

Managing for Sustainability

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Abstract: Despite the rapidly growing importance of sustainability to corporations, the majority of firms manage sustainability in simplistic, and often mechanical ways. These methods are often incapable of solving the complex sustainability problems typically encountered in companies. There are many reasons for this seeming paradox, though the chief cause is companies often fail to connect their strategic decisions to their present sustainability problems. This paper examines some of the common causes of underperforming in sustainability management, and offers a conceptual framework changing the way sustainability is managed going forward. In particular, a strategic knowledge-based approach to sustainability management is recommended. Historically, corporate strategies have focused on improving business performance factors, such as profits, yet are rarely geared toward solving the complex challenges that undermine sustainability efforts. By adopting pre-emptive strategies that prevent the formation of sustainability problems, companies reduce risks and forgo the costs often associated with sustainability continuous improvement initiatives.

Key words: eco-efficiency, interactive planning, knowledge processing, organizational learning, strategy, sustainability, sustainability management

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1. Introduction

For most companies, there are many challenges inherent in managing for sustainability. Some of the most well-known type of problems center around the difficulties of handling the unintended consequences of sustainability projects. The conventional wisdom is that sustainability projects are simple and easy to manage. There is little evidence to support this claim. However, some of the greater problems of sustainability management are lesser known ones. First, and foremost, sustainability is a concept with numerous competing, and often conflicting definitions. Most corporations have, by default, adopted sustainability strategies designed mainly to reduce variable cost, cut wastes, and improve efficiency incrementally. This strategy provides a solid foundation for corporate philanthropy, but is less likely to generate results of strategic significance to companies or have an ongoing positive impact on the environment or communities. The most commonly-used strategy for sustainability management, *eco-efficiency*, contains many contradictory elements. The types of difficulties faced by companies using eco-efficiency strategies are predictable. They typically reflect the inherent limitations in the way sustainability approaches designed. The purpose of this paper is to critically examine the most commonly used sustainability management strategies — with specific focus placed on eco-efficiency strategies. It will also

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propose a newer strategy for sustainability management that is more closely based on proven management theories and is better able to address the needs of all corporate stakeholders.

After the initial big bang of sustainability initiatives subsides and initial enthusiasm around capturing low-hanging fruit fades, sustainability initiatives based on making incremental process improvements typically deliver positive results, but rarely are they of a sufficient magnitude to create sustainable competitive advantages or offset the forces of entropy arising from macro-systems. Most incremental sustainability initiatives do not yield the sort of financial performance that is seen as being an attractive financial opportunity by most corporations. Rather, sustainability is often seen as an opportunity to do the right thing and be a good corporate citizen. While doing sustainability — for its own sake — is worthwhile form of corporate social responsibility.

Despite the shortcomings of incremental sustainability improvement strategies, more large companies than ever have programs in social responsibility, environmental stewardship, and sustainability. Despite the fact that there is agreement about sustainability's importance, there is a widening gap between the urgency of the general global "sustainability problem" and the rate of capacity increases of most organization's ability to improve sustainability. Sterman's (2012) interrogatory is most direct in pointing to the magnitude of this issue — he asks, "...is the burgeoning sustainability movement itself sustainable? And do current approaches to sustainability actually make a difference to the sustainability of human society? The answer to both questions is no. Despite notable successes and many important contributions, the current sustainability movement, in business, public policy, and education, is neither effective nor itself sustainable." (p. 21) It is arguable the causes of the sustainability problem has more to do with organizational ineffectiveness in managing sustainability as much as it reflects the impact of the external forces being blamed. There are many causes of organizational ineffectiveness related to sustainability. Clearly, the difficulties inherent in managing the dynamics of sustainability projects are an overlooked cause. While eco-efficiency methods are able to contribute in specific ways to keeping sustainability initiatives moving forward — while controlling costs and reducing waste, a higher level of sustainability effectiveness is needed for the next decade. The limitations of eco-efficiency strategies are relatively well-known (Hoffren & Korhonen, 2007; Ehrenfeld, 2005). The challenges of managing the dynamics of sustainability improvement processes can be daunting. This is especially true after low-hanging fruit is harvested in the early stages of sustainability initiatives. While eco-efficiency strategies are widely considered to be simple and relatively easy to launch in corporations, these benefits are often neutralized by the aforementioned difficulties in sustaining improvements. Since eco-efficiency strategies are typically employed as tactical operational tools by most companies, their alignment with broader long-range corporate strategies often tend to be only be coincidental. On balance, eco-efficiency strategies play a significant role in sustainability management serving as a critical driver for continuous improvement initiatives, but the general absence of learning and capability-building engines, leave these strategies in a sort of awkward *no-man's land*. Even the earliest thinkers in related fields that rely on continuous improvement, such as total quality management (TQM) understood the necessity of learning processes to drive capability development. For example, Deming (1993) proposed a framework he termed a *system of profound knowledge* as a means to drive collective action-learning processes needed to sustain improvements. Companies that have further improved on Deming's ideas, such as Toyota, have developed their own systems to create and share the knowledge needed for innovation and sustainable improvement. For example, Spear (2004) describes Toyota's system of continuous experimentation and learning. In parallel, they also operate a system known as Yokoten — designed to spur knowledge exchange and innovation. Historically, factors such as knowledge processing (McElroy, 2003), organizational learning (Garvin, Edmondson,

& Gino, 2008), and innovation have often taken a back seat to economic analysis and limited forms of process improvement, such as Six Sigma. A key component of knowledge processing is knowledge validation. Not all knowledge is created equal. Much knowledge is unreliable, untrustworthy, or incomplete. Yet, in most organizations, extant shared knowledge is usually regarded as being flawless. Knowledge valuation processes are necessary to improve the quality of knowledge-in-use within the organization. Low quality knowledge leads reliably to ineffective action, which, in turn, causes underperformance. The simplicity of eco-efficiency sustainability methods is at the same time its primary limitation. The temporary nature of sustainability project teams engender flexibility, and yet at the same time increase the complexity of managing such initiatives. Without learning, there is no adaptation, and without adaptation there is no sustainability. Highly-structured improvement processes are merely a starting point for thinking about sustainability, not an end. They lack the adaptive capacity to co-evolve with the environment and promote the type of action-learning necessary to raise sustainability team performance beyond their initial effects. Siebenhuner and Arnold (2007) have critiqued such non-learning sustainability approaches. "Implementing sustainable development in corporations, however, necessitates organizational learning." (p. 339). It is not surprising that eco-efficiency strategies are self-limiting in their potential to generate truly sustainable improvements to sustainability. Such eco-efficiency methods are an important piece of the whole sustainability puzzle. Their value is better understood in the context of corporate strategy where incremental improvement is used in tandem with innovation and differentiation strategies.

First-generation sustainability strategies narrowly focused on cost-reduction and efficiency improvement as a way to help to corporations seeking to balance concerns for the environment and community with profits. This new paradigm became most well-known for its instantiation in the form of the Triple Bottom Line system of accounting (Elkington, 1997). This innovation in sustainability management is best understood in light of the historical evolutionary pattern of the discipline.

2. Origins of Sustainability Management

The World Commission on Environment and Development (1987) defines sustainability as — *meeting the needs of the present without compromising the ability of future generations to meet their needs*. In other words, sustainability is defined in economic terms explaining the goal of efficiently using resources with little waste generated in the process. Unsurprisingly, there are a plethora of sustainability techniques in use today that area aimed at increasing efficiency and reducing waste in organizations. The most popular, though not most effective, sustainability techniques generally adopt eco-efficiency strategies. The concept of eco-efficiency is most simply defined as *being achieved by the delivery of competitively priced goods and services that satisfy human needs and bring quality of life, while progressively reducing ecological impacts and resource intensity throughout the life cycle, to a level at least in line with the Earth's estimated carrying capacity* (Schmidheiny, 1992).

The United Nations Environment Program defines sustainability management as *the processes or structures that an organizational uses to meet its sustainability goals and objectives while transforming inputs into a product or service*. (p.3) Interest in managing for sustainability is greater than ever among senior corporate executives. At the same time, social and environmental pressures on organizations to manage sustainability more effectively continue to grow. Often, companies respond to this pressure by investing ever more intensively in an ever narrower set of operational sustainability techniques based on eco-efficiency strategies.

Most corporations deal with sustainability as a set of operational techniques because it enables them to

improve efficiency while at the same time reducing negative environmental effects. While this type of strategy is expedient, its main benefit is to slow the rate of decay in organizational and environmental sustainability. On face value, it is reasonable to think of sustainability being at the core of a corporation's business model because sustainability is really in essence survivability, and little matters more to a corporation than this purpose. Sometimes, when corporations get extremely unbalanced, they place profits or efficiency ahead of survivability, mistaking them as pathways to survivability. However, survivability is something that a corporation's executive team should formally address as an explicit part of its strategic plan. Certainly, survivability is as important as *thrive ability*. The ability to thrive suggests a state where an organization performs at optimal levels while all relevant sustainability systems—both internal and external also remain in balance.

At the highest level of abstraction, the *raison d'être* of a business corporation is to exist and survive — to fulfill a social purpose — such as meeting a customer need for a product or service. More specifically, the factors needing to be managed in a corporation to enable it to survive are often reflected in various performance measurement scorecards, such as the Balanced Scorecard (Kaplan & Norton, 1992) and more recently, the MultiCapital scorecard (Thomas & McElroy, 2015). After all, the scorecards measure the tangible outputs of organizational activities linked to an organization's purpose. The various types of capitals this particular scorecard tracks include human, social, built, financial, and natural capital. These are all part of an interactive, and dynamic system of interconnected variables that are interdependent. Therefore, the more conventional of these factors, such as financial measures, e.g., financial profit, should never be considered as being independent variables because doing so detaches them from the larger survivability system. Managing for sustainability by tracking a wider array of performance variables, such as the aforementioned ones — social, environmental, human, built, and financial, forms the basis for a more systemic strategic to address stakeholder interests, it does not adequately support organizational learning and adaptation necessary for sustainability. In principle, there are only very few systems in the natural world that are sustainable without learning and knowledge-creating processes ongoing. Learning, adaptation, and improved effectiveness are more often the result of strategies based on what Martin terms as design-thinking (Martin, 2009). A main engine for organizational learning and adaptation is the process of knowledge-processing. Deming foresaw the tight link between continuous improvement and knowledge processing in the early days of the Quality Movement.

3. Continuous Improvement for Sustainability

Historically, systems or frameworks of management, such as total quality management (TQM), sought to link corporate performance to a single benchmark standard — such as quality. Further, since the ideal of quality was considered to be zero defects, or in other words, perfect quality — all activities in an organization were tied in some way to this ideal of quality. While the advent in TQM, represented a quantum leap in the way business was viewed, it was not sufficient to ensure survivability because as it is practiced, particularly in the West, it deemphasizes the importance of human, social, and natural capital. It should be noted, that the writings of early TQM theorists, such as Deming, clearly articulate the need to consider human knowledge and social processes as being integral parts of the quality system. Unfortunately, the rich concepts of TQM — as it was originally formulated — have been decomposed into various statistical tools, such as six Sigma. The failings of six Sigma to achieve sustainable improvement owe to the same sorts of conceptual weaknesses as are being seen now in eco-efficiency strategies. In other words, they do not contain an “improvement engine”, such as, organizational

learning, knowledge management, or systemic innovation practices. There is a long history, particularly in the West, of taking robust management theories, and attempting to “engineer” them by reducing them to mechanical subcomponents and processes. Such improvement strategies fail to consider that most errors stem from design flaws of larger systems. In other words, causes of the major sustainability challenges of today are the direct result of past design decisions, and their unintended consequences. Given this reality, corporate sustainability performance cannot be engineered down to being the product of one simple technique or narrow set of techniques, such as is so evident in the way incremental improvement strategies focus on narrow aspects of companies and ignore strategic elements of the whole firm eco-efficiency strategies. At its simplest, sustainability management is a process of linking design and strategy to balance the needs of stakeholders with the needs of the natural environment and community. The notion of design being central to effective management of complex systems is not new. Simon (1968) in *Sciences of the Artificial* wrote, *the proper study of mankind is the science of design, not only as the professional component of a technical education but as a core discipline for every liberally educated man* (p. 83). Sustainability management must, by default, be about the equilibrium of whole systems. In a fragmented world divided by competing interests and priorities, responsibility for the whole is often subordinated to the special interests of various subgroups. Within the arena of sustainability management, the domains of the artificial world collide with the natural environment to form complex, dynamic, problems with no single solution that is agreeable to all participating parties. Consequently, it become imperative to prevent wicked sustainability problems from emerging through the use of thoughtful design, and reduce their impact through continuous improvement initiatives. Each company has its own unique sustainability terrain that must be considered when a sustainability management strategy is being designed.

4. The Sustainability Terrain

Although there are different kinds of obstacles that slow progress toward becoming more sustainable in various firms, there are some common pitfalls that dot the *sustainability terrain*. When organizational processes are perceived by managers and employees as being simple machines where sustainability initiatives are nothing more than mere “plug and play programs” that are dropped into the organizational milieu, it diverts them from seeing the dynamic complexities that must be overcome to move more effectively toward greater sustainability. These dynamic complexities within a company’s sustainability milieu compose its *sustainability terrain*. The implicit assumption seemingly behind most eco-efficiency strategies is that the sustainability terrain of most companies is both a flat surface traveled over on flat, smooth roads. However, to be realistic, the sustainability terrain of most companies includes the equivalent of not only structures, like mountains and valleys, but moving parts, such as wind, flowing rivers, and changing temperatures. Effective sustainability programs are based on strategies that align the company’s approach with both the terrain and its broad strategy.

The sustainability terrain of every company is unique. That is, every company presents a distinctive picture that is the product of the way its business strategy, technology, leadership, culture, and leadership all intermingle. At its simplest, this terrain is largely defined by the management system intact within a company. In the larger sense, it is the product of the various dynamic forces at play within the firm. Sustainability is different than most business functions because there are fewer clear and meaningful short-term outcomes. While it’s true that there are sustainability metrics and outcomes, their causal connection to the most significant sustainability states is usually remote. For example,, sustainability metrics are unlike most business performance measures, such as profits, sales,

or even quality. More often, sustainability is focused on demonstrating greater efficiencies, or reductions in resource consumption or waste creation. Whether a company reduces its water consumption in a year may not be a useful metric in determining the extent to which that organization or segment of its environment will be more sustainable in the next decade. As a result of this lack of meaningful context, the default metrics of most sustainability initiatives are process improvement measures. This microscopic focus on business process improvement further encourages sustainability programs to be disconnected from a company's overall business strategy. At its simplest, a firm's business strategy may render certain sustainability initiatives to be moot. For example, product design changes made to meet competitor advances, technological changes, or changing consumer trends may create pressure for product improvements and redesigns. It may be that new product features have a better resource consumption profile and end up replacing materials and/or resources with unfavorable profiles. Strategically, it may make more sense to eliminate or redesign products with unfavorable sustainability profiles rather than to invest resources in conventional process improvement in the internal installed capital base. Another factor is that sustainability projects may be far more difficult to manage effectively than is generally understood. As a matter of principle, a key strategic question is whether it is better to invest funds in R&D to create new products for new markets, redesign products with unfavorable sustainability profiles or run sustainability projects with existing products in complex environments with high risks of unintended outcomes and cost overruns. The project management literature is full of examples of seemingly simple projects that were subject to scope creep, mission creep, cost overruns, and delays.

Despite the increasing pressure on companies to report on their sustainability performance, many executives are skeptical about investing resources into yet-to-be-proven newer sustainability methods. For most companies, adopting in any even moderately complex sustainability improvement methods can represent an intolerable risk for a very uncertain payoff. The long-term performance benefits of most sustainability methods are still questionable in the minds of many executives.

Among the common pitfalls of most sustainability projects that are ignored by most simple sustainability techniques are their tendency to (1) Ignore feedback effects within sustainability project and between the project and the company, (2) Fail to account for non-linearities in cause and effect, (3) Encourage misperceptions of dynamics feedback, (Sterman 2000) (4) Be overly mechanistic and less capable of adapting to overseen circumstances, (5) Focus on achieving narrow performance goals to justify the projects rather than learn, over time, how the systems in play really work, and how to control them (Sterman 1992) (6) Borrow staff from other projects only until short-term threshold goals are met, and then staff returns to their home project, causing a lack of ownership for sustainability projects (2012) and (7) Destabilize systems by taking actions on the basis of flawed understandings of cause and effect in projects (Thompson & Cavaleri 2010). As a matter of course, flawed mental models contribute to ineffective designs for sustainability. Many of today's sustainability problems are the result of non-strategic operational choices to maximize short-term profits and the expense of long-term sustainability. Remediation processes, such as eco-efficiency strategies, are an unwitting effort to mitigate the damage created by flawed earlier choices. Are corporations bound to spend money, ex post facto, in desperate attempt to transform unsustainable systems into marginally more sustainable ones? What is the cost of acting non-strategically when it comes to sustainability?

5. Viewing Sustainability Strategically

The conventional view of sustainability strategies is that they are a collection of techniques designed to address a well-defined and self-limiting issue or problem. To date, there has not been a compelling rationale to treat sustainability as a major strategic imperative. De Geus (1997) reports the average lifespan of a major multinational corporation — Fortune 500 — is only between 40 and 50 years. Further, he reports of the Fortune 500 companies that existed in 1970, by 1983, nearly 1/3 of these companies were gone. If we view sustainability as being a component of survivability — for both companies and the environment — then this is a matter of strategic importance deserving the utmost attention from top executives. Even if there is a consensus that sustainability as a subject matter should be given greater weight by corporations, there is really no single high-effective methodology for operationalizing sustainability strategies. Of course, incremental improvement strategies are often a one-size fits all approach that can be easily adopted by most firms, yet the impact and sustainability of such methods is questionable. Is there another way to view sustainability management more strategically? Certainly. While it is beyond the scope of this paper to provide a treatise on the subject, it is important to explore ways to think about sustainability more effectively.

One of the most important considerations in shifting to a more strategic view of sustainability is to understand that a company's current installed base of products and processes are the result of prior strategic decisions. Each firm has a particular product mix that reflects the unique way it has chosen to respond to customer preferences and industry demand trends. Typically, various materials are selected to fabricate products and certain technologies are selected to manufacture them. Additionally, various natural resources are integrated into production systems. For example, water is often used in textile manufacturing, while sand is used for sandblasting in metals fabrication. Local rivers and streams have historically been used to discharge effluent from manufacturing processes. Every company can be thought of as being composed of products and related processes that have unique sustainability attributes. For example, some products may contain components or raw materials that are primarily nonrenewable resources, while others may include largely materials made from renewable resources — such as wood or animal resources that can be farmed. Since most products and processes rely on a combination of renewable and nonrenewable resources — in the aggregate, each product line within a company can be categorized as having a *sustainability profile*. Each product lines profile reflects the extent to which it relies upon nonrenewable resources. Strategically, various product lines and manufacturing processes can be viewed as having future potential for sustainability. Similarly, production processes may rely heavily on either taking in scarce resources or discharging toxins into an environment with limited absorptive capacity. So if product and process sustainability attributes are viewed together as being part of a broader system it becomes increasingly clear that design choices become preeminent. In other words, the sustainability challenges of today are often the effects of the design choices made in the past. When it becomes clear that design choices are so impactful on sustainability, then, we also begin to see that broader business strategies implicitly are founded on design choices which often bring physical form to products and processes that have some impact on sustainability — which is predictable, but often unknown at the time.

6. Business Strategies

There are many well-documented business strategies known for being effective in providing desired results,

such as competitive advantage, industry leadership, or simply more profits. For example, Porter's (1980) generic strategies of cost leadership, differentiation, or focus are judged as effective by virtue of conferring competitive advantage, yet today, the criteria for judging the effectiveness of strategies has changed. How can business strategies be considered as being successful if they harm sustainability? Can we view strategy in reverse...starting from a sustainability perspective. Business strategies start with analysis of industries and the broader business environment. Such analytics may typically invoke choices to compete in certain industries or industry segments. From a sustainability perspective, each industry has its own unique sustainability risks and rewards that provide certain sustainability challenges. It is important to note that these sustainability challenges can be met in different ways by different companies and in so doing a highly complex sustainability challenge can be overcome — but often at a cost that is prohibitive given the prevailing business model the company has adopted. The industry itself may not be the determining factor of whether a firm can operate within it sustainably. Rather, it is the fit between the company's sustainability competencies and the challenges that emerge from the industry.

Strategic considerations of sustainability are often seen as being distant or remote from the operational aspects of sustainability in most organizations. There are several simple explanations for this phenomenon. One is that the connection between strategic decisions relating to products, processes, and industry positioning are typically distant in time and space from the effects that are seen in operational sustainability settings. For example, many legacy production systems were designed before sustainability was a concern for company, yet such production systems may be efficient, reliable, and cost-effective enough to justify its existence. Therefore, the tendency is to use incremental improvement techniques to tweak the sustainability of such a system. That is a reason why eco-efficiency techniques have an important place in sustainability strategies because they buy time for companies — when more radical strategies cannot be justified. However, dysfunction results when sustainability elements are seen as being static or fixed, rather than dynamic. That is, companies and industries are more dynamic than ever with changes in industries, products, processes, technologies, and location all being part of a fluid continuously changing mix. Industries evolve in ways often leading toward obsolescence, so, an exit strategy may lead to innovation or entry into another industry. Further, technology revolutions, such as 3-D printing, may change concerns will profile of a product or process. The resulting dynamics often create complex scenarios where the sustainability concerns of a firm about a particular product or process of yesterday may quickly become made irrelevant by the strategic changes unfolding at any point in time. For example, products that are in the late stages of their product lifecycle within an industry that is becoming progressively obsolete, will, by default, resolve sustainability issues by either ceasing production or having declining profit margins make investment in sustainability unable to provide a sufficient return on investment. On the other hand, products may through research and development be redesigned, reconfigured, or reborn in significantly new ways that have a much improved sustainability profile, and thus render the typical sorts of eco-efficiency methods irrelevant in this case.

For simplicity sake, several essential elements of a strategic sustainability system will be described. Perhaps the simplest, broad concept of strategic sustainability is to think of a companies installed capital sustainability base. Its components are its products, its production systems, and processes, its markets and its industries. While these parts are often considered to be separate, independent, and are typically managed in ways that account for the performance of the part with little consideration of the whole. Smith and Sharicz (2011) researched corporate sustainability initiatives and found: (1) A lack of clear definition of sustainability, (2) Short-term focus, (3) Expediency in decision making, and (4) Quick fix problem solving, rather than thoughtful consideration of

problems. Over time, in corporate cultures where deeper type of systems analysis rarely occur, the norm becomes to treat sustainability superficially as a technique to be completed on schedule, as is common in eco-efficiency initiatives, rather than a strategic means of organizational transformation. Sustainability is typically dealt with by companies as a limited set of operational techniques rather than a systemic business strategy.

Brady, Henson, and Fava (1999) predicted the potential obstacles that would face corporations as managers wishing to integrate environmental and sustainability issue in a more systemic way would face several challenges. These include developing a common vision and strategy, the selection of management systems and tools, and the collection of the right data.

7. Strategic Sustainability Analysis

It essential for managing a firm's sustainability to assess its current situation vis-à-vis sustainability. This is because, going forward, the more closely a sustainability management strategy mirrors a firm's strategic direction, the more likely sustainability management decisions will be value for their ability to support corporate performance. It is critical to evaluate, (1) Current level of sustainability, (2) Life cycle of the stage of the product, (3) Life cycle phase of the industry, and (4) Technological complexity of the sustainability system in question. For example, if a subsystem of company currently has a very low level of sustainability, its products are near the end of their life cycle, the industry is in rapid decline, and the complexity of the system is very high, this would indicate a very unfavorable situation to intervene in the firm's sustainability management system. The financial position is very weak due to declining sales of the product and industry, and the lack of current sustainability would require major improvements — thus a relatively high project cost. In a case of high technological complexity, this suggests a high degree of systemic instability with an accompanying high risk of error. In such a case, any intervention designed to improve system sustainability would also engender a high risk of failure due to the possibility the unintended consequences created in an unstable system. Obviously, the structure of the situation shifts in the case of a new product, in a relatively new industry, with a sustainable, and stable system. Strategically, there are very few challenges posed by this situation. The greatest challenges come with mixed situations where systems are unsustainable or marked my instability resulting from industry dynamics defined by uncertainty, hyper-competition, or rapid growth. As a matter of course, the preferred strategy in a firm during the early stages of industry life cycle is to adopt an agility strategy. Agility strategies tend to emphasize the need to adapt and make minimal investments in long-term infrastructure.

8. Conclusions

Although relatively little is known about the process of managing for sustainability, the need to improve corporate sustainability performance is greater than ever. The prevailing eco-efficiency strategies are of limited value largely because they are used in expeditious ways by firms that severely limit their long-term viability. In particular, the failure of such eco-efficiency methods to account for project dynamics, adaptation, and learning, leave such projects with a limited potential to make a meaningful impact on sustainability. Many of the leading sustainability approaches, such as eco-efficiency strategies, are fatally flawed in their designs. The conspicuous omission of organizational learning, knowledge processing, and innovation engines force project teams to fail when it comes to developing the capability to solve complex problems. Consequently, sustainability project teams often become trapped in a vicious cycle of focusing on making short-term gains by capturing low-hanging fruit,

and never developing the high-quality knowledge needed to solve complex problems. Over time, sustainability teams become stuck in learning more and more about problems of progressively less significance to sustainability.

It is not surprising that sustainability teams often run out of energy after low-hanging fruit have been captured. In addition to repairing the effects of unintended consequences of earlier quick fixes, teams often are powerless to effect change in the deeper infrastructures that are subtly generating problems as a result of design choices made in the past. Unfortunately, formulating proactive, sustainability management strategies going forward does not fix current problems because they are more preventive than curative. The most important change to flow from adopting such an approach is the realization that executives who are unaware of the potential impact of future business strategies on sustainability are destined to repeat the design errors that created the current sustainability challenges in the first place. One of the most pragmatic steps that can be taken by firms is to adopt an *interactive planning* approach to strategy formulation for sustainability. When this planning approach is coupled with a knowledge processing engine it generates a steady stream of higher quality knowledge in the organization to fuel incremental improvement initiatives designed to lift sustainability to high levels (Labeledz, Cavaleri, & Berry, 2011). While the use of knowledge processing and organizational learning models to drive firm operations is well-known, it is also just as critical to drive strategic planning processes.

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