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The Community Innovation Survey and the innovation performance of enterprises funded by EU's Framework Programmes

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Research and Innovation

European Commission

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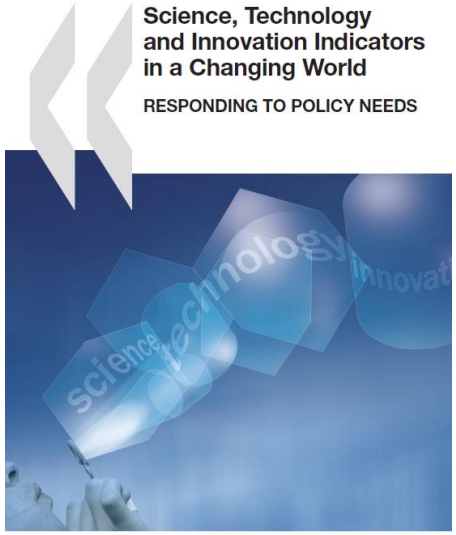
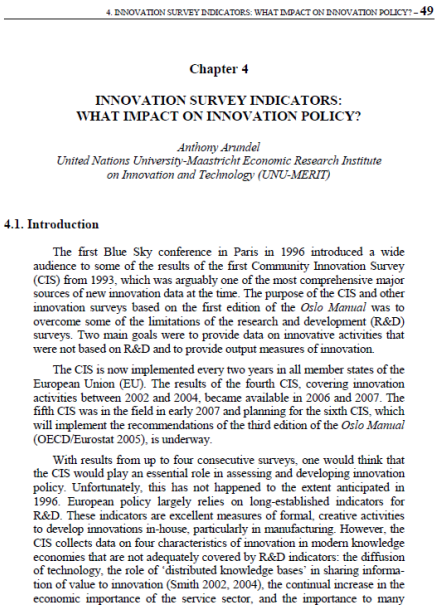
1- Background

- **First CIS edition presented in 1996.** Great expectations…
- … **Arundel (2006):** "(…) *one would think that the CIS would play an essential role in assessing and developing innovation policy. Unfortunately, this has not happened to the extent anticipated in 1996*".



➔ **Similar in 2016: Despite a large CIS-based scientific literature, the Commission services have rarely used it to evaluate the EU's Framework Programmes.**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Chapter 4

INNOVATION SURVEY INDICATORS: WHAT IMPACT ON INNOVATION POLICY?

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4.1. Introduction

The first Blue Sky conference in Paris in 1996 introduced a wide audience to some of the results of the first Community Innovation Survey (CIS) from 1993, which was arguably one of the most comprehensive major sources of new innovation data at the time. The purpose of the CIS and other innovation surveys based on the first edition of the *Oslo Manual* was to overcome some of the limitations of the research and development (R&D) surveys. Two main goals were to provide data on innovative activities that were not based on R&D and to provide output measures of innovation.

The CIS is now implemented every two years in all member states of the European Union (EU). The results of the fourth CIS, covering innovation activities between 2002 and 2004, became available in 2006 and 2007. The fifth CIS was in the field in early 2007 and planning for the sixth CIS, which will implement the recommendations of the third edition of the *Oslo Manual* (OECD/Eurostat 2005), is underway.

With results from up to four consecutive surveys, one would think that the CIS would play an essential role in assessing and developing innovation policy. Unfortunately, this has not happened to the extent anticipated in 1996. European policy largely relies on long-established indicators for R&D. These indicators are excellent measures of formal, creative activities to develop innovations in-house, particularly in manufacturing. However, the CIS collects data on four characteristics of innovation in modern knowledge economies that are not adequately covered by R&D indicators: the diffusion of technology, the role of 'distributed knowledge bases' in sharing information of value to innovation (Smith 2002, 2004), the continual increase in the economic importance of the service sector, and the importance to many

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1- Background

- **Evaluation of FPs largely relies on traditional indicators (basically, papers and patents)…**

- **… and on external (and expensive) studies:** Almost 20 ongoing, more than €2 million total budget!

- **This continues to happen despite of the strong critiques in the *Ex Post Evaluation of FP7*:**
  "*Considering that the FPs have consistently been the third largest budget of the European Union, a strategic and professional monitoring and evaluation system is required that increases transparency and serves as a comprehensive and trusted source of evidence-based decision making*" (Martinuzzi et al., 2015)

1- Background

PARADOX:

- **For Horizon 2020 very focused on (measurable) IMPACT and on INNOVATION.**

➔**"*Performance Indicators*" defined in the legal base** (Regulation 1291/2013)…

➔**… But innovation remains largely uncovered:** patents (all), prototypes and testing activities (SCs), firms with innovation new to market of firm (LEIT).

➔Actual innovation outputs and outcomes? TRLs? Barriers? Environmental impact (CO2/Energy savings)? Further investments? Economic returns?

➔Critical in the current political framework: Juncker priorities: "**Growth, Jobs and Investment**".

1- Background

The Community Innovation Survey (CIS):

- **CIS 1 launched in 1992.**
- **Carried-out and handled by Eurostat.**
- **Biannual.**
- **Large coverage:** 143,669 enterprises from 13 EU's MS and NO in CIS 2012
- Provides **harmonised** data on enterprises' innovation activities and results by **sector**, **size of company**, **type of innovation** and the **various stages of the innovation process**: objectives, sources of information, investments, public funding.
- … and includes a question that allows to identify **beneficiaries from EU's Framework Programmes**!

1- Background

Aims of the CIS 2008, 2010 and 2012 analysis:

- **Assessment of economic impact of FP7:**
  - Do firms supported by FP7 perform better?
  - Differences by country, size of cie., sector?
  - Economic returns (turnover)?

- **Assessment of CIS as a tool to monitor and evaluate the Framework Programmes (Horizon 2020) and its caveats.**

Causality!!

2- CIS results

- **FP7-funded innovative enterprises perform significantly better than those not supported.**
- **Biggest differences in "new to the market product and service innovations" ➔** *Positive for a R&I programme (no replication)*

- **<u>REMINDER:</u>** Correlation does not mean causality. At least, FP7 attracts the most innovative firms. Innovation logic likely to be circular, not linear.

	Supported by FP7	Non-supported by FP7	Significance Chi-square	Phi coefficient
CIS 2008 (2006-2008)				
New to the market product or service innovations (NEWMKT)	1,132 73.36%	13,376 42,67%	<0.0001	0.13
New to the firm product or service innovations (NEWFRM)	1,082 71.14%	17,554 56.02%	<0.0001	0.064
New to the market process innovations (INPSNM)	357 39.23%	3,471 19.8%	<0.0001	0.106
CIS 2010 (2008-2010)				
New to the market product or service innovations (NEWMKT)	1.076 79.79%	11,575 31.59%	<0.0001	0.186
New to the firm product or service innovations (NEWFRM)	917 70.38%	15,299 41.72%	<0.0001	0.106
New to the market process innovations (INPSNM)	362 49.05%	3,048 12.83%	<0.0001	0.203
CIS 2012 (2010-2012)				
New to the market product or service innovations (NEWMKT)	1.191 78.51%	10,144 43.38%	<0.0001	0.169
New to the firm product or service innovations (NEWFRM)	943 66.74%	13,821 59.38%	<0.0001	0.035
New to the market process innovations (INPSNM)	378 42.81%	2,732 18.83%	<0.0001	0.156

2- CIS results

- **Relatively small, but significant, differences per size:**

Large use to perform better than SMEs.

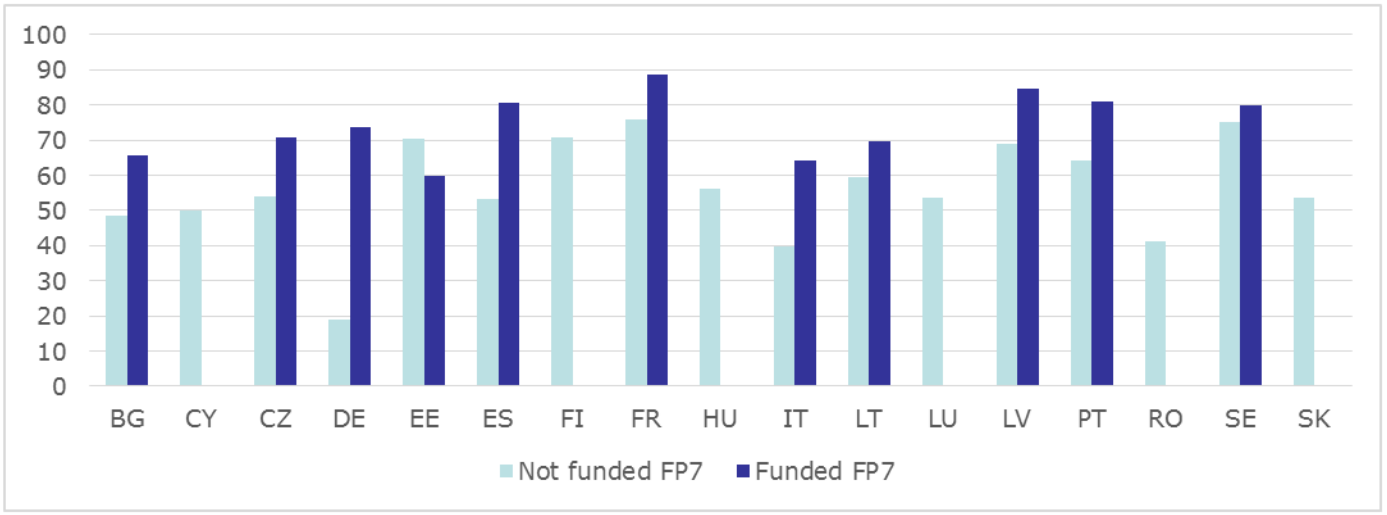
		Large	Micro	Small	Medium
CIS 2008	Not funded FP7	51.6%	40.1%	39.1%	43%
(NEWMKT)	Funded FP7	79.1%	69.9%	70.4%	69.7%
CIS 2010	Not funded FP7	46.4%	30.6%	24.9%	35.5%
(NEWMKT)	Funded FP7	81.4%	81.6%	76.1%	76.7%
CIS 2012	Not funded FP7	51.6%	43.4%	39.5%	43.2%
(NEWMKT)	Funded FP7	82.4%	79.6%	76.8%	73.5%

NEWMKT: "New or significantly improved good or service introduced onto your market before competitors"

2- CIS results

- **Country is a much more significant variable.**

CIS 2012



N= 11,492 innovative enterprises not funded by FP7 (31.5% of the total) and 996 enterprises funded by FP7 (77.6% of the total)

- **NB:** Contingency coefficient: 42,3%
- **Differences much less pronounced between countries when enterprises funded by FP7 ➔ "Cohesion role" of FP7**

2- CIS results

- **Sector is also a statistically significant variable:**
  - **Manufacturing** (NACE C) **provides the majority of new to market innovations**, in the whole economy and amongst FP7 funded enterprises (>50% in all cases and years)…
  - **…Followed by Information and Communication** (NACE J, around 10-14%), by **"Wholesale, retail and repair of vehicles"** (G, <10%) and **"Professional, scientific, technical activities"** (M, <10%).
  - **Within innovative enterprises supported by FP7, Manufacturing** (>50%)**, Scientific & Technical services** (around 25%) **and ICT** (12-14%) **cover alone 90% of the new products to the market.**
  - **Big gap in innovation performance between FP7-funded firms and not funded ones. Examples**:
    - In CIS 2008, 73,2% of FP7-funded manufacturing enterprises introduced innovations new to market. 79,4% in CIS 2012.
    - Amongst not funded, around 47% both.
    - Sectoral differences sometimes higher than +100% and +200%!
    - ICT, most performant sector (FP7 funded and overall).

2- CIS results

CIS 2008: Eco-innovation module

- **Allows to quantify innovations with environmental benefits** (materials or energy savings, reduced CO2 footprints, waste or water efficiency, etc.)
- **Innovative companies supported by FP exploit proportionally much more environmental-friendly products and services:**

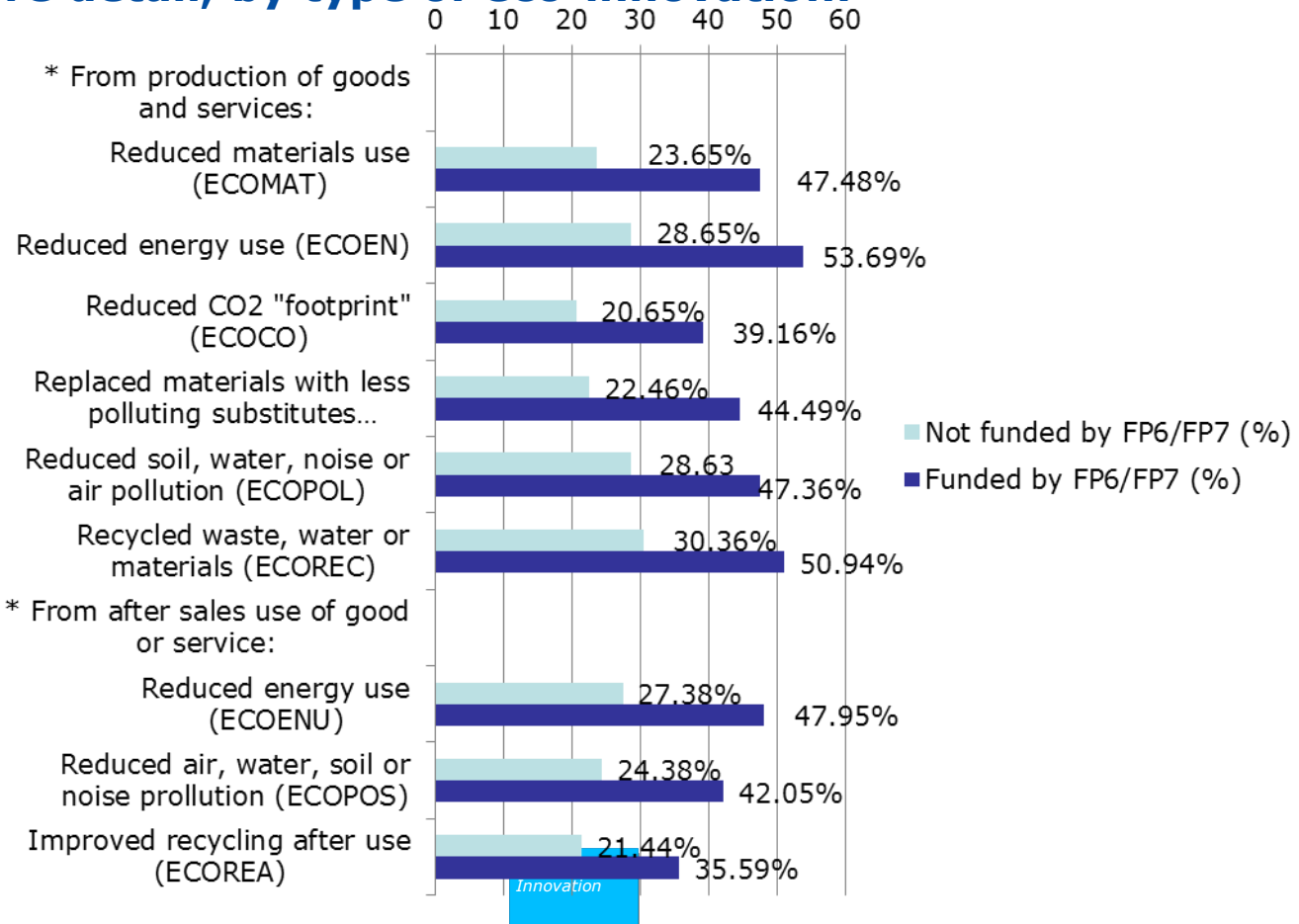
Percentage of innovations with at least one environmental benefit

	No environmental benefit	Environmental benefit	N
Not funded by FP6/FP7 (% by row)	80.12%	19.88%	65,180
Funded by FP6/FP7 (% by row)	43.63%	56.37%	1,783
Total (% by row)	79.15%	20.85%	66,963

2- CIS results

CIS 2008: Eco-innovation module

- **With more detail, by type of eco-innovation:**



2- CIS results

CIS 2008: Eco-innovation module

- **Eco-innovation drivers:**
  - **Existing regulations and taxes** (24.7%/44.7% for FP7 non-funded and funded firms respectively)
  - **Voluntary codes or agreements, future regulations or market demand similar response rates** (17-19%/38-39%).
  - **Surprisingly, grants, subsidies or other financial incentives are the less often quoted factor, including among FP6/FP7-funded companies** (10.4%/22.7%).
  - Confirms **Horbach (2016):** regulations and cost-savings are the main motivations of eco-innovation, while subsidies are relevant for innovations reducing CO2 emissions.

➔ **Very useful for policy** (e.g. EC's Fitness Checks…)

➔ **Next module in CIS 2014 (forthcoming).**

2- CIS results

Economic impact

- **CIS provides data on % of turnover derived from innovations + on total turnover enterprises.**

➔Possible to assess differences between FP7-funded enterprises and those not funded and economic impact (in terms of sales).

- **Issue: FP7-funded firms have much bigger turnovers ➔ "Size effect" ➔** Large 46% of FP7-funded enterprises.

2- CIS results

Economic impact

- **Percentages of turnover coming from innovations**

CIS 2008	New to the market innovation (% turnover)	T-test significance (method)	New to the firm innovation (% turnover)	T-test significance (method)
Not funded FP7	5.2	<0.0001 (Satterthwaite)	8.1	0.0004 (Satterthwaite)
Funded FP7	17.4		15.4	
CIS 2010	**New to the market innovation (% turnover)**	**T-test significance (method)**	**New to the firm innovation (% turnover)**	**T-test significance (method)**
Not funded FP7	8.5	<0.0001 (Satterthwaite)	12.2	<0.0001 (Satterthwaite)
Funded FP7	18.7		15.4	
CIS 2012	**New to the market innovation (% turnover)**	**T-test significance (method)**	**New to the firm innovation (% turnover)**	**T-test significance (method)**
Not funded FP7	10.8	<0.0001 (Satterthwaite)	15.7	0.69 (Satterthwaite)
Funded FP7	19.1		15.4	

2- CIS results

Economic impact

- Average turnover coming from innovations
- Issue: "Size effect" much higher than "turnover effect"

CIS 2008	New to the market innovation (derived turnover, million €)	New to the firm innovation (derived turnover, million €)	Total innovation (derived turnover, million €)
Not funded FP7	3 (N=61,587)	4.1 (N=61,567)	7.1 (N=61,567)
Funded FP7	67.3 (N=1,591)	83.4 (N=1,601)	154.1 (N=1,554)
CIS 2010	**New to the market innovation (derived turnover, million €)**	**New to the firm innovation (derived turnover, million €)**	**Total innovation (derived turnover, million €)**
Not funded FP7	5.9 (N=36,454)	6.6 (N=36653)	12.2 (N=36,204)
Funded FP7	70 (N=1,309)	122 (N=1,323)	196.8 (N=1,284)
CIS 2012	**New to the market innovation (derived turnover, million €)**	**New to the firm innovation (derived turnover, million €)**	**Total innovation (derived turnover, million €)**
Not funded FP7	6.6 (N=23,035)	10 (N=23,030)	16.6 (N=22,804)
Funded FP7	77.8 (N=1,335)	114.6 (N=1,313)	196.3 (N=1,294)

NB: All T-tests statistically significant

3- Caveats for evaluation use

- **Timing vs. FP7's and Horizon 2020's**
- **Geographical coverage**
- **Questionnaire design:** Due to filters, question allowing identification of FP7-funded firms covers only (i) innovative enterprises, and (ii) product, service and process innovation (no marketing and organisational)
- **Confidentiality rules:** Relevant amount of information lost when more than 2 variables are crossed (esp. if one is FP7 funding) ➔ Much more relevant than expected…
- **Eco-innovation module**: Too focused on regulation, compared with economic and ethical motivations. Only on eco-innovation motivations - what about factors/behaviours (e.g. regulation) non-innovative firms? (Mazzanti, 2016)
- Of course, **causality issue always to keep in mind!**

4- Conclusions

- In any case, this analysis demonstrates that **CIS is a gold mine for evaluating and monitoring the Framework Programmes - and Horizon 2020.**
- Provides **quantitification** in terms of **exploitation of innovation results** – Data still missing at the Commission.
- Even if the data are incomplete or not detailed enough (e.g., to analyse the specific impacts by FP7-Cooperation Theme or Horizon 2020-Societal Challenge), **the main information is provided…**
- **… for free and with relatively basic statistical skills!**

Thank you!

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