

Dynamic Sustainability Strategy: Human Capital, Knowledge, and Innovation

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Abstract

Company leaders are rallying behind sustainability more than ever, but are becoming increasingly unsure of how to manage sustainability programs to fit their business strategy. Clearly, there is a shift toward taking a more strategic view of sustainability. Yet, in the minds of many executives, there is a knowing/doing when it comes to linking sustainability practices and strategies -- in operational terms. The vast majority of firms have adopted sustainability practices based on *eco-efficiency* principles. While such practices do provide some incremental gains in reducing resource consumption, they do little to address the underlying causes that hinder a firm's movement toward greater sustainability. This paper examines the limitations of eco-efficiency, and proposes more strategic ways of looking at sustainability challenges. Specifically, these include McElroy's *context-based sustainability* and Sterman's system dynamics capability trap in managing sustainability programs. The paper concludes with recommendations for how such perspectives might be integrated into a larger strategic planning process.

Introduction

There is a growing consensus of the importance of sustainability, yet little agreement over the best methods for managing organizations toward greater sustainability. There is emerging imperative facing leaders to discover new methods and strategies for balancing human, ecological, and organizational interests. Yet, perhaps ironically, the most popular sustainability methods used by corporations today, while necessary, do little to restore the requisite types of equilibrium needed to move at a faster rate toward sustainability. The urgency of the current sustainability issues problems facing mankind has been well documented (McElroy and Van Englen, 2012). Product consumption and waste generation are growing at increasing rates driven by the growing human population on the planet and spreading economic development. Consequently, the rate of growth of sustainability problems is faster than the rate of increase in the management capacity and abilities of corporations to solve and/or control them. (Sterman, 2013). Despite this ominously foreboding scenario, the limitations of organizations to effectively address sustainability challenges is not intrinsic to the issue of sustainability itself. Rather, it owes to the ineffective ways in which organizations tend to manage sustainability projects.

Moreover, these limitations can be traced to the way organizations manage human capital, organizational learning, knowledge management, innovation, and most importantly, their own business strategy. Contrary to conventional wisdom, sustainability challenges need not hinder corporate performance, but rather they may serve as the focal point in creating more effective business strategies in the future.

The purpose of this paper is to propose an improved business strategy capable of meeting the sustainability challenges of the next several decades. This strategy is the outgrowing of recent research in fields, such as system dynamics, organizational learning, knowledge management, and innovation. It is also informed by contemporary research in the field of sustainability management. This paper will outline a number of the fundamental challenges that often cause sustainability initiatives in organizations to fail and/or become ineffective.

The Organizational Challenge Posed by Sustainability

Many organizations unwittingly adopt the position that by employing *any* sustainability methods it represents a positive step in the right direction of achieving greater levels of sustainability.

While there are some elements of truth in this simplistic perspective, in the end, such strategies do little to provide greater sustainability and shift the focus of attention away from using sustainability as a means to designing radical breakthrough business. Those organizations employing **only** simplistic sustainability tools risk sliding dangerously down a steep, slippery slope tilted toward incrementally greater levels of operational efficiency and drifting gradually away from reaching higher levels of strategic effectiveness.

Eco-Efficiency: Cure or Problem?

Currently, the prevailing organizational strategies for moving toward greater sustainability fit into a narrow genre known as *eco-efficiency strategies*. Eco-efficiency techniques are operational organizational strategies seeking to add economic value to a firm while simultaneously improving its sustainability (Schaltegger, S. and Synnestvedt, T., 2002). Eco-efficiency strategies are often linked to greater shareholder value and measures of economic vitality. Derwall and colleagues (2011) studied the economic impact of eco-efficiency strategies of corporate financial performance. Their research found that eco-efficiency use in corporations had positive effects on operating performance and market value. Their research also indicates that investment markets may reflect such considerations when evaluating future economic potential of a firm going forward. Many popular eco-efficiency methods are founded upon techniques often used in 1. lean manufacturing, 2. waste reduction, 3. process improvement, and 4. product redesign (Bateman, 2005). There are many variations on the theme of *green programs*, ranging from Lean Manufacturing to designing products with more favorable environmental profiles, such as alternative fuel vehicles (AFVs), e.g., hybrid automobiles. To date, no AFV programs have been successful in supplanting fossil fuel vehicles on a large scale. While these *green* techniques are often useful, they do not address the underlying systemic structures that hinder the ability of organizations to move faster toward sustainability.

The operational rationale for these popular *green programs* is to help companies focus more on conserving resources by waste reduction, process improvement, and thereby increasing efficiency. Despite cost reduction, efficiency gains, and apparent economic benefits, critics of such approaches, as Brown, Dillard and Marshall (2004), evaluate them as being “fatally flawed”. They are severely limited by a narrow focus nearly exclusively on physical and

economic capitals -- without regard for contextual factors, such as limits and thresholds. In other words, they follow extremely reductionist paradigms, are grossly simplistic, and ignore virtually all prudent systemic and human capital considerations. Green programs are necessary, but not sufficient for successfully moving toward greater sustainability. If such eco-efficiency strategies were merely simplistic and innocuous, that would be one thing, but as Sterman (2013) notes they are often difficult to integrate with the rest of the organization and often produce unintended consequences that undermine their ability to reliably yield sustainability improvements. This need not be the case. While conventional strategies designed to develop products with more resource-efficient profiles, such as hybrid automobiles, or manufacturing types of products with components using fewer resources typically yield only marginal incremental gains. There are other more promising knowledge-based sustainability approaches emerging. Such knowledge-based approaches promise more highly effective sustainability initiatives capable of going beyond simply capturing low-hanging fruit. Knowledge-based systems are rather distinctive because they also are capable of driving the sorts of radical innovation that can offset the rising tide of unsustainability that plague many industries. (Cavaleri and McElroy, 2013). This paper will explore several of the underlying systemic structures and problems that cause sustainability initiatives to underperform. Further, it will propose a new business strategy capable of providing radical gains in both sustainability and business performance.

The Challenge of Managing for Sustainability

Typically, most sustainability problems and improvement initiatives are framed in a way by managers and consultants that virtually insures their underperformance. Such programs are often initiated with insufficient capacity to do more than use simple efficiency techniques to capture

low-hanging fruit. The reasons sustainability initiatives are often crippled from their outset owes to a daunting set of circumstances. In a hyper-competitive world, most companies have minimal slack resources. Employees are often over-stressed and carry heavy workloads that lessen their productivity and narrow the focus of their work to completing only the most essential tasks. Consequently, only simple eco-efficiency sustainability techniques will appeal to such companies as there are insufficient slack resources to address the true complexities and unwieldy dynamics that often characterize complex sustainability milieu. Companies often function on such tight project timelines they have little or no interest in understanding the dynamic and systemic forces at play – which if ignored – will only exacerbate those tendencies that will cause such initiatives to be ineffective. Yet, for those interested in identifying such potential pitfalls, a closer examination reveals several areas that managers of sustainability projects should pay heed.

I. Dynamics of Sustainability Projects

Sterman (2013) has analyzed the causal structure of a generic sustainability improvement program. His analysis found that sustainability project teams faced with a combination of insufficient project knowledge, management capacity, and resources, would generally opt to harvest low-hanging fruit, leaving the more serious problems to fester and worsen below the surface. The abundance of low-hanging fruit early harvested in the early stages of the initiative would convey the appearance of success, thus, leading project resources to be shifted back toward routine, non-sustainability tasks. Increasing work backlogs, employee burnout, and quality problems would demand that human resources be reassigned to conventional projects. The longer-term dynamic created, over time, by these policies designed to shift resources among projects is inadvertently to stunt the development of knowledge and management capacity in

sustainability programs. Simultaneously, it also masks some slowly developing crises from growing unattended and related to sustainability issues. When these crises rise to a sufficient level to capture the attention of the management team, then, the apparent choices would appear to be to address the most urgent sustainability crisis – aka.. returning back to the low hanging fruit again.

The resulting dynamics originating from the systemic structure depicted in Figure 1 produces a recurring pattern that not only undermines sustainability initiatives, but it actually causes managers to shift their attention away from seeking fundamental solutions to sustainability issues -- over the long term. Ultimately, this model suggests that the underlying forces that cause sustainability programs to underperform essentially owe to limited strategies that virtually ignore system dynamics, organizational learning, knowledge management, and radical innovation strategies.

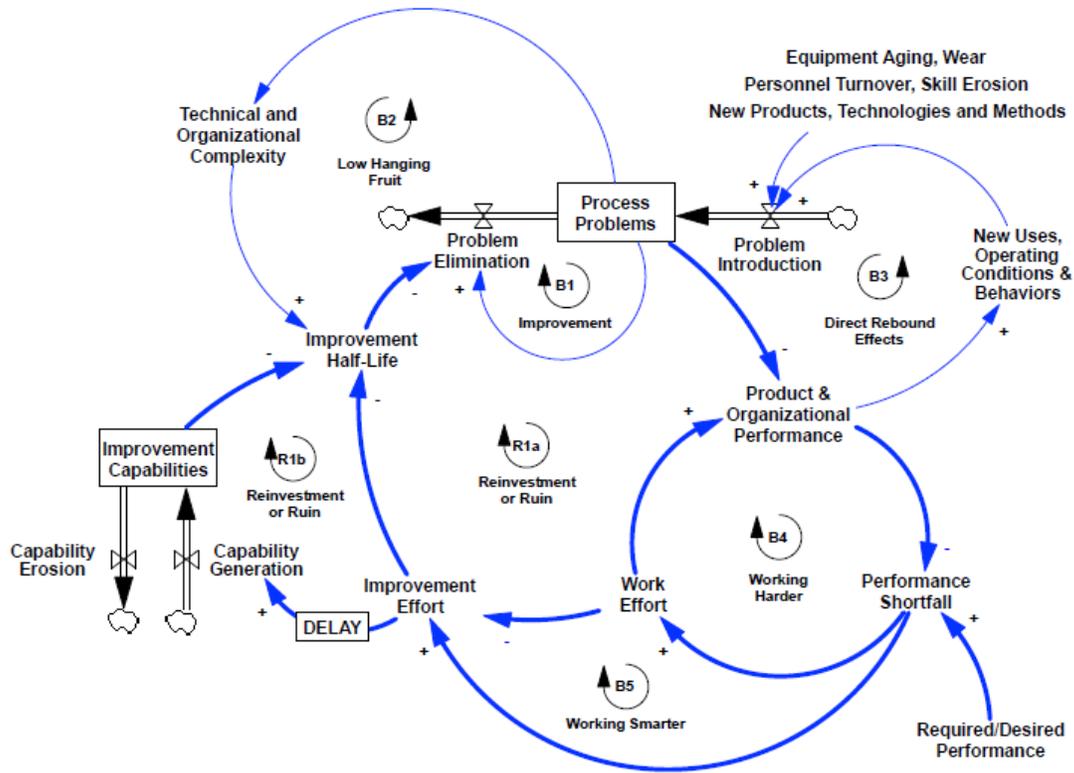


Figure 1 – The Capability Trap (From Sterman, 2013, p.11)

II. Capitals – Stocks of Critical Resources

Organizations typically become unsustainable when reserves of critical assets become depleted or exhausted. These reserves may be conceptualized as being *stocks* of resources essential to the ongoing functioning of an organization. This conceptual framework proposes that organizations are composed of a network of interconnected stocks. This is nothing new. Such thinking can be

traced to several leading systems theorists, in the 1960s, including the economist, Kenneth Boulding, and the founder of the system dynamics approach, Jay Forrester at MIT. Boulding regarded natural and other resources as constituting capital stocks prone to depletion by human activity, especially human economic activity (Boulding, 1966). His concept of organizations as being a series of interconnected stocks would later become the basis for the work of Herman Daly. Daly (1977) envisioned all natural systems as being comprised of natural capital stocks that are subject to continuous and irreversible depletion by human activity. Forrester (1961) envisioned organizations, as well as global systems, as being a series of interconnected resource stocks. Most importantly, he saw these stocks as being interconnected by a series of feedbacks, and feedback loops that caused these to fill and drain over time. Forrester's primary work with the Club of Rome during the 1960s, was to model and simulate how the policies of industry and government would impact life-critical resources, such as supplies of food, clean water, and fresh air. (Forrester, 1979) These models, as well as those developed upon them by Meadows, Randers, and Meadows (1993) have served as a benchmark for many critical strategies for improving the sustainability of nations and industries.

More recently, other researchers, including McElroy and van Engelen (2012) and McElroy (2013), have expanded Boulding's and Daly's notions of capital stocks. They have identified at least six critical types of capitals related to ongoing organizational sustainability. These critical capitals include both financial and non-financial capitals. Non-financial capitals include natural, human, social, intellectual, and constructed capitals. In organizations, at any given point in time, those capitals upon which the organization is having impact, using, or should be having impact, are included in what is known as its *sustainability context* (McElroy and Van Engelen, 2012). In other words, the organization sustainability context is its set of interconnected capitals, and the

feedbacks that influence the levels of these capitals as a direct result of the policies and decisions made by executives. Additionally, an organization's sustainability context also includes other factors, such as the interests of its stakeholders, government, competition, and the natural resource setting that surrounds the locations where the organization operates. These factors collectively determine what the organization's share of the resource burden is, or should be, to produce and maintain them. Ultimately, an organization's sustainability context gives rise to norms, standards or thresholds for those impacts, direct and indirect, will be on the carrying capacities of vital capitals, and ultimately, their sustainability.

In order to effectively manage these capitals, it is insufficient to merely be able to track their levels or understand their interrelationships with each other. Rather, moving toward greater sustainability depends on developing a deeper understanding of the forces of cause and effect emanating from the environment, as well as among the capitals, in their relationship to the environment. By understanding the dynamic complexity inherent in such systems of interconnected capitals and environmental forces, it gives rise to an appreciation of the potential risks of various business strategies that may pose grave risks to the sustainability of these vital capitals. It is patently clear that eco-efficiency models are incapable of evaluating the full extent of these risks. Unless these serious limitations of eco-efficiency models are well understood, their value in terms of ensuring the movement of organizations towards greater sustainability becomes very truncated. Currently, eco-efficiency models tend to focus narrowly on one set of vital capitals, namely, financial or economic capitals, in the interests of investors stakeholder groups. In business, the practice of evaluating business performance solely on the basis of financial and economic measures is quickly being replaced. Other business evaluation

techniques, such as the Balanced Scorecard, (Kaplan and Norton, 1996), the Triple Bottom Line scorecard (Elkington, 1997), and the Adaptive Scorecard (Firestone, 2006) all account for other types of capitals. The very notion that eco-efficiency models can promote movement towards greater sustainability while at the same time ignoring the role of capitals, stakeholders, and systemic forces is puzzling at best.

III. Social/Technical Balance

In management theory and research, it has been well known since the 1960s, that achieving effectiveness in projects requires a wise balance between social and technical factors. This is particularly true in domains characterized by high levels of complexity. Given the many complex dynamics that can define a sustainability project -- it is nearly impossible to engineer or 'solve' the sorts of elusive problems that arise in such system with a simple formula or by using an operations research technique. In the absence of the ability to reduce such complex sustainability problems, such as those described earlier in this paper -- involving interrelated sets of capitals, it is highly unlikely that optimal solutions can be predicted in advance of experimentation and inquiry by work teams. Typically, teams are able to construct effective strategies, over time, through experimentation, organizational learning, and inquiry. There are no shortcuts here as the means to understanding the causes and effects arising in complex systems take time and are contingent upon the action research capabilities and skills of work teams.

Eco-efficiency programs typically deal with complexity by ignoring it, and assuming it is irrelevant to the success of sustainability programs. Making such assumptions, enables eco-efficiency programs to focus narrowly on areas with low complexity, low dynamism, and fewer interrelated causal factors. While making such assumptions may seem warranted, in fact, it

represents a narrow ‘special case’ scenario that applies to only a small portion of types of sustainability projects. Research by Reppening and Sterman (2002), and others, proposes that under-capacity of management and action learning deficiencies in situations defined very high level of complexity often lead to underperformance. While many situations involving sustainability projects are defined by low levels of *technical complexity*, this is often offset by extraordinarily high levels of *organizational complexity*. Research on technological complexity based on the Perrow (1967) demonstrates that there are actually few situations where technical complexity is of the sort where simple tools and techniques will prove to be highly effective.

(Figure 2)

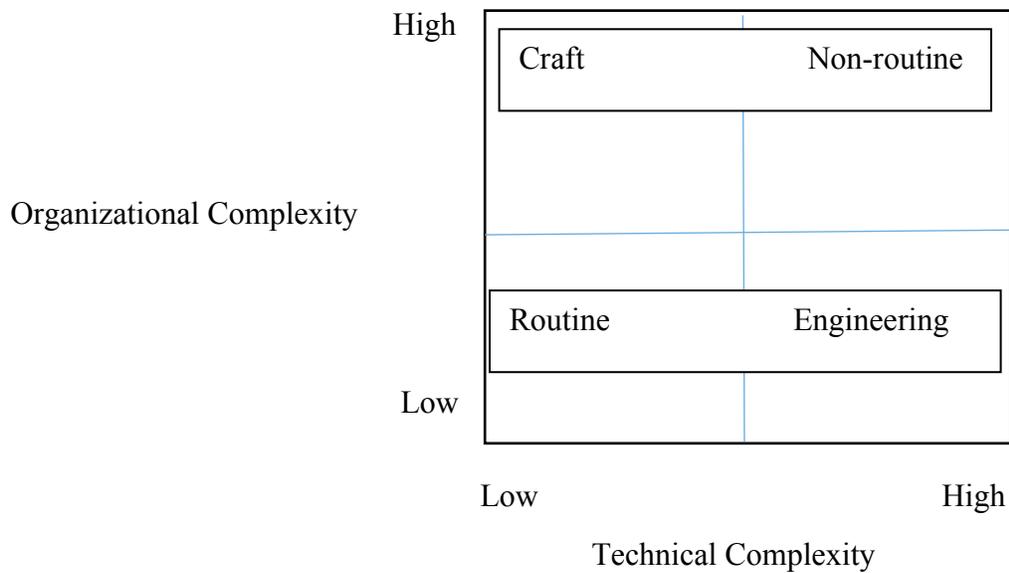


Figure 2 – Types of Technological Situations

The sorts of sustainability techniques characterized by the use of eco-efficiency methods are predicted in Figure 2 to only be effective in the Routine technology quadrant (lower left). As such simplified methods are misapplied to any of the other quadrants the odds increase of producing unintended consequences.

The very notion that work teams misperceive sustainability situations as being simple -- when they are in fact complex, dynamic, and risk-laden -- was researched by James Thompson. His research involved extensive interviews with executives of over 20 companies in the United Kingdom. His research examined whether decision-makers were able to analyze and understand the complex systemic structures that characterized situations where they were required to make decisions intended to improve sustainability. He found that the majority of the managers surveyed believed they must have been operating in a simple sustainability situations, when, in fact, they were almost inevitably in the midst of a highly complex dynamic system. Further, he explored whether these managers could understand a complex system dynamics analysis of the situation capable of supporting their decision-making efforts in that situation going forward. The results of the study indicate that managers were able to appreciably improve their understanding of the situation by having a consultant explain the underlying systemic structure to them. This study suggests that actual learning and knowledge transfer occurred as a result of the interactions between the manager and consultant. However, the research also found a significant tendency toward making decisions that yielded unintended consequences prior to the intervention by the consultants. In other words, sustainability situations were being defined as being routine and mechanical, and by using simple intervention techniques, it actually worsened the outcomes of these sustainability situations by producing unintended consequences. (Thompson and Cavaleri, (2010). Clearly, the types of perceptual bias seen in this study, and in Sterman's research, are of the sort that cannot be remedied by any simple technique or method. Yet, there is a compelling need to address the shortcomings of overly simplistic eco-efficiency methods that simply focus on efficiency and measures of financial value. Do these methods actually provide greater financial value than are found in those organizations that do not use such methods? The answer

is certainly affirmative. However, as was stated earlier in this paper, eco-efficiency methods are necessary, but not sufficient to achieve significant gains towards greater sustainability. The problem that companies will face as they move forward to seeking greater levels of sustainability is that eco-efficiency methods do not offer the sort of strategic framework that will enable companies to move to the next level of understanding about ways more highly effective sustainability projects. Undoubtedly, there is a need for a strategic context that encompasses every sustainability project to enable such projects to succeed. In fact, if the right sorts of strategies are employed, sustainability projects need not just be a cost to the organization, but rather a *driver* of radical innovation. It can enable companies to discover and exploit new technologies and industries. The next section of this paper will outline a framework for a basic strategic management approach built on a foundation of achieving greater sustainability.

A Dynamic Sustainability Strategy

One of the most fundamental precepts underlying any business strategy is that it must be capable of conferring both financial value and sustainability. To achieve this it must first address the questions of what creates financial value. The prevailing models upon which eco-efficiency methods rest essentially deal only with the cost portion of the income statement, while completely ignoring the revenue portion. Thus, any innovative business strategy must find ways to promote not only process and product improvement, but also the sorts of radical innovations that will lead to new products, new applications, and new markets. Now this sort of thinking may run against the conventional mindset in many corporations where various business functions are housed in separate silos, such that R&D and manufacturing, operating separately. This approach is not without precedent. Many companies, such as, Toyota, Samsung, 3M, Google, and Apple

use systems where product innovations can bubble up from project teams. At Toyota, their unique approach to knowledge management, called *yokoten*, enables *ad hoc* improvisational groups to form around interest in specific types of problems. Then, participants in these groups are able to return back to their home project teams with lessons learned that are relevant to the ongoing interests of the team. This is much more than a *learning organization* because the anchoring of problem-solving efforts and linking them to knowledge validation and sharing transforms this process into a type of system where knowledge is gained in immediately used to solve problems, and then, the knowledge becomes revised on the basis of lessons learned, and shared with others in the company.

From a strategic management point of view, an approach such as *yokoten* is not a general business strategy, but rather it is a sophisticated method for executing some of the precepts of total quality management, such as when used at Toyota. So, what type of a system can become the basis for an entire strategic management process that can be embraced by most organizations -- not just by world leading companies such as Toyota? The starting point of such an approach should be with changing the strategic planning process from being a linear one to one that is focused on acquiring learning and knowledge in the process. Such an approach can best be found in what Ackoff (1967) first termed *interactive planning*. Interactive planning is an ongoing, continuous, planning approach wherein goals and strategies are formulated as devices to help educate executives about the practical considerations of what is necessary to close the gap between ideal future states and the current reality. Adopting such a planning process, inherently installs an action learning perspective into the process of planning and executing business strategies. Such a type of planning process should be used at every level in the organization.

One of the problems with the way sustainability projects are conventionally managed is that team members are typically forced by time pressures, burnout, and competing forces to find ways to generate quick wins, rather than more deeply continuing to explore the underlying causal structures leading to sustainability issues. Therefore, organizations need to create sufficient slack to enable at least some team members to burrow more deeply into the causes of sustainability problems, as part of a greater interactive planning process. Of course, an accountant might argue that the cost of doing this is prohibitive, and will ultimately lead to the destruction of the company. While this alone could be true, it is highly improbable. Making investments that identify and cull out deeper causes of sustainability problems can often be justified by the promise of greater revenue. How do accountants quantify such promise? How can they be justified? Surely there are cost savings that will arise from redesigned processes that arise as a result of new knowledge gained from deeper inquiry into the causal structure of the organization. Just like the efficiencies that arise from the *learning curve theory* in economics, there are also radical innovations that may result from lessons learned about the causes of sustainability problems. What sorts of radical innovations can result from such initiatives? Inevitably, when team members more deeply understand what is causing things to go wrong, it enables them to also speculate about how things might be different in the future. Such speculation is referred to as *abductive reasoning* by logicians. If such speculations can lead to new realizations, and enable team members to imagine new possibilities, then there are bound to be new applications for products and services, and new revenue generated. While it may be argued that there is no guarantee that such processes will inevitably produce such revenue-generating products and services, the list of companies that have used such a strategy is impressive. Perhaps chief among them is 3M. The 3M product known as Post It Notes was not the product of some sort of formal

R&D process, or reengineering, or eco-efficiency. It was the result of a bootlegging effort by a company chemist. This product innovation resulted in large amounts of revenue coming into the company that never previously existed. 3M has become a company that depends on innovation as a driver for new sources of revenue to promote not only growth, but to yield greater profits. The financial accounting mentality that grips the business strategies of many companies can never account for the effects of radical innovation of new products and services. Yet, if sustainability projects can drive this radical innovation at the same time costs are being radically reduced, the benefits be obvious. Toyota has been a primary beneficiary of radical innovation cost savings strategies. Their cost-saving strategies do not come at the hands of consultants or incremental simple processes. Rather, they arise out of spontaneous group interventions designed to solve problems and share knowledge. Again, not every organization is capable of operating in the manner of Toyota. Yet, every company can act to improve the capability of the managers of its sustainability projects. MIT's John Sterman (2013) notes there is a 'management capability trap' that many organizations face that hinder their own sustainability projects. These traps often drive them into a self-sealing rabbit hole where only cost reduction serves as the focus of improvement efforts. The downward spiral often becomes a death spiral where cost-cutting leads to more cost-cutting and eventually there is not even enough slack or management capability left in the system to extricate the organization from this downward spiral. While many executives may be uncomfortable with a business strategy reliant on radical innovation stemming from insights gained from sustainability projects, boards of directors should see the wisdom in such a strategy. Consequently, boards should ensure that sufficient slack exists in companies to provide the resources, financial, human, and time, it's to enable the organization to be both highly effective and cost-effective.

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