



*The ISO 14001 Environmental Management  
Standard in Japan: Results from a National  
Survey of Facilities in Four Industries*

---

*Eric Welch*

*Department of Public Administration  
University of Illinois at Chicago*

*Yasuhumi Mori*

*Social and Environmental Systems Division  
National Institute for Environmental Studies, Japan*

*Funded by a grant from the Ministry of the Environment, Japan*

# *Outline*

- *Types / Characteristics of Voluntary Policies*
- *Characteristics of ISO 14001 – new efforts on greenhouse gas emissions management*
- *ISO 14001 in Japan*
- *Literature and expectations*
- *Data*
- *Adoption model variables, findings*
- *Exploration of possible ISO effects*
- *Conclusions*
- *Other research*

# *Voluntary Policy*

- *Wide range of programs that employ explicit or implied regulatory and market incentives to obtain commitments from polluters in service and manufacturing industries to reduce the environmental damage for which they are responsible (33/50 program; Climate Challenge).*
- *Shift toward more flexible instruments*
- *Created outside legislative processes*
- *Governments may prefer*
  - *Administrative costs lower*
  - *Political complexities lower*
- *Voluntary greenhouse gas emissions policies*
  - *What can we expect?*

# *Voluntary Policy*

- *Firms willing to adopt and implement if benefits – economic, regulatory, informational, societal – are perceived to be higher than the costs.*
  - *(Andrews, 1998; Delmas, 2002; Khana and Anton, 2002; Rivera et al. 2006; Lyon and Maxwell).*
- *Some voluntary programs result in beyond compliance pollution abatement*
  - *(Arora and Cason, 1996; Konar and Cohen, 1997; Bjoner and Jensen, 2002; Potoski and Prakash, 2005)*
- *Some do not...*
  - *(King and Lenox, 2000; Gamper-Rabindran, 2006; Welch et al., 2000).*

# *General Questions*

- *High Profile / Popularity of Voluntary Policies*
- *Questions That Drive Research:*
  1. *Under what circumstances do governments choose to use voluntary policies to control pollution?*
  2. *What factors determine the willingness of private sector organizations to volunteer to reduce pollution?*
  3. *What determines the effectiveness of voluntary policies?*

# *ISO 14001*

- *Global voluntary EMS; International Standards Organization, 1996; over 100,000 facilities*
  - *An EMS is an organization-level management tool used to develop, implement and monitor environmentally sustainable practices with the objective of continual environmental improvement.*
- *Components:*
  - 1) *organizational level environmental policy;*
  - 2) *identification of environmental aspects;*
  - 3) *establishment of objectives and targets;*
  - 4) *implementation plan;*
  - 5) *monitoring and evaluation;*
  - 6) *periodic management review*
- *ISO 14064 standards (2006) GHG accounting and reporting at the firm level.*

# ISO 14001

- *Certification and continued compliance with the standard requires third party audits.*
  - *Results not public*
- *Expensive, low to no subsidies*
- *Japanese adoption levels high*
  - *costs incurred by organization*
  - *benefits must be high*
- *ISO adoptions in Japan and the World 1999-2004*

	1999	2000	2001	2002	2003	2004
Japan	14106	22897	36765	49449	66070	90569
World	3015	5556	8123	10620	13416	19584
Percent Japan	21.4	24.3	22.1	21.5	20.3	21.6

# *Research Questions*

- *What factors affect adoption of ISO 14001 Environmental Management Standard (EMS) in Japan?*
- *To what extent does adoption affect environmental outcomes?*
  - *Positive effects of ISO 14001 on outcomes (Potoski and Prakash, 2005; Anton, 2006)*
  - *Effects depend upon how ISO 14001 is managed (King et al., 2005)*
  - *Increased pollution (Barla, 2007, Boiral, 2007)*

# *Literature –adoption determinants*

- *Resources - larger organizations more likely to benefit from voluntarism*
  - *More visible to external stakeholders*
  - *More able to self-promote*
  - *Greater capacity to respond – more experience, slack resources to identify benefits and undertake application process*
- *For ISO 14001 consistent findings that size to be an important indicator of certification.*

*(Arora, 1995; Videras and Alberini, 2000; Rivera et al., 2006; Nakamura, 2001; King, et al., 2005; Potoski and Prakash, 2005)*

# *Literature –adoption determinants*

- *Attitudes, beliefs and values*
  - *Environmental attitudes of top decision makers positively related to environmental behavior of hotels (Rivera and De Leon, 2005)*
  - *For ISO adoption, environmental beliefs by firm executives did not affect adoption levels. The level of perceived personal and firm level responsibility to protect the environment was strongly significant (Nakamura et al., 2001).*
- *Positive attitudes toward ISO and perceived social responsibility will be positively related to adoption.*

# *Literature –adoption determinants*

- *Economic Benefits and Competitiveness*
  - *Club goods – certification signifies “joining the club and adhering to its standards (Potoski and Prakash, 2005).”*
    - *Enables special access to resources or special treatment.*
  - *Certification reduces information asymmetries between suppliers and potential buyers (King et al., 2005)*

# *Literature –adoption determinants*

- *Economic Benefits and Competitiveness*
  - *Firms volunteer to signal customers or investors (Lyon and Maxwell, 2004) - Lower risk; Exploitation of market opportunities; Satisfaction of customer demands*
  - *ISO adopters in are more export oriented (Welch et al., 2001) certification to facilitate external trade (Chan and Li, 2001).*
- *Voluntarism can lead to new sources of competitive advantage, new markets and capital opportunities, customer recognition.*
- *Facilities undergo ISO certification when they are more dependent on international trade and when the perceive higher benefits of certification to their own economic competitiveness.*

# *Literature – adoption determinants*

- *Regulatory Benefits*
  - *Political economic argument (Becker, 1983; Pelzman, 1976; Stigler, 1971)*
  - *Reduction of regulatory pressure, reduced reporting requirements, pre-emption of future regulation (Arora and Cason, 1996; Khanna et al., 1998; Decker, 2003; Lyon and Maxwell, 2004).*
- *Higher regulatory pressure will increase likelihood of ISO adoption.*

# *Literature – adoption determinants*

---

- *Environmental Quality*
  - *Dirtier firms may be more visible and therefore more likely to adopt. Low hanging fruit. (Arora and Cason, 1996; Khanna et al., 1998)*
  - *Cleaner firms are in an easier position – often have better environmental management systems and are therefore more able to address the complexities of certification. Have already invested.*

# *General Model*

- *ISO Adoption = f(size and resources, environmental attitudes, social responsibility, economic benefits, regulatory benefits, environmental quality, industry controls)*

# *Data*

- *Mixture of Quantitative and Qualitative*
- *National survey of facilities in four industries: electronics, electrical power, electric machinery and chemical manufacturing*
- *3227 mail surveys*
  - *1515 ISO adopting facilities – Japan Accreditation Board for Conformity Assessment (1237; 82%)*
  - *1713 non adopters – Japan Statistics Bureau List of Manufacturing Facilities (481; 28%)*
  - *Stratified by size*
  - *Facility manager or the primary ISO contact*

# *Data*

- *Interviews*
  - *21 adopter facilities selected, 15 agreed to interviews*
  - *Open and closed ended questions*
    - *Basic information, certification history, primary products, expected benefits of ISO 14001, decision making processes, assessments of economic and other benefits, environmental actions*
  - *Environmental management personnel*

# *Variables*

- *Dependent variables*
  - *Four stage adoption*
    - *Early certifier (pre-1999)*
    - *Recent certifier (1999-2002)*
    - *In-process certifier*
    - *Non-certifier*
  - *Four sets of independent variables*
    - *Size and resources*
    - *Attitude and perspective of management*
    - *Economic benefits and competitiveness*
    - *Regulation*

# *Size and Resources*

- ***Number of Employees***
  - *Approximately how many full time employees in facility (fewer than 50; 50 to 299; 300 to 999; 1000 to 4,999; 5,000 or more)*
- ***Internal Resource Capacity, cronbach alpha = 0.82 (seven point scale, strongly disagree to strongly agree).***
  - *My facility has sufficient financial resources to implement voluntary standards.*
  - *My facility has sufficient human resources to implement voluntary standards.*
  - *Top management in our facility supports the adoption of new voluntary standards.*

# *Size and Resources*

- ***Environmental Labor***
  - *How many full time equivalent (FTE) employees in your facility spend a majority of their time on environmental issues?*
- ***Environmental Division***
  - *Does your facility have a specific environmental division or section? (Yes = 1, No = 0)*
- ***Environmental Decision Making***
  - *How often does the individual in charge of environmental management in your facility participate in top level decision making meetings (seven point scale from never to always, 0 if no environmental manager)*

# *Attitude and Perspective*

- ***EMS Attitude, cronbach alpha = 0.80 (seven point scale, strongly agree to strongly disagree)***
  - *Establishment of an environmental management system is necessary to achieve high levels of environmental performance.*
  - *An environmental management system provides an effective environmental management strategy.*
- ***Facility Social Responsibility, alpha = 0.80***
  - *Our facility should network with industry leaders to learn more about environmental management.*
  - *Government should provide more administrative guidance/technical assistance to help private sector actors become more environmental (negative scale).*
  - *Industry associations should provide more guidance to help members become more environmental.*

# *Economic Benefits and Competitiveness*

- *Percent Revenues from Japan*
  - *What percentage of your total revenues are accounted for by sales to Japan (also asked about revenues from sales to other countries)*
- *Environmental Image*
  - *A good environmental image is important for competitive survival. (seven point scale, strongly agree to strongly disagree)*

# *Economic Benefits and Competitiveness*

- *Competitiveness Perception*
  - *To what extent are each of the following factors primarily and issue of environmental quality or economic competitiveness for your facility?*
  - *(Summed series of questions on a seven item scale, which ranges from environmental quality to economic competition.)*
  - *Reduction in raw material use; Increase use of recycled inputs; Energy efficiency; Reduction of water use; Reduction of CO<sub>2</sub>; Reduction of waste production; Increase product lifetime; Develop more environmentally benign products*

# *Regulation and Environmental Performance*

- ***Number of Regulations***
  - *For each of the following types of emissions, indicate whether the emission is regulated for your facility. (Summation of discrete responses.) Dioxins; Trichloroethylene; Sulfur oxides; Soot and dust; Nitrogen oxides; BOD or COD; Dichloroethylene*
- ***Citizen Pressure, cronbach alpha = 0.71***
  - *Our facility is feeling increasingly accountable to the public for business decisions that affect the environment.*
  - *Citizens are increasingly attentive to the environmental consequences of our facility's business decisions.*
- ***Local Voluntary Agreement***
  - *Has your facility ever entered into a voluntary environmental agreement with a local or state government? (Yes = 1, No = 0)*

# *Local Voluntary Agreements*

- *Background*
  - *National regulation slow and weak*
  - *Dramatic local problems, public pressure, ability of local government to develop ordinances stricter than national laws.*
  - *Facility based agreements, multiple pollutants, typically stricter than national regulations*
- *Monitoring*
  - *Spot inspections, fuel and emissions, public disclosure of agreement but not of emissions*
- *Sanctions*
  - *Operation / expansion / construction permits, shut down, liability*
- *Inducements*
  - *Land, infrastructure, site selection*

# *Findings I*

DV: Early = 4; Recent = 3; In Process = 2; Non-adopt = 1

## **Facility Size and Resources**

Number of Employees	1.51 (0.05) ***
Internal Resource Capacity	2.33 (0.08) ***
Environmental Labor	-0.006 (0.005)
Environmental Division	0.45 (0.10) ***
Environmental Decision Making	0.03 (0.01) ***

## **Attitude and Perspective**

EMS Attitude	0.05 (0.02) **
Facility Social Responsibility	0.01 (0.01)

# *Findings II*

DV: Early = 4; Recent = 3; In Process = 2; Non-adopt = 1

## **Economic Benefits and Competitiveness**

Percent Revenues from Japan      -0.003 (0.001) \*\*

Competitiveness Perception      -0.004 (0.005)

Environmental Image      -0.07 (0.03) \*\*

## **Regulation and Oversight**

Local Voluntary Agreement      0.24 (0.07) \*\*\*

Number of Regulated Pollutants      -0.04 (0.02) \*\*

Citizen Pressure      -0.04 (0.01) \*\*\*

# *Findings III*

## **Industry**

Chemical Manufacturing	-0.35 (0.11) ***
Electric Machinery	0.35 (0.10) ***
Electronics	-0.05 (0.15)
Electrical Power	-0.36 (0.15) **
n	1492
Number Early Adopters	595
Number Late Adopters	569
Number In-process Adopters	161
Number Non-adopters	167
Log Likelihood	-1343.32

# *Expected Findings*

- *Earlier adopters are*
  - *larger, have greater financial and human resource capacity.*
  - *have environmental divisions, active environmental decision makers.*
  - *more positive about the ISO EMS.*
  - *more dependent on international trade.*
  - *more likely to have a local voluntary agreement.*

# *Unexpected Findings*

- *Earlier adopters*
  - *are less likely to be concerned about environmental image.*
  - *perceive lower levels of citizen pressure for accountability.*
  - *report fewer regulated pollutants.*

# *Environmental Outcomes*

- *Extent of Public Disclosure*
  - *Indicate whether your facility discloses information on the following items to the public and other external stakeholders. Information disclosure here means a condition in which information is available in brochures, reports and/or the internet for perusal and use. (Summative measure of discrete responses)*
  - *Reductions of raw material use; Increased use of recyclables; Energy use levels; Carbon dioxide emission levels; Waste production levels; Regulated air emission levels; Regulated water emission levels; Environmental expenditures; Voluntary environmental objectives and/or targets; Environmental audit results*

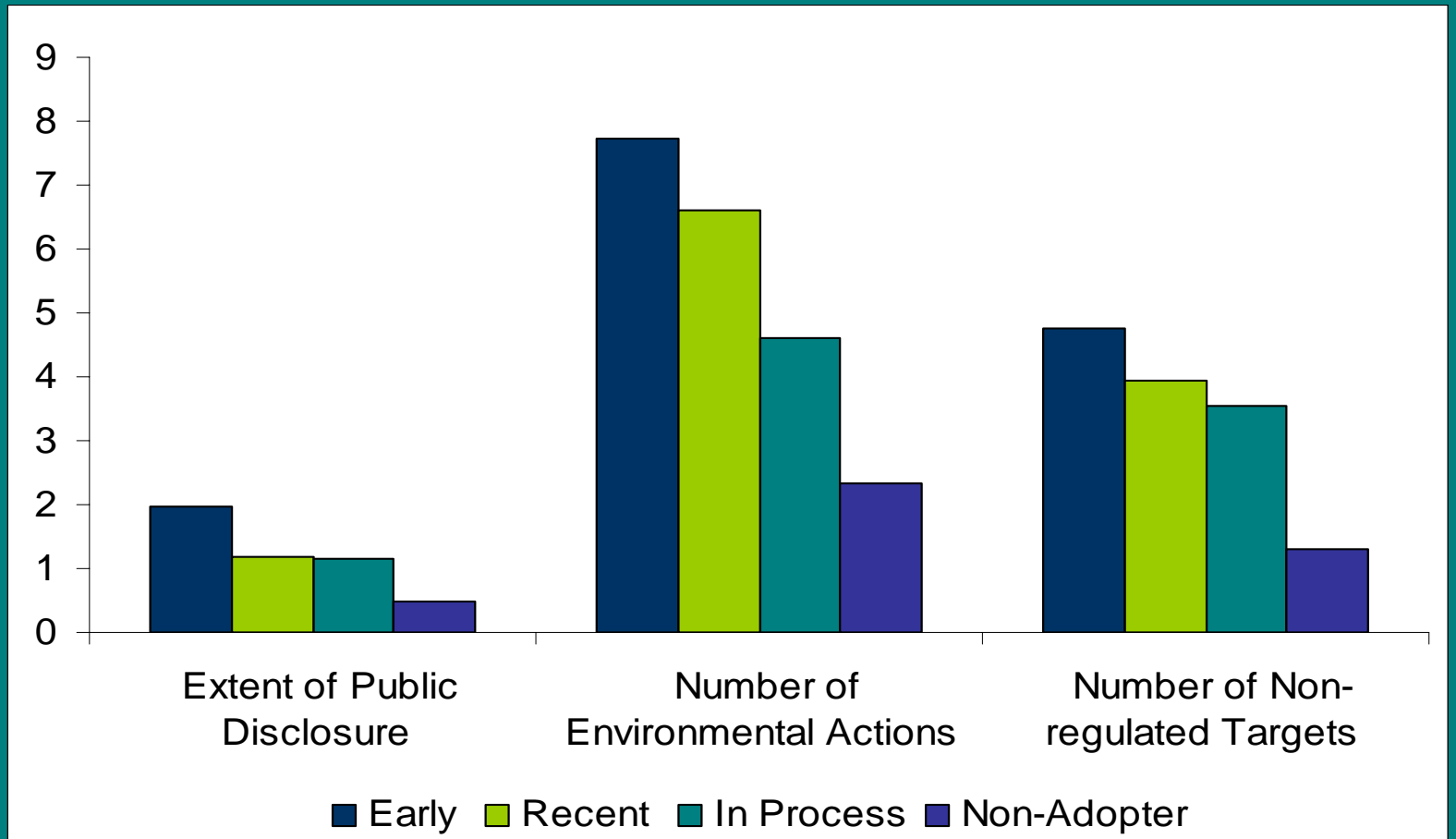
# *Environmental Outcomes*

- *Number of Environmental Actions (Summative measure of discrete responses)*
  - *Publishes an environmental policy*
  - *Publishes an annual environmental report*
  - *Applies environmental considerations to purchasing decisions*
  - *Uses lifecycle analysis*
  - *Systematically reduces fossil fuel use*
  - *Systematically reduces toxic chemical use*
  - *Undergoes environmental audits by external third party organizations*
  - *Uses Eco-labeling*
  - *Uses PRTR (Pollutant Release and Transfer Register)*
  - *Creates separate accounts for environmental expenses.*

# *Environmental Outcomes*

- ***Number Non-regulated Targets***
  - *For which of the following factors does your facility have specified targets? (Summed indicator)*
  - *Reduce raw material use; Increase use of recycled inputs; Energy efficiency; Reduce water use; Reduce waste production; Increased product lifetime; Develop environmentally benign products*

# Findings IV



# *Findings V*

- *Interview responses*
  - *Most interviewees indicated that waste reduction and energy savings targets were established as a result of ISO certification.*
    - *Energy and waste disposal costs are particularly high in Japan – more experience, may expect higher relative economic returns*
  - *Over half mentioned that new or tougher emission targets for regulated chemical substances were established as a result of certification. Only two admitted tougher standards set before certification.*

# *Findings V*

- *Half of the interviewees indicated that emission targets were set above industry standards*
- *Half of the facilities indicated partial or complete attainment of the targets (other unsure or non-committal)*
- *Only four of the facilities mentioned that they had actively adjusted or were considering adjusting regulated or non-regulated targets.*

# *Finding V*

- *Most important outcomes:*
  - *Establishment of a system of environmental management (2)*
  - *Emission reduction (4)*
  - *Created an impetus for environmental action (1)*
  - *Improved environmental awareness of employees (1)*
  - *Extended environmental actions of the facility to non-regulated emissions (1)*
  - *Significant positive response from citizens (2)*
  - *Excessive costs coupled with no clear linkage to economic benefits (6)*
  - *Identified of cost reductions as a result of certification (2)*

# Conclusions

- *Adoption of ISO 14001*
  - *Earlier adopters are larger, more slack resources, are more reliant on international trade, have greater environmental management capacity and more experience with local voluntary agreements, enjoy relatively good environmental image and feel less pressure from regulators and stakeholders.*
- *ISO Certification is a catalyst for establishment of some elements of an environmental management system.*
  - *Boiral (2007) –“rigorous compliance with the standard often resulted in real improvements, these improvements were primarily technical and administrative in nature”*
- *But it does not necessarily result in clear procedures for adjustment and improvement, nor is there indication of clearly recognizable benefits.*
  - *Boiral (2007) – “adopting this standard tends to lead to a ceremonial behaviour intended to superficially show that the certified organizations conformed to the standard”*
- *Limited hope for ISO 14064 to have an effect on GHG*