



**Horizons for European Research and
Innovation. Universities' past
experiences and future perspectives**

**Improving the Relevance of Research
in Romanian Universities.**

New Approach:

**Romanian Alliance of Technical
Universities**

**Politehnica
University of
Timisoara**

Motto

The University must be science before it can be University. [...] Precisely, because the institution cannot be composed of science – the unrestricted creation of exact knowledge – it requires the spirit of science to animate its institutional life. [...] Science is the dignity of the university – and more, for life is possible without dignity: it is the soul of the institution...”

José Ortega y Gasset's
Mission of the University

INTRODUCTION

Some burning problems of the economy (industry in particular) today:

- orientation towards an knowledge-based economy, "that rely heavily on scientific research and a trained workforce that means the priority of *intellectual capabilities* and competition on highly qualified specialists, intellectual property and knowledge"
- pressing need for specialists with skills in the new 5G technologies, in development strategy of Industry 4.0 and for switching to industry 5.0,

correlated with

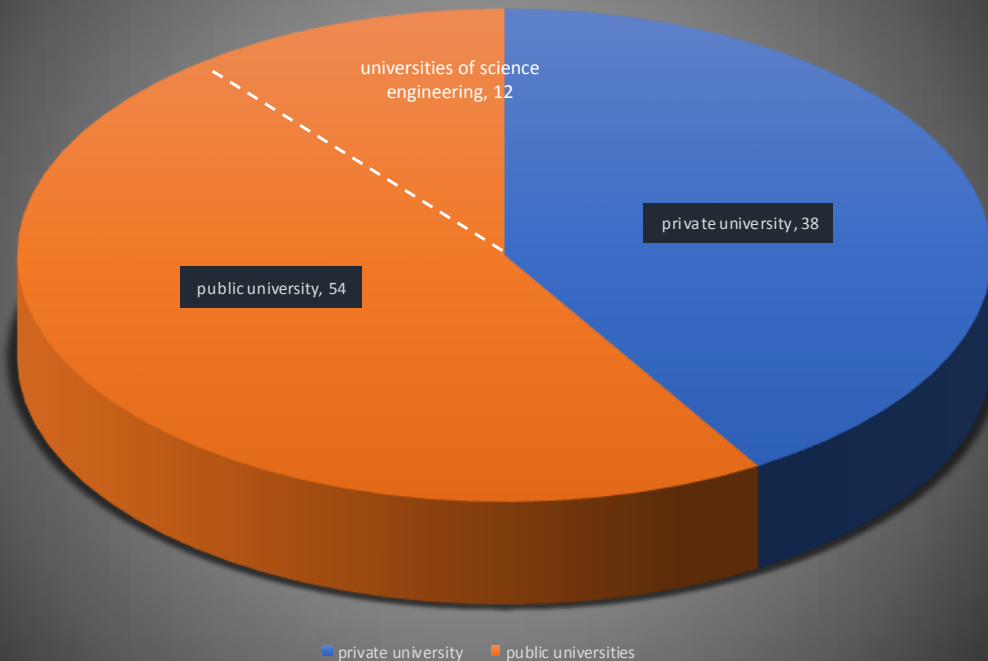
restrictive financial policies of governments with major effects on the financing of public institutes

put universities in the face of strategic options:

- an increasing number graduates or improvement of top research
- universities of research and education or specialized universities / advanced research
- orientation towards activities needed for own financing (mainly applied research) i.e. entrepreneurial university or university based on generators of knowledge (basic research)

Romanian Universities

Distribution of Romanian universities



Particularities

- 92 universities : 4.2 universities /1 mil. inhabitants
- the majority of private universities and around 50% of the public ones have less than 6,000 students and are focused on the education of the human resource and have a more than modest presence in the scientific landscape.
- the private universities in almost totality do not present technical studies.
- Of the 55 public universities, only 12 are universities with a preponderance of over 70% engineering sciences

Fig.1 Distribution of Romanian universities according to their status

Romanian Alliance of Technical Universities

In 2016 the most important 5 technical universities in Romania:

- Politehnica University of Bucharest
- Politehnica University of Timisoara
- Technical University of Cluj-Napoca
- Technical University of Iasi
- Technical University of Civil Engineering of Bucharest

have joined forces, forming the Romanian Alliance of Technical Universities (acronym ARUT).

They represent 5.4 % of the total number of Romanian universities. ARUT aims to represent both a collaborative platform for the most prestigious technical universities in the country, as well as a common, strong voice, permanently involved in optimizing policies in education and research

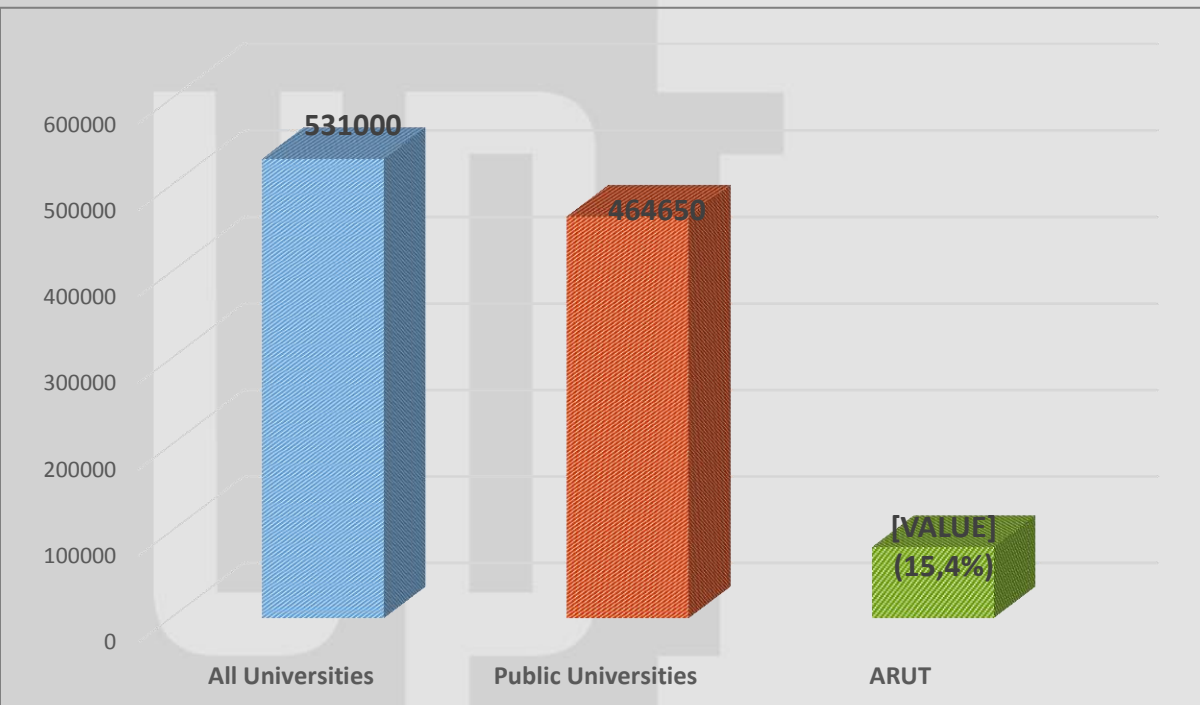


Fig.2 Distribution of the number of students in the Romanian universities (2017/2018 academic year)

ARUT's involvement in Financing excellence projects in RDI

ARUT in the most important national competitions PNCDI III

- Subprogram Institutional performance
Institutional development projects - Financing excellence projects in RDI

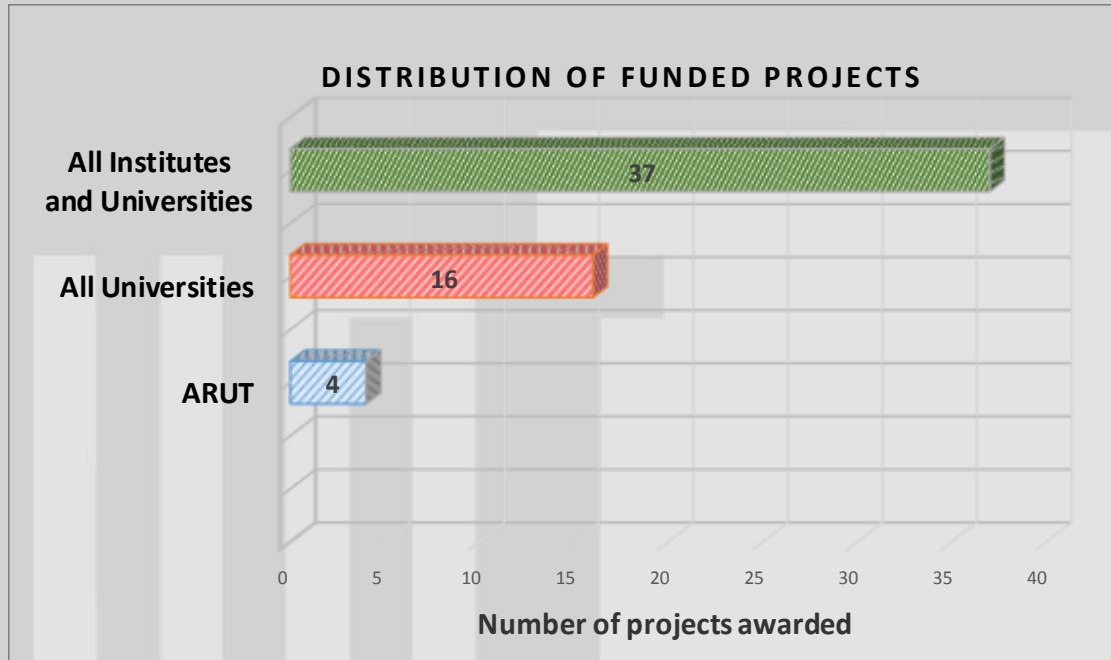


Fig.3 Results of competition PNCDI III Financing excellence projects in RDI

ARUT universities have received 4.52 million euro, representing 13.25% of the total budget of the competition.

ARUT's involvement in Complex projects realized in RDI consortia

ARUT in the most important national competitions PNCDI III

- Subprogram Institutional performance
Complex projects realized in RDI consortia

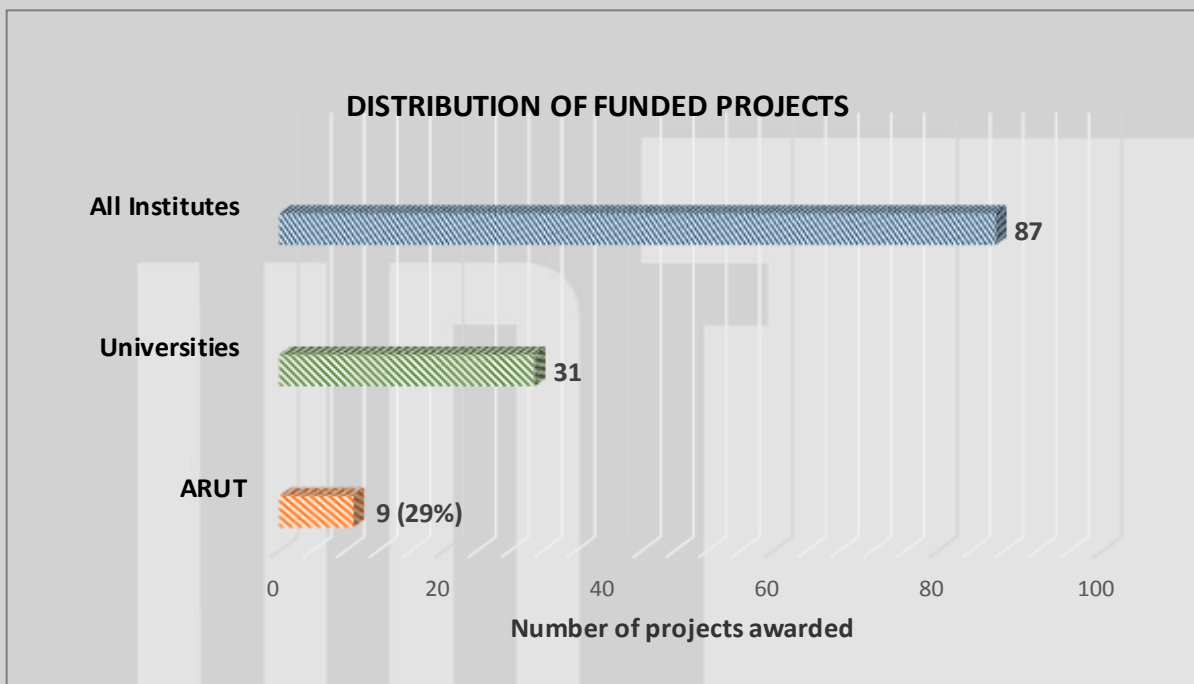


Fig.4 Results of competition PNCDI III "Complex projects realized in RDI consortia"

Note:

- 87 projects out of a total of 380 were declared successful
- In 71% of these projects, the universities of ARUT are present (both as coordinators and as partners)

PARTICIPATION IN THE H2020 PROGRAM (I)

	No. applications	% total EU	No. eligible applications	% total EU	Success rate(%)	Grants awarded	% total EU	Accessed funds (mil. euro)	% total EU
Cyprus	4126	0.65	3169	1.66	12.97	436	1.92	167.8	0.42
Czech Republic	7423	1.18	5855	3.07	14.31	888	3.92	301.5	0.75
Estonia	3765	0.6	3162	1.66	13.28	423	1.87	150.5	0.37
Latvia	2465	0.39	2006	1.05	13.66	280	1.24	60.86	0.15
Lithuania	2910	0.46	2320	1.22	13.66	326	1.44	61.05	0.15
Malta	1053	0.17	902	0.47	12.31	119	0.53	22.7	0.06
Polonia	13179	2.09	10174	5.33	12.1	1260	5.56	408.5	1.01
Slovenia	3140	0.5	2503	1.31	12.78	333	1.47	96.16	0.24
Slovenia	7507	1.19	5547	2.91	11.3	656	2.9	238.9	0.59
Hungary	8053	1.28	6480	3.4	11.48	763	3.37	261.2	0.65
Bulgaria	4633	0.73	3697	1.94	10.09	404	1.78	87.6	0.22
Romania	7060	1.12	5216	2.73	11.96	673	2.97	183.3	0.45
Croatia	3397	0.54	2619	1.37	12.98	359	1.58	76.03	0.19
Austria	17514	2.78	12726	6.67	16.38	2107	9.3	1240	3.06
Germania	78471	12.43	44579	23.36	14.92	6708	29.61	6810	16.88
Franta	55627	8.81	35364	18.53	15.14	5402	23.84	4910	12.18
Italia	77763	12.32	45434	23.81	11.41	5260	23.22	3680	9.13
Marea Britanie	80602	12.77	52225	27.37	14.48	7780	34.34	5930	14.7
Olanda	40248	6.38	25688	13.46	15.83	4109	18.14	3320	8.24
Portugalia	17170	2.72	11926	6.25	13.09	1576	6.96	691	1.71
EU average/ Total EU	711170		206477		11.91	24546		44190	

Tab.1 Romanian participation compared to other European countries

PARTICIPATION IN THE H2020 PROGRAM (II)

RO - Romania in H2020					
Pillar	Signed grant agreements with at least one participant from Romania	All participations in grant agreements	No of Romanian Participants in grant agreements	EU financial contribution to grant agreements (euro)	Net EU financial contribution to Romanian participants (euro)
Excellent Science	107	2,116	164	496,956 208	24,628 431
Industrial Leadership	137	2,605	251	898,049 390	29,715 756
Societal Challenges	380	8,033	538	2,559,899 664	115,058 633
Spreading excellence and widening participation	17	104	19	17,274 722	6,626 622
Science with and for Society	13	265	13	36,808 892	1,706 128
Cross-theme	4	24	4	8,004 895	6,626 665
Euratom Research and Training Program	15	640	27	765,854 674	4,879 463
TOTAL	673	13,787	1,016	4,782,848 444	183,280 032

Tab.2 Romanian participation in H2020 program detailed on pillar

PARTICIPATION IN THE H2020 PROGRAM (III)

Innovation Performance Modest Innovator

Innovation performance of the country according to the European Innovation Scoreboard 2018

R&D intensity
0,5% ^{2,1%}
EU average

R&D intensity (GERD as % of GDP)

R&D Intensity ranking
28 on 28^{EU}

Ranking position of the country in its country group, calculated based on R&D Intensity

EU contribution to R&I
1,25B ^{1,06B}
ERDF and EAFRD

H2020 contribution to R&I in EUR and contribution from European Structural and

Researchers ratio
913 ³⁶⁸⁷
EU average

Researchers (FTE) per million of population

Researchers ratio ranking
28th on 28^{EU}

Ranking position of a country based on the number of researchers per million of population

Knowledge-intensive employment
21,6% ^{36,1%}
EU average

Percentage of employment in Knowledge Intensive activities

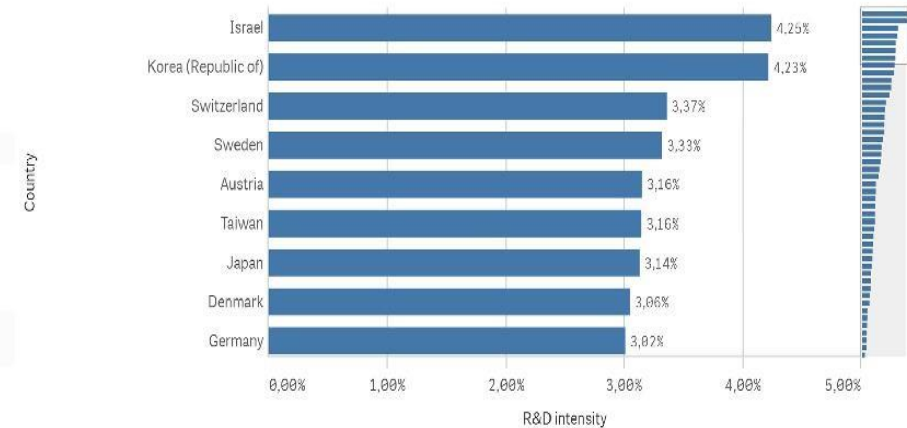
Patent applications rate
0,3 ^{3,7}
EU average

Patent applications per billion GDP in current Purchasing Power Standards (PPS in EUR)

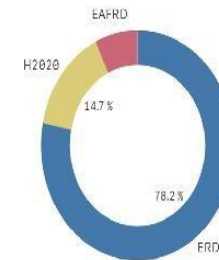
Top cited publications rate
4,8% ^{11,1%}
EU average

Percentage of scientific publications within the 10% most cited scientific publications

R&D indicators by country



EU Contribution to R&I (EUR)



Socio-economic data comes from external sources and the refresh date depends on the source system, as follows:

- 2018 for Innovation Scoreboard, ERDF, EAFRD
- 2017 for Population, RIA, EU Budget share

Fig.6 Romania's innovation performance indicators

PARTICIPATION IN THE H2020 PROGRAM (IV)

Comments

“Innovation performance” results are modest (fig. 2). Intensity index Research and Development in Romania (R&D intensity) is 0.5 compared to 2.1 EU average, as a result of :

- a very small number of researchers employed. In Romania we have less than 1000 (913) researchers / 1 million inhabitants. compared to almost 3700 researchers / 1 million inhabitants (European average)
- the number of articles in the first 10% as the number of citations is very low (4.8% of articles with Romanian authors compared to 11.1% European average)
- very few patents were actually implemented relative to the gross domestic product (0.37% patent application per billion GDP compared to the European average of 3.7%).

PARTICIPATION OF ROMANIAN UNIVERSITIES IN THE H2020 PROGRAM (I)

No.	LEGAL NAME	Value projects H2020	Number. of projects granted	
			Total	coordinated
1	UNIVERSITATEA POLITEHNICA DIN BUCURESTI	€ 7,178,947	34	5
2	UNIVERSITATEA TEHNICA CLUJ-NAPOCA	€ 4,286,235	19	3
3	UNIVERSITATEA BABES BOLYAI	€ 2,943,474	10	2
4	UNIVERSITATEA DIN BUCURESTI	€ 2,613,064	20	3
5	UNIV.DE MEDICINA SI FARMACIE CLUJ-NAPOCA	€ 1,506,406	6	1
6	UNIVERSITATEA TRANSILVANIA DIN BRASOV	€ 1,503,204	6	1
7	ACADEMIA NATIONALA DE INFORMATII MIHAI VITEAZUL	€ 824,337	3	0
8	UNIVERSITATEA ALEXANDRU IOAN CUZA DIN IASI	€ 823,371	7	3
9	UNIVERSITATEA POLITEHNICA TIMISOARA	€ 748,956	3	2
10	UNIVERSITATEA DE VEST DIN TIMISOARA	€ 745,191	7	0
11	UNIV.DE STIINTE AGRONOMICE SI MED.VETERINARA BUCURESTI	€ 732,273	5	2
12	UNIVERSITATEA DIN CRAIOVA	€ 727,457	10	0
13	UNIVERSITATEA DUNAREA DE JOS DIN GALATI	€ 676,313	3	0
14	UNIV. DE STIINTE AGRICOLE SI MED. VETERINARA CLUJ NAPOCA	€ 640,189	5	0
15	ACADEMIA DE STUDII ECONOMICE DIN BUCURESTI	€ 443,964	4	0
16	UNIVERSITATEA STEFAN CEL MARE DIN SUCEAVA	€ 440,500	3	1
17	UNIVERSITATEA TEHNICA GHEORGHE ASACHI DIN IASI	€ 424,710	1	0
18	UNIVERSITATEA VALAHIA TARGOVISTE	€ 384,568	1	0
19	UNIV. DE STIINTE AGRICOLE SI MED. VETERINARA TIMISOARA	€ 349,313	4	0
20	UNIVERSITATEA LUCIAN BLAGA DIN SIBIU	€ 325,938	3	0
21	UNIV.DE MEDICINA, FARMACIE, STIINTE SI TEHN. TARGU MURES	€ 259,500	1	0
22	UNIV. DE MEDICINA SI FARMACIE DIN BUCURESTI	€ 248,984	2	0
23	UNIV. DE STIINTE AGRICOLE SI MED. VETERINARA DIN IASI	€ 220,625	1	0
24	UNIVERSITATEA DE MEDICINA SI FARMACIE TIMISOARA	€ 220,149	1	0
25	UNIVERSITATEA SPIRU HARET	€ 207,000	1	0
26	UNIVERSITATEA TEHNICA DE CONSTRUCTII BUCURESTI	€ 187,503	1	0
27	UNIVERSITATEA OVIDIUS DIN CONSTANTA	€ 87,500	1	0
28	UNIVERSITATEA NATIONALA DE APARARE CAROL I	€ 83,500	1	0
29	UNIVERSITATEA DIN ORADEA	€ 70,000	1	0
30	UNIVERSITATEA SAPIENTIA DIN CLUJ-NAPOCA	€ 60,600	1	0
31	UNIVERSITATEA DE MEDICINA SI FARMACIE DIN IASI	€ 7,875	1	0
	TOTAL	€ 29,971,642	166	23

Tab. 3 Romanian universities that have applications granted in H2020

PARTICIPATION OF ROMANIAN UNIVERSITIES IN THE H2020 PROGRAM (II)

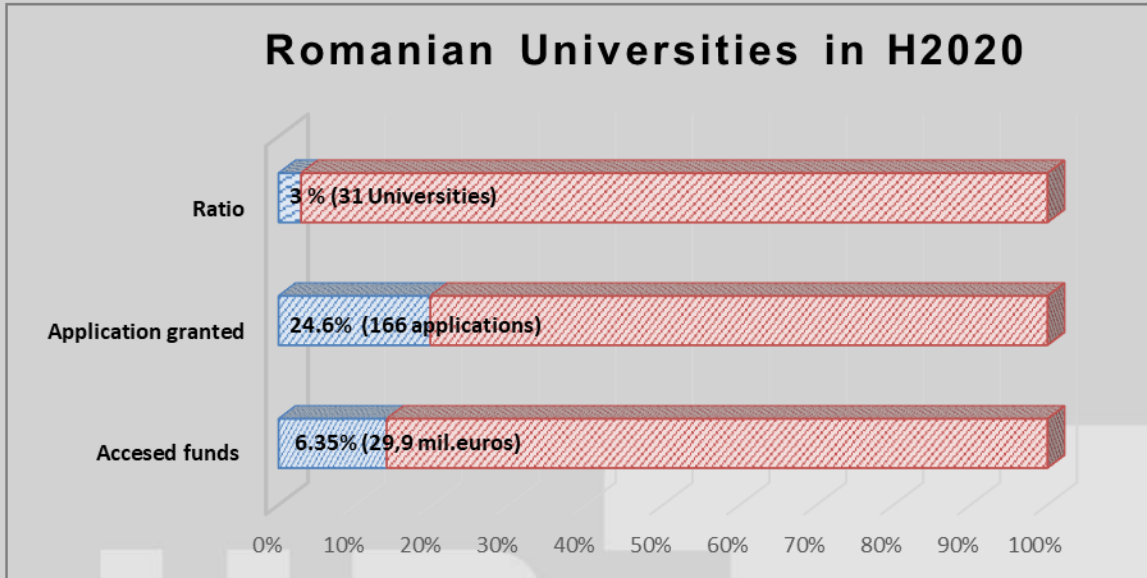


Fig.7 Comparative data (in % and values) regarding the presence of the Romanian universities compared to all Romanian participants in H2020

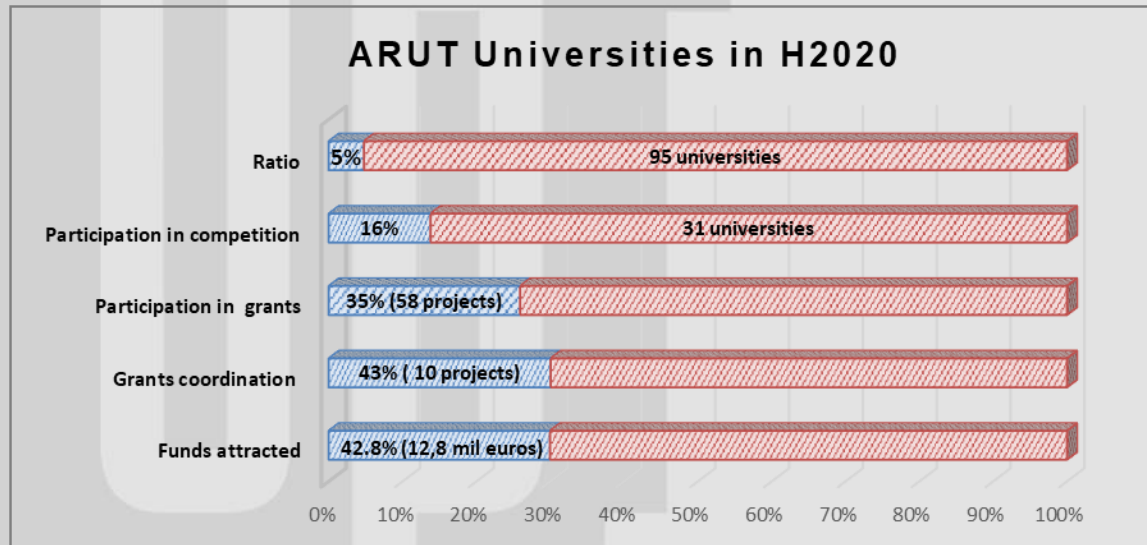


Fig.8 Comparative data (in % and values) regarding the presence of ARUT Universities compared to the Romanian universities participants in H2020

PARTICIPATION OF ROMANIAN UNIVERSITIES IN THE H2020 PROGRAM (III)

- there are 31 Romanian universities (29 public and 2 private) present in the grants awarded through H2020.
- universities represent 3.05% of number of Romanian participants in grant agreements.
- the number of granted applications for these universities (166) represents 24.66%.
- the value of the accessed funds is 29, 971 642 million euros, representing a quota of 16.35% of the total amount attracted by Romania.
- The Romanian technical universities members of ARUT alliance have granted 58 projects (35% of the total granted projects with Romanian participation), 10 as coordinator (43% of the total) with a total value of 12, 826 349 euros) which represents a proportion of 42.79% of the total amounts attracted by the Romanian universities.

ANALYSIS AND POINTS OF VIEW

Main causes for this results in the program:

- weak integration in European research networks, which drastically limits the possibilities for inclusion in the consortia that are constituted for the submission of projects.
- lack of visibility of the Romanian researchers at European level.
- lack of sufficient number of researchers; one of the causes being brain drain migration from Romania
- low pay until 2018 for university teachers and researchers
- lower pay and differentiated compared to that of partners in H2020 projects
- complexity of the management activities is often discouraging (starting with the project proposal and continuing with the project development, reporting, reimbursement etc.), taking into account the current obligations as a teacher (teaching, evaluation, other administrative activities).
- differences between the legislation in Romania and other countries (regarding the payroll, allowance for expenses, the method of purchasing equipment) that slows and makes it difficult the activity of Romanian parties.

HORIZON EUROPE. EXPECTATIONS (I)

European Commission sets itself several complex tasks in this new research program,

1. Simpler and fewer partnerships

Under their plan, FP9 would do a spring clean on EU partnerships, and create a clear, easy to communicate architecture under the umbrella term “European Partnership Initiatives”.

2. Bridging the east-west divide

The new programme promises more resources to close the persistent research gap. Horizon 2020 introduced three competitions to boost poorer member state participation: teaming, twinning and ERA Chairs. “The budget of this strand will be ring-fenced and increased in comparison to Horizon 2020,” the paper says

3. Growing bigger, more competitive companies

The continent generates scientific discoveries “but is lagging behind in turning them into new products, services, processes or business models that impact markets”, European companies grow, but remain too small to compete globally.

HORIZON EUROPE. EXPECTATIONS (II)

4. More open science

Horizon Europe promises to get serious on open access. Going forward, open access will be the general rule in the next program, although there will continue to be exceptions for commercial and personal data.

5. Greater foreign access

According to the program documents it “will extend association to include all countries with excellent R&I capacities and no longer confined to a particular part of the world [...] will be maintained, while encouraging comparable reciprocal access to third country programs”

6. More citizen science

Missions planned under the EU’s 2021 – 2027 research program are the answer to “the clear need for greater outreach to citizens”

A take on research ‘moonshots’, missions, as described in another draft document, “must be readily understandable to the public [and] captivating in nature.

HORIZON EUROPE. EXPECTATIONS (III)

Science Europe firmly believes that Europe needs and deserves a research program which:

- has a substantially larger budget than Horizon 2020 in order to meet ambitious goals such as strengthening the European position on the world research and innovation landscape, and addressing the societal challenges Europe faces;
- recognises ‘excellence’ as its core principle and reinforces instruments promoting research excellence such as the European Research Council
- provides opportunities for fundamental and applied research in all parts of the programme
- includes measures to encourage and develop excellence in all countries of the European Research Area
- encourages Open Access to research results and data sharing.

PROPOSED SOLUTIONS / ACTIONS (I)

- Increasing the visibility of Romanian researchers through :
 - promoting Romanian researchers in European Committees, Working Groups, Interest Groups.
 - encourage Romanian researchers to apply as evaluators in European programs and to provide support for the correct description of the evaluator profile
- Encouraging participation of universities in the H2020 competition by UEFISCDI
- Developing a sub-program dedicated especially to countries in this part of Europe (a kind of Horizon INTERREG focused on regional research)
- Application of measures for the effective and real growth of the support from NCPs in Romania (which should be organized as a team), an external consultancy for drafting projects until a team is established in each university specialized in this activity.
- Inviting specialists from other European universities to train Romanian research groups

PROPOSED SOLUTIONS / ACTIONS (II)

- Directions of action at the institutional level:
 - professionalization of project management (project proposals, project development) through the creation of "Support Centers" for International CD projects with the role of increasing the capacity to participate in European competitions (launched in Romania in no.2016 a competition within the Program Operational Competitiveness 2014-2020 (POC) - for European structural funds, for this purpose but not yet finalized);
 - focus on accessing specific financing instruments to maximize participation in European projects. An example of this is the competitions of projects financed from the European Structural and Investment Funds for "Creating synergies with the RDI actions of the Horizon 2020 program of the European Union ..."
These financing instruments include co-financing RO for type projects. Teaming, Twinning, ERA Chairs, etc. from the "Spreading excellence and widening participation" pillar of H2020.

PROPOSED SOLUTIONS / ACTIONS (III)

- Creation at ARUT level of a specialized department for the development of Horizon Europe projects, gathering knowledge and best practices from the 5 universities' experts.
- Choosing and designation of priority areas of research, at the level of university and ARUT, where there is potential (human resources, research infrastructure, fields of doctoral studies, remarkable results) in the "intelligent specialization" paradigm.
- ARUT (and other educational and research structures) will have to convince the Romanian government to increase of the national RDI budget, which is directly reflected in the net amount of the EU contribution for the participants in the European projects in the respective country.



POLITEHNICA