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Policies for Enhancing Corporate Environmental Management: a Framework and an Applied Example

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ABSTRACT

This paper develops a four-phase schematic representation dubbed the *CEM lifecycle* for conceptualizing how corporate environmental management (CEM) programs typically evolve in a given organization and then explicates the forces that influence corporate commitment as a CEM program progresses from inception to later phases of the CEM lifecycle. Examples are then presented on how the Singaporean government encourages enhancement of CEM programs by designing support programs that target the underlying corporate needs inherent to the first three CEM lifecycle phases. The examples provided in this paper of Singaporean CEM support programs illustrate how policy can be strategically designed to improve corporate uptake of CEM programs by enhancing CEM knowledge in the initial phase of the CEM lifecycle, providing technical support in the second lifecycle phase and providing opportunities for public recognition in the third lifecycle phase. The article concludes that replicating the strategic approach to policymaking exemplified in the Singaporean case study can significantly improve the competitiveness of domestic firms through encouraging more efficient use of resources; however, in order to design truly sustainable economies (provide for the needs of future generations), governments must be prepared to more coercively regulate the exploitation of natural endowments. Copyright © 2012 John Wiley & Sons, Ltd and ERP Environment.

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Introduction

THE NOTION THAT A DEGREE OF FRICTION EXISTS BETWEEN THE ECONOMIC ACTIVITIES OF HUMAN BEINGS AND OUR natural environment is not new. Mention of the importance of humanity's connection to the natural environment extends back millennia. Suggestions that there is more to life than the pursuit of commercial gain have been expressed in biblical testaments – 'woe to those who add house to house, who join field to field, until they are the sole inhabitants of the land' (Isaiah, 5:8), Islamic admonitions – 'walk on the earth in humility' (Koran, 25:63), Confucian teachings – 'the superior man seeks what is right; the inferior one, what is profitable' and philosophical musings – 'what's the use of a fine house if you haven't got a tolerable planet to put it on?' (Henry David Thoreau). Through these millennia, environmental governance ideology has largely stressed the moral and ethical imperatives of good environmental stewardship.

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In the mid-20th century, the moral and ethical justifications for environmental governance began to cede ground to a new perspective that held that improved environmental governance could in fact be of economic benefit. As former Indian Prime Minister Jawaharlal Nehru is purported to have said, 'the highest type of efficiency is that which can utilize existing material to the best advantage'. By the end of the 20th century, a number of management theorists began to flesh out these economic opportunities and a considerable amount of research was conducted that looked at how commercial enterprises could extract value from enhanced corporate environmental management (CEM) (Esty and Winston, 2006; Hart, 1997; Hawken, 1992; McDonough and Braungart, 1998; Reinhardt, 1999). One of the seminal pieces was written by strategy guru Michael Porter and a colleague from Harvard University, Claas van der Linde, in which the authors concluded 'the relationship between competitiveness and the environment has been framed incorrectly... how an industry responds to problems may in fact be a leading indicator of overall competitiveness' (Porter and van der Linde, 1995a, 1995b).

Since the 1980s, a great deal of management literature has emerged that champions the legion of benefits attributed to enhanced CEM. Benefits identified by management researchers include cost reductions (King and Lenox, 2001; Yakhou and Dorweiler, 2004), enhanced competitive advantage (Kolk *et al.*, 2001; Porter and van der Linde, 1995a, 1995b), access to green market niches (Berry and Rondinelli, 1998; Kiernan, 2001), improved innovation (Palmer *et al.*, 1995), enhanced access to financing (Ruf *et al.*, 2001), lower cost of capital (Wilmshurst and Frost, 2000), enhanced employee motivation (Kolk *et al.*, 2001), improved employee retention (Kolk *et al.*, 2001), reduced operational risks (Berry and Rondinelli, 1998), reduced exposure to litigation (Beets and Souther, 1999), improved operating margins (Porter and van der Linde, 1995a, 1995b), enhanced brand value (Cerin, 2002; Hawken, 1992), improved customer retention (Kolk *et al.*, 2001; Wilmshurst and Frost, 2000), improved relationships with suppliers (Wilmshurst and Frost, 2000), reduced risk of government regulation (Reinhardt, 1999; Yakhou and Dorweiler, 2004), enhanced community support (Kaplan and Norton, 1996; Van Tulder and Kolk, 2001), overall improvements in stakeholder relations (Cormier and Magnan, 2003; Valentine, 2010c) and enhanced product/service quality (Hawken *et al.*, 1999; Stanwick and Stanwick, 2001).

Problematically, the study of CEM is still in its infancy, and as a result there are still far more questions than answers. On one hand, there is general agreement that for most firms there are profits to be derived from improved CEM. This is evidenced by the thousands of environmental consultancies that have sprung up over last two decades to help organizations reap financial benefits from improved CEM. On the other hand, there is also intuitive understanding that environmental initiatives suffer from diminishing returns. As a firm commits itself to progressively more CEM initiatives, the financial benefits become increasingly harder to identify and exploit. However, there is insufficient quantifiable research on when CEM programs become unprofitable, how industry or firm structure influences CEM profitability or how national, regional and cultural differences influence CEM profitability. In short, we know that there are benefits to be gleaned from enhanced CEM; but we have not been able to definitively identify the boundaries governing CEM profitability, nor have we been able to fully qualify the influences that allow profitability to be enhanced in applied CEM. The inability to provide corporate managers with a clear framework to strategically guide CEM remains one of the greatest barriers to encouraging enhanced CEM practice (Valentine, 2010c).

This then gives rise to a conundrum in terms of public policy. There are a significant number of public benefits to be derived from improved corporate environmental governance. Enhanced corporate environmental governance conserves national resources and mitigates social and environmental costs associated with polluting activities. For example, it has been noted that the top causes of death in China are cardiovascular and respiratory diseases associated with pollution (Valentine, 2010b). Enhanced corporate environmental governance also nurtures the development of green businesses and improves production efficiencies, which in turn enhances employment and corporate income tax (Hawken *et al.*, 1999). For these reasons, the government of any nation has a vested interest in attempting to improve corporate environmental governance.

Opponents of government intervention in corporate activities might be tempted to argue that government should refrain from influencing corporate activities and allow free-market forces to catalyze CEM uptake. However, this represents a naïve and overly pessimistic perspective of the role of government, because it assumes that any government market intervention will inevitably be obstructive rather than constructive. Furthermore, a key hurdle to enhancing CEM uptake lies in addressing the knowledge gaps that exist in many commercial organizations regarding the benefits of CEM and how to exploit these benefits (Esty and Winston, 2006; Valentine, 2010c). In

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the absence of adequate knowledge, the pace at which free-market forces could initiate enhanced uptake of CEM would be ponderous. In the interim, all the potential benefits outlined in the previous paragraphs would be unrealized. Therefore, the government has a role to play in knowledge dissemination.

Building on the premise that a degree of government involvement in enhancing CEM can in fact deliver benefits to business and to society at large, the intent of this paper is to better understand the methods through which government can positively influence the process.

In order to achieve this goal, two knowledge lacunae need to be addressed. First, a better understanding is required concerning how CEM programs typically evolve in a given organization. This is a prerequisite for guiding the development of government support programs that help resolve CEM developmental deficiencies in corporations. The next section attempts to address this knowledge gap by drawing from CEM literature to develop a four-phase schematic representation dubbed the 'CEM lifecycle', which conceptualizes and then explicates the forces that influence corporate commitment as a CEM program progresses from inception to later phases of the CEM lifecycle. To the best of the author's knowledge, this is the first time such a conceptual framework has been created for use in a public policy context. Second, governments can apply a number of diverse policy instruments to catalyze change in corporate practice; however, there is insufficient understanding of which policy tool should be applied and when. In the third section, a case study is presented, which demonstrates how the Singaporean government attempts to encourage enhanced CEM practice by designing support programs that target the underlying corporate needs inherent in the first three CEM lifecycle phases. As will be seen, the analysis of the Singaporean approach to supporting enhanced CEM highlights the importance of conflating corporate need with public policy. It is felt that this analysis makes a contribution to improved understanding of which policy tool should be applied and when.

Methodologically, conceptualization of the CEM lifecycle was based on an extensive literature review complemented by unstructured interviews conducted between 2007 and 2010 with corporate strategists and managers in Singapore and Japan. The subjects were participants in environmental management workshops conducted at the University of Adelaide's Singapore Campus (24 participants), the Singapore Environmental Institute (35 participants), the National University of Singapore (10 participants) and the International University of Japan (nine participants).

Noting some of the dominant perspectives shared by workshop participants helps to shed light on the profile of workshop attendees in terms of sophistication of corporate environmental management awareness. Overall, the majority of the participants in these workshops were generally aware that applied corporate environmental management could result in cost savings for firms and that specialized knowledge in regard to how to approach cost cutting programs of this type was required to fully exploit such opportunities. In fact, identifying strategies to cut costs through environmental management was the prominent reason that most workshop participants gave for attending the workshops. Participants were also unanimous in the belief that there were limits to applied environmental management, which, if exceeded, would pose a financial burden to the firm. However, differences existed in regard to defining what these limits were. In short, the overall consensus of workshop participants was that it pays to be green but there are limits to how green a firm can be.

There was also a disparity of knowledge amongst participants regarding key elements of applied corporate environmental management. For example, participants possessed disparate degrees of understanding regarding the nature of strategies for extracting cost savings. Predictably, individuals employed in production functions were generally more aware of the possibilities for cost savings through technological enhancements. There was also a prominent lack of knowledge when it came to revenue-side contributions that a corporate environmental strategy could make, with very few participants able to voluntarily provide examples without guided prompts. In short, feedback from the workshops clearly indicated that a rudimentary understanding of corporate environmental management existed but, generally, the depth and breadth of understanding did not extend beyond cost saving applications.

Although the sample set exhibits a self-selection bias (they all voluntarily attended these workshops) and is not culturally representative of the global corporate community (most attendees were from Asia, with the majority from Singapore), these concerns were not deemed to be confounding factors because, as will be seen in the next section, the challenge of identifying a generic CEM lifecycle is influenced by the economics of resource usage rather than culture- or industry-specific variables. The economics of resource usage spans cultures and industries.

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The CEM Lifecycle

A review of the CEM literature and discussions with corporate strategists and managers suggests that CEM can be conceptualized in terms of level of commitment (both financially and operationally) to environmental management initiatives and profitability. As Figure 1 illustrates, there appear to be four distinct phases through which a given firm progresses as its commitment to CEM practice deepens. These four phases will be outlined in this section.

Phase 1: Low Hanging Cherries

Phase 1 of the CEM lifecycle is characterized by CEM initiatives that are technologically unsophisticated and inexpensive to implement. Typically, initial CEM initiatives stem from attempts to improve resource usage efficacy, which can be facilitated through eliminating unnecessary resource use, reducing necessary resource usage and re-using or recycling materials when possible (Hawken *et al.*, 1999). In short, Phase 1 CEM activities are based on the premise that waste is akin to inefficiency, and therefore, eliminating waste leads to reduced operational costs (Porter and van der Linde, 1995a, 1995b; Reinhardt, 1999).

Although, a formal approach to initiating Phase 1 CEM activities can produce better results (Hawken *et al.*, 1999), CEM activities during Phase 1 can be as simple as the formation of 'green teams', cross-departmental groups who are assigned a task of breaking down targeted business activities into inputs, processes and outputs and then brainstorming ways to enhance resource usage efficiency. To illustrate the simplicity of implementation, Phase 1 CEM initiatives designed to improve energy efficiency could include simple solutions such as reducing pre-set air conditioner temperatures, installing timers on electrical appliances, installing motion activated lighting systems, substituting fans for air-conditioning, utilizing energy-efficient light bulbs, installing window coverings or turning appliances off rather than engaging the standby function.

Phase 1 initiatives typically promote an escalating commitment to CEM for one simple reason – the initiatives enhance profitability, often in a substantial manner. For instance, GE's Ecomagination Treasure Hunt program of this type for reducing energy usage purportedly resulted in US$150 million in energy savings.[1] Due to the profitability of early CEM initiatives, managers become incentivized to search for other opportunities and this catalyzes the adoption of more sophisticated CEM commitments, leading to Phase 2.

Phase 2: Cost Saving Investments

Cost savings realized during Phase 1 of a CEM program tend to inspire greater commitment to CEM from senior managers who have greater authority to guide strategic investment – making the necessary investments to realize greater cost savings. The presence of a formal investment commitment, therefore, is what distinguishes Phase 2 activities from Phase 1 activities. Phase 2 initiatives are typically characterized by more elaborate technological solutions for enhancing CEM, facilitated either through internal R&D or through solutions proposed by external consultants.

In Phase 2, the influence of closed loop manufacturing (McDonough and Braungart, 2002), industrial ecology (Graedel and Allenby, 2001) and total quality management (Deming, 2000) practices is prevalent. The essence of closed loop manufacturing is to reduce the amount of resources used and the amount of waste produced through any given process by restructuring processes to use waste products from other processes as resource inputs (McDonough and Braungart, 2002). Industrial ecology broadens the application by applying closed loop theory to clusters of previously unconnected entities. One prominent example involves the town of Kalundborg, Denmark, where resources are shared and waste products are re-used within a cluster of industries and other businesses. Amongst other exchanges, an agricultural farm uses sludge and water from a local fish farm as fertilizer; a cement company uses fly ash from a local power plant as a foundation for cement; liquid sulfur from an oil refinery is refined into sulfuric acid by another firm; and surplus yeast from insulin production is used by pig farmers as feed.[2] Total quality management (TQM) also provides a foundation for Phase 2 CEM initiatives because a key strategy for applied TQM is to utilize technology in order to reduce waste and continually improve efficiency (Deming, 2000; Imai, 1986).

[1]Ecomagination website FAQ. http://files.ecomagination.com/wp-content/uploads/2010/07/Treasure_Hunt_FAQs_071110.pdf [6 May 2011].
[2]This process is well described at http://www.indigodev.com/Kal.html or in *Industrial Ecology* (Graedel and Allenby, 2001).

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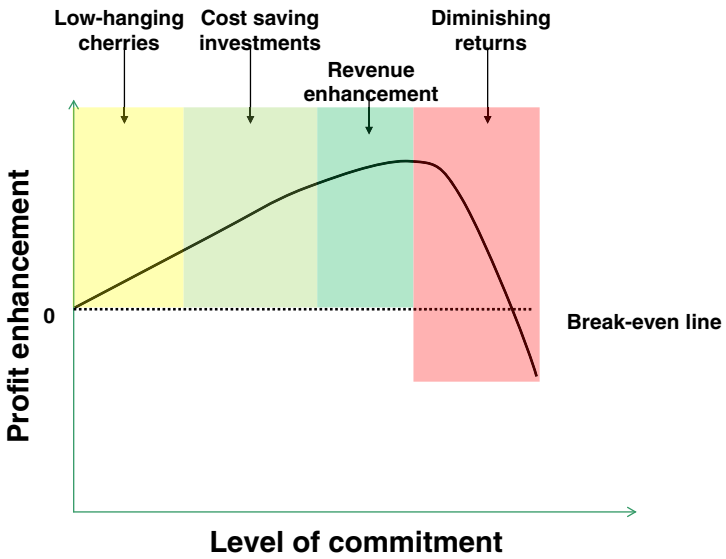

Figure 1. The CEM lifecycle

The technical nature of many of the initiatives found in Phase 2 of the CEM lifecycle requires a re-examination of business operations that goes beyond the daily scope of business operations. An example helps to clarify this point. In beef processing plants, the core challenge is to minimize input costs (i.e. the cost of cattle), maximize processing efficiencies (i.e. extract the most salable product) and expedite the end-product to the intermediary (i.e. the butcher shop) in salable condition. People who work in this industry are not typically equipped with broader closed loop knowledge that would allow them to maximize efficiencies that are beyond the scope of these core activities. For example, in beef processing, a considerable amount of tallow (cow fat) is produced as a byproduct, which many plants pay to dispose of. However, tallow is a source of oil and, therefore, can be used to manufacture biofuel. Biofuel can in turn be utilized for running generators that could electrify beef processing plants. In short, making better use of tallow could significantly reduce processing plant energy costs. Yet, this opportunity for significant cost saving is frequently overlooked because this solution typically falls beyond the scope of daily business consciousness. This is why technical knowledge is often a pre-requisite for supporting Phase 2 CEM activities.

Phase 3: Revenue Enhancement

When a firm experiences success through early CEM initiatives, organizational support tends to amplify as news of CEM successes disseminates to other departments (Esty and Winston, 2006). Through this diffusion process, revenue-generating departments such as marketing and customer service begin to explore opportunities to leverage enhanced environmental governance for corporate gain. This represents Phase 3 of the CEM lifecycle and features initiatives that typically focus on exploiting green niches (Berry and Rondinelli, 1998; Kolk *et al.*, 2001) and enhancing brand image (which in turn can positively influence stock prices, cost of capital, customer retention and operating margins) (Beets and Souther, 1999; Cormier *et al.*, 2004; Hawken, 1992; Kiernan, 2001).

An initiative recently unveiled by the ice-cream maker Ben and Jerry's provides an example of a Phase 3 CEM initiative. Recently, Ben & Jerry's announced development of an in-store freezer – dubbed the 'Cleaner Greener Freezer' – to preserve their ice-cream products. The key benefit of this freezer is that its greenhouse gas emissions are reduced.[3] In order to understand how this product represents a Phase 3 initiative, one must consider the revenue enhancing impact of this product. Ben & Jerry's direct customers are retailers of ice-cream (i.e. grocery stores), which are typically very concerned about community image. Consequently, when the representative from Ben & Jerry's offers a free freezer that

[3]More on this product can be found at http://www.benjerry.com/activism/environmental/hc-freezer/ [10 May 2011].

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conveys an environmentally responsible image to the general public, the product virtually sells itself. Meanwhile, for each store that adopts a Cleaner Greener Freezer, Ben & Jerry's benefits through enhanced retail selling space and an opportunity to link its brand to an environmentally friendly initiative.

Phase 4: Diminishing Returns

It is perhaps worth noting, prior to outlining Phase 4 of the CEM lifecycle, that the first three phases need not evolve sequentially, nor is it necessary for initiatives falling within earlier phases to be fully exploited before initiatives that characterize other phases begin to emerge. For example, an energy-intensive business might decide to hire a qualified engineer in order to technically improve processes to enhance energy efficiency (a Phase 2 initiative). Through this process, the benefits accruing to the firm may stimulate an organization-wide search for other ways to save money by reducing waste. In this example, the organization began with a Phase 2 initiative, and then through its success was incentivized to investigate Phase 1 initiatives.

Eventually though, firms begin to experience diminishing returns in regard to CEM initiatives (King and Lenox, 2001; Valentine, 2010d). The diminishing returns profile is largely caused by competitive pressures, technological limitations and resource constraints, all of which are inter-related.

Competitive pressures are at the core of the diminishing returns profile for corporate environmental governance. In theory, many firms that do not rely on a finite resource as a key production input could achieve self-sustainability by making the investments necessary to replenish renewable resources used and remediate environmental sinks. However, in practice, the financial cost associated with such enlightened business practice would significantly undermine the capacity of any given firm to compete with other firms that operate in a less sustainable manner. In short, depending on the industry and the nature of the competitive practices, there comes a point in any CEM program where additional CEM initiatives are either too costly or cannot be implemented without impairing the competitiveness of the firm (Valentine, 2010d).

In addition to the CEM boundaries imposed by the competitive profile of a given industry, another prime reason why CEM programs exhibit diminishing returns relates to the cost of technology. At a certain stage in any CEM program, the costs associated with abating environmental damage can no longer be offset through resource efficiency savings. Subjects interviewed for this paper suggest that the Pareto principle applies to CEM process improvements – 20% of the investments made in environmentally efficient technologies yield 80% of the cost and resource savings.

A final key reason why environmental governance is more costly at progressively higher levels stems from two types of resource constraint. First, there are some processes that depend on finite resources (e.g. precious metals) that have no commercially viable, renewable substitutes and so a form of technological lock exists. Until technology advances to provide a cost effective alternative, finite resources diminish. An example is the gasoline powered automobile. Electric powered vehicles (EPV), which are powered by renewable energy sources, may be able to mitigate the use of finite fossil fuel reserves, but EPV technology and infrastructure has not yet progressed to the point where it can successfully compete with gasoline powered vehicles in global automobile markets. Without government intervention, any conventional automobile manufacturers shifting to EPV products would likely see a rapid decay of market share. Second, in some industries key renewable resources are consumed in such high volumes that the public commons is inevitably impaired either through excessive waste or secondary environmental impact. A prominent example is use of our atmosphere as a sink for pollutive emissions such as CO_2. For many energy intensive firms, one way to reduce CO_2 is to improve operations and reduce energy consumption. However, there comes a point where further CO_2 emission abatement even in the presence of best available technology will only be possible by shifting to alternative energy sources, which under current market conditions are more costly. In such a case, without government intervention, a firm must sacrifice profitability if it wishes to adopt a CO_2 zero emissions strategy. Under current corporate incentivization schemes such a proposition is rarely viable.

The diminishing returns profile of CEM initiatives places corporate managers in a precarious position: once the profitable CEM initiatives have been exploited, they can choose to continue to expand CEM initiatives by pursuing unprofitable initiatives, thereby putting their jobs and their annual performance bonuses at risk; or these managers can adopt a strategy of maintaining a high commitment to CEM but limit the commitment to initiatives that benefit the firm, thereby enhancing prospects of corporate survival and maximizing annual performance bonuses. The choice that most managers make should be inherently obvious: CEM stops when the benefits to the firm stop.

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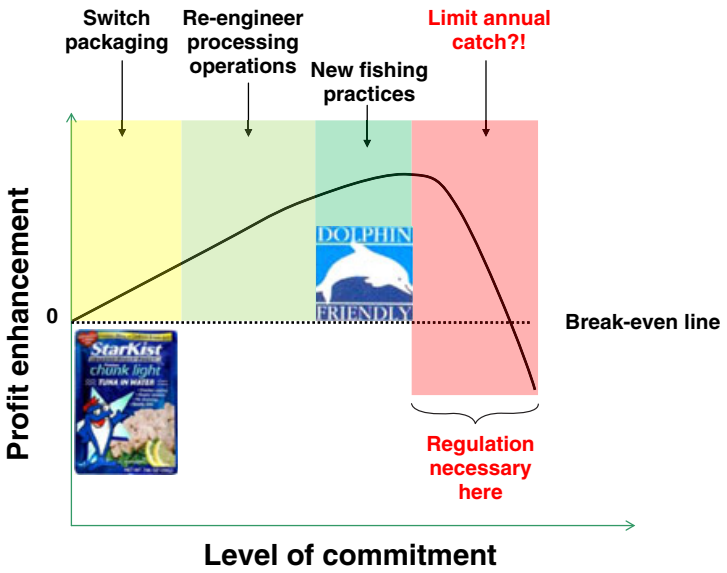

Figure 2. The CEM lifecycle as it applies to StarKist

The challenge of encouraging further commitment to CEM despite the unprofitable nature of further CEM commitments characterizes Phase 4 of the CEM lifecycle.

Consider the challenge faced by the seafood company StarKist and its tuna business (Figure 2) as a concrete illustration of the phases of the CEM lifecycle and the limits to CEM from a corporate perspective. A significant Phase 1 initiative at StarKist was a switch from aluminum tin cans to vacuum packed seafood containers. Not only did this packaging change drastically reduce the cost of packaging, the diminished weight and size also significantly reduced shipping costs. Over the years, as StarKist has endeavored to compete with other seafood companies, it has gradually re-engineered its processing operations to reduce costs. It now utilizes its raw materials (the seafood) much more efficiently than it did when the firm was first founded. Alterations to processing operations require R&D investment supported by technical knowledge; therefore, such changes exemplify Phase 2 CEM initiatives. In the 1980s, StarKist (and other tuna processors) faced intense consumer pressure over its tuna fishing practices, which inadvertently produced a significant number of dolphin mortalities. StarKist responded by adopting new fishing practices that drastically minimized dolphin mortality. The firm subsequently leveraged this innovation by promoting its 'dolphin friendly' practices on its packages, gaining a significant amount of market share as a result. This illustrates a Phase 3 CEM initiative whereby a CEM initiative enhances corporate revenues.

However, despite massive efficiency improvements in how StarKist manages its tuna business, global increases in demand for tuna have sired a situation wherein some species are on the verge of biological collapse. For example, some analysts contend that stocks of Mediterranean bluefin tuna will suffer a complete collapse of the species by 2012, if current over-fishing practices continue.[4] The only way for StarKist to play a role in averting a crash of threatened tuna species is to support an industry-wide initiative to reduce the total annual catch and allow the species to recover. Of course, this means that senior managers at StarKist (and other competing seafood companies) not only need to voluntarily limit revenue growth in this sector, they also need to find a way to prevent parties that are not participating in the quota scheme from undermining remediation efforts by ramping up catch volume. Such cooperation is a lot to ask of competing private sector firms and independent fishermen.

The StarKist illustration exemplifies the ultimate challenge that emerges at Phase 4 of the CEM lifecycle. For some environmental endowments (frequently the main resource inputs or key environmental sinks of a firm), aggregate usage is so high that the environmental endowment begins to show signs of depletion (or saturation in the case of sinks). At such junctures, the only sustainable response is to drastically curtail exploitation of the resource. This is apparent now in fisheries, tropical lumber, fresh water (in many regions) and greenhouse gas emissions, to name just

[4]World Wildlife Organization http://wwf.panda.org/?162001/Mediterranean-bluefin-tuna-stocks-collapsing-now-as-fishing-season-opens [10 May 2011].

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a few current environmental endowments under siege (UN, 2006, 2007; Valentine, 2010a). However, the reason that these endowments are under siege is because they play a major role in the production processes of many firms and the consumption habits of many individuals. Asking lumber firms, fisheries or businesses that depend on supplies of fresh water to voluntarily cap their use of lumber, fish or water respectively (with no guarantees that others will be prohibited from exploiting the environmental endowment under threat) is akin to asking a pious person not to pray.

Consequently, the only way that Phase 4 CEM initiatives can be consistently precipitated is for all industry players to either agree to collaborate on applying and enforcing industry-wide standards or for the government to step in and regulate exploitation. In short, Phase 4 usually represents the stage at which government intervention is necessary if a degraded environmental endowment is to be remediated or preserved.

The Corporate Environmental Management Framework: Limitations and Uses

The CEM lifecycle described in this section lacks empirical validation to help further define *inter alia* the transitions between phases, the dynamics that are in play at each stage and the drivers that influence the scale, scope and pace of CEM. Consequently, this schematic representation requires a significant amount of further enquiry to be of applied use for strategic CEM. However, it does provide a useful abstraction of how CEM programs generally evolve and articulates the existence of financial barriers that eventually emerge to stymie further CEM commitments. This is of practical use for policymakers because it permits a deeper understanding of the inherent corporate needs that must be satisfied to support enhanced CEM practice. It also highlights how transitions to new phases give rise to new needs that require new support programs if CEM is to be enhanced. These insights can help guide policymakers to tailor support programs that will more effectively enhance CEM uptake. Precisely how programs can be tailored will be explained in the next section by demonstrating how the Singaporean government supports enhanced CEM by creating programs to support specific corporate needs at each of the first three phases of the CEM lifecycle.

Singapore Policies for Supporting CEM

Overall, there is significant empirical support that incentives are more effective than disincentives as initiating devices for encouraging a gradual evolution in corporate business practice. The consensus appears to be that incentives encourage innovation whereas disincentives encourage gaming of the system (Bemelmans-Videc *et al.*, 2003; Hood, 1986; Howlett and Ramesh, 1995; Salamon, 2002). Activities of the Singaporean government to promote enhanced CEM support this contention. In this section, examples are provided from Singapore on how the government has intervened in order to provide support for enhanced CEM practice. It is hoped that this analysis will help advance understanding of how policy tools can be tailored to meet corporate needs and better incentivize corporate behavior.

It should be noted prior to embarking on this review of Singaporean policy for supporting CEM that the focus on Singapore should not be misconstrued as constituting an appraisal of the Singaporean government's approach to policymaking in this regard. Rather, Singapore was chosen because (i) there are numerous examples of best practice that serve to highlight key lessons and (ii) choosing one nation provides a degree of socio-cultural and economic continuity that allows the reader to see how policy approaches must be altered to support different stages of the CEM lifecycle. Like all nations, a full critique of Singapore's approach to supporting enhanced corporate environmental governance would likely reveal areas of improvement as well as the areas of best practice identified in this paper.

Policies for Supporting CEM during Phase 1

Firms with poor environmental governance records are typically characterized by a lack of sufficient understanding regarding the financial and strategic value that CEM initiatives can contribute (Hawken *et al.*, 1999; Reinhardt, 1999). Therefore, a key challenge for policymakers in trying to catalyze initial uptake of CEM is to demonstrate to laggard firms how minor commitments to CEM can produce significant corporate benefits. Three programs in Singapore provide useful insight into the mechanics of kick-starting CEM programs and demonstrate how programs can be scaled to support escalating interest.

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In order to stimulate corporate interest in CEM in a risk-free manner, the Singapore Environmental Institute (SEI), which is part of the Ministry of the Environment and Water Resources (MEWR), has developed a Professional Sharing Series (PSS).[5] It consists of a series of workshops delivered by practitioners, which examine an array of CEM themes. The PSS workshops are free and provide interested parties with a taste of the types of benefit that can be gained through CEM. Typically the PSS provides the inspiration necessary to encourage a more formal commitment to CEM knowledge enhancement.

In order to help business people take the next step in the learning process, SEI has developed the 'Program for Environmental Experiential Learning' (PEEL).[6] This is a program that focuses on site tours in order to impart best practice in CEM areas. Thematic areas include a Clean Land Trail, Clean Air Trail, Clean Water Trail, Public Health Trail, Climate Change Trail and Recycling Trail. The cost of the day-long tour is US$80 per person and gives participants first-hand experience in how CEM initiatives can be implemented for corporate benefit.

For firms that wish to make a more aggressive investment in enhancing CEM knowledge, SEI offers a series of formal workshops that typically extend over 2–3 days and seek to provide training in specific CEM areas. For example, in June 2011, the SEI offered a workshop entitled 'Energy Management Program for Public Sector Facilities and Operations Managers'. The intent of the workshop was to teach participants how to 'identify energy saving opportunities in government buildings, work with contractors to implement energy improvement/retrofit measures and achieve cost savings in utilities bills for the public sector'. [7] The program itself costs approximately US$800, but for larger facilities the payback period is likely measured in weeks if not days.

There are two notable characteristics of the programs offered by SEI. First, the programs provide scaled learning opportunities. Interested parties can progress from free public workshops to relatively inexpensive experiential site-tours to more elaborate (and more expensive) training programs. Such scalability allows participants to gradually cultivate high levels of CEM proficiency. Second, the programs are all voluntary in nature, thereby adhering to the policy premise that 'carrots and sermons' are more effective than 'sticks' for encouraging early CEM adoption (Bemelmans-Videc *et al.*, 2003).

Policies for Supporting CEM during Phase 2

The inherent challenge associated with encouraging corporations to amplify commitment to CEM through strategic investment (Phase 2) lies in helping firms overcome the initial hesitance to finance initiatives that cannot be evaluated through cost–benefit modeling because there is no precedent for the investment. The cost of designing and/or implementing structural changes in order to reap CEM benefits can be daunting for many firms. Therefore, the policy challenge is to lessen the risk of investment. Prospective solutions include tax relief, investment subsidies, training grants, grants for employing professional consultants and the provision of advisory services. In Singapore, all of these approaches are evident.

As an example of tax relief, SPRING Singapore, which is Singapores national enterprise development agency, authorizes a tax credit (Investment Allowance) totaling 30–50% of approved fixed capital expenditure on top of the standard 100% capital allowance for investment in process improvements designed to improve resource utilization efficiency.[8] The Ministry of Finance also offers a 'Tax Incentive Scheme for Highly Efficient Pollution Control Equipment' which permits accelerated depreciation for investments of this type.[9]

As an example of an investment subsidy to encourage improved utilization of resources, the NEA has developed the '3R Grant' program, which co-funds up to 80% of manpower, equipment, material and professional service costs incurred in improving waste management.[10]

[5]Details on this series can be found on the SEI website: http://www.nea.gov.sg/cms/sei/PSS.html
[6]Details on this series can be found on the SEI website: http://www.nea.gov.sg/cms/sei/PEEL.html
[7]Details of this program can be found on the SEI website: http://www.nea.gov.sg/cms/sei/Courses_EnergyPSFMO.html
[8]Details of this program can be found on the Enterprise One website: http://www.sedb.com/edb/sg/en_uk/index/why_singapore/Guide_to_Investing_in_Singapore/financial_assistance.html#one
[9]Details of this program can be found on the NEA website: http://app2.nea.gov.sg/tax_incentive_scheme.aspx
[10]Details of this program can be found on the NEA website: http://app2.nea.gov.sg/funds_3rfund.aspx

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As an example of subsidized training, in addition to the SEI programs outlined earlier, the Economic Development Board of Singapore has developed a formal certificate program in energy management and the National Environmental Agency (NEA) subsidizes participation in this program.[11]

The Singapore government also offers grants to support the employment of outside consultants to provide businesses with the knowledge necessary to embark on Phase 2 CEM investments. For example, the NEA supports a 'Design for Efficiency Scheme', which 'aims to encourage investors in new facilities in Singapore to integrate energy and resource efficiency improvements into manufacturing development plans early in the design stage'. The program covers up to 80% of the cost of hiring consultants to incorporate resource efficiency initiatives into plant designs.[12] For established businesses, the NEA has developed the 'Energy Efficiency Improvement Assistance Scheme' (EASe), which covers up to 50% of the qualifying cost of engaging a consultant to advise on systems for improving energy efficiency in larger organizations.[13]

Policies for Supporting CEM during Phase 3

Encouraging adoption of Phase 3 CEM initiatives requires a fundamentally different policy approach because the catalyst for corporate commitment in regard to Phase 3 initiatives is different. In Phases 1 and 2, the policy challenge is to encourage firms to progressively accelerate financial commitments to SEM by raising awareness that Phase 1 and 2 initiatives are actually profitable for the firm. Therefore, the policy tools that are most useful are instruments that encourage corporations to learn more about CEM and experience the benefits through seedling projects. Phase 3, however, is characterized by revenue-enhancing CEM initiatives. Typically, firms that are the most likely candidates to adopt Phase 3 initiatives already understand the benefits of environmental governance and are merely looking for channels to promote competitively superior environmental governance practices. Therefore, policies designed to support Phase 3 initiatives should seek to either enhance opportunities to publicize competitively superior CEM performance or provide firms with financial incentives to pursue CEM beyond cost saving initiatives.

In Singapore, channels for enhancing public recognition are provided by the Singapore Environment Council (SEC), which is an NGO that works closely with the Singaporean government. A core focus of the SEC is the management of a green labeling scheme, which allows businesses to distinguish their product offerings from competitive offerings by developing and certifying environmentally friendly features.[14] The SEC also manages the annual Singapore Environmental Achievement Awards, which are public events that herald corporate environmental governance achievements in Singapore.[15] This awards program gives firms that are superior in environmental governance the chance to enhance brand image through a high profile public event.

One strategy commonly in place to encourage Phase 3 CEM initiatives that is markedly neglected in Singapore is use of green procurement programs to enhance corporate environmental governance. Although many private organizations that operate in Singapore, such as HP, McDonald's and 3 M, have specific policies that mandate purchases from environmentally sound suppliers (Esty and Winston, 2006), the Singapore government does not apparently have a comprehensive policy that prioritizes the purchase of 'SEC green label' products. One possible explanation for this is that Singapore's financially lean, corporatized system of public management tends to emphasize value for money in public purchases (Quah, 2010) over supporting superior corporate environmental governance.

Policies for Responding to CEM during Phase 4

As was outlined earlier, as CEM programs mature, environmental initiatives tend to exhibit diminishing returns until eventually additional CEM initiatives begin to decrease profits. Consequently, initiatives aimed at *encouraging* voluntary uptake of CEM at these advanced stages are ineffective. Incentivization programs must give way to coercive strategies when corporate practice must be changed and there is no profitable way to enable such change

[11]Details of this program can be found on the E2 website: http://www.e2singapore.gov.sg/scem.html
[12]Details of this program can be found on the NEA website: http://www.e2singapore.gov.sg/design-for-efficiency.html
[13]Details of this program can be found on the NEA website: http://www.e2singapore.gov.sg/ease.html
[14]Details of this program can be found on the SEC website: http://www.greenlabel.sg/sgls
[15]Details of this program can be found on the Singapore Environmental Achievement Awards website: http://www.seaa.sg/

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(Bemelmans-Videc *et al.*, 2003). Coercive strategies tend to span a spectrum of severity that ranges from fines to forced termination of activities.

In Singapore, environmental policies that exhibit more coercive severity (i.e. prohibitions, heavy fines) tend to be manifest in regard to the exploitation of environmental sinks; however, coercive strategies are virtually non-existent in regard to limiting the use of precious resources. There is a rather straightforward explanation for this – aside from water, Singapore does not have sufficient supply of any natural resource to consider it strategically imperative to coercively control consumption. It imports virtually all its consumables. Even in regard to potable water, which is perhaps Singapore's only strategically sensitive commodity, there are no prohibitions on use. Rather the authorities try and control consumption by staggering user charges based on consumption volumes.

Conclusion

The main insight to be gleaned from examining some initiatives from Singapore's approach to enhancing CEM in the context of the CEM lifecycle is that corporate needs must first be ascertained in order for effective public policies to be developed. For firms in Phase 1 of the CEM lifecycle, Singapore supports CEM uptake through programs designed to enhance fundamental CEM knowledge because knowledge is what firms need in order to identify the low hanging cherries associated with this initial phase (see Figure 3). Similarly, for firms that have progressed to higher levels of CEM sophistication (Phase 2), the Singaporean government responds by providing ways to access specialized knowledge and helps reduce the risks associated with CEM investments through subsidies and tax relief. In Phase 3, as firms begin to experiment with CEM initiatives to bolster revenues, promoting good environmental governance becomes a critical corporate need and the Singaporean government responds to this through supporting awards programs. Finally, when critical resources or environmental sinks need to be preserved and this is not financially feasible through soft incentives, Singapore turns to disincentive policies. In short, there is evidence that Singapore has been effective at tailoring support policies and programs to suit the evolving needs inherent throughout the CEM lifecycle.

Singapore's approach to CEM represents an approach that many nations appear to be striving to replicate, to varying degrees of success. In all major economies, economic growth tends to supersede environmental governance in terms of policy importance. As a result, public policy aimed at encouraging enhanced levels of corporate governance tends to focus on encouraging enhanced CEM *while* sustaining economic growth. By extension, economic growth requires investment and investment is dependent upon corporate profitability. In other words, the zeitgeist governing CEM

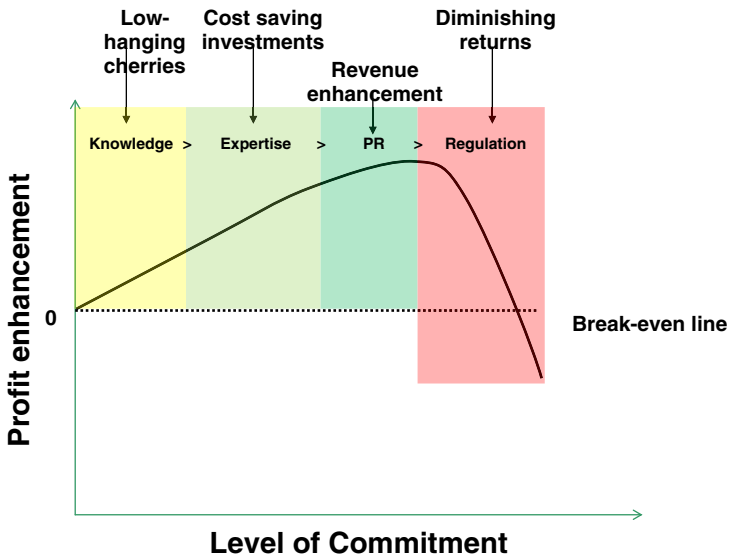

Figure 3. The link between the CEM lifecycle and policy tools

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support policy is to encourage profitable CEM initiatives – those associated with Phases 1–3 of the CEM lifecycle. Globally, coercive tools are seldom used for promoting enhanced CEM; when they are, they are usually limited in application to extreme cases of pollution or resource exploitation. The end result is that, in many nations, legislation and other punitive measures have helped to reduce severe cases of pollution, and corporate initiatives to enhance CEM (often supported by government programs such as those described in Singapore) have led to improved resource usage and less waste. However, these improvements should not be considered to be synonymous with a trend toward sustainable business practice.

The volume of resources used in industrial practices around the world is so extensive that many of our global environmental endowments are under siege. Our planet is warming due to excessive accumulations of greenhouse gases, predominantly stemming from anthropocentric activities (IPCC, 2007). As of 2010, 884 million people still lacked access to safe drinking water, and 2.6 billion people lacked access to proper sanitation.[16] Deforestation continues at a rate of 130,000 sq. km per year, an area almost 200 times the size of Singapore.[17] In 2005, the UN estimated that, of the 441 fish species it monitors, 52% were fully exploited with no further room for expansion, 17% were over-exploited (heading toward depletion) and 7% were depleted (heading toward extinction) (UN, 2005). Energy resources are declining at precipitous rates. The Japanese government, which is a major importer of oil, estimates that commercially recoverable reserves of oil will be exhausted in 40 years (ANRE, 2006). From 2000 to 2005, the world's proven reserves-to-production ratio of coal dropped by almost a third, from 277 to 155 years (Kavalov and Peteves, 2007). The pro-nuclear Japanese Federation of Electric Power Companies estimates that there are only 85 years of economically recoverable uranium resources left (Valentine, 2009). Across the environmental endowment spectrum there are clear signs that aggregate consumption of many key resources and over-exploitation of many environmental sinks have surpassed sustainable levels. Given that corporate operations play a large role in the resource consumption process, it needs to be emphasized that, while there have been significant achievements in CEM in many nations (including Singapore), consumption is still far from sustainable, on aggregate.

Consequently, there are two conclusions that this paper will finish with. First, environmental governance at the corporate level is still in a state of infancy in many firms. Therefore, the framework introduced above can help policy-makers better understand corporate CEM support requirements and develop programs to provide the type of support that corporations require at each phase of the CEM lifecycle. Many of the examples drawn from the Singaporean approach for supporting CEM can serve as points of departure for applied policy in other nations. If CEM can be enhanced through tailored government programs, some of the damage caused by corporate activity can be mitigated.

Second, if national leaders are intent on facilitating the creation of a truly sustainable society, there must be stronger willingness to move beyond incentives and embrace more coercive tools to limit overall consumption of the key natural resources and environmental sinks that will be needed to support the needs of subsequent generations. Interestingly, regulations per se are not necessarily deplored by all corporate leaders. Enlightened leaders of environmentally responsible firms realize that environmental regulations can be a source of competitive advantage in that regulations tend to force poor environmental performers to play a costly game of catch-up (Porter and Kramer, 2006). This suggests that the phlegmatic approach that most nations have taken to governing use of natural endowments needs to be revisited.

Will Rogers is purported to have said 'the business of government is to keep the government out of business – that is, unless business needs government aid'. Clearly, in improving CEM, businesses can benefit from strategic government support and so can society.

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[16]UNICEF website: http://www.unicef.org/wash/ [12 May 2011].
[17]Food and Agriculture Organization of the United Nations website: http://www.fao.org/DOCREP/ARTICLE/WFC/XII/0350-C5.HTM

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