LIEE NTUA LABORATORY OF INDUSTRIAL & ENERGY ECONOMICS
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Participation determinants in EU-funded Framework Programmes: An empirical assessment for Greece

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Presentation Structure

- Research Objective
- Theoretical Background
- Methodology
- Research Findings
- Conclusions
- Policy Implications

Research Objective

- The paper aims to explore **the factors that favour or hinder the participation of Greek Firms and Research Groups (RGs)** of Universities and Research Centers in European research projects. In particular, it examines:
  a) the entity's basic characteristics (e.g., size, sector and age for firms, and size, scientific field and institution type for RGs),
  b) the level of human capital, and the innovation and R&D strategy/capacity for firms, and the research capacity for RGs
  c) the availability of other funding sources for research activity for RGs,
  d) the past participation,
  e) the motivation for participating,
  f) other exogenous factors

Theoretical Background

Firms

- **Factors** favouring the propensity **for applying and getting funded from FPs** (Barajas and Huergo, 2010; Faber et al., 2016)
  - Firm's **absorptive capacity** (e.g. intangible assets)
  - Firms belonging to **high-tech** and **knowledge-intensive sectors**
  - **Export activity**
  - **Previous international R&D collaboration**
  - **Prior experience in FP proposals** (even rejected)
  - **Motive for knowledge sharing** in order to develop new knowledge and innovation opportunities for the long-term future (Bach et al., 2014)
  - **Motive for cost sharing** of R&D and developing new products
  - ➢ On the other hand, **participation costs** in terms of finances, time and expert manpower decrease the probability to participate in FPs

Academic/Research Organizations

- **Factors** that increase the propensity to **apply for funding from FPs** as well as to **receive such funding** (Lepori et al., 2015; Enger and Castellacci, 2016; Enger, 2018)
  - **Previous participation in FPs**
  - **Central and influential position** in the research networks formed through these programmes
  - **Scientific Reputation**, i.e. scientific production (no of publications) and its impact (no of citations)
  - **Organization Size** (e.g. due to better common infrastructures, more developed support services, more opportunities for internal cooperation)
  - **Research Capacity**, i.e. no of researchers and research teams
  - ➢ The **availability of other funding sources** (e.g. national funding) mainly facilitates **application efforts.**

Empirical approach: Two quantitative and one qualitative research methods

Survey

- An online survey was conducted between February and July 2022 in **260 Greek entities: 103 business firms and 157 research groups** in Universities and Research Centers which had participated in Horizon 2020.
- Main survey instrument: **two structured questionnaires** (firm and research group version) **completed by:**
  a) the R&D manager or the owner/founder of the firm,
  b) the research group member with the scientific responsibility of an EU-funded Horizon 2020 research project.

Case Studies

- **25 Case Studies** were conducted in **Greek business firms (9)** and research groups of Universities (10) and Research Centers (6).
- They were based on **face-to-face interviews** (each one conducted by 2 researchers) completed in July 2022 **with:**
  a) the R&D manager or the owner/founder of the firm,
  b) the research group member with the scientific responsibility of an EU-funded Horizon 2020 research project.
- The interviews were based on two **semi-structured questionnaires**.

Social Network Analysis

- It provides insights for a longitudinal view of the **EU-funded research networks** regarding the structure of network relationships and the position of individual organizations within them.
- It utilizes the **"STEP-to-RJVs" database** (developed by LIEE-NTUA) including detailed information on collaborative research projects of FP1-FP7 and Horizon 2020.

Greece is exhibiting a long standing and intense presence in the EU-funded FPs since their inception in 1984

- Greece ranges between the **7th and 10th position** among EU countries in terms of **participations** and between the **8th and 11th position** in terms of the number of **participating organisations** for the overall period 1984-2020.
- Greece is in the **9th place** based on the number of organizations that are in the **top-1% and the top-5% in terms of centrality** in the research networks (see Figure).
- **Greek universities and research centers** have acquired **a significant role** in the resulting research networks (Protogerou et al., 2010; Caloghirou et al., 2021).
- The **share of competitive EU FP funding** in total R&D expenditure is **much larger for Greece** (10-12%) compared to other large and research advanced EU countries (Caloghirou et al., 2021).
- **Higher success rate** compared to the total average in important H2020 funding programmes (e.g. ICT: 13.6% vs 8.5%, Heath: 9.3% vs 7.7%, Energy: 16.5% vs 12.3%)

Ranking based on the top 1% central organizations	Country	Central Organizations		Peripheral Organisations
		Top 1%	Top 5%	
1	Germany	123	484	11859
2	United Kingdom	122	311	9048
3	France	100	392	8717
4	Spain	84	314	6671
5	Italy	79	379	7868
6	Netherlands	45	189	5118
7	Sweden	32	108	2552
8	Belgium	31	178	3401
9	Greece	28	107	2245
10	Austria	27	84	2116
11	Finland	23	70	1486
12	Portugal	21	90	1902
13	Denmark	18	80	1938
14	Poland	12	87	1423
15	Ireland	11	41	1184
16	Hungary	8	46	794
17	Czech Republic	7	49	772
18	Slovenia	4	17	590
19	Romania	3	27	872
20	Slovakia	3	14	382
21	Bulgaria	2	19	491
22	Cyprus	2	15	264
23	Estonia	2	9	305
24	Latvia	2	10	231
25	Lithuania	2	12	288
26	Luxembourg	2	10	228
27	Croatia	1	4	273
28	Malta	1	2	82

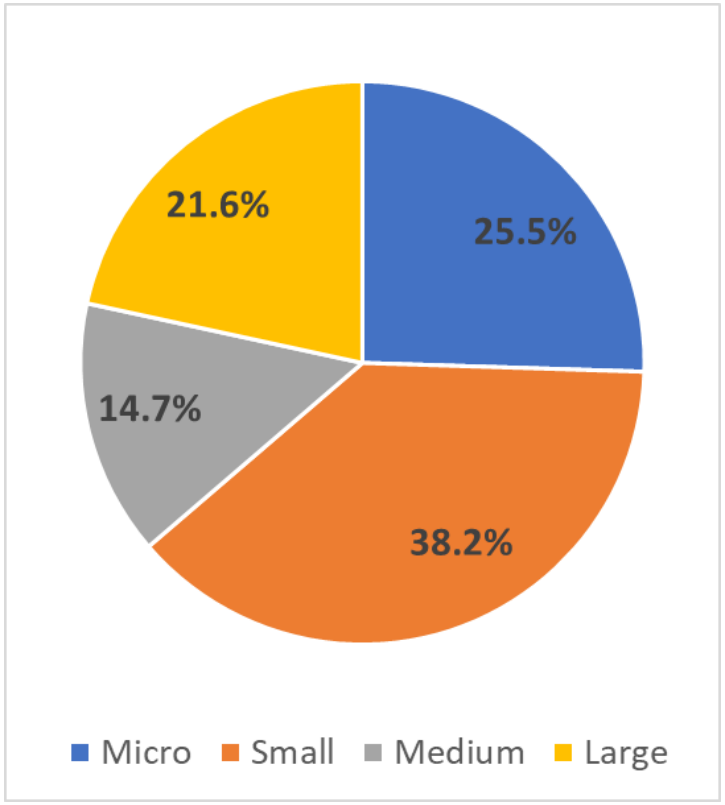
7 Greek Universities and research centers are ranked among the top 100 European organizations based on the centrality of their network position, their total participations and their participations as coordinators of research projects, in all FPs (1984-2020).

Organization Name	Organization Type	Ranking by Centrality	Ranking based on Participations as Coordinator*	Ranking based on Total Participations*
National Technical University of Athens	Academic	7	9 (147)	7 (1263)
Aristotle University of Thessaloniki	Academic	23	42 (73)	34 (523)
Foundation for Research and Technology - Hellas	Research	29	20 (111)	26 (615)
University of Patras	Academic	36	92 (45)	44 (469)
National Centre for Scientific Research "Demokritos"	Research	57	50 (64)	77 (356)
Centre for Research and Technology Hellas (CERTH)	Research	61	15 (125)	30 (568)
National and Kapodistrian University of Athens	Academic	88	39 (116)	56 (424)
Centre for Renewable Energy Sources	Research	171	201 (26)	143 (213)
Athens University of Economics and Business	Academic	226	986 (6)	314 (121)
INTRACOM	Industry	243	138 (34)	174 (187)
Agricultural University of Athens	Academic	258	317 (18)	278 (135)
National Observatory of Athens	Research	319	659 (9)	365 (103)
Technical University of Crete	Academic	325	842 (7)	469 (82)
Hellenic Centre for Marine Research	Research	331	986 (6)	339 (112)
ATHENA Research and Innovation Centre in Information, Communication and Knowledge Technologies	Research	427	279 (20)	387 (98)

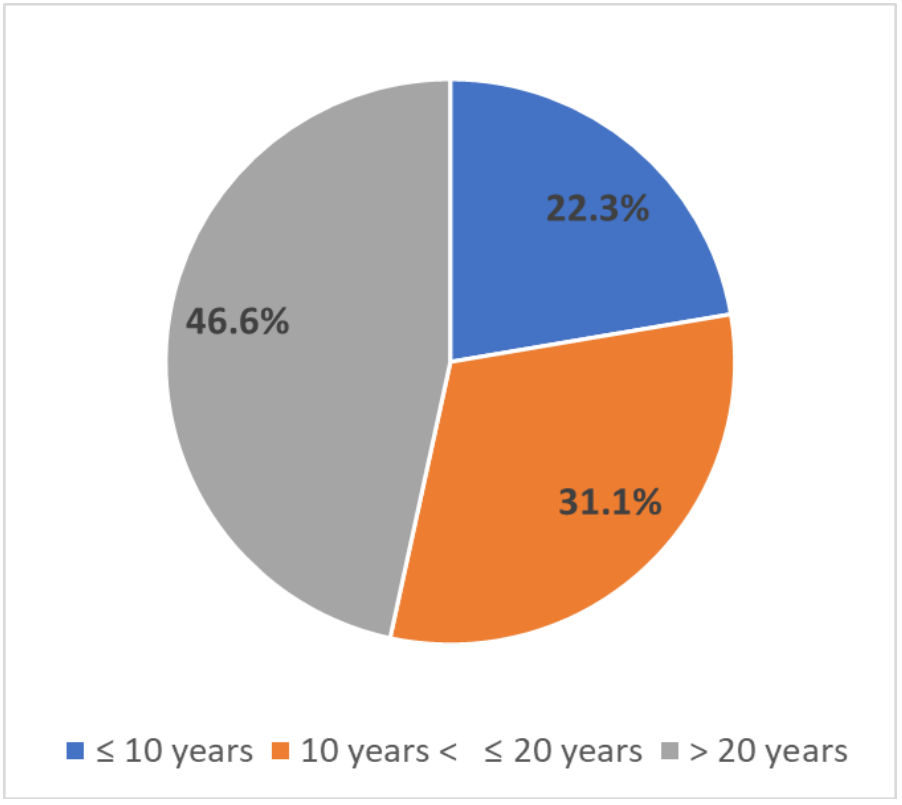
*In parenthesis the number of participations as Coordinator and total participations respectively

Survey Sample Characteristics: Firms (N=103)

Size



Age



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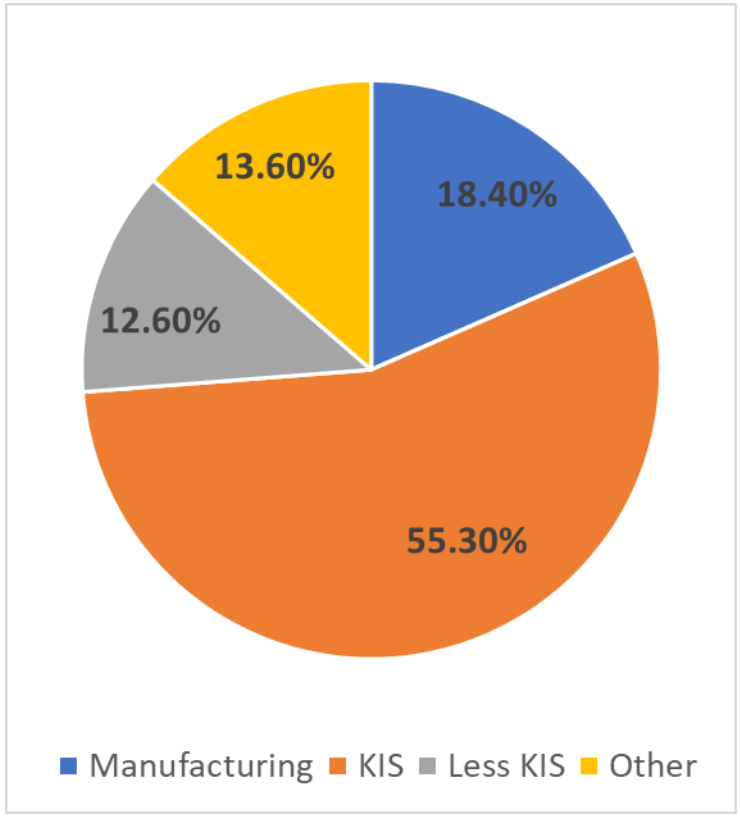

Survey Sample Characteristics: Research Groups (N=157)

	No. of Research Groups	% of the total sample	No. of Organizations
Universities	110	70%	16
Research Centres	47	30%	11

No. of Research Groups Members	Total Sample of RGs (%)	Univer-sities' RGs (%)	Research Centers' RGs (%)
0 < ≤ 5	**14.1**	13.8	14.9
5 < ≤ 10	**31.4**	28.4	38.3
10 < ≤ 20	**28.2**	29.4	25.5
20 < ≤ 30	**15.4**	18.3	8.5
30 < ≤ 50	**6.4**	6.4	6.4
50 <	**4.5**	3.7	6.4

Scientific Field	Total Sample of RGs (%)	Univer-sities' RGs (%)	Research Centers' RGs (%)
Engineering and technology	**42.2**	47.7	28.9
Natural sciences	**24**	18.3	37.8
Medical and health sciences	**9.7**	11.9	4.4
Agricultural sciences	**9.1**	7.3	13.3
Social sciences	**8.4**	7.3	11.1
Humanities	**6.5**	7.3	4.4

Basic characteristics of the case studies' sample – Selection Criteria

- 9 Firms
  - **3 young micro firms**: 1 spin-off (2019) and other two young firms (2017 & 2012) in a) laser technologies applied in medicine, b) biotechnology, and c) nanotechnology respectively
  - **6 established firms**:
    - 5 Large firms in a) cosmetics, b) telecommunications, c) mining, d) energy storage systems, and e) primary and secondary education.
    - 1 Medium-sized firm in design and production of industrial equipment
- 16 Research Groups (RGs)
  - **9 RGs** from **4 Universities and 3 Research Centres** included in the **100 top European Organisations** in terms of **FPs participation and position centrality** in the relevant research networks.
  - **7 RGs** from **4 Universities and 3 Research Centres** with **relatively high FPs participation** as well.
  - Various scientific fields: Medicine, pharmaceutics, biology, software, chemical engineering, environmental technologies, biomedical engineering, material science, energy technologies etc

Survey & Case Studies Results

Participation in Horizon 2020 programme: Research Groups (RGs) exhibit higher success rate of proposals and higher number of funded projects, and also they conduct a coordinator role more frequently

	Firms		Research Groups	
	N	Average*	N	Average*
Total No of Projects in Framework Programmes	100	9.5 (5)	144	12.9 (6)
No of Projects in Horizon 2020 programme	103	4.2 (2)	157	5.9 (3)
No of proposals in Horizon 2020 programme	101	16.7 (8)	156	19.6 (8.5)
Success Rate in Horizon 2020 programme	101	42% (33.3%)	156	45.7% (40%)
Ratio of Horizon 2020 projects with Coordinator Role	102	7.3% (0%)	156	23% (10%)
	N	**% of Firms**	**N**	**% of Research Groups**
Role of Coordinator in at least one Horizon 2020 project	**102**	**15.5%**	**156**	**51.6%**

* Mean and median in parenthesis

- Furthermore:
  - **Medium/Large firms** have higher number of proposals and funded projects
  - **Micro/Small firms** exhibit higher success rate and have the role of coordinator more frequently
  - **RGs from Research Centres** have higher number of proposals and funded projects compared to RGs from Universities

The majority of Research Groups' funds comes from European Programmes. For Universities' RGs, this funding source is even more significant.

% of total funding for research activity within the last 5 years	Universities (N = 109)	Research Centres (N = 47)
	Mean	Mean
European Programmes	69.1%	60.5%
National Programmes	19.6%	28.7%
Cooperation with firms or other entities for service provision	9.5%	8%
Regular budget of the University or Research Centre	1.7%	2.8%

Firms' Motives for participation in FPs: Access to funding, networking and acquisition of new knowledge are the most important motives

Survey results

	Valid N	Mean (5-point scale)	High Extent (% of Firms)
Funding and Networking	103	**4.28**	**83.5%**
Access to funding			
Networking and building solid cooperation			
Technological knowledge enhancement	103	**4.48**	**88.3%**
Monitoring key technological developments / cutting edge technologies			
Strengthening existing / creation of new know-how			
Innovation and business development	103	3.83	57.3%
Faster development and market introduction of new products/services			
Entering a new market / improving the company's position in an existing market			
R&D cost and risk sharing	102	3.48	54.9%

Case study results

- Access to funding
  - ➢ Especially important and vital for young research-intensive firms
- Networking and building solid cooperation with other entities
  - ➢ Continuous and systematic research collaboration with research bodies and/or other firms, access to new customers, and promotion and enhancement of firm's image.
- Strengthening existing / creation of new know-how
  - ➢ Enhancing their innovation capability in long term and in turn entering new markets and strengthening their competitive position
- Monitoring key technological developments / cutting edge technologies
  - ➢ Particularly for large firms

Research Groups' Motives for participation in FPs: Access to funding for maintaining/enhancing their human resources, networking and advancing their research activity are the most important motives

Survey results

	Valid N	Mean (5-point scale)	High Extent (% of Firms)
Funding and human resources maintaining/enhancement	155	**4.72**	**92.9%**
Access to funding			
Maintaining of existing and acquiring of new researchers			
Networking/Reputation enhancement	156	**4.49**	**85.9%**
Strengthening scientific reputation			
Networking and building solid cooperation			
Research Knowledge/Infrastructure enhancement	156	4.17	69.9%
Research activity and monitoring developments in cutting-edge fields			
Technological infrastructure enhancement			
Producing research results with potential commercial utilization	155	3.49	51.6%

Case study results

- Access to funding with primary goal to maintain and enhance their human resources
- Networking and building solid cooperation with other knowledge entities at a European level & Evolving their research activity and monitoring developments in cutting-edge fields
  - ➢ Acquisition/exchange of knowledge.
  - ➢ Expanding the field of their activities and enhancing the interdisciplinarity of their work.
  - ➢ Enhancing the research group's visibility and scientific reputation.
- Technological infrastructure enhancement
  - ➢ Important for RGs belonging to specific scientific/technological fields

Determinants of Firms' participation and proposals intensity in Horizon 2020 programme (linear regression models)

Independent Variable	Dependent Variable	
	No of H2020 projects (Ln)	No of proposals in H2020 (Ln)
Control Variables		
Firm's Age	-0.007	-0.001
No of Employees (Ln)	0.463***	0.592***
Sector_Manufacturing	-0.344	0.340
Sector_KIS	0.126	0.893***
Sector_Less KIS	-0.306	0.239
Firm's knowledge and innovation characteristics		
Ratio of Employees with Master/PhD	0.006**	0.004
Innovation Strategy	0.186*	0.000
Ratio of Employees involved in R&D	0.011***	0.020***
Previous participation intensity in FPs		
No of projects in previous FPs	0.008	0.013*
Participation motives		
Motive_Funding/Networking		0.487***
No. of Observations	89	88
F	9.33	12.76
Prob > F	0.000	0.000
R^2	0.5152	0.6236
Adjusted R^2	0.4599	0.5748

- **Firms' human resources capacity** favours the participation in proposals and research projects.
- Firms in **Knowledge-intensive Services** are more interested in acquiring European funding for research activity.
- Firms with **higher human capital, research capacity and innovation strategy** tend to participate more in funded European projects.
- **Previous participation** in FPs influences positively the participation in proposals.
- The **motive of access to funding and networking** is a crucial determinant for participating in proposals submission.

Determinants of Research Groups' (RG) participation and proposals intensity in Horizon 2020 programme (linear regression models)

Independent Variable	Dependent Variable	
	No of H2020 projects (Ln)	No of proposals in H2020 (Ln)
Control Variables		
Organization_Research Center	0.442***	0.443***
SciField _Engineering_Natural_Agriculture	0.516***	0.368*
SciField_MedHealth	0.024	-0.065
SciField_Social Sciences_Humanities	-	-
Organization's Networking_First 100 European	0.038	-0.060
RG's Capacity		
RG's Members (Ln)	0.601***	0.590***
RG's Funding Characteristics		
% of funding from National Programmes	-0.009***	-0.008**
% of funding from Cooperations with firms or other agencies	-0.012***	-0.010*
Previous participation intensity in FPs		
No of projects in previous FPs	0.012***	0.018***
Participation motives		
Motive_HRsEnhancement/Funding		0.348**
No. of Observations	139	138
F	15.82	11.04
Prob > F	0.000	0.000
R^2	0.4932	0.4371
Adjusted R^2	0.4621	0.3975

- RGs from **engineering and technology, natural and agricultural sciences** exhibit higher participation in research projects.
- **RGs' research capacity** favours significantly the participation in proposals and research projects.
- The **access to other funding sources** decreases the tendency for participating in European projects.
- **Previous participation in FPs** facilitates strongly the participation in proposals and research projects.
- The **motive of access to funding and human resources maintaining/enhancement** is a crucial determinant for participating in proposals submission.

Case Studies' Research Findings
Enablers and barriers for participation in FPs

Enablers: Common for firms and RGs'

- The **previous participation in FPs** and the **already established networking** with other entities from Europe and Greece
  - The entrance in new proposals/consortiums is favoured through **scientific reputation and visibility building**.
  - The **relations with Greek research groups** is critical for – both young and established - **firms' participation** in FPs.
  - The RGs' and firms' staff **accumulates experience in proposals preparation/submission**.
- **Capacity (availability of human resources)** to participate in proposals preparation.
  - **Larger entities with slack human resources** that can be utilized exclusively or mainly for this purpose.
  - The participation in proposals submission implies **a higher risk for smaller firms and research groups**, due to the more limited resources and the uncertain result of getting funded due to the increased competition.

Case Studies' Research Findings
Enablers and barriers for participation in FPs

Barriers (Disincentives)

- For RGs: The **increased bureaucracy of Greek Universities and Research Centres** relating to financial administration rules (e.g. lengthy procurement procedures for acquiring research equipment) stemming from the Greek legislation.
- For Firms: The requirements of Horizon 2020 programme for **large and interdisciplinary consortiums:**
  - **increases the complexity of the participation and projects' implementation process,** and
  - may make **less clear the project's outcome** and consequently the **expected business benefits**, especially for smaller firms.

Conclusions

- The **Greek participation in FPs has been particularly high**, not only compared to similarly capacity European partners, but also in relation to the country's own GDP and R&D expenditure.
- **Research Groups** are characterized by **more intensive participation** – having the role of coordinators more frequently – as **funding from FPs is vital** for them.
- **Previous participation** facilitates significantly current participation, especially for Research Groups.
- **Research capacity** and **availability of high-level human resources** favour proposals and participation intensity for both types of entities.
- **Crucial motives** that affect significantly the intention to participate in European projects**:**
  - **Firms: Access to funding and networking** with various targeting (building relationships with research bodies and/or other firms, new knowledge acquisition, approaching new customers).
  - **Research Groups: Access to funding** aiming at **maintaining existing and attracting additional researchers.**

Policy Implications

Proposed measures for increasing the participation of knowledge-intensive (KI) entities in FPs:

1. **Creation/Strengthening of mechanisms supporting the participation** of young and micro/small firms, and small research groups in proposal submissions:
   a) management-consulting and networking services (National level and Organisation level, i.e. Universities & Research Centres)
   b) Financial support to these firms and research groups per submitted proposal (National level)
2. **Mitigating the increased bureaucracy** of Greek Universities and Research Centres implying inefficient and lengthy financial administration prodecures (e.g. for procuring research equipment). (National level and Organisation level)

Thank you very much for your attention

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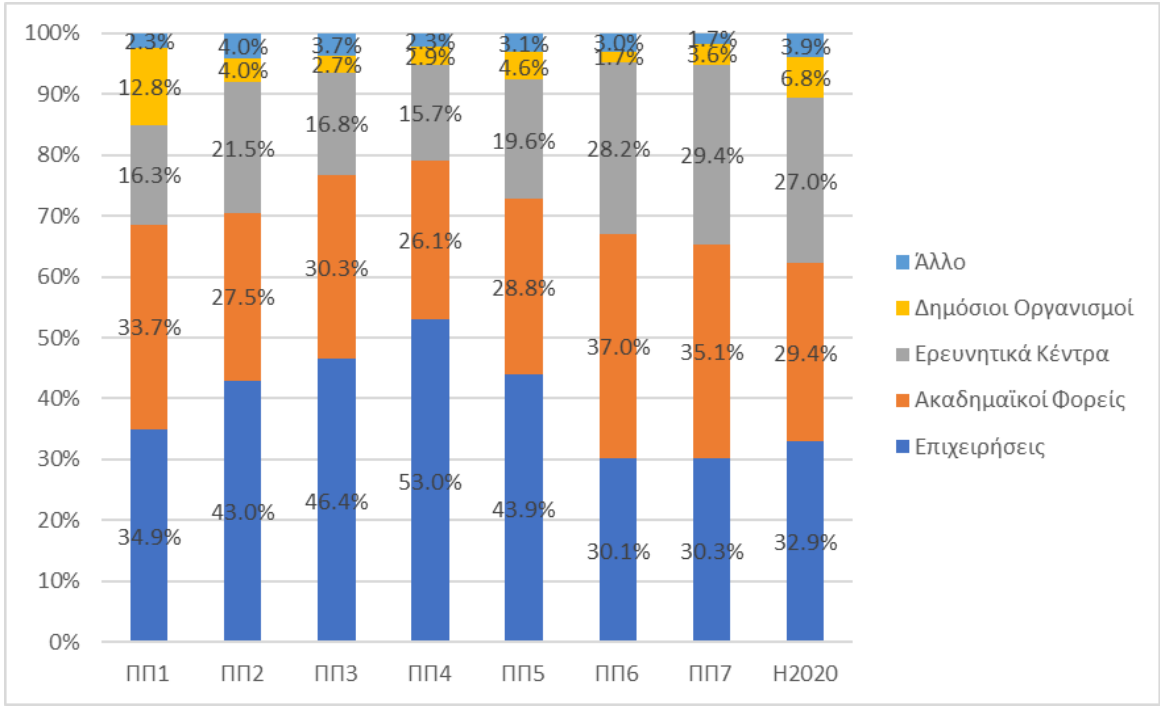
Spare

Σύνολο συμμετοχών από την έναρξη των Προγραμμάτων Πλαίσιο (1984-2020)

Κατηγορία	Συμμετοχές	%
Επιχειρήσεις	4.486	37,7%
Ακαδημαϊκοί Φορείς	3.697	31,0%
Ερευνητικά Κέντρα	2.860	24,0%
Δημόσιοι Οργανισμοί	515	4,3%
Άλλο	354	3.0%
Σύνολο	**11.912**	**100,0%**



Ποσοστό συμμετοχών ανά ΠΠ και ανά κατηγορία οργανισμών

Χρηματοδότηση στο H2020

Κατηγορία	Συμμετοχές H2020	Συνολική χρηματοδότηση	%	Χρηματοδότηση ανά συμμετοχή
Επιχειρήσεις	1.018	269.802.999 €	28,3%	272.804 €
Ακαδημαϊκοί Φορείς	911	327.131.940 €	34,3%	361.872 €
Ερευνητικά Κέντρα	835	304.951.338 €	32,0%	366.088 €
Δημόσιοι Οργανισμοί	210	38.967.099 €	4,1%	189.161 €
Άλλο	121	13.169.275 €	1,3%	108.837 €

Συντονιστικός ρόλος

- Ανοδική πορεία: Ακαδημαϊκοί φορείς & Ερευνητικά κέντρα
- Πτωτική πορεία: Επιχειρήσεις

Κατηγορία	ΠΠ1-ΠΠ6	ΠΠ7	H2020
Επιχειρήσεις	13,1%	7,9%	6,3%
Ακαδημαϊκοί Φορείς	9,1%	12,0%	16,5%
Ερευνητικά Κέντρα	14,7%	15,8%	17,1%
Δημόσιοι Οργανισμοί	1,9%	0,0%	1,0%
Άλλο	7,8%	2,4%	0,0%