of 20 members amounts to 380 individuals with an advisory role in the Network.

### C. Potential for World Bank involvement

**Changes in the RDI system are essential.** Reforms are complex and long-term but of strategic relevance for the country's innovation potential, its connectivity with global knowledge networks and private sector competitiveness.

**The World Bank has vast global experience in setting up a transparent and efficient governance models at national, institutional and program level, and could advice the Polish Government on R&D system reforms.** Croatia's Science and Technology Projects (STP) and the Innovation Serbia Project (ISP) can serve as valuable examples of World Bank engagement in Europe (Box 3).<sup>37</sup>

#### Box 3. Examples of World Bank projects targeting RDIs reforms Science and Technology

##### 1. Projects (STP) in Croatia - targeting reform of individual RDIs<sup>37</sup>

One of the project objectives was to enable RDIs to commercialize research outputs. The achievement of this objective was rated as substantial. Expected results in enabling RDIs to commercialize research outputs met or surpassed all the outcome indicators.

The activities, outputs and outcomes that contributed to the achievement of this objective are:

- The STP supported Brodarsky Institute (BI) through assistance in corporate governance, business processes, human resource development, upgrading physical infrastructure and commercialization. The project financed equipment for research projects, consulting services and training, and on a selective basis, incremental operating costs and severance payments for staff downsizing in certain areas. BI was successful in broadening the collaboration with industry and increasing its share of revenues from private contracts. It concluded 41 research contracts with industry worth over EUR 9 million and doubled its share of revenues from private companies from 22 percent in 2006 to 45 percent by end 2010.
- STP supported commercialization of the Rudjer Boskovic Institute / Rudjer Innovations (RBI/RI). With project assistance, RI was successful in establishing spillover companies. Five companies were established with project contribution of about EUR 1.5 million. Two of the companies are already sustainable, a third is in incubation period and two made initial steps towards sustainability. RI has concluded 12 licensing agreements amounting to EUR 750,000, including with prestigious international institutions. In addition, five patents were granted and 37 patent applications were filed.

37. <http://documents.worldbank.org/curated/en/79783146826187/pdf/ICR20700P080250ICdisclosed03080120.pdf>

## 2. Science and Technology Projects phase 2 (STP2) (2013 – ongoing)<sup>38</sup> – reforming RDIs network in Croatia

Provision of Technical Assistance for the Government of Croatia on the evaluation of the network of public research institutes, including the preparation of strategic planning and financial management strategies and preparation of performance-based contracts between the MSES and public research institutes.

## 3. Innovation Serbia Project (2011)<sup>39</sup> - targeting reform of individual RDIs

Technical Assistance to Research and Development Institutes:

The objective was to provide: (a) customized technical assistance to up to 2 RDIs based on a detailed needs assessment; and (b) limited technical assistance to up to 4 RDIs based on a general needs assessment; and (c) technical input to the Government's future RDI sector reform program based on lessons learned from the technical assistance program.

The World Bank team conducted detailed diagnostic assessments of four RDIs that is: Institute of Physics, Belgrade (IPB), Institute of Molecular Genetics and Genetic Engineering (IMGGE), Institute of Food Technology (FINS), Novi Sad, and Institute of Medicinal Plants Research (IMPR). These assessments provided detailed recommendations (and specific action plans) for improved institutional capacity, performance management, knowledge transfer and research commercialization practices that were the basis for customized technical support provided to these RDIs. As part of the TA, the World Bank organized trainings for a broader group of 10 RDIs to identify opportunities for institutional improvements. These institutions participated in discussions to identify cross-cutting topics of interest to RDIs, including: Program/Project Management, IP Management, R&D Marketing and Sales, Performance Evaluation and Career Planning/Development, and Managing/Developing R&D Capabilities.

### Research Sector Reform

Given its modest means, the TA program made important contributions to the voluntary institutional adjustments and technology transfer efforts at IPB and IMGGE institutes. These two RDIs were responsible for three of the early-stage technology transfer targets met under this project. However, supporting technology transfer and commercialization was very challenging owing to basic research orientation of most RDIs and the weak institutional capabilities, low level of technological and even lower market readiness of the proposed R&D projects.

With the establishment of an Innovation Center at the IPB, technology transfer activities progress picked up during the project. IPB leadership as well as many department heads and researchers demonstrated strong interest and willingness to undertake some difficult institutional and mind set changes. The IMGGE transformed itself from a university-like organization to a research institute comparable with its international counterparts and at closing was on the verge of exporting a new product supported under the TA.

Both RDIs reported a significant change in attitudes among its management teams and researchers in engaging the private sector on potential knowledge transfer and commercialization projects. Both RDIs reported the culture as more favorable toward conducting applied research with commercialization potential by partnering with the private sector, internal reforms in performance and institutional management, and the need to look for non-budgetary sources of revenues for the future. Both RDIs were able to obtain several knowledge transfer contracts from the private sector firms and European organizations, produce patent filings and high-quality publications.

The management of the FINS and the IMPR—the two other RDIs supported under the detailed TA—appreciated the in-depth assessments yet found it difficult to motivate staff to proceed with the recommended institutional reforms without an explicit mandate, push or support from the Ministry of Education, Science and Technological Development.

**To effectively restructure RDIs in Poland a more comprehensive reform encompassing both research institutes and research at universities would be advised.** Based on the World Bank's experience in the field, such reform can lead to expanded scientific capacity, increasing the critical mass, international visibility and impact of research. As a first step, an international evaluation of RDIs and R&D at HEIs along with technology mapping could be pursued to assess the quality and potential of research organizations. As a second step, an international

38. <http://documents.worldbank.org/curated/en/797831418783/pdf/ICR20700P080250IC0disclosed03080120.pdf>

39. <http://documents.worldbank.org/curated/en/394131476361888907/pdf/P126229-Serbia-Innovation-Project-ICR-4-Portal-10-0-P126229-2016-10-08-11-25-10112016.pdf>

board of advisors could be created to discuss and advice on the most adequate structure of the R&D system in Poland including consolidation of select RDIs and universities to create hubs of excellence and increase economies of scale. Such an approach in reforming the R&D landscape is undertaken currently in Croatia partly within the World Bank project STP phase 2 (STP2) through a comprehensive international evaluation of the network of 25 public RDIs.

## AREA B. Coordination of innovation policy

**The SRD recognizes limited effective coordination of public policies as an issue.** It states: “due to the horizontal nature of innovation policy, a correctly functioning ecosystem for innovation is to be supplemented by a good coordination of actions undertaken by public institutions”. Two actions are indicated in the Strategy: “Improving the horizontal and vertical coordination of innovation policy (the inter-ministerial, inter-institutional one, and between the central and regional level)” and “Ensuring synergies in the operation of institutions over-seeing innovations”.

### a. Current status

**Policy coordination at the working level is being pursued through weekly meetings of the Interdepartmental Group for Innovation.** The group is composed of relevant innovation stakeholders including representatives from eight ministries<sup>40</sup> 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. Meetings are held every Wednesday morning and until June 8, 2018, 73 meetings were held with participation close to 100%. Among the Group's achievements are the second Act on Innovation in the area of tax credit for R&D, creation of the concepts of the “Start in Poland” and “Scale Up!” programs. The group also holds discussions on inter-ministerial sensitive subjects, as for instance a new regulation on energy-intensive industries, which caused controversy between the Ministry of Environment and the Ministry of Investment and Development (MliR).

**Coordination among implementation units also takes place within the Polish Development Fund, responsible for implementation of a variety of innovation programs under MPiT and MoF (see figure 10).** Although the law giving PFR legal personality has not yet been enacted, PFR facilitates regular meetings of the management of institutions it encompasses. During PFR's creation, some organizational changes were implemented to eliminate overlapping competences, with a clear division of responsibilities among institutions and reallocation of responsibilities (e.g. the department for supporting foreign expansion of companies was moved from PARP to PAIH). However, the scope of implemented changes is limited and some inefficiencies remain. The new legal framework will equip PFR with more tools to perform a full integration of activities undertaken by subordinate bodies.

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40. See Annex 1 for the Group's members.

## Main challenges in coordination

- 1. Currently, there is a lack of horizontal coordination of policies for Science, Technology, Innovation, and advanced human capital.** Additionally, there is limited communication between MPiT and MSHE in setting up 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,<sup>41</sup> 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 (Ms. Streżyńska, Mr. Jackiewicz, Mr. Radziwiłł) 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 gathered only 4 times. A new solution has been proposed recently to endorse Ms. Emilewicz - the minister of MPiT as new chairman. This should facilitate organization of the council's meetings.
- 2. Limited coordination of policies between national and regional level.** Interactions between 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 by frequent political rotations at regional level. So far, developing synergies was unsuccessful, partly owing to 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.

**MPiT recognizes the challenge of a limited coordination between the national and regional level, in particular the limited cooperation with the regional Marshals.** To address this challenge, a first meeting of the Innovation Council led by Min. Emilewicz (still to be appointed as chairman) is planned with the Marshals in July 2018. Discussion will cover topics of a new EU cohesion policy and necessary changes in education policy at regional level.

## b. Global best practice in policy coordination

**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.

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41. See Annex 1 for the Council's members.

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. The councils typically involve representatives from key government ministries, as well as participants from academia and private sector. In most cases, councils also play a long-term advisory role. 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 (Box 4). Such bodies also monitor and evaluate the innovation policies and strategies of the different agencies and provide feedback to learn from implementation experience.

#### Box 4. Examples of Coordination Councils

##### **Japanese Council for Science and Technology<sup>42</sup>**

Japan redefined in 2001 the role of the Japanese Council for Science and Technology Policy, bringing together five ministries (Science and Technology Policy, Internal Affairs and Communications, Finance, Education, Culture, Sports, Science and Technology, Economy, Trade and Industry) with academics and business people with a strong planning and coordination role, allocating budgets, defining policies and supervising implementation. Head of the Council is an independent member of the Council of Ministers. The secretariat is comprised by more than 100 professionals. In practice, the Council became a horizontal Ministry of Innovation, with strong coordination and detailed policy making across all the sectors linked to research, technology development and innovation. It is responsible for publishing “The Science and Technology Basic Plan” every five years, which sets national priorities in this area and annual strategic documents tracking its implementation. The Council manages also the science and technology budget and allocation of human resources and evaluates nationally important R&D initiatives.

##### **The Council for Science and Technology of the UK<sup>43</sup>**

The Council provides strategic advice for the prime minister and plays a coordination role across ministries in defining innovation policies that require a consistent science, technology and research approach. Since its establishment in 2010, the principal areas of expertise are high-level priorities for science and technology on a national level, development of STEM (science, technology, engineering and mathematics) academic ecosystem and horizontal analysis of opportunities and risks associated with technological advancement. The Council includes up to 20 members, who are academics and directors of research institutes and is supported by a dedicated secretariat based in the Government Office for Science. Meetings of the Council are held every 3 months or more often in case there is a need to take a position on urgent matters of significant importance for the science and technology ecosystem. One of the most important achievements of the Council is the establishment of the Chief Scientific Advisers (CSAs) network, members of which provide on-going R&D advisory in each governmental department, facilitating interdepartmental coordination of policies.

#### **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 characteristic of advisory councils are: (i) have members from Academy, industry and ministries; (ii) are included in “innovation law” or have 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 (Box 5).

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42. <http://www8.cao.go.jp/cstp/english/policy/index.html>

43. <https://www.gov.uk/government/organisations/council-for-science-and-technology/about#who-we-are>

## Box 5. Examples of Advisory Councils

### **The Austrian Council for Research and Technology Development<sup>44</sup>**

Established in 2000, the Council has an important influence on government policy. It periodically publishes medium-term agendas for research and innovation, so called Strategy Documents, as well as more operational Recommendations. The Council gained a sound legal basis in 2004, along with the adoption of the law regulating its operations, and consists of eight members appointed for 4 year terms by the Minister of Science and Research and the Minister of Transport, Innovation and Technology.

### **The Science, Technology and Innovation Council of Canada (STIC)<sup>45</sup>**

The Council provides holistic advice to government across science and innovation in support of the development of a national science ecosystem, as well as the technology and innovation strategy. It provides private (non-public) advice to the government. Additionally, the Council biannually publishes so-called “State of the Nation” reports summarizing country’s science and technology performance over the past 24 months and advices on modifications of Canada’s R&D strategy. STIC is supported by a Secretariat staffed by federal public servants. The Secretariat provides analytical, advisory, and administrative services to the Council.

### **The Council for Science and Technology Policy (AWTI) of The Netherlands<sup>46</sup>**

AWTI is an independent advisory body, not connected to any ministry or department, which provides advice for the government or members of the parliament, focusing on mid- and long-term policymaking in science, technology, innovation and its social & economic impact. The Council takes position in response to inquiries and each time public interest requires an opinion of the AWTI. The Council coexists with a separate policy coordination board, each with its own secretariat (AWTI employs 10 staff members in total).

### **Finland’s Research and Innovation Council<sup>47</sup>**

The Council is an advisory body to the government, headed by the Prime Minister. It includes the Minister of Education, the Minister of Economic Affairs, five members from business and academia and five permanent experts. The Council meets usually every two months. Its discussions are confidential, and supports government in STI policymaking.

## C. Potential for World Bank involvement

Poland would benefit from best practices to improve coordination for a more coherent approach to innovation policy. Potential relevant solutions may include expansion of responsibilities of already existing institutions such as the Innovation Council that could incorporate the function of a high level coordination body. In addition, the role of a strategic advisory council could be performed by already operating entities. A new coordination model between the national and regional level would also be warranted. The World Bank has a vast experience in setting up new institutions with specific functions, mandate, transparent M&E and reporting practices, budget, boards, etc. Some of the countries in which the World Bank has experience include Chile, China, Colombia, Croatia, Malaysia, Romania, Russia, Serbia, South Africa, among many others.

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44. [https://www.rat-fte.at/home\\_en.html](https://www.rat-fte.at/home_en.html)

45. <https://www.gov.uk/government/organisations/council-for-science-and-technology/about#who-we-are>

46. <https://english.awti.nl/>

47. <http://valtioneuvosto.fi/en/research-and-innovation-council/meetings>

## AREA C. Fiscal incentives for innovation

### a. Overview of recent developments

**New tax relief for R&D was implemented in 2016 replacing former technological relief, which was unattractive because of a highly formalized procedures and narrow definition of new technology.** The so-called First Act on Innovation significantly extended the list of activities qualifying for R&D relief. Previously, only 50 percent of expenditures incurred for the acquisition of new technology in the form of intangible assets (such as proprietary rights or licenses) were eligible for deduction. The First Act on Innovation extended eligible costs to wages and social contributions of R&D employees, purchase of commodities and raw materials, external knowledge bought from scientific units, fees for use of research equipment, amortization and depreciation of selected groups of assets, and costs of obtaining intellectual property protection.<sup>48</sup>

**In subsequent years, R&D tax incentives were further increased.** The First Act on Innovation enabled deductions of 30 percent of employee costs from taxable income and 20 percent or 10 percent of other costs respectively for SMEs and large companies. In 2017 these thresholds were raised to 50 percent of salaries/social contributions and 50 percent or 30 percent of other costs. Even larger reliefs were included in the Second Act on Innovation. From January 2018, all companies, regardless of their size, can deduct 100 percent of all eligible costs.<sup>49</sup> Additionally, the list of eligible items was clarified and further extended, including purchase of specialized equipment or services enabling the use of research equipment for R&D.

**Existing companies with status of R&D center also received additional support.** The status of an R&D center may be granted to entities with revenue generated from sales of goods and products and from financial operations worth at least EUR 1.2mn, where at least 20 percent is generated from sales of the results of own R&D activity. Prior to 2016, R&D centers enjoyed tax exemption from local property taxes (including real estate, agricultural as well as forestry tax) and up to 20 percent of gross monthly income was treated as deductible expenses. After the Second Act on Innovation, R&D centers can deduct 150 percent of all eligible costs, which compared to ordinary firms include also depreciation of buildings and premises used in R&D activity and external knowledge purchased from entities other than scientific units. As of June 2018, 36 companies had this status.<sup>50</sup> Regulations regarding creation of special purpose vehicles (SPV) by universities and scientific institutes were also recently streamlined.

**There are also additional fiscal incentives in place.** The Ministry of Entrepreneurship and Technology is currently working on implementing a patent box regime, which will offer one

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48. Act of November 4, 2016 on the Amendment of Certain Acts Defining the Conditions for Conducting Innovative Activities

49. Act of November 9, 2017 on the Amendment of Certain Acts to Improve the Legal Environment for Innovative Activities

50. <https://miir.bip.gov.pl/centra-badawczo-rozwojowe/wykaz-przedsiębiorcow-posiadajacych-status-cbr.html>

of the lowest taxes for commercializing R&D in the EU.<sup>51</sup> Such reform will expand the array of tax incentives for R&D outputs, which remains limited in Poland. Besides tax incentives focused on innovation, additional support instruments include newly amended regulations on special economic zones (SEZ) extending SEZ benefits to the whole country.<sup>52</sup> Moreover, special depreciation provisions have been promoted since 2007 under the name ‘Lump Sum Depreciation’ enabling enterprises below a certain size threshold to benefit from 100 percent expensing of the cost of certain capital goods. Between 2007 and 2008, the threshold was only EUR 800,000. On average before the 2007 reform, firms in Poland could depreciate the cost of machinery and equipment over 7 years using straight line depreciation. Introduction of the 100 percent was a generous revision to the 7-year-depreciation. In 2009, the benefits were further extended to medium-sized firms with turnover below EUR 1.2 million.

## b. Potential World Bank Involvement

**The World Bank could support the Polish Government with analysis and advice on tax incentives based on its broad expertise in that area.** Recently, the World Bank evaluated the effectiveness of the lump sum depreciation policy in Poland following the two major reforms that took place in 2007 and 2009. The evaluation was pursued based on administrative data on VAT and CIT returns from Poland’s Revenue Authority with application of a difference-in-differences<sup>53</sup> methodology combined with an instrumental variable approach. The analysis found that treated firms increased investment spending by around 14 percent; mature and profitable firms benefit more relative to younger and more cash constrained firms; and the effect is more pronounced in the manufacturing sector. The World Bank could expand its analysis to other tax incentives, including to assess the effect of the generous R&D incentives introduced in 2018 or before and verify their impact on different groups of enterprises. As such, analysis could be performed based on CIT tax return data.

## AREA D. Monitoring and impact evaluation

### a. The relevance of impact evaluation

**Monitoring and evaluation (M&E) and impact evaluation (IE) are valuable tools in effective policy making.** IE goes beyond M&E by identifying the changes in outcomes that are generated by the program. For example, one might observe that after subsidies were provided to researchers to work with companies on R&D, the number of patents increased. This would be observable through M&E. However, if one does not know how many patents there would have been in the absence of the subsidy program – the counterfactual – one cannot say whether the patents increased because of the program or would have increased in any case. IE complements the efforts to monitor and evaluate projects by allowing one to say whether a program was directly responsible for an observed outcome.

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51. <https://www.pb.pl/ulga-zatrzymy-patenty-w-polsce-911504>

52. See companion Position Paper on Regulatory Policy.

53. Difference-in-difference (DD) methods are a common strategy for evaluating the effects of policies or programs. They compare changes over time in a group unaffected by the policy intervention to the changes over time in a group affected by the policy intervention, and attribute the “difference-in-differences” to the effect of the policy.

**IE is particularly valuable** when a program is: (i) Innovative – testing a new, promising approach; (ii) Replicable – has the potential to be scaled up or applied in a different setting; (iii) Strategically relevant – is a flagship initiative, requires substantial resources, has the potential to cover a large number of people, or could generate substantial savings; (iv) Untested – little is known about the effectiveness of the program, globally or in a particular context; (v) Influential – results will be used to inform key policy decisions.<sup>54</sup>

**IE is commonly used in advanced economies.** In the UK a recent study evaluated the impact of support by Innovate UK, the UK’s national innovation agency, assessing the impact on firm performance of public support for innovation incorporating a difference-in-difference method to the effect of the policy. The study finds that supported firms increased their employment (by 32 employees, or about 11-14 percent), and were more likely to have survived (by 14 percentage points) four years after support began, compared with similar unsupported firms. The study also presents evidence of increased sales (around 12-25 percent) resulting from support. The employment and survival effects were largest for younger and mid-aged firms (2-5 years old and 6-19 years old, respectively), whereas the tentative sales effects were larger for mid-aged and older firms (more than 20 years old).<sup>55</sup> In sum, IE helps discover how interventions work and whether they should be removed, modified, or scaled up, giving policymakers an opportunity to re-design their programs through continuous feedback loops. This mitigates the risk that a program will be unsuccessful.

## b. Status of evaluations in Poland

**Evaluations of innovation programs in Poland in 2007-2013 have not been comprehensive.**<sup>56</sup> Some studies have not used robust methods or complete data (Annex 2). The focus was on the direct effect on firm performance and not necessarily on indirect effects such as knowledge spillovers from R&D institutions that received grants. Beneficiaries of grants from direct measures could indirectly have improved the performance of non-beneficiary firms. Non-beneficiary firms could have benefitted through knowledge spillovers from beneficiary firms in the region or through vertical industrial linkages by purchasing better inputs or selling more output to beneficiary firms.

**No single organization in Poland is in charge of monitoring the innovation system**, producing indicator reports and contributing to the evaluation of the system or part of it. This is important in the light of the numerous strategies developed in recent years (SRD, the national research program, etc.), each with different goals, targets and objectives that should be monitored.

## c. Potential for World Bank involvement

The World Bank is currently assessing the impact of innovation interventions in Poland. Its objectives are to: (i) develop a methodology to calculate the return to public investment in research and innovation (ROI analysis) in reference to innovation support measures in the

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54. Gertler (2011).

55. Department for Business, Energy, and Industrial Strategy (2017).

56. World Bank TA project “Measuring the Return on Investment of Public Support to Innovation” in collaboration with the Government of Poland, funded by the EU, 2017-2018.

2007-2013 project cycle; (ii) pilot tools to assess and improve current research and innovation support instruments (i.e., financial cycle 2014-2020), including portfolio mapping, functional reviews, and efficiency analyses. The project is ongoing and will be finalized in 2018. The evaluation methodology developed in the project aims to (i) support redesigning and shaping science, technology and innovation policies by using data and information on existing instruments; (ii) support the adoption of good practices in design, implementation and coordination of innovation policy instruments; (iii) formulate policy recommendations to strengthen the innovation policy mix by eliminating redundancies and leveraging complementarities across the portfolio of instruments; (iv) build capacity to design, implement and monitor STI policies and to rationalize policy mix – measure, learn and adapt; (v) improve the ability of governments/ministers to credibly pitch for resources for specific programs.

**Results from the work undertaken by the World Bank present an opportunity for the Polish Government to design a comprehensive evaluation methodology for overseeing the results and impact of government programs.** The results obtained could directly contribute to the objective of the SRD to ensure synergies in the operation of institutions responsible for innovation, in implementation of programs and innovation instruments, and in coordination of evaluations in the area of innovation.

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## ANNEX 1.

# Members of the Innovation Council and the Interdepartmental Group for Innovation

### Innovation Council

Chairman – Mateusz Morawiecki, Minister of Economic Development (currently Prime Minister of the Republic of Poland).

Members:

- Jarosław Gowin, Deputy Prime Minister, Minister of Science and Higher Education,
- Piotr Gliński, Deputy Prime Minister, Minister of Culture and National Heritage
- Anna Streżyńska, Minister of Digital Affairs
- Dawid Jackiewicz, Minister of Treasury,
- Konstanty Radziwiłł, Minister of Health
- Anna Zalewska, Minister of National Education.

Secretary of the Council as appointed by the chairman.

### Interdepartmental Group for Innovation

Chairman – Jadwiga Emilewicz, Undersecretary of State in the Ministry of Economic Development (currently Minister of the Entrepreneurship and Technology).

Members:

- Piotr Dardziński, Undersecretary of State in the Ministry of Science and Higher Education,
- Szymon Ruman, Undersecretary of State in the Ministry of Digital Affairs,
- Leszek Skiba, Undersecretary of State in the Ministry of Finance,
- Tomasz Szatkowski, Undersecretary of State in the Ministry of National Defense,
- Marek Zarórski, Secretary of State in the Ministry of Treasury,
- Mariusz Orion Jędrysek, Secretary of State in the Ministry of the Environment,
- Secretary of state or undersecretary of state appointed by the Minister of Health,
- Secretary of state or undersecretary of state appointed by the Minister of National Education.

## ANNEX 2.

# Examples of Evaluations of Innovation Programs under IE and ROP programs<sup>57</sup>

Several studies listed below have examined the effects of the Operational Program Innovative Economy (POIE) 2007 - 2013 and Regional Operational Programs (ROPs) on firms but they focus only on a subset of measures, do not use a comprehensive dataset, or do not examine the full period when the programs were operational, for instance:

- WYG PSDB (2013) focuses on the Regional Operational Program (ROP) for the Pomorskie Voivodeship for 2007-2011.<sup>58</sup> The study examines the effects of the grants and subsidized loans on innovation and competitiveness indicators of micro-firms and SMEs. The data for this study was collected through surveys conducted online or through phone calls, which can restrict the sample size or introduce sample selection bias. While a matching procedure was used to create a control group, the study does not include details on the procedure. The study finds that the regional program had a positive impact on the innovation and competitiveness of beneficiaries: there was an increase in employment, revenue growth from the sale of new or significantly improved products and services, and clients.
- Polish Agency for Enterprise Development (2013) investigates the effects of three measures of the IE program that focus on the application of R&D work (POIE.04.02.00), improving firm processes with new technological solutions (POIE.04.04.00), and increasing the use of electronic services (POIE.08.02.00) for 2007-2010. While there are over 4,000 beneficiaries in these three measures, the sample size in the study is only about 400 firms collected through PARP's innovation survey. As there was no data collected for a control group, the effect on a beneficiary is compared to a hypothetical scenario where the beneficiary may have received support under one of the other two measures. The beneficiaries from the other measures are an imperfect control group as the measures may have different effects on the firm performance.
- A study by the Ministry of Infrastructure and Development (2014) examines the effects of three programs supported by the EU Cohesion Policy, which includes the IE program, but does not distinguish between the programs in the evaluation. The study focuses only on large firms with more than 249 employees and over EUR 50 million gross turnover or EUR 43 million total liabilities. Data was collected through interviews so the sample size was small.
- A study by the Center for Evaluation and Analysis of Public Policies of Jagiellonian University (CEAPP, 2015) is one of the more robust evaluations of the IE program. The study uses a propensity score matching and a difference-in-difference method to examine the effect of the IE program. While the methodology is robust, the study focuses on only four measures in the IE program.<sup>59</sup> Nonetheless, the study finds that the IE program increased firms'

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57. Measuring the Return on Investment of Public Support to Innovation. Methodology Note (Draft). March 2018, World Bank

58. The measures that WYG PSDB examined in their study is RPPM.01.01.00, RPPM.01.02.00, RPPM.01.03.00 and RPPM.01.04.00.

59. The study focused on four measures: POIE 04.01.00, 04.02.00, 04.04.00, 08.02.00.

employment, the offering of unique products and services, and the quality of products and services. Additionally, the program increased the share of companies that introduced new or significantly improved products, business systems, or logistics solutions.

- Similar to CEAPP (2015), the Central Statistical Office (GUS) collaborated with CEAPP to evaluate an expanded list of measures (with three more national measures and regional measures) from the IE program (GUS, 2015). While the study uses the same robust methods as CEAPP (2015), it does not distinguish the effects from national measures and regional measures, which are broader in focus. Using the same method, the study finds that the regional measures increased employment and fixed assets of some beneficiaries, but the effect is not present in all regions. No significant impacts of the regional measures are observed for profits or exports. The study does not find any effect of the national measures on employment, net revenues, or profits. However, there are some positive effects on fixed assets, especially technical equipment and machines, export activities, and R&D activities for firms receiving support from certain measures.
- A study by WYG PSDB (2016b) examines the effects of a long list of measures in the IE program on firm performance over 2007-2013. As the study collected information through a telephone survey, no data was collected on firm characteristics and outcome variables before the IE program. The study found that the IE program was fairly effective in support of innovative activities, especially measures POIE.04.01.00 and 01.04.00, stimulating R&D activities in firms. In contrast, the development of linkages between enterprises and business support institute (measure POIE.05.01.00) was not as effective in improving firm performance.

## ANNEX 3.

### World Bank involvement in innovation policy in Poland, 2013-2018

Over the past five years, the World Bank was engaged in numerous projects related to innovation policy in Poland. A summary is provided below.

**Return on investment on innovation spending (ongoing, 2018).** Research initiative with the objective to develop a comprehensive methodology for measuring ROI on public STI support programs and providing policy advice for European Commission in designing 2021-2027 Multiannual Financial Framework.

**Guidance to National Centre of Research & Development (NCBR) to Enhance Efficiency and Effectiveness of its R&D Programs (ongoing, 2017-2018).** Advisory project aimed to restructure flagship enterprise innovation support programs managed by NCBR and introduce rigorous methods of M&E.

**Podkarpackie Center for Innovation (2017-2018).** Design and implementation of regional innovation and entrepreneurship support institution as a part of the second edition of the Catching-up Regions Initiative.

**Lessons from Poland, Insights for Poland: A Sustainable and Inclusive Transition to High Income Status (2016-2017).** Report discussing Poland's economic success since transition from communism. The innovation ecosystem stood as one of the crucial areas of the analysis.

**Toward an innovative Poland: The entrepreneurial discovery process and business needs analysis (2014-2015).** Advisory project intended to support the government in prioritization of innovation spending during the new Multiannual Financial Framework, fulfilling ex ante conditionalities and strengthening capacity of key business support institutions.

**Resilience and Growth Development Policy Loans (2014-2015).** Budget support operations with the objective to promote Poland's economic growth and resilience leading to more dynamic job creation and shared prosperity. Innovation was one of the key pillars in this series of two programmatic DPLs (each loan worth approx. US\$ 1 billion).

**Review of Smart Growth Operational Program (2014).** Assessment of the flagship innovation support program for enterprises funded by the EU Structural Funds.

**RIS3 (innovation strategy) in Swietokrzyskie region (2014).** Support for regional managing authority to prepare a regional innovation strategy (RIS3) based on the new concept of "smart specialization".

**M&E of RIS3/Smart Specializations (2014).** Technical assistance project focusing on reviewing proposed monitoring and evaluation mechanisms for regional innovation strategies (RIS3).

**Review of RIS3s (innovation strategies) in Poland (2013).** Review of regional innovation strategies as to their compliance with the "smart specialization" concept (an ex ante condition to access EU funds in the EU new budget perspective).

**RAS Enterprise Innovation Review (2012-2013).** Assessment of Poland's "Enterprise Development Program", guiding spending of up to 10 billion euro on innovation in the new EU budget perspective 2014-2020.

