Drivers of Environmental Certifications at Industry Level

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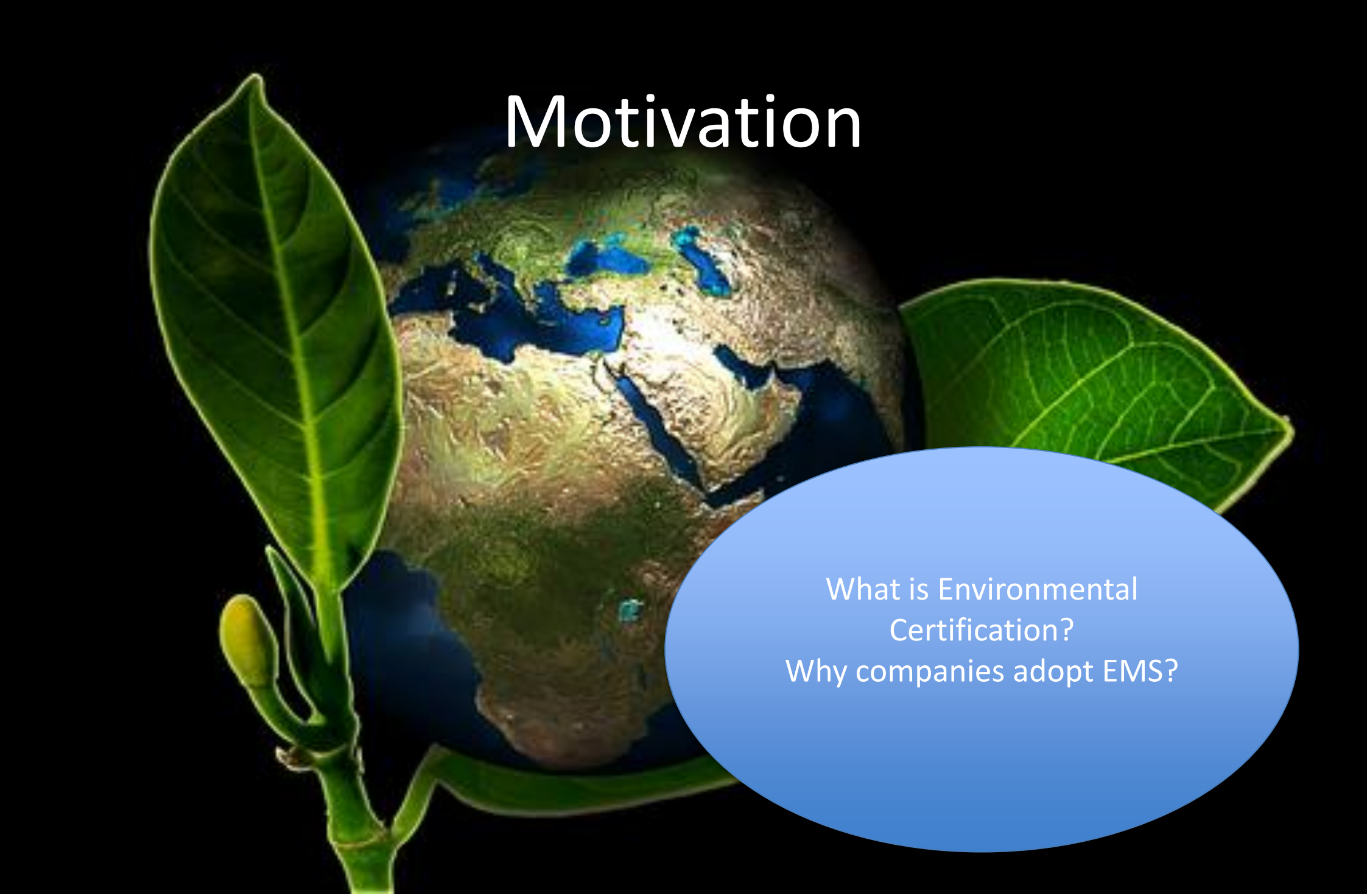
Motivation



What is Environmental Certification?
Why companies adopt EMS?

Environmetal Management Systems:

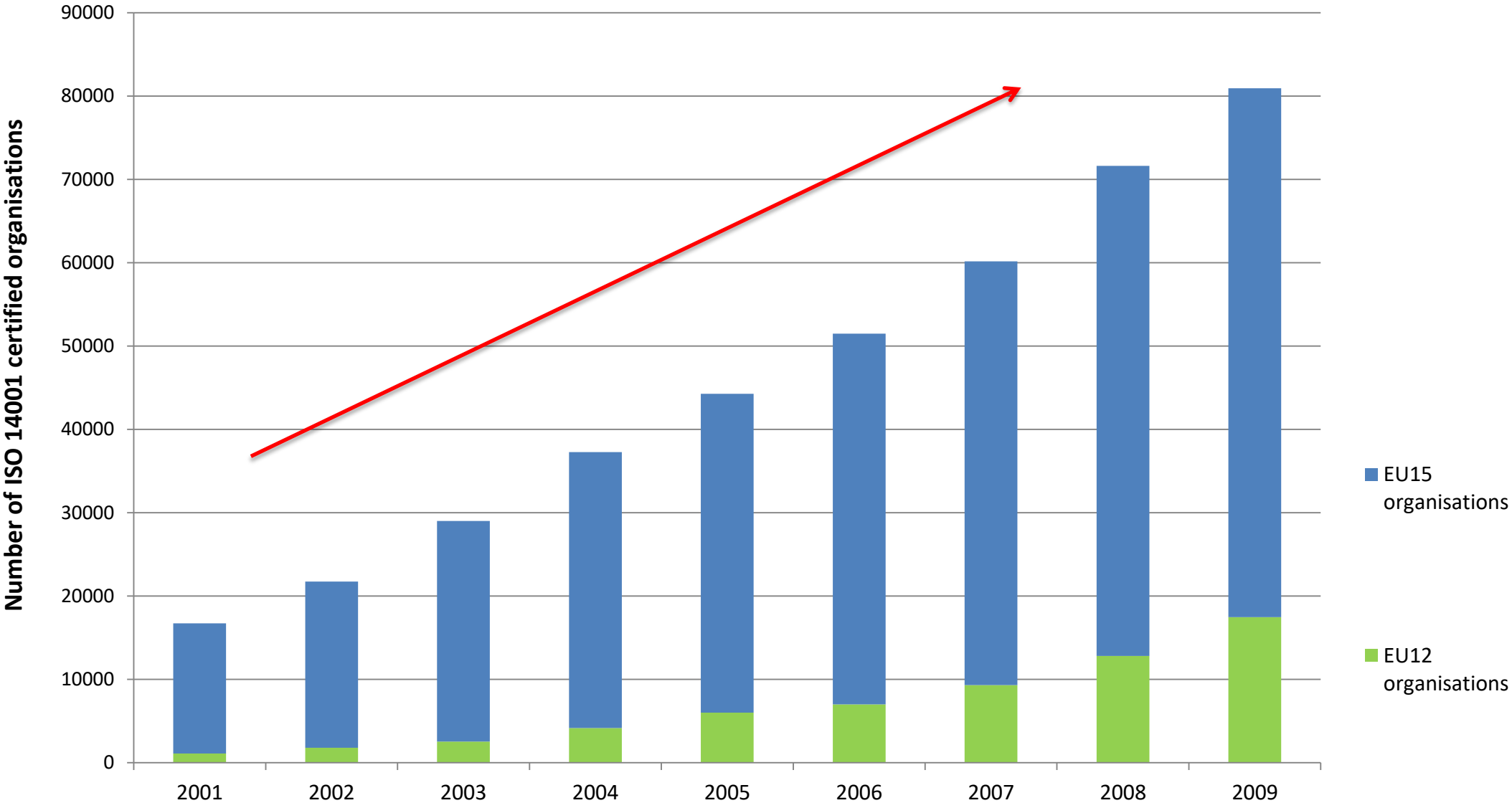
is a set of processes and practices that enable an organization to reduce its environmental impacts and increase its operating efficiency.

This is a framework that helps an organization achieve its environmental goals through consistent review, evaluation, and improvement of its environmental performance.

Environmental Management Systems (Testa et. al. 2014)

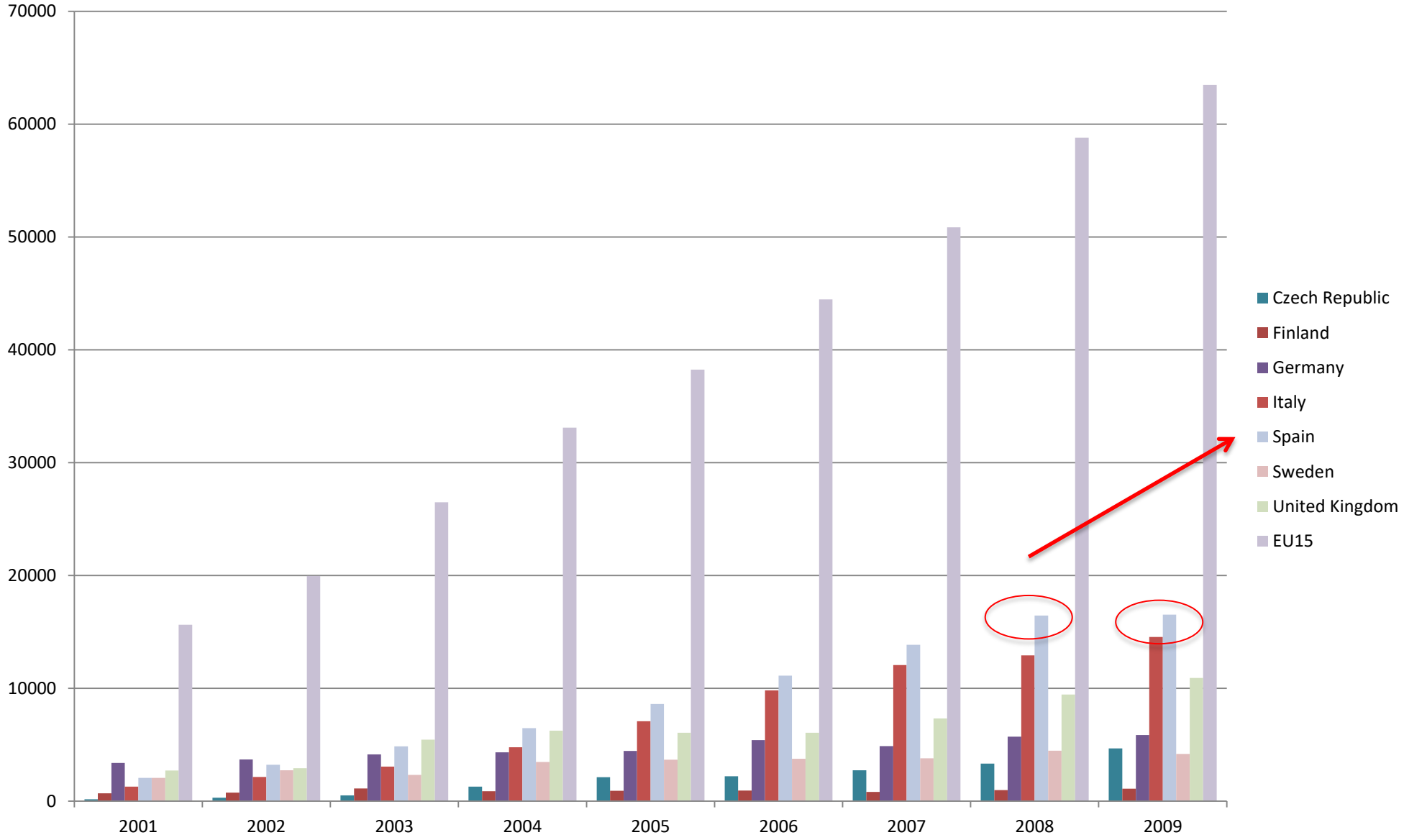
ISO14001 **International Organization for Standardization**	**EMAS** **Eco Management and Audit Scheme**
• Always International • Private norm • Less mandatory to diffusion • More global to all sectors	• European at the beginning, from 2010 international • Public from EU • sets more stringent requirements on external communication, since it is required a mandatory document • Focus on industry

Environmental Certifications in EU



Source: European Environmental Agency

Environmental Certifications by countries. Source: European Environmental Agency



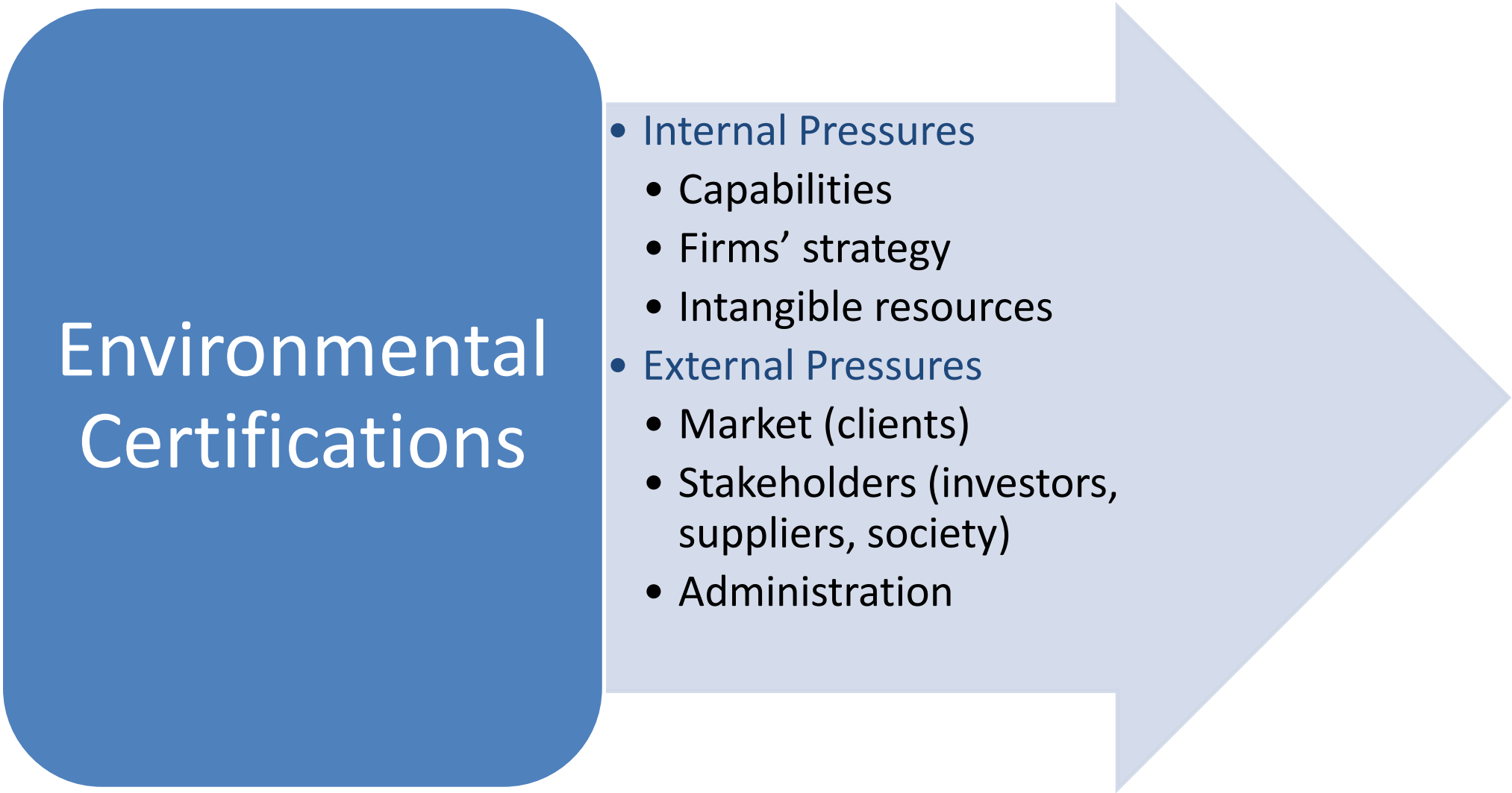
Background Literature

Drivers of environmental certifications (Takahashi and Nakamura 2010; Rivera-Camino, 2001, Iatridis and Kesidou 2015):

- **Internal pressures** (Quazi et al. 2001; Liu et. 2010; Singh et al. 2015) more consensus of substantive motivations

- **External pressures** (Khanna and Anton, 2002; Castka and Prajogo, 2013), ambiguous results

Framework


Environmental Certifications
Internal Pressures
Capabilities
Firms' strategy
Intangible resources
External Pressures
Market (clients)
Stakeholders (investors, suppliers, society)
Administration

Empirical Analysis

- Model and Methodology
- Data and Variables
- Results

Empirical Analysis

Model and Methodology:

$$EC_{it} = \beta_0 + \beta_1 INTERNAL_{it} + \beta_2 EXTERNAL_{it} + \mu_i + e_{it}$$

Internal: experience and organizational innovations

External: compliance, SCR and regulation

We compile from several data bases to get information at Industry level for 2009-2014.

16 manufacturing sectors

Data and Variables

- **Dependent Variable**: number of environmental certifications in the International Organisation for Standardisation (ISO) –**Intensity**-
- **Independent variables**:
  - CONTROLS:
    - The Industrial Companies Survey: Sales, Size, Human R&D personnel, Foreign capital, Number of firms, Acquisition of energy products, Environmental R&D.
    - The Environmental Protection Activities Survey: investments in production process and in the end-of-pipe.
  - INTERNAL
    - ISO 9001 –**intensity**-
    - Innovation in Companies Survey (the Spanish version of the CIS): Organizational innovations, Commercial Innovations
  - EXTERNAL
    - The Environmental Tax Account: Pollution tax
    - The Air Emissions Account: Co2
    - Innovation in Companies Survey: Commitment with environment and with norms

Dependent variable →

Controls

Internal

External

Variables	Definitions	Source
ISO14001	Number of ISO 14001 certifications per industry	International Organization for Standardization
Sales	Annual Turnover	Industrial Companies Survey, National Statistics Institute of Spain INE
Size	Average size in the sector (employees / firms)	Industrial Companies Survey, INE
Human R&D personnel intensity	Personnel in R&D as % of total personnel	Statistics on R&D activities and Innovation in Companies Survey, INE
Foreign capital	Number of firms with more than 50% of foreign capital as % of total firms	Statistics on R&D activities and Innovation in Companies Survey, INE
Number of firms	Number of firms	Industrial Companies Survey, INE
Acquisition of energy products	Expenditure on acquisition of energy products	Industrial Companies Survey, INE
Environmental R&D	Business R&D expenditure on the control and care of the environment	Statistics on R&D activities and Innovation in Companies Survey, (INE)
Investment in the production process	Investment in environmental protection (integrated equipment and facilities)	Environmental protection activities survey, INE
Investment in end-of-pipe	Investment in environmental protection (independent equipment and facilities)	Environmental protection activities survey, INE
ISO 9001	Number of ISO 14001 certifications per industry	International Organization for Standardization
New business practices	Organizational innovation: Introduction of new business practices	PITEC
New workplace organization	Organizational innovation: New methods of organizing work	PITEC
CO2 emissions	Carbon dioxide emissions into the atmosphere of (thousands of tonnes of equivalent CO2)	Air emissions account, INE
Pollution taxes	Taxes on pollution and resources	Environmental tax account, INE
Importance to reduce environmental impact	Firms that consider of high importance the innovation objective “Reduce environmental impact” (as % of total firms)	Innovation in Companies Survey, INE
Importance of meeting regulatory requirements impact	Firms that consider of high importance the innovation objective “Meeting regulatory requirements” (as % of total firms)	Innovation in Companies Survey, INE

Preliminary Results!!!!!

Table 2. Main Drivers of Environmental Certifications

	(1)	(2)	(3)	(4)
lcifraei	0.177	0.202	0.235	0.307***
	(0.218)	(0.227)	(0.188)	(0.0980)
lfirmsei	0.641***	0.605***	0.051	0.180**
	(0.132)	(0.134)	(0.138)	(0.083)
tammed	0.002**	0.002**	-0.004	-0.010***
	(0.001)	(0.001)	(0.007)	(0.002)
khum	0.140***	0.139***	0.032	-0.036
	(0.051)	(0.052)	(0.046)	(0.023)
foreign	0.010	0.114	0.016	0.349***
	(2.975)	(2.893)	(6.508)	(4.028)
ladqpe	0.161	0.271	0.032	-0.137**
	(0.205)	(0.219)	(0.154)	(0.058)
lgenv		-0.070*	-0.091**	0.049
		(0.041)	(0.032)	(0.034)
lprevc		-0.076**	-0.055*	0.003
		(0.038)	(0.030)	(0.034)
ltratc		-0.018	-0.013	-0.072**
		(0.043)	(0.035)	(0.032)
INTERNAL PRESSURES				
liso9			0.782***	0.626***
			(0.108)	(0.047)
ionsistg			-0.606	-1.160**
			(0.482)	(0.592)
iocaemp			0.657*	0.951**
			(0.398)	(0.480)
EXTERNAL PRESSURES				
otcrn				0.175
				(0.345)
otmm				-0.123
				(0.359)
limpcr				0.055*
				(0.029)
Constant	-5.530**	-4.700*	-2.355	-2.929***
	(2.440)	(2.582)	(1.916)	(0.487)
Observations	96	96	90	68
Number of id	16	16	15	12

Robustness Diagnostics

- Hausman Test FE-RE in the limit.
  - Differences within are not enough for identification.

- Use different specifications and methods
  - Changes in dep. var: ratio of iso14 over firms
  - Check about endogeneity of some variables
  - More internal/external pressures

Table 3. Robustness Diagnostics

VARIABLES	(1) With Exports	(2) With commercial Innovation	(3) Investments in lags	(4) Instrumenting ISO9001	(5) With CO2 emissions
Lgenv	0.054	0.047	0.058	0.055	0.031
	(0.044)	(0.035)	(0.038)	(0.037)	(0.039)
Lprevc	0.032	0.013	-0.019	0.0078	-0.003
	(0.041)	(0.038)	(0.038)	(0.036)	(0.040)
Ltratc	-0.078*	-0.073**	**-0.093****	-0.079**	-0.061
	(0.043)	(0.033)	**(0.041)**	(0.035)	(0.037)
liso9	0.424***	0.640***	0.595***	0.630***	0.618***
	(0.134)	(0.057)	(0.055)	(0.055)	(0.057)
ionsistg	-0.962	-1.002	-1.516**	-1.429**	-1.118*
	(0.715)	(0.638)	(0.640)	(0.693)	(0.621)
iocaemp	0.586	0.876*	1.051*	1.227**	0.798
	(0.701)	(0.501)	(0.577)	(0.547)	(0.560)
otcrn	0.580	0.084	0.407	0.470	0.014
	(0.411)	(0.376)	(0.391)	(0.398)	(0.415)
otmm	-0.672	0.018	-0.192	-0.345	0.021
	(0.482)	(0.411)	(0.410)	(0.406)	(0.427)
limpcr	-0.028	0.049	0.042	0.042	0.057
	(0.067)	(0.031)	(0.035)	(0.033)	(0.038)
xesp	-1.200				
	(0.767)				
xue	**2.098***				
	(1.212)				
icntec		-0.070			
		(0.564)			
icnmp		0.276			
		(0.553)			
lco2					-0.031
					(0.042)
Constant	-1.847	-2.782***	-3.230***	-2.897***	-2.935***
	(2.471)	(0.534)	(0.576)	(0.554)	(0.620)
Observations	56	68	58	58	56
Number of id	10	12	12	12	12

Conclusions I

- Sectors with Larger & Foreign firms adopt more EMS
- Internal pressures confirm literature, while external ones have less impact in the intensity of adoptions.
- Internal factors:
  - Experience in certifications matters, and results do not show problems of endogeneity
  - New management systems reduces the adoption while changes in the organizational workplace increase it.
- Investments in specific environmental or in the prevention decrease the adoption of EMS whether firms use experience and higher levels of workforce participation.

Conclusions II

- External: only Regulation plays slightly role via specific environmental taxes.
- Investments in the contamination treatment reduces the adoption when firms pay for pollution tax (maybe)

Implications

External stakeholders press on the adoption of EC very few however Internal motivations of companies acts as a main driver.

The use of experience and changes in the participations and organization workers motivate to increase the intensity of Environmental Systems adopter companies.

Thank you for your attention

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