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Young researchers for the economy

Leader Program 2009-2015

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The National Center for Research and Development in Poland (NCRD)

The National Center for Research and Development is a governmental funding agency of the Ministry of Science and Higher Education in Poland dealing with applied research. It was appointed in the summer of 2007 as a platform for effective dialog between scientific and business communities (within the area of national science, science and technology, and innovation policies). It operates under the Act of the National Center for Research and Development of 30 April 2010 (*Journal of Laws of 2010*, No. 96 item 616).

The reform of the science system gave the Center more freedom to manage its financial assets within the scope of a strategic research program. The NCRD (within the new initiatives and possibilities that commenced as of 1 September 2011) was assigned the function of a Mediation Institution by the Ministry of Science and Higher Education in three operational programs: Human Capital, Innovative Economy, and Infrastructure and Environment. Consequently, NCRD became one of the well-known innovation centers in Poland. The new financial perspective for 2014-2020, in particular the Operational Program Development of Intelligent ("Poire"), is available to entrepreneurs and entities within the science sector. It is the largest European Union funding program for research, development, and innovation, through which approximately 10 billion euros (including 8.6 billion euros from the European Development Fund Regional) is generated. Regardless of Poire, entrepreneurs and members of the science sector will be able to raise funds with regional operational programs, sectoral, national programs or with European program Horizon 2020.

The Leader Program

The driving mission of the Polish National Center for Research and Development (NCRD) is to "support the development of scientific personnel, particularly those starting their career in science", as well as to "support Polish scientific institutions and enterprises in developing their capacity to produce and use solutions based on research findings in order to keep up the momentum in economic development for the benefit of the society." The Leader Program accomplishes its objectives by granting funds to young researchers for implementation of their ideas (the results of which can be further utilized in the economy) and creation of new research teams. It thus not only strengthens the young researchers' scientific expertise and increases their competence, but also helps them to plan, manage, and orient their research teams independently, preparing them to face the market. The Leader Program also creates a strong foundation aimed at increasing the competitiveness of Polish science and a new generation of Polish researchers globally. Therefore, the program helps scientists to implement ideas and apply for funds for further research at the European level. It is also aimed at encouraging scientists to cooperate with businesses while performing economically valuable and implementable studies and research and enhancing mobility and

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Table 1. Project funding under the Leader Program

	Total amount of funding (PLN)	The average amount of funding (PLN)	Number of applications funded
1st edition	21 622 510	940 109.1	23
2nd edition	33 136 748	920 465.2	36
3rd edition	40 179 986	1 057 368	38
4th edition	48 376 610	1 075 056	45
5th edition	40 860 592	1 135 016	36
6th edition	39 408 182	1 159 064	34

Table 2. Science domains in projects implemented according to the OECD

Research areas	1st edition	2nd edition	3rd edition	4th edition	5th edition	6th edition	Total	Percentage of the total
Interdisciplinary	1	6	14	20	22	26	89	42%
Engineering and technical sciences	9	17	13	10	9	5	63	30%
Natural sciences	9	8	8	8	2	2	37	17%
Medical and health sciences	2	4	2	4	1	0	13	6%
Agricultural sciences	2	1	1	3	0	1	8	4%
Social sciences	1	0	0	0	1	0	2	1%

exchange between research sectors, universities, and research units (http://www.ncbir.pl/en/domestic-programs/lider/).

The elitist Leader Program is addressed to young representatives of various scientific disciplines, and, as in the case of all funding project contests, several restrictions must be met:

- The Leader must not be older than 35 years of age;
- The Leader must have obtained a doctoral degree no earlier than 7 years before the launch of the competition or have completed second cycle degree studies;
- The Leader must be an author of publications in reputable scientific journals, patents, or implementations;
- The Leader must not have participated as project manager in the Leader Program;
- The Leader must have established cooperation with a research organization (public or private) conducting research or development, which is based in Poland and will employ the project manager (Leader) and members of his/her research team;
- The Leader must have Polish citizenship or a residence card in Poland.

Statistics

Funding

The Leader Funding Program was launched in 2009. During the 1st edition, 23 projects were financed with a total sum of more than 21 million PLN. In subsequent years, until 2012, a subsidy for research grew, reaching over 48 million PLN in the 4th edition. In the 5th and 6th editions of the contest, the funding amount dropped to about 40 million PLN. The allocation in all six competitions amounted to nearly 224 million PLN (Table 1).

So far, under the auspices of the Leader program, the National Research and Development Center in Poland has announced 6 competitions. In the 4th edition, the number of funded applications was the highest: 45. In the 6th contest, the NCRD financed only 34 grants (but continuously increased the average funding of the grant). In the 6th edition, a project received, on an average, a funding of 1 159 thousand PLN. The increase in

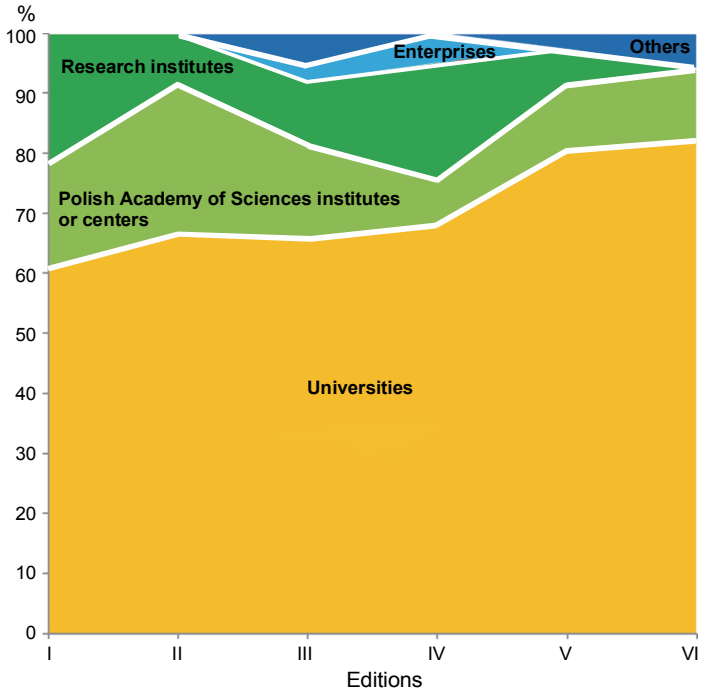

Fig. 1. Types of research facilities where Leader Program are run

the amount of money granted for projects in particular editions is shown in Table 1.

Research areas

The research areas of the winning projects, grouped according to the OECD (Organization for Economic Co-operation and Development) classification, indicate that the most popular are interdisciplinary research. They represent 42% of all the projects. Interestingly, in 2009, they accounted for only 5%, and in the last competition (2015) they constituted 85% of all the winning/funded projects (Table 2).

Engineering and technical sciences come second, accounting for 29% of the total research. Here, the most frequently selected areas are electrical engineering, electronics, information technology engineering (9.4%), mechanical engineering (7.5%), and material engineering (5.7%). Nanotechnology (2.4%) and medical engineering (1.9%) are definitely less popular. The most favored areas within the natural sciences (17%) are the chemical sciences (6.6%), physical sciences (3.8%), and life sciences (3.3%). Medical biotechnology (4.2%) is the dominant field in the case of medical and health sciences (6% of all projects). Agricultural biotechnology as well as forestry and fishing (1.4% each) are the most frequently selected areas of agricultural sciences (4%) (Table 2).

In total, in the years 2009-2015 (with the exception of multidisciplinary grants), the projects were carried out in 23 scientific fields, with nine of them being represented by just one project. Although in the 1st, 2nd, and 4th editions, winners carried out projects in 13 scientific disciplines, in the last one there were only nine disciplines. In this respect, the last, 6th, contest was the least diverse to date. The decrease in the popularity of particular fields of science can only partially be explained by the increase in the share of interdisciplinary projects that combine different, less popular areas. This is particularly true for nanotechnology with 25 interdisciplinary projects and other engineering and technical sciences (15). Other most popular areas are electrical engineering, electronics and information technology engineering (22), material engineering (22), chemical (17) and physical sciences (15), and mechanical engineering (15).

Sex and age of Leaders

Leaders, the winners of consecutive competitions, are standout young scientists. So far, there are 212 Leaders, out of which 67% are men. This situation is due to male dominance in the fields of technology and science. In recent years, however, this disparity has significantly changed, and we observe a positive trend of increasing share of women among the winners of the Leader Pro-

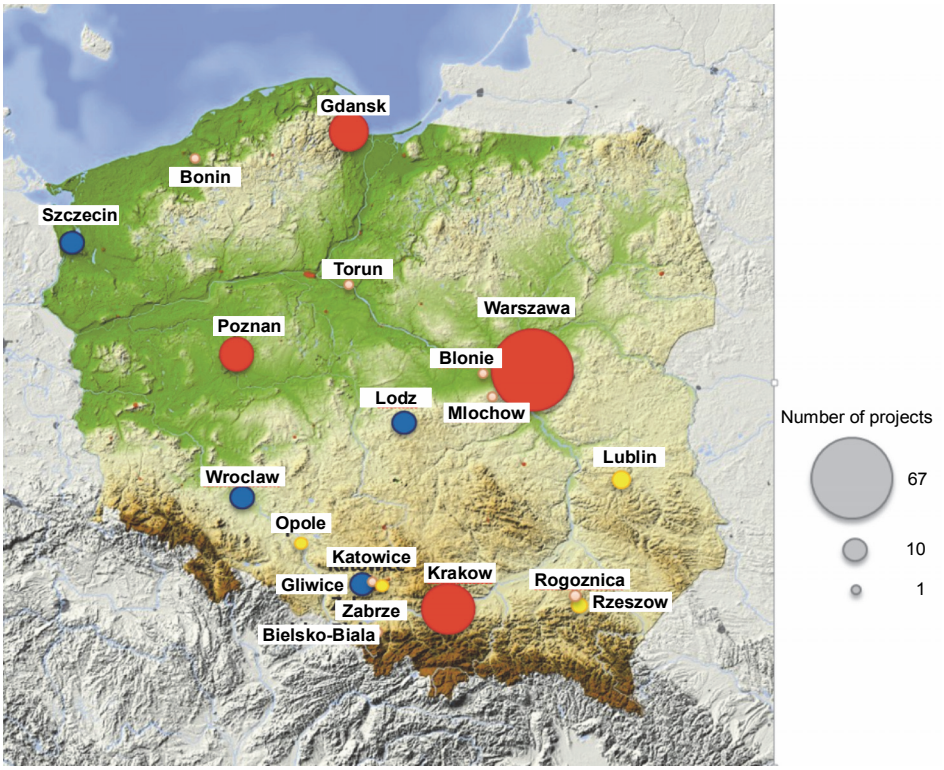

Fig. 2. Spatial distribution of Leader Program realized in Poland

gram. In the 1st edition, they accounted for only 26% of Leaders and even less, 17%, in the 2nd edition. In the 6th edition, the balance between the sexes almost equalized, and the dominance of men was minimal (53% to 47%). The number of successful projects run by women in the 6th edition (compared to the 1st) has almost tripled (from 6 to 16).

The average age of a Leader fluctuates around 32 years. Throughout the whole competition, the Leaders of the 2nd edition of the program were the oldest (on an average almost 33 years). In the last two years, the age of the winner was a little over 31 years. This trend could be explained by changes introduced in the rules of the competition since the 3rd edition, which made the competition open to holders of a master's degree.

Research facilities

The majority of the winners (70%) of the program realize their projects at universities. An organizational unit (institute or center) of the Polish Academy of Sciences was selected by 14% of Leaders, and 10% implemented their projects in research institutes. Interestingly, in the 1st edition, 60% of Leaders were associated with a higher education sector, while in the last edition it was over 82%. In 3rd, 4th, and 5th editions, some of the winners were associated with enterprises; however, it was only about 1% of the total number of beneficiaries. A total of 2% of the winners implemented their projects in the units not belonging to any of the above four categories.

Spatial distribution

When it comes to spatial distribution of Leader projects realized in Poland, regions with strong academic centers dominate, with most of them in Mazowieckie (69 winners of all editions) and Malopolska (37 winners). With the exception of Upper Silesia, in other regions the most important are the university centers in the largest cities in the regions. These are in Pomerania – Gdansk (24 winners), Wielkopolska – Poznan (20 winners), province of Lodz – Lodz (12 winners), Lower Silesia – Wroclaw (11 winners), province of Lublin – Lublin (7 winners), etc. (Fig. 2).

Four cities – Warsaw, Crakow, Gdansk, and Wroclaw – have had representatives in all the six editions of the competition. Three cities were represented in five editions: Poznan, Lodz, and Szczecin. Of all the cities, the highest number of financed Leader projects is imple-

Table 3. Top three research facilities where the highest number of LEADER projects are run

Place in the ranking	Name of research facility	Number of LEADER projects run in the facility
1	Warsaw University of Technology	19
2	Academy of Mining and Metallurgy	13
3	Gdansk University of Technology	12

mented in Warszaw (32%). The 2nd place is occupied by Krakow (17%). Gdansk owes its relatively strong position (11%) and the third place to a large number of Leaders from Gdansk University of Technology and University of Gdansk. An increasing number of winners from Poznan (in 3rd to 5th editions) have secured the 4th place for the capital of Wielkopolska.

Interestingly, with an increase in the number of projects, a decrease in the number of scientific units in which these projects are conducted can be observed. Of the total 70 scientific units, half realize only one project. Twelve units, or 17% of the total, implement two projects, and seven units implement three projects. There is also a group of entities, in which more than 10 projects are carried out. The leader here is Warsaw University of Technology, with as many as 19 projects. The Academy of Mining and Metallurgy comes second (13 projects), and Gdansk University of Technology (12 projects) occupies the third rank (Table 3). They are followed by University of Poznan (11 projects), Technical University of Lodz (11 projects), and University of Warsaw (10).

Conclusions

By definition, a Leader is "a person that holds a dominant or superior position within its field, and is able to exercise a high degree of control or influence over others." As Kathy Heasley (Founder and President of Heasley & Partners) said "*Leadership is being bold enough to have a vision and humble enough to recognize achieving it will take the efforts of many people – people who are most fulfilled when they share their gifts and talents, rather than just work. Leaders create that culture, serve that greater good and let others soar.*"

Both economy and science need creative leaders realizing their visions, as they not only set new directions, but also can win the society for their ideas. Unlike management, leadership cannot be taught, although it may be shaped and enhanced through coaching or mentoring. In science, it is related to improving the skills of young researchers. Particularly significant areas of competence include the ability to independently plan and manage scientific projects, to manage teams of researchers, and to commercialize the research results. Leadership involves establishing a clear vision, sharing that vision with others so that they will follow it willingly, providing the information, knowledge, and methods to realize that vision, as well as coordinating and balancing the contradictory interests of all members and stakeholders.

The achievements of outstanding young scientists, winners of the Leader Program, will be presented on the pages of *BioTechnologia* in a series of articles called *Young researchers for the economy*.

Article based on statistical analyzes performed in NCRD.