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Environmental Management Systems: Do They Improve Performance?

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http://ndems.cas.unc.edu/

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Why Study EMSs?

- Government recognition for implementing EMSs:
  - Is such recognition warranted?
- Regulatory uses of EMSs
  - Do the effects of an EMS justify regulatory flexibility?
  - Are regulatory mandates for EMSs desirable?
- Government investments in developing and promoting EMSs:
  - Are EMSs for government facilities an effective use of resources?
  - Are EMS assistance programs an effective use of resources?

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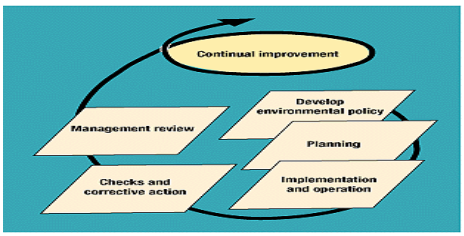
The EMS Process



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Elements of an EMS

- Environmental policy statement:
  - A documented public commitment by top management to compliance, prevention of pollution, and continual improvement
- Planning process:
  - Environmental aspects and impacts, significance, objectives and targets
- Implementation and operation:
  - Assigned responsibilities, communication, training, documentation
  - Operational control, monitoring & measurement, emergency prep/response
- Corrective and preventive action procedures:
  - Root cause analyses, procedure updates, audits
- Top management review

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Objectives of NDEMS Study

- What effects does EMS have on environmental performance, regulatory compliance, costs and benefits?
- What factors matter to these outcomes?
- What implications for public policy?

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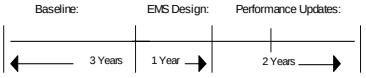
NDEMS Study Design

- Longitudinal study: three phases of data collection



- Facility-level data: 83 facilities in 20 sectors, 17 states
  - 58 provided design data, 30 provided update data
  - Included corporate, privately held, federal and local govt., both large and small
  - Sectors included chemicals, electronics, food, machinery, metals, pharmaceuticals, pulp and paper, printing, transportation, utilities

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Key Findings

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Finding #1: Performance

Introduction of an EMS had positive effects on the environmental performance of most facilities.

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- More than half (56%) improved at least half of their environmental indicators
- Nearly two-thirds (64%) improved at least half of indicators related to EMS objectives
- Nearly three quarters (73%) eliminated compliance violations

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Finding #2: Variability

The content of the EMS varied widely.

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Aspects and Impacts

- *Aspects*:
  - *Most focused on operations & production processes; very few addressed product impacts*
- *Impacts*:
  - *Most included waste generation, pollution, natural resources (energy, water, site, …)*
  - *About half also included health & safety impacts.*
  - *Less than 1/3 included beneficial impacts*
  - *Govt. facilities more often included health & safety and beneficial impacts.*

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Significance Determinations

- For many, any compliance issue = significant
  - *Even if environmental impact low*
- For some, significance = major impact on envt.
  - *E.g. hazardous wastes, major emissions and discharges*
- For others, significance = every impact
  - *E.g. non-hazardous trash, oily rags and swabs*

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Objectives and Targets

Example	Objective	Target	Category
A	Reduce hazardous waste by 10%	3,734 lbs. total (Average = 415 lbs. per month; monthly monitoring)	Performance
B	Recycle antifreeze	Install antifreeze recycling system	Project
C	Reduce solid waste disposal	Increase employee awareness	Management-Activity
D	Comply with FIFRA	Maintain contractor (grounds maintenance) requirements	Compliance

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Finding #3: Costs

Costs varied greatly between business and government facilities.

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- Median net cost of EMS introduction = ~$40,000.
  - *Main cost element for all facilities was labor.*
  - *Auditing and registration costs were a small fraction*
- EMS costs per employee were 3-4x higher for government facilities than for businesses.
- Consultant costs were a major cost element for government facilities, though not for businesses.

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Factors Affecting Outcomes

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ISO certification: no difference

- Facilities that were certifying their EMS to ISO 14001 and using third-party auditors were not statistically different from the others

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Motivations mattered

- Greater environmental performance improvement by facilities that saw market potential, competitive advantage, increased revenues, or support of other professionals as reasons for EMS adoption

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Compliance history mattered

- Facilities that had reported non-compliance incidents during their baseline period scored lower on post-EMS environmental performance

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Pre-existing capabilities mattered

- Facilities that had already developed some internal capabilities for EMS adoption improved more – and had lower costs – than those that had more limited pre-existing internal capabilities
  - *Examples: quality-management systems, pollution prevention or waste management plans*

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Ownership mattered

- Facilities owned by publicly traded corporations generally improved their performance more than did either privately held or government facilities
- Businesses improved compliance more than did government facilities.
- *Reason: greater internal capabilities*

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Govt. EMS assistance mattered

- Especially to government facilities and to privately-held businesses
  - *Reason: no access to the management capabilities and resources of a parent corporation.*
- Corporate subsidiaries generally not motivated by government assistance

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Ownership, Capabilities, Resources

Resource & Capabilities	Ownership		
	Traded	Private	Gov't
Management Systems Experience	76%	50%	0%
Utilized Environmental Management Techniques	81%	25%	17%
Parent Provided EMS Template	68%	18%	0%
Gov't Assistance Motivated Adoption	10%	44%	83%

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Policy Implications

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1. EMSs are worth encouraging. On balance, performance and compliance appear to improve, and facilities also believe they benefit.

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2. EMSs are not an automatic guarantee of superior performance – nor even of compliance.

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3. The content of an EMS provides a clearer basis for public policy rewards than does the mere existence of an EMS – or of ISO 14001 EMS registration.

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4. EMS is a valuable window into environmental impacts and performance improvements.

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5. Government facilities might benefit more than they recognize from cost savings and management improvements associated with EMS introduction.

- *Businesses were more conscious of potential economic and management benefits, not just environmental performance and compliance.*

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6. EMS assistance programs are best targeted toward government facilities and small businesses.

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7. Standard templates for many common government operations could reduce EMS costs, build management capabilities
   - Examples: motor pools, construction and maintenance operations, water supply and wastewater treatment facilities, schools, ...

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- Also: www.mswg.org
- MSWG San Antonio 6/03
- MSWG Maine Fall '03

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Why Do Facilities Adopt EMSs?

- Market forces
  - *Customer and corporate mandates, brand image, public relations*
- Cost savings (eco-efficiency)
  - *Water, energy, and materials use, waste mgt., insurance, liability, ….*
- Mainstreaming environmental responsibility
  - *broaden employee awareness*
  - *integrate into all managers' responsibilities, and with quality management*
  - *standardize procedures, training, record-keeping*
  - *Consistency across multiple facilities, due diligence*
- Regulatory benefits?
  - *less spills, less violations; smoother inspections; regulatory flexibility?*

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Benefits Reported

Benefit Category	Percentage of Facilities Reporting Benefits
	n=32
Management Efficiency	94%
Operational Efficiency	78%
Liability	53%
Regulatory	53%
Customer/Supplier Relations	19%
Community Relations	13%

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Design Costs *(per employee)*

Cost Category	Traded (20)		Private (16)		Gov't (6)	
	Mean	*% Total*	*Mean*	*% Total*	*Mean*	*% Total*
Labor	$206	77.2%	$317	59.7%	$822	59.8%
Consultants	$ 12	4.5%	$ 37	7.0%	$499	36.3%
Travel/Training	$ 14	5.2%	$ 34	6.4%	$ 50	3.6%
Equipment	$ 0	0.0%	$ 33	6.2%	$ 0	0.0%
Materials	$ 7	2.6%	$ 22	4.1%	$ 1	0.1%
Auditors, ISO 14001 Registration	$ 28	10.5%	$ 88	16.6%	$ 0	0.0%
Average Total Cost /Employee	$267	100%	$531	100%	$1441	100%

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Regulatory Mandates for EMSs?

- EMS per se is not a clear indicator of performance or compliance.
- EMSs encourage environmental improvement in many ways in addition to compliance.
  - *Examples: eco-efficiency, root-cause correction, mainstreaming of environmental responsibilities*
- Value could be reduced if emphasis mandated on single-medium regulatory compliance.

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Study Limitations

- Small sample (37 facilities through 1st update)
- Short time period (~2.5 years from baseline to 1st update)
- Cooperating facilities (volunteers, recruited by states and EPA, technical and financial assistance, regulatory flexibility in some states)

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