

“The Greek Research and Innovation System: Strengths and Weaknesses.  
Is an innovating out of the crisis feasible for the Greek economy?”

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# Links between R&I Policies and Growth: some key-messages

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- **Growth cannot** be considered as mostly a **macroeconomic phenomenon**. In contrast, to that view, growth is a **dynamic process** that takes **many different forms** and results from the interplay of **lots of different factors** (technology, institutions, industry structures, human capital,..).
- There is **not an automatic link** between the necessary macroeconomic stabilization (plus some general market-based structural reforms) and a high-quality, high-potential growth trajectory.
- A well functioning **innovation system** (in its broader view) is essential.
- Furthermore, in a **rapidly globalising world**, success depends ever more on **the production and conversion of knowledge into Innovation**. **Therefore, investing in research and innovation** is increasingly **crucial** for shaping a better European future.
- **Knowledge intensive entrepreneurship** (KIE) can be considered as a transformative mechanism converting useful knowledge into economic activities and innovative new ventures and a key driving force for an innovation-led and high-growth potential growth path.

# The promise of growth in the Greek context: Go for an innovation-led growth strategy to improve structural competitiveness and the position of the Greek production system in the international division of labour

- **The current situation**

- Long (already a decade) and deep (loss of 25% GDP, very high unemployment above 20%) **depression** i.e. a prolonged period of economic **recession** marked by a significant decline in income and employment of the Greek economy.
- The huge investment gap during the crisis period is estimated between 100-130 billion Euros.
- Competitiveness of the Greek economy deteriorated (by losing a considerable number of places) by all available rankings (IMD, WEF,..).
- The importance of the denominator is key in dealing with the Greek debt crisis (DEBT/GDP).

- **The gloomy future**

- Did the recovery has come and the restart of the hardest hit peripheral economy in Europe is on its way? And how sustainable can be? Three years back, during Q3 and Q4 of the year 2014, there was the same feeling, but for many reasons, the recession did not end.
- And, now a danger is ahead us, for Greece to become a **cheap country for visitors and foreign business, very expensive for its inhabitants, incapable to employ and take advantage of its educated and well trained younger generations, and unable to sustain an acceptable standard of living.**

- **The key goal of the country's strategy**

- The improvement of the position of the *Greek system of production and innovation in the evolving international division of labour*
- Exclusive focus on unit labour cost is **not the right strategy** for improving competitiveness.
- **Structural Competitiveness** should be in the epicenter of economic policy and the growth agenda.

# 1. The Greek Research and Innovation System: Strong and weak points

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- High and visible presence of Greek academic institutions (both in terms of participation and project co-ordination) coupled with an important role in the research networks emerging from the EU- funded under competitive terms research programmes during a period of more than 30 years (1984- 2013).
- Increasing scientific production and academic recognition (in terms of citations).
- Remarkable presence in the top 1% of most cited research (a proxy for research excellence).

But.

- Very little commercialisation and less academic entrepreneurship.
- Underinvestment by both the public and the private sector in R&D.
- The threat of one way “brain drain” (instead of a two-way mobility of researchers in an internationalised research landscape).

# Participation intensity and centrality role of Greece in FPs (1984-2013)

(\* number of actors, number of participations in parenthesis)

Rank	Country	Participants (Participation)	Coordinators (Participation)	Central Actor (Participation)
1	GERMANY	10688 (38613)	1753 (4196)	99 (15304)
2	UNITED KINGDOM	7793 (32092)	1679 (4628)	103 (15015)
3	FRANCE	7627 (30207)	1542 (3988)	90 (11984)
4	ITALY	6549 (24496)	1281 (2886)	69 (8663)
5	SPAIN	5246 (18277)	942 (2111)	56 (6245)
6	NETHERLANDS	4172 (15862)	809 (2170)	43 (6905)
7	BELGIUM	2989 (10927)	602 (1381)	19 (3680)
8	<b>GREECE</b>	<b>1891 (8871)</b>	<b>298 (930)</b>	<b>21 (4028)</b>
9	SWEDEN	2223 (8710)	280 (770)	26 (3804)
10	DENMARK	1766 (6568)	366 (859)	15 (2373)
11	SWITZERLAND	1537 (6074)	83 (213)	19 (2596)
12	AUSTRIA	1805 (5857)	289 (671)	23 (1935)
13	FINLAND	1303 (5249)	177 (531)	18 (2435)
14	PORTUGAL	1578 (5079)	209 (386)	16 (1571)
15	NORWAY	1104 (4063)	177 (465)	12 (1230)
16	IRELAND	972 (3683)	151 (433)	9 (1475)
17	POLAND	1085 (3220)	121 (207)	10 (587)
18	CZECH REPUBLIC	740 (2044)	39 (50)	6 (406)
19	ISRAEL	562 (1961)	93 (187)	9 (855)
20	HUNGARY	695 (1942)	53 (76)	4 (327)
	Other-EU (28)	2877 (7516)	217 (323)	18 (1400)
	Other-Non EU	4248 (7989)	92 (181)	9 (436)
	<b>Total</b>	<b>69450 (249300)</b>	<b>11253 (27642)</b>	<b>694 (93254)</b>

# Top 20 most important organizations in EU- funded policy-driven research joint ventures (1984-2013)

A/A	Organisation Name	Type	Country	Participations	Coordinator	Centrality score*
1	FRAUNHOFER GESELLSCHAFT ZUR FÖRDERUNG DER ANGEWANDTEN FORSCHUNG EV	RES	GER	2265 (1)	420 (1)	5 (1)
2	CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE (CNRS)	RES	FRA	2064 (2)	291 (2)	10 (2)
3	NETHERLANDS ORGANISATION FOR APPLIED SCIENTIFIC RESEARCH - TNO	RES	NET	1232 (3)	191 (3)	11 (3)
4	CONSIGLIO NAZIONALE DELLE RICERCHE (CNR)	RES	ITA	1063 (4)	154 (5)	18 (4)
5	VTT - TECHNICAL RESEARCH CENTRE OF FINLAND	RES	FIN	1021 (6)	141 (6)	19 (5)
6	COMMISSARIAT À L'ENERGIE ATOMIQUE (CEA)	RES	FRA	1036 (5)	175 (4)	26 (6)
7	<b>NATIONAL TECHNICAL UNIVERSITY OF ATHENS</b>	<b>EDU</b>	<b>GRE</b>	<b>951 (7)</b>	<b>108 (14)</b>	<b>27 (7)</b>
8	CONSEJO SUPERIOR DE INVESTIGACIONES CIENTIFICAS	RES	ESP	865 (8)	130 (7)	35 (8)
9	KATHOLIEKE UNIVERSITEIT LEUVEN	EDU	BEL	854 (9)	124 (8)	36 (9)
10	IMPERIAL COLLEGE OF SCIENCE, TECHNOLOGY AND MEDICINE	EDU	UK	803 (10)	98 (18)	42 (10)
11	TECHNICAL UNIVERSITY OF DENMARK	EDU	DEN	660 (16)	66 (31)	52 (11)
12	ECOLE POLYTECHNIQUE FEDERALE DE LAUSANNE	EDU	SWI	671 (14)	30 (108)	56 (12)
13	DEUTSCHES ZENTRUM FÜR LUFT- UND RAUMFAHRT EV (DLR)	RES	GER	744 (11)	120 (10)	61 (13)
14	RHEINISCH-WESTFÄLISCHE TECHNISCHE HOCHSCHULE AACHEN	EDU	GER	639 (17)	59 (39)	62 (14)
15	UNIVERSITÄT STUTTGART	EDU	GER	578 (20)	52 (46)	63 (15)
16	LUND UNIVERSITY	EDU	SWE	570 (22)	55 (43)	64 (16)
17	UNIVERSIDAD POLITECNICA DE MADRID	EDU	ESP	572 (21)	55 (43)	67 (17)
18	THE CHANCELLOR, MASTERS AND SCHOLARS OF THE UNIVERSITY OF CAMBRIDGE	EDU	UK	691 (13)	77 (24)	79 (18)
19	KUNGLIGA TEKNISKA HOEGSKOLAN	EDU	SWE	554 (23)	53 (45)	81 (19)
20	SIEMENS AKTIENGESELLSCHAFT	IND	GER	699 (12)	113 (11)	81 (19)

# The Greek organizations among the 80 most important organizations based on: A) their Participation and B) its central role in the European FPs. (1984-2013)

Name	Type	Centrality	Participations	Coordinator
<b>National Technical University of Athens***</b>	EDU	7	951 (7)	108 (14)
<b>Aristotle University of Thessaloniki</b>	EDU	29	379 (50)	38 (74)
<b>National and Kapodistrian University of Athens</b>	EDU	45	338 (58)	24 (134)
<b>University of Patras</b>	EDU	47	352 (55)	35 (85)
<b>Foundation for Research and Technology</b>	RES	51	408 (41)	61 (35)
<b>Centre for Research &amp; Technology Hellas</b>	RES	65	300 (69)	72 (29)
<b>National Centre for Scientific Research "Demokritos"</b>	RES	75	236 (92)	45 (55)

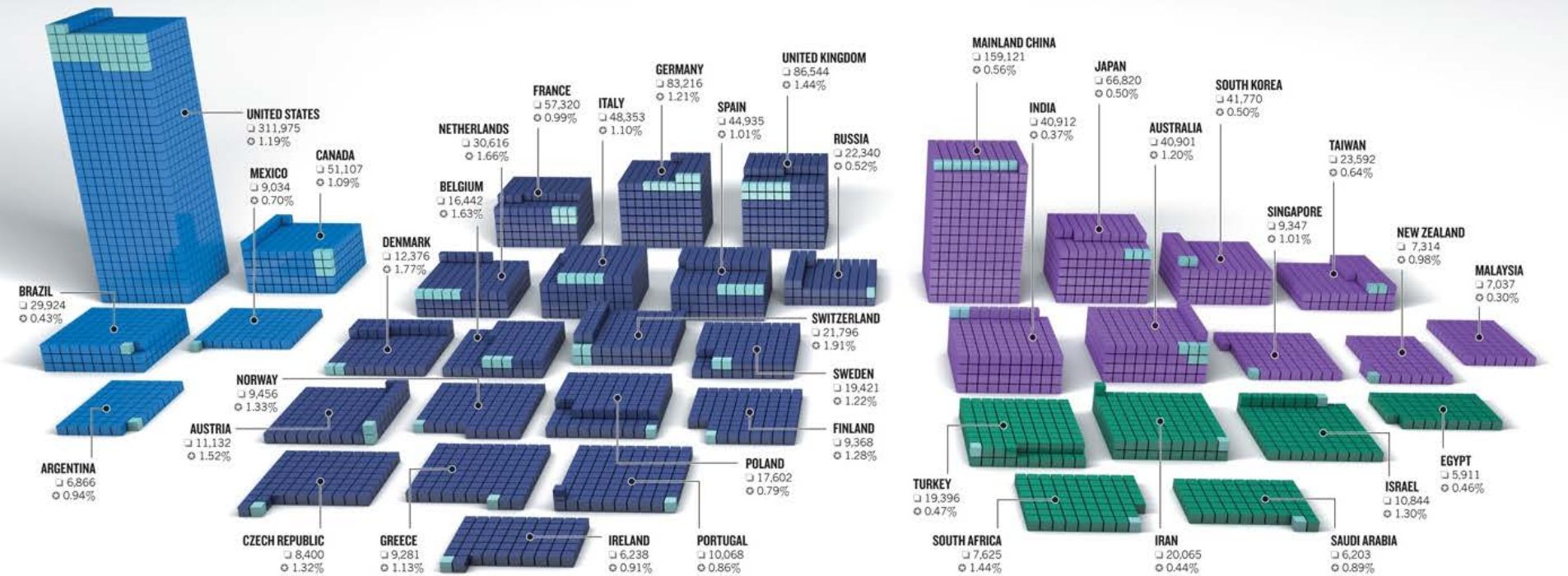
Source: STEP to RJs Database, Laboratory of Industrial and Energy Economics, NTUA.

\*\*\*The contributions of the Research Institute of Communications and Computer Systems NTUA (NTUA) are included in the participations of the NTUA



# Excellence in Research

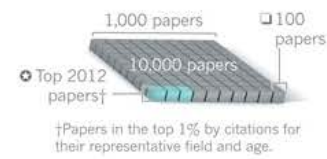
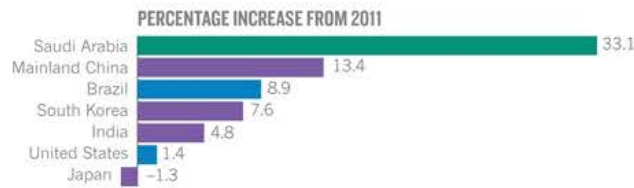
The share of the published research production of each country in the top scientific journal in the top 1% of most cited papers (2012)



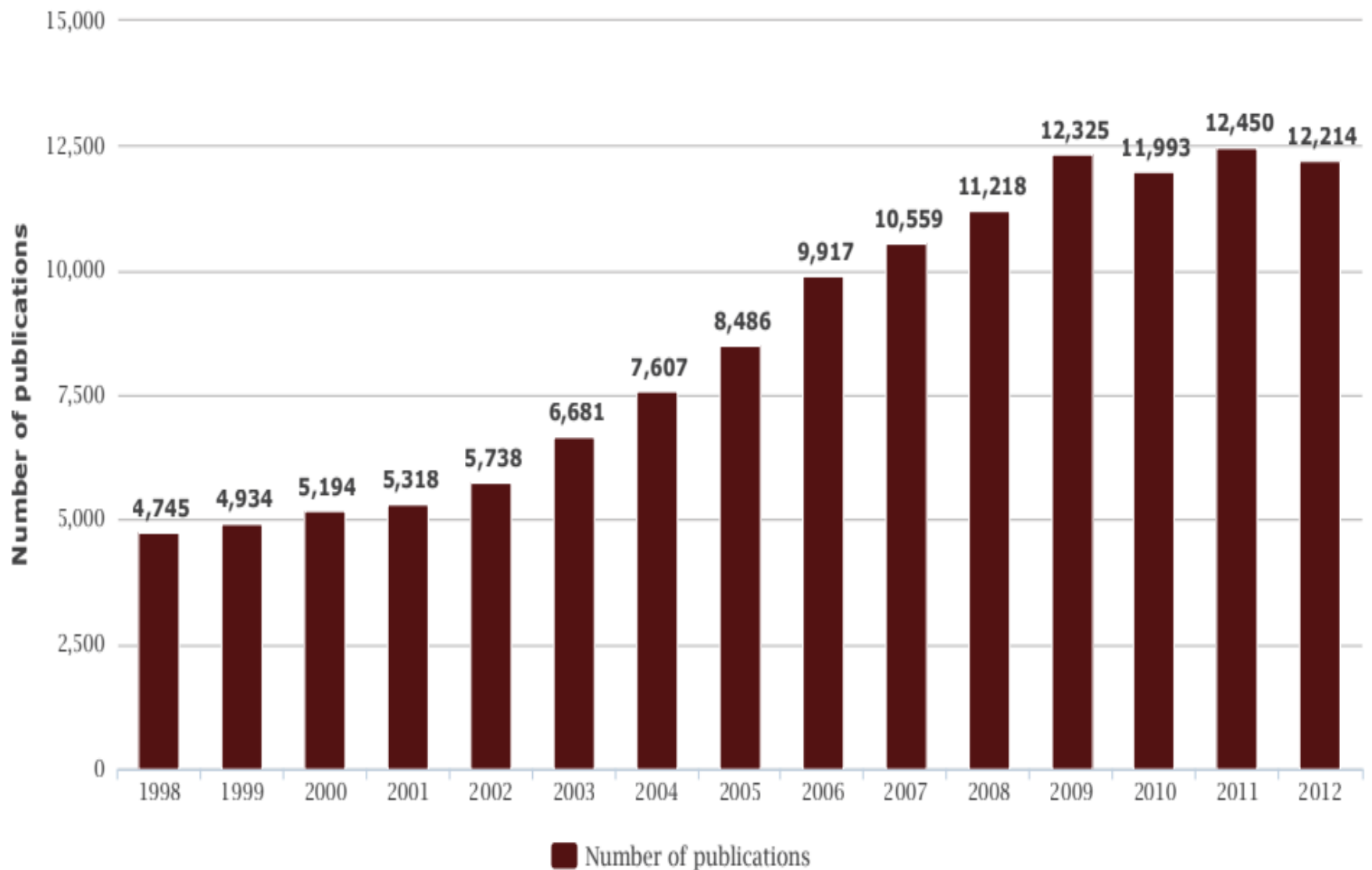
## SCIENTIFIC PAPER TRAIL

Number of research papers published in 2012 by leading science nations, and the proportion of each country's research this year that is in the top 1% of most-cited papers\*.

\*Figures estimated from data for January–October; 39 countries with total above 6,000 papers shown.







**Figure 2.1.1** Development of the number of Greek scientific publications, 1998-2012

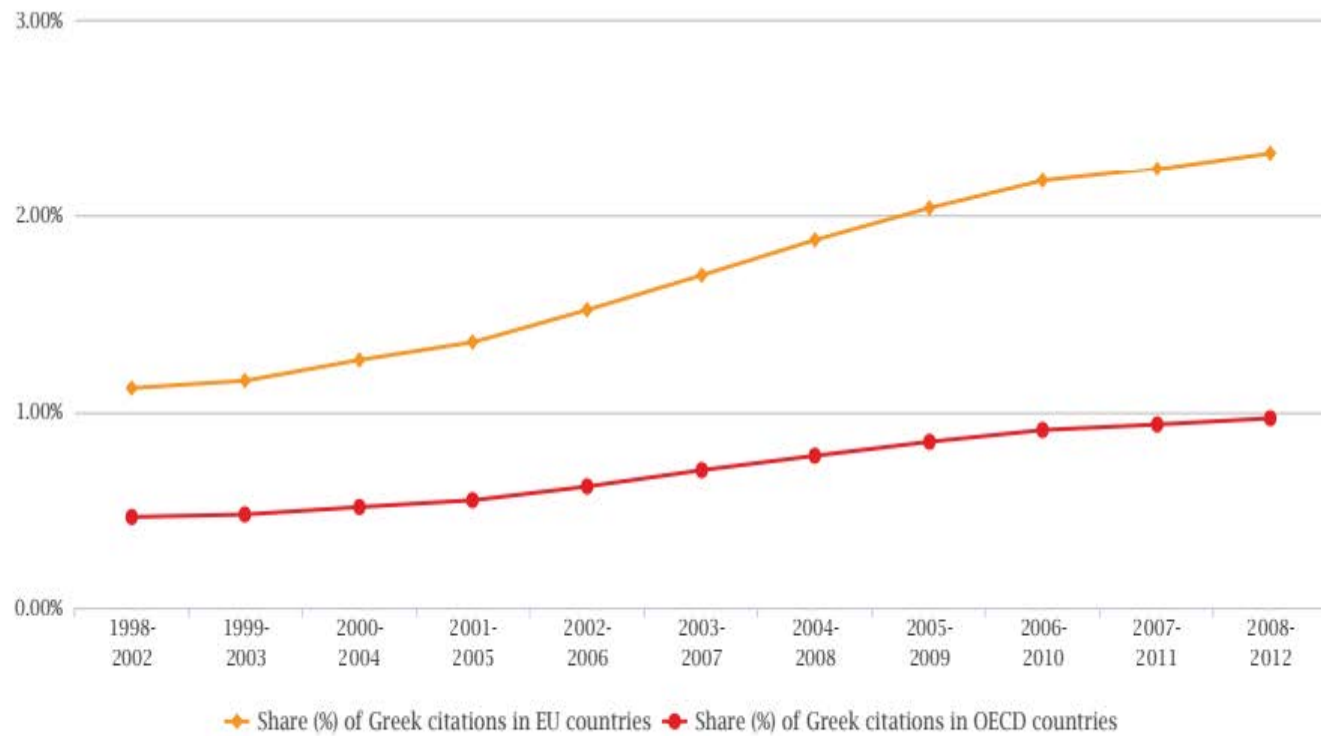


Figure 2.2.3 Share (%) of Greek citations in EU and OECD, 1998-2012

## 2. The system of production and entrepreneurship

- **The size** : Too many micro firms (particularly with 1-4 employees) and high self-employment compared to other EU countries. Even within the group of larger firms, most are SMEs and only a small number of actually large firms.
- **The survivors during the crisis (among the top 2000+ larger firms)**: Those of the established (incumbent) firms that are doing some research, invest in technology upgrading, develop innovations, invest in human capital performed better during the crisis.
- Among the **young firms**, those that performed better were oriented to link (or “plug in”) with international networks of innovation (i.e. new firms active in mobile applications and content).
- The majority of the **newly founded firms** during the crisis were active in very conventional activities with low knowledge content, aiming exclusively to the local market and to the last stage of consumption (very little B2B).

# Demographic characteristics of Greek businesses\*

	Number of enterprises			Number of persons employed			Value added		
	Greece		EU-28	Greece		EU-28	Greece		EU-28
	Number	Share	Share	Number	Share	Share	Billion €	Share	Share
Micro	669 773	96.7 %	92.7 %	1 225 566	58.7 %	29.2 %	18	37.4 %	21.1 %
Small	20 058	2.9 %	6.1 %	361 207	17.3 %	20.4 %	10	20.9 %	18.2 %
Medium-sized	2 455	0.4 %	1.0 %	228 692	10.9 %	17.3 %	8	16.6 %	18.5 %
<b>SMEs</b>	<b>692 286</b>	<b>99.9 %</b>	<b>99.8 %</b>	<b>1 815 465</b>	<b>86.9 %</b>	<b>66.9 %</b>	<b>37</b>	<b>74.8 %</b>	<b>57.8 %</b>
Large	400	0.1 %	0.2 %	273 587	13.1 %	33.1 %	12	25.2 %	42.2 %
Total	<b>692 686</b>	<b>100.0 %</b>	<b>100.0 %</b>	<b>2 089 052</b>	<b>100.0 %</b>	<b>100.0 %</b>	<b>49</b>	<b>100.0 %</b>	<b>100.0 %</b>

\* Figures are estimates for 2014 produced by DIW Econ, based on 2008 – 2012 figures from the Structural Business Statistics Database (Eurostat). The data cover the ‘non – financial business economy’, which includes industry, construction, trade and services (NACE Rev. 2 sections B to J, L, M and N), but not enterprises in agriculture, forestry and fisheries, as well as the largely non – market service sectors, such as education and health.

Source: **Small Business Act, Fact Sheet 2014**, European Commission

# Global Entrepreneurship Monitor

## Early stage entrepreneurship

- A non-profit academic research consortium aiming at measuring early stage entrepreneurial activity in more than 60 countries
- Some 61,4% of early stage entrepreneurs respond that none of their customers will consider their products / services as new and unfamiliar (*50,6% in innovation countries*).
  - But also a 15,6% respond that all their customers will consider their products new and unfamiliar (*16,9% in innovation countries*).
- A 56% of early stage entrepreneurs use technologies or procedures for their products / service that have been available longer than 5 years. (*65,3% in innovation countries*)
  - But 19,3% respond that they use technologies that are available less than one year
- A 55,3% of early stage entrepreneurs join a market where there are many other businesses offering the same products or services to your potential customers - high competition (51% in innovation countries)
  - But also 10,5% respond that they launch their venture in niche markets

# Classification: Innovative Performance

Source: Field Research among the 2000 largest Greek firms

Typology		Category A: «highly innovative» Product innovation <b>AND</b> process innovation	Category B: the «average innovative» Either product <b>OR</b> process <b>OR</b> organizational innovation	Category C: the «Low innovative»  No innovation at all
How many?	2011	<b><u>21,9% of the sample</u></b>	<b><u>48,6%</u></b>	<b><u>29,5% of the sample</u></b>
	2013	<b><u>13,6% of the sample</u></b>	<b><u>42,2%</u></b>	<b><u>44,2% of the sample</u></b>
Differences		<ul style="list-style-type: none"> <li>✓ 61% large firms</li> <li>✓ 86% applies vocational education and training</li> <li>✓ 30% conducts some R&amp;D in house</li> </ul>	<ul style="list-style-type: none"> <li>✓ 46% large firms</li> <li>✓ 79% applies vocational education and training</li> <li>✓ 25% conducts some R&amp;D in house</li> </ul>	<ul style="list-style-type: none"> <li>✓ 33% large firms</li> <li>✓ 60% applies vocational education and training</li> <li>✓ 14% conducts some R&amp;D in house</li> </ul>



# A growth strategy: What?

- Introduction of a clear “activating knowledge” systemic dimension in the economic “policy mix’.

The strategy should address seven key-issues:

- Enhance the **STID system** (i.e. university-industry cooperation, interfirm networks.. ..) [i.e. ELIDEK initiative for the promotion of R&I]
- Create a **vibrant ecosystem for Knowledge-intensive entrepreneurship** to flourish (the pool of potential would be entrepreneurs especially among engineering and business graduates and the need for creating effective coaching and mentoring mechanisms ) [accelerators, incubators such as INVENT ICT (three-years joint initiative NTUA and the Mobile Industry Association), Fund of Funds joint initiative of the Greek Gov and EIF).
- Enhance the **manufacturing base** of the Greek economy, by promoting a modern industrial policy linking a systemic innovation view and a technology upgrading focus with a global value chain perspective.
- Invest in developing and upgrading the **human factor**.
- Organize a **smart and effective functional state** beyond mere cuts in public expenditures.
- **Public Procurement** for Innovation
- **Untap the under-utilised ICT induced growth potential** which can bring about productivity gains both in the public administration and the business sector. Investment in ICT and new technologies should go hand in hand with training the people and the organizations using them.

# Move Beyond the conventional sectoral approach to the perception of the value chain and the innovation “ecosystem”

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- The concept of the ecosystem for the analysis of value chains and related socio-economic processes.
- Technical-socioeconomic ecosystems.
- The role of actors and stakeholders. Broad range.
- Interactions between organizations and symbiotic relations for the creation of knowledge.
- Platforms, learning, knowledge and innovation networks.

# Examples of ecosystems in the Greek context

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- The ecosystem of Information and Communication Technologies.
- The agro-bio-nutritional-food value chain coupled with tourism activities.
- The environmental ecosystem.
- The construction and building renovation ecosystem (projects, materials, insulators, bioclimatic, smart buildings, energy saving, renovations of buildings..).
- Energy (production and demand management..).
- Health (services and pharmaceutical industry).
- Creative and Cultural Industries.

# A growth strategy: How?

- **Implementation** matters very much in the Greek and other similar contexts. Drafting the policy framework and putting the incentives right is not sufficient.
- A **system of interrelated and well coordinated public policies** with concrete measures and clear rules of the game is also necessary.

# The organization and the strategic management of the implementation matters a lot

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- **System of policies.** Consolidation and integration of measures, interventions and actions. Timing and the cost of time are crucial.
- **Public debate agenda configuration.** Development is a process of mobilization of resources, humans, groups etc.
- Strategic coordination but decentralized implementation. Leave space for initiatives of all kinds (including experimentation).
- The **quality and effectiveness** (=capacity to deliver) of the actors involved: The key is “develop skills and capabilities both for the public and private sector’.
- A process of **engaging actors** in each of these value chains as well as allowing space for new actors to emerge should be activated

# Funding and broad consensus are **prerequisites**

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- A reasonable **national public investment programme** to support the strategy for growth, employment and structural competitiveness supplementary to necessary European initiative.
- A system of **facilitating** and **enabling** investments of all kinds to be designed and implemented effectively.
- The necessary restructuring and re-orientation of the banking system.
- A system of **early-early seed capital** for the promotion of tech startups and knowledge intensive entrepreneurial ventures in cooperation with coaching and mentoring mechanisms.
- A new **social** and **political** deal for promoting this strategy is an absolute must.