

Track: Ways of Knowing

**Environmental Management Systems:
A Sustainable Strategy for a Sustainable World?**

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Abstract: Over the past several years many business firms worldwide have adopted formal environmental management systems (EMSs) as procedures for systematically identifying environmental aspects and impacts of their operations, setting explicit goals for compliance, performance, and continuous improvement, and managing for them throughout these operations. This procedure has been standardized and promoted by the International Organization for Standardization, at the suggestion of the Business Council for Sustainable Development, as a strategy for achieving sustainable use of the environment by businesses themselves—“governance without governments”—whether or not they are subject to effective government regulation and enforcement.

A timely and important series of questions, therefore, is whether the adoption of formal EMS procedures does in fact produce more sustainable environmental and economic outcomes, and whether the adoption and use of such procedures is itself a sustainable business practice. On what environmental aspects and goals do they focus: regulatory compliance, superior performance, unregulated environmental impacts, sustainability, or others? What benefits and costs follow from the use of EMS procedures: to the firm, to governments and other stakeholders, and to the public? How much do these outcomes depend on the EMS design process: on who is involved in it, on how hard the firm challenges itself with the goals and objectives it sets, on the influence of external incentives and stakeholders? And how sustainable are the EMS goals and commitments themselves across potential changes in management personnel, ownership, market forces, and other forces? Depending on the answers, the EMS procedure offers either a promising approach to more sustainable environmental management, or troubling questions as to how environmental sustainability can be achieved in the emerging global economy.

This paper presents preliminary impressions on similarities and differences among the environmental management systems adopted by 18 business and government facilities in ten U.S. states, representing both large and small facilities in 10-20 economic sectors, and among the processes used by these facilities to create and implement their EMSs. Based on these impressions, the paper identifies issues and additional research needs that must be addressed to determine more fully the value of EMSs for advancing environmental sustainability.

Data are drawn from the National Database on Environmental Management Systems, housed at the University of North Carolina (UNC) at Chapel Hill, which currently is collecting baseline and EMS design data from approximately 100 business and government facilities in ten U.S. states. Over the next several years it will also add post-implementation performance data on environmental, economic, regulatory, and other outcomes for the same facilities at six-month intervals. The database is being developed and maintained by investigators from UNC-Chapel Hill and the Environmental Law Institute with support from the U.S. Environmental Protection Agency, in cooperation with the facilities themselves as well as with ten U.S. states and the Multi-State Working Group on Environmental Management Systems.

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I. Introduction

Over the past several years many business firms worldwide have adopted formal environmental management systems (EMSs) as procedures for systematically identifying environmental aspects and impacts of their operations, setting explicit goals for compliance, performance, and continuous improvement, and managing for them throughout these operations. Many businesses have developed their own environmental management procedures for years, but until recently there was no trend toward formalizing or standardizing them more generally. Even within many corporations they remained largely the responsibility of a single office responsible primarily for regulatory compliance and risk minimization, such as a Vice President for Environment, Health and Safety, rather than an organization-wide mission for which all managers would be held accountable.

In the early 1990s, however, in anticipation of the 1992 “Earth Summit” in Rio de Janeiro,⁴ the Business Council for Sustainable Development proposed the development of an international voluntary standard for environmental management systems by the International Organization for Standardization. The apparent intent was to offer a strategy for achieving sustainable use of the environment by businesses themselves—“governance without governments”—whether or not they were subject to effective government regulation and enforcement. This procedural standard was finalized in late 1996 as ISO 14001; other documents in the ISO 14000 series provide more detailed guidance on many EMS-related topics, such as environmental performance evaluation, life-cycle analysis, eco-labeling, and others.

The widespread adoption of ISO 14001 environmental management systems (EMSs) thus represents at least a philosophical intent to provide a means toward achieving the goal of sustainable development. An important and timely question, therefore, is to what extent (if at all), and under what circumstances, do they achieve this? How does the introduction of a formal procedure such as an EMS change the actual environmental and economic performance of a business (or other organization) that adopts it, and to what extent do these performance changes affect sustainability?

At a minimum, organizations that adopt the ISO 14001 standard accept a responsibility to adopt a written environmental policy; to identify all environmental aspects and impacts of their operations; to set priorities, goals and targets for continuous improvement in their environmental performance; to assign clear responsibilities for implementation, training, monitoring, and corrective actions; and to document their procedures and results, and evaluate and refine their implementation over time, so as to achieve continuous improvement both in their attainment of environmental goals and

⁴ Officially, the United Nations Conference on Environment and Development.

targets and in the EMS itself. An organization that adopts an ISO 14001 EMS can be certified as conforming to it by an approved third party “registrar.” Similar procedural standards, varying somewhat in their details, have been adopted in Great Britain (BS 7750) and the European Union (the Eco-Management and Auditing Scheme, or EMAS).

Significantly, the substantive decisions that make up the content of the EMS are left almost entirely to the discretion of the adopting organization itself. An ISO 14001 EMS can be used to pursue a wide range of self-selected environmental goals and priorities: examples include compliance with regulatory standards, improving environmental performance beyond regulatory minima, reducing unregulated environmental impacts, improving environmental sustainability per se, or others. ISO 14001 does not prescribe substantive environmental performance standards, nor does it direct which of many possible environmental goals should be given priority. It does not prescribe the introduction of specific pollution-prevention or sustainability-related practices. It does not mandate how fast or how far “continuous improvement” must proceed, nor even how quickly an organization must actually achieve compliance with environmental regulations. Nor does it require that even the EMS itself, let alone the documentation of its achievements or failures, be made public. An EMS is thus a formal set of procedures and of voluntary but internally documented assertions as to how an organization intends to manage its potential impacts on the natural environment and related aspects of its operations.

Two timely and important questions, therefore, are whether the adoption of formal EMS procedures does in fact produce more sustainable environmental and economic outcomes, and whether the adoption and use of such procedures is itself a sustainable business practice. Specifically:

- First, do EMSs in practice focus on strategic priorities for improving sustainability, or merely on short-term, limited improvements in regulatory compliance and pollution-prevention efficiencies? What is the scope of the EMSs: do they represent merely localized, facility-level practices and performance, or corporate-wide adaptation and evolution toward environmentally sustainable patterns of business activity? On what environmental aspects, impacts, and objectives do they focus: on regulatory compliance, on superior performance beyond compliance for regulated aspects, or on unregulated environmental impacts? How far and how fast do EMS adopters commit to improve?
- Second, are the EMS procedures sustainable? Do they represent genuine long-term, organization-wide commitments to continuous maintenance of the procedure, as well as continuous improvement in its outcomes, or merely one-time paperwork exercises? How much do these outcomes depend on the EMS design and implementation process: on who is involved in it, on the motivations and expectations that led to the decision to implement it, on the influence of external incentives and stakeholders, and on the continued presence of its initial champions and participants?
- And third, how sustainable are the EMS goals and commitments themselves across potential changes in management and organizational structure, in ownership (e.g. mergers, spinoffs and buyouts), in political authority (e.g. elected leadership, for public organizations), in market forces (affecting financial and investment assets as well as products), and other factors?

Depending on the answers, the EMS procedure may offer either a promising approach to more sustainable environmental management, or merely continuing unanswered questions as to how environmental sustainability can be achieved in the emerging global economy.

II. Environmental Management Systems and Sustainability

A first question must be, if an EMS were to reflect progress toward greater sustainability, how would we recognize it? The meaning of “sustainable development” itself has been the subject of widespread debate, which requires at least brief review.

The term “sustainable development” was first coined and promoted by the United Nations’ World Commission on Environment and Development (WCED), chaired by Prime Minister Gro Harlem Brundtland of Norway. The 1987 report of this commission, Our Common Future, proposed long-term strategies for achieving “sustainable development” (WCED 1987). The core of its definition combined global economic and social progress with respect for natural systems and environmental quality: sustainable development, it argued, meant development that would meet the basic needs of the present generation of humans without endangering the ability of future generations to meet their own needs. The Commission’s vision specifically included economic development, ecological sustainability, and social equity as essential, interdependent, and co-equal elements. Unlike many environmental-protection advocates, it focused attention on the dire economic plight of the poorer countries, and urged a renewed commitment to promoting economic growth, particularly in impoverished Africa and debt-laden Latin America. However, it urged that the core elements of that growth be radically redirected from past patterns, policies and priorities, to emphasize less energy-intensive technologies, stabilization of human population levels, intensified conservation of natural systems and energy, and reorientation of technologies toward reduced risks.

The core concepts of sustainability were further elaborated in the Agenda 21 document adopted by most nations at the 1992 Earth Summit. Chapter 30 of that document called for achieving sustainability by promoting clean and efficient production, pollution prevention, and commitment to best practices in industry; using investment as an instrument of sustainability; promoting technological innovations that enhance sustainability; instituting best practices worldwide; and disseminating these practices to suppliers, communities, and small businesses as well, wherever one does business.

The question remained (and remains), how can these concepts be operationalized with sufficient clarity that they can be recognized in the actions of individual businesses, municipalities, and other organizations?

Considering just the environmental element of sustainability, for instance, one could argue that increasing progress toward sustainability follows a sort of “Guttman scale,” with each succeeding level both incorporating and transcending the previous levels: from mere compliance with environmental standards, to pollution prevention (incremental internal efficiencies in use and recapture of waste materials and energy), to design for

environment (decreasing environmental impacts in the overall use and reuse of materials and energy in production processes), to product stewardship (decreasing environmental impacts throughout the overall life cycle of products, as well as production processes), to strategic management for environmental sustainability per se (for instance, substituting lower-impact services for higher-impact products, and reconfiguring the mix of business activities as a whole toward reduced environmental impacts and renewable levels of resource use), and finally, to the full vision of sustainability, channeling the economic use of sustainably available environmental resources into meeting human needs and wants equitably as well as profitably.

The higher levels of this scale may not even be achievable by all firms as presently constituted: ultimately they are goals for the overall economy and society, which may require the radical transformation or even “creative destruction” of some existing businesses, and their replacement by more sustainable competitors (see the work of Stuart Hart on this point). They may also require approaching sustainability not just from the perspective of enterprises themselves, but also (and perhaps even primarily) from those of sustainable communities and ecosystems—real environments, in which multiple enterprises interact with people, other species, and ecological processes—and of sustainable economies and civilizations in the aggregate, for which what matters is the overall levels of balance and interaction among extraction and use of materials and energy, landscape transformation, population growth, per-capita material demands and wants, and distributional equity.

One methodology for operationalizing and evaluating the sustainability of business enterprises has been developed by the Dow Jones Company, the Sustainable Asset Management (SAM) Index (www.sustainability-index.com). This methodology requests detailed questionnaire information from CEOs of firms in each of 73 industry groups, supported by company policies and environmental, social, and financial reports and other available documentation, as well as media reports. It defines “sustainable” firms as those (a) in industrial sectors in which the top-ranked company scores at least 20% of the maximum sustainability score and (b) scoring at least 1/3 the score of the top-ranked company in their sector. Market capitalization is also taken into account, so that the index preferentially emphasizes financially significant industries and firms.

The SAM questionnaire covers a wide range of sustainability-related criteria, both general and some specific to each sector. Examples include sustainability policy and strategy, such as organization and responsibilities, policies, stakeholder relations, signed sustainability charters and corporate governance; management of opportunities, such as employee incentives, intellectual capital management, extent of information technology integration, use of strategic planning metrics, sustainability planning, environmental health and safety reporting, and social responsibility reporting; and management of sustainability-related risks and costs, both strategic (as evidenced e.g. by corporate integrated risk management and environmental management systems, world-wide minimum environmental and social standards, and corporate codes of conduct) and operational (evidenced e.g. by environmental health and safety audits, social audits, materials and energy input-output analyses, environmental profit and cost accounting, contingency plans

for environmental health and safety incidents, corporate health and wellness programs, controversies related to the treatment of employees, and environmental liabilities).⁵

The SAM index thus covers a wide range of sustainability-related criteria, which the authors assert to be equally weighted across economic, social and environmental factors, and it professes to provide consistent comparisons across firms and major industrial sectors. It clearly provides evidence as to whether reporting firms are thinking about many sustainability-related issues. What is not clear from published information is how the evaluators actually weight and aggregate the many individual information elements that make up these extraordinarily multi-factorial indexes, nor whether all firms in each sector even respond: low performers may perhaps simply choose not to be rated. Nor is it clear how strongly the cumulative performance of all firms in fact achieves greater environmental sustainability: the index is designed for comparisons among responding firms, but not for estimation of aggregate change toward greater or less sustainability. Finally, it does not appear to capture data on many actual environmental or other performance levels, except to the extent that these are reflected in corporate annual reports, formal legal penalties or liabilities, or negative press coverage.

A second conceptual methodology for operationalizing sustainability has been developed by The Natural Step (TNS), a non-profit environmental education organization founded in Sweden in 1989 which now operates worldwide (www.naturalstep.org). TNS offers a more substantive and scientifically-based set of principles for environmental sustainability, based on laws of thermodynamics and natural cycles. These include four primary principles:

- Substances from the Earth's crust must not systematically increase in the biosphere. This requires the development of comprehensive programs for metal and mineral recycling, and decreasing economic dependence on fossil fuels, so that these materials and energy resources are not extracted and dissipated faster than they are naturally redeposited and reintegrated in nature.
- Substances produced by society must not systematically increase in the biosphere. This requires reducing economic dependence on persistent human-made substances, such as stratospheric ozone-depleting compounds (e.g. CFC, halons) and synthetic organic chemicals that bioaccumulate in food chains.
- Nature's ecological functions and diversity must not be systematically impoverished by physical displacement, over-harvesting or other forms of ecosystem manipulation. Biodiversity, which includes the great variety of animals and plants found in nature, provides the foundation for ecosystem services which are necessary to sustain life; human harvesting of biotic resources, and landscape transformation, must therefore be limited to levels at which biodiversity and natural resources can be naturally maintained and regenerated.
- Resources must be used fairly and efficiently in order to meet basic human needs worldwide. If the total resource throughput of the global human population continues

⁵ Actual indicators range from the existence of sustainability policy statements, annual environmental and social reports, and charter commitments, to other formal procedures and programs (such as best-practice benchmarking, a certified EMS, environmental and social audits, employee health programs, environmental purchasing policies, and expectations of suppliers and contractors), and some industry-specific performance-related policies (e.g. use of closed-loop processes, natural organic materials, and toxic chemicals).

to increase, it will be increasingly difficult to meet basic human needs as human-driven processes intended to fulfill human needs and wants are systematically degrading the collective capacity of the Earth's ecosystems to meet these demands. To achieve the first three conditions, therefore, both technically and in terms of the social stability and cooperation necessary to accomplish them, it is also necessary to be both efficient in resource use and waste generation, and fair in using them to meet basic human needs worldwide.

The Natural Step thus offers a conceptual approach that articulates more specifically the substantive principles of sustainability than does the SAM index, but it is not itself fully operationalized. It is proposed to be implemented incrementally, beginning with those steps that are easiest and most cost-effective for a particular organization, but nonetheless guided by the overall strategic principles of sustainability. Like ISO 14001, it leaves all specific decisions about priorities, actions, and pace of implementation to the individual organization, but it does offer more specific and fundamental sustainability-related goal categories than does ISO 14001 for evaluating potential options and decisions.

Using these criteria, one might compare EMS documents for evidence of the extent to which they demonstrate not just basic conformity to ISO 14001 procedures and documentation requirements, nor merely compliance with environmental regulations, nor other ad hoc or short-term environmental aspects of environmental performance, but also a specific focus on aspects, impacts, and performance targets that are specifically sustainability-related. For example:

- Do they reduce mineral and energy use per unit production, and shifts toward increased recycling and renewable energy?
- Do they reduce the use of bioaccumulating synthetic chemicals?
- Do they address opportunities for introduction of closed-loop processes, and reduce use of biotic resources and of landscape transformation?
- Do they increase efficiency of resource use, and address the social and equity aspects of environmental sustainability, both for their workers and customers?
- Do they address sustainability implications throughout the facility's operations, and indeed throughout the supply and use chains of the products it processes?
- Do they consider more fundamental strategic redesign of the enterprise as a whole to achieve more sustainable results throughout its processes, products, and services?
- Do they create a process by which a broader range of managers, other employees, suppliers and customers, and other external stakeholders are drawn into greater commitment to sustainability principles and priorities?
- Do such sustainability impacts receive high priority in the organization's EMS targets and commitments?
- How consistently does the organization adhere to these priorities over time, and through changes in personnel, structure, ownership, and market and other forces that also influence its decisions?

A third methodology for corporate sustainability reporting is the Global Reporting Initiative (GRI), begun in 1997 under the leadership of CERES (the Coalition for Environmentally Responsible Economies) with participation by corporations, non-governmental organizations (NGOs), consultants, accountancy organizations, business

associations, universities, and other stakeholders. GRI has recently developed an “Exposure Draft” of guidelines for such reporting, which they are now pilot testing. The goal of these guidelines is to establish a common framework for enterprise-level reporting on the linked aspects of sustainability: the environmental, the economic and the social. It seeks to elevate enterprise-level sustainable development reporting to the level of general acceptance and practice now accorded financial reporting. To ensure the long-term value of these reporting practices, GRI also seeks to develop and advocate greater stakeholder awareness and use of such reports (www.globalreporting.org).

The GRI guidelines, like the SAM index, are aimed at documenting information systematically at the enterprise level. They include environmental aspects of products and services as well as processes, affecting air, water, land, natural resources, flora, fauna, and human health. They also address social aspects such as treatment of minorities and women, involvement in shaping local, national and international public policy, and child labor and labor union issues. Finally, they include economic aspects, especially financial performance but also activities related to shaping demand for products and services, employee compensation, community contributions, and local procurement policies.

Examples of specific environmental performance indicators, for instance, include major stakeholder groups; number, volume, and nature of accidental or non-routine releases to land, air, and water, including chemical spills, oil spills, emissions resulting from upset combustion conditions; indicators of occupational health and safety; total energy use; total materials use other than fuel; total water use; quantity of non-product output (NPO) returned to process or market by recycling or reuse, by material type and by on- and off-site management type; quantity of NPO returned to land, by material type and by on- and off-site management type; emissions to air and discharges to water, by type; indicators of social and economic aspects of operational performance; and major environmental, social, and economic impacts associated with the life cycle of products and services, with quantitative estimates of such impacts. The guidelines urge that all these indicators be expressed using normalizing factors that would make them meaningful to users of the information, and include comparative data from the two previous years.

In effect, these guidelines provide more substantive and specifically sustainability-related suggestions of the range of environmental (and other) performance indicators that might be addressed in an EMS. The GRI guidelines do not provide guidance for implementing data collection, information and reporting systems and organizational procedures for preparing sustainability reports, leaving these to ISO and other procedural guidance processes. Like both EMS and the SAM index, they also do not present standards for rating sustainability management and performance, but merely for comparing performance incrementally against both the enterprise’s own prior-year performance and other enterprises.

III. The National Database on Environmental Management Systems (NDEMS)

To examine the actual performance of enterprises and their component facilities and operations, it is important to try to collect both systematic data across such facilities,

and detailed but also comparable case studies of the actual experiences of many types and sizes of enterprises and facilities.

The National Database on Environmental Management Systems (NDEMS) is designed to include data on EMS implementation from 75 pilot facilities receiving state or federal technical assistance to implement EMSs in ten U.S. states, plus approximately 20 non-pilot “control” facilities, using identical data collection protocols for each. The design of the study is a longitudinal comparative-case analysis in real time, including a three-year retrospective baseline, detailed data on EMS content and implementation processes, and at least two years’ post-implementation data on changes in environmental and economic performance and other outcomes beyond the EMS design phase, as facilities implement EMSs.

The NDEMS database is specifically aimed to collect *facility-level* data, which limits its ability to answer some important questions about strategic adaptation of entire enterprises without additional data collection. However, facility-level data do provide important insights at the scale at which real impacts occur to real people, environments, and ecosystems. They also provide important building blocks for more far-reaching assessments of enterprise-level adaptation and evolution, as well as community- and society-wide sustainability.

The goal of the NDEMS project is to determine the effects of ISO 14001 and other environmental management systems on five kinds of outcomes: environmental performance, regulatory compliance, pollution prevention, engagement with stakeholders, and economic performance. The database includes both private and public-sector facilities, both large and small businesses, and both simple and complex operations.⁶ Facilities included so far represent over a dozen sectors of the economy, including chemicals, electronics, food processing, machinery, metals, pharmaceuticals, pulp and paper, printing, transportation, utilities, federal facilities, and county and municipal governments. Most are implementing either ISO 14001 or similar sorts of EMSs. However, not all are seeking ISO 14001 third-party certification: some believe that for their purposes, internal implementation of an EMS is sufficient and most cost-effective. Their reasons for this decision are of course an interesting and important research question in itself.

IV. Preliminary Impressions

We have begun to analyze preliminary data on EMS designs from eighteen facilities from which we have received initial EMS design data submissions. Our first

⁶ Of the initial 55 facilities participating in NDEMS, for instance, 23 facilities or their parent organizations are privately held, 17 are publicly traded and twelve are local, state or federal government facilities (three did not report ownership). Perhaps more importantly, approximately 69 percent reported that they are part of a larger business or government organization. This may prove to be an interesting dimension on which to compare facilities. For example, facilities that are part of a larger organization may have very different motivations for adopting ISO 14001 than independent facilities. The EMSs of independent facilities may be designed very differently than the EMSs of facilities that must report to a larger organization, perhaps because larger organizations exert a greater degree of bureaucratic control over their facilities’ EMS design.

impressions of their responses suggest potentially interesting findings if they hold up across larger numbers of facilities.

First, the responses to the EMS design protocol show that in contrast to early presumptions that EMSs would be adopted only by larger transnational corporations, in fact EMSs are being implemented by facilities of all sizes and in many sectors. These facilities represent eight industrial sectors in nine states, ranging from small and medium-sized enterprises (17%) to large divisions of multinational corporations (22%), and located in communities ranging from small towns (39%) to major metropolitan areas (22%). Not all report direct economic net benefits from doing so, but most believe that it has been a worthwhile process, and several have explicitly stated that they would do it again even though it may not pay for itself on any strict economic basis.

Second, with respect to the EMS design process, most EMS core development teams were headed by the facility environmental manager and were composed primarily of other environmental and engineering staff, occasionally including consultants and representatives of senior management, but rarely either hourly employees or external stakeholders. However, those facilities that did involve a wider variety of employees in EMS development reported a significant additional benefit from the process: a heightened and more widely shared awareness of environmental issues among employees, a shared vision for addressing them, and associated benefits to employee morale.

Third, almost all of the facilities used the EMS aspects- and impacts-identification process as an opportunity to investigate thoroughly all activities and areas of their facilities, and to identify those that would have a potential impact on the environment. A few apparent exceptions, however, were facilities that may have relied too heavily on readily available, generic checklists of aspects and impacts rather than designing a specific process for their facility, and thus bypassed part of the critical thought process of identifying their own distinctive aspects and impacts.

Fourth, most of the facilities developed formal systems to evaluate the environmental aspects and impacts of their processes, and were quite creative in the use of these systems to determine significance. However, most used these rating-system outcomes only as a starting point for more judgmental decision processes. A sizeable number of facilities explicitly gave greater weight to legal and compliance issues than to other considerations (sustainability, for instance), so that regulatory compliance remained a primary priority.

Finally, over half of these initial eighteen EMSs had just been developed during the past year as state-assisted pilot projects, and most of these EMSs set only a small number of short-term objectives and targets focused on compliance and/or pollution prevention.⁷ In contrast, at least four of the facilities—those that had already prepared EMSs on their own, and had had them in operation for at least three years—focused not so much on compliance

⁷ Interestingly, one facility even included objectives and targets that had already been reached before the EMS was complete—perhaps to use early and easy successes to build momentum for further implementation, or perhaps simply to use the EMS document for good public relations.

as on product stewardship and other more sustainability-related objectives and targets.⁸ For example, one facility with a pre-existing ISO 14001 certified EMS had explicitly incorporated principles of environmental sustainability into its EMS, and in so doing had shifted its emphasis from short-term compliance improvements to long-term product stewardship.

It will be important to observe whether the newly initiated EMSs of state-assisted pilot facilities evolve over time from compliance toward broader and more fundamental sustainability priorities as well, or whether state assistance proves to have been a structurally biasing incentive in favor of emphasizing short-term compliance improvement over other potential EMS priorities. Comments from a number of business speakers who have implemented EMSs suggest that such evolution does often occur over time, as the process of participating in EMS design and implementation identifies unanticipated business benefits in addition to mere compliance improvement. However, at this point it cannot be assumed.

V. Additional Research Needs

It is important to stress that at this point these statements represent only preliminary, suggestive impressions from a small portion of our database, and that even these have not yet been fully analyzed and confirmed. Nor have we yet reached the point of determining changes in actual environmental performance and other outcomes, since those post-implementation data will be collected over the coming two to three years.

These preliminary impressions do, however, help to suggest interesting areas for closer analysis as well as for additional investigation.

First, the database needs to be completed, including both the rest of the EMS design data and, importantly, post-implementation data on actual environmental, economic, and other changes in outcomes. The questions we are investigating should also be replicated for additional numbers and types of facilities, to increase the reliability of the findings and the range of comparative information. They should also be augmented with more detailed on-site case studies, to flesh out more fully the decision processes and outcomes of EMS adoption. And they should clearly be replicated for facilities in other countries as well, to compare national and cultural differences in the uses of these procedures. Some of these case studies could well be different facilities of the same parent corporations whose U.S. facilities we are studying; others should be facilities that do not share that common influence, and which might therefore reveal important differences in processes and outcomes rooted in different national jurisdictions, economic systems and cultures.⁹

⁸ Two of the eighteen addressed product stewardship, two others included the development of employee environmental awareness programs as specific objectives and targets, and one incorporated an objective to design and implement an environmentally friendly cleaning program.

⁹ A significant number of NDEMS facilities or their parent organizations, for instance, conduct business internationally as well as in the United States. Many produce products in countries other than the United States; many also market their products abroad.

A second and broader set of questions concerns corporate-level use of EMSs. Are there strategic motivations for introducing consistent types of EMSs throughout an entire corporate structure, not just at the level of individual facilities, and even requiring them of its suppliers or customers as well? Do such initiatives produce additional or different benefits from those available at the facility level? Examples might include changes in corporate-level full cost accounting systems, which could not be altered at the facility level alone, or changes in the strategic configuration of an entire firm to achieve overall reductions in resource extraction or in emission and discharge loadings to the biosphere.

A third set of questions concerns the process of third-party auditing and certification. What is the competence of the providers of these services? What standards and criteria do they use to support or withhold certification? How consistent are these criteria across certification providers? And what are the practical incentives to these firms to apply stringent or lenient standards for certification, and the resulting dynamics of the third-party certification services industry over time?

Finally, a fourth and longer-term set of important research questions concerns the stability or evolution of EMS goals and commitments over time. A stated commitment of EMS adoption is to continuous improvement in environmental performance. However, it is also possible that such commitments would not survive either the replacement of the individuals who made and implemented the original commitments, or changes in competitive pressures in either product or investment market conditions, let alone the changes in priorities and internal organization that often accompany a corporate takeover or buyout (or in the case of a public-sector facility, a change in elected political authorities). Just in the two years in which we have begun building our database, for instance, several of our intended participating firms have experienced such changes, with real consequences for their EMS processes. In some cases the change in management has reinforced and strengthened commitment to EMS implementation, but in others it has had the opposite effect. The implications are fundamentally important to the credibility and sustainability of any EMS commitment to continuous improvement in environmental performance and sustainability. These issues need careful and ongoing study if EMSs are to be trusted as a “voluntary” approach to achieving public environmental goals.

VI. Discussion

How and when then do EMSs connect to sustainability, and what can we learn about businesses’ commitment and progress toward sustainability by examining their EMS documents and processes?

First, we must recognize that the fact of EMS adoption by itself provides no clear or continuing evidence of commitment even to significant improvements in environmental performance, let alone to sustainability per se. EMS guidance leaves the content of environmental goals almost entirely to the discretion of the implementing organization. We can and must therefore examine whether or not the EMS itself, and the commitments it represents—for instance the organization’s written environmental policy statement, the aspects and impacts identified, and the priorities and targets selected for action—reflect any specific commitments to sustainability, or merely to more immediate objectives such

as regulatory compliance. We can also learn something about how far and how fast EMS adopters commit to push themselves toward sustainability, and toward their other self-selected priorities and targets.

Second, we can learn how the content of the EMS policy statement, priorities, and other commitments is shaped by the process by which it is created and sustained. Note that the decision even to adopt and implement an EMS is driven by factors other than the EMS itself (by definition, since the EMS at that point does not yet exist). The goals and content of the EMS may also be determined, therefore, more by these same exogenous factors—customer demand, market positioning, regulatory or liability exposure, a CEO champion, or others—than by the EMS process itself. On the other hand, preliminary impressions also suggest that the process does sometimes produce new and unexpected benefits—such as unanticipated cost savings, broader buy-in by managers outside the environmental health and safety hierarchy, and employee commitment and morale—that may reinforce organizational commitment both to EMS goals and to sustaining the EMS process. The motives that drive continuing commitment to an EMS once begun, that is, may be different from those that motivated its adoption in the first place.

Third, we can learn something about the influence of government encouragement on EMS adoption and design. Many of the facilities we are examining are participants in state pilot projects, which provide technical assistance and some other benefits to facilities willing to adopt EMSs and cooperate with government agencies in examining them. This cooperation may encourage more firms to adopt EMSs, especially perhaps small and medium-sized firms that lacked the financial and technical resources to do it entirely by themselves. But will it also bias the emphasis of their EMSs toward immediate government-related goals, such as regulatory compliance, rather than sustainability? Will it also result in EMS adoption based more on the availability of short-term external assistance than on long-term commitment for the enterprise's own business reasons?

Finally, and most important, we hope to identify some of the actual changes in environmental and economic performance and other outcomes that result from EMS adoption, and whether these reflect significant movement toward more sustainable business practices or not.

In short, the widespread adoption of standardized environmental management systems offers hope of several positive adaptations toward more sustainable business practices. One is the simple commitment they represent to continuous improvement in environmental performance outcomes, however incremental such steps may be. A second benefit is the creation of an explicit and documented procedure for goal- and target-setting for environmental performance improvement, engaging cross-functional teams rather than merely separate vertical chains of command. A third is the diffusion throughout the organization of awareness and legitimacy for environmental goals as part of all business functions, and of explicit and documented accountability for their achievement, when such considerations have in the past been largely marginalized in the Environment, Health and Safety staff.

At the same time, EMSs by themselves are only limited procedural instruments for such purposes, and the goals themselves—sustainability or others—must and will be

driven by more fundamental exogenous forces. All the substantive decisions that an EMS reflects are self-selected from within the enterprise, and often reflect only the perspectives and priorities even of particular facilities and business units. There is no reason to expect, therefore, that an EMS developed at the level of a specific facility will reflect more fundamental or far-reaching goals or innovations that might be identifiable at the corporate level. There is also no guarantee, and probably no logical expectation, that a facility-level or even an enterprise-level EMS will incorporate the broader perspectives on sustainability that would be seen from the point of view of a community, ecosystem, or aggregate national or global sustainable civilization rather than from that of a particular corporate enterprise itself.

The ultimate reality is that both the adoption and the content of EMSs, as voluntary and discretionary actions of businesses, will over time be only as good or as sustainable as are the underlying business reasons—the private benefits to the implementing organization—that justify them to their parent organizations and shareholders. Their content and continuity provide indicators of the existence of those forces, rather than causes of them. Such voluntary approaches to environmental performance improvement and sustainability are desirable in principle, but their advocates must also acknowledge the enduring realities of externalities, in which it remains more rational for a business or a government jurisdiction to dump costs on third parties than to incur them themselves. They must also acknowledge the reality of “tragedies of the commons,” circumstances in which the cumulative outcomes of individually rational choices have collectively perverse effects. Finally, they must acknowledge the important roles of unintended as well as explicit government incentives. For example, some of the important incentives for more environmentally sustainable business practices may lie in the very cost and time burdens imposed by regulations that businesses often decry, rather than in the regulatory standards themselves; and in some industries, they may be driven also by in relative costs driven by regulations such as EPA’s landfill standards which dramatically increased the profitability of commercial waste management and recycling. It is also true, of course, that government incentives can also work in powerfully perverse ways as well, such as continued subsidies for extractive industries such as mining and logging.

These realities suggest, therefore, that while EMSs may well prove to be a valuable tool for promoting continuous improvement toward more sustainable environmental performance, those results may not occur through EMS adoption alone, and probably not entirely even from any enterprise-defined approach alone, in the absence of some effective mechanism for meshing enterprise-based perspectives with those of the communities and ecosystems in which they operate and the aggregate ecological and equity effects of business activity. For the present, the incentives that many major transnational corporate enterprises experience to standardize their operations worldwide to U.S./European standards provide a promising starting point. For the future, further work will be necessary to assure that both these firms and other organizations have effective incentives to harmonize their activities with the fundamental substantive principles of sustainable development.