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MANAGEMENT'S WORLDVIEW: FOUR CRITICAL POINTS ABOUT REALITY, LANGUAGE, AND KNOWLEDGE BUILDING TO IMPROVE ORGANIZATION PERFORMANCE

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From the perspective of hindsight, many researchers have ascribed plausible reasons as to why various firms have prospered and others failed. Some have gone further and worked at understanding how a specific management viewed the world at the time decisions were being made. But, the real challenge is to make progress toward useful guideposts so management can develop a worldview that better equips them to improve firm performance in the future. Without such guideposts, organizational computing, analytics (i.e., fact-based problem solving), and other modern initiatives may lose their way or not reach their full potential for improving firm performance. In the direction of useful guideposts, this article advances four points about reality, language, and knowledge building, which have been underutilized as a means to develop insights for solving business problems and constructing viable strategies. The rationale for these four complementary points is explained in terms of the management decisions behind the growth of Walmart, the successful restructuring of IBM, and the eventual bankruptcy of Kmart. Ideally, leaders should be mindful of these points and strive to ingrain them in the firm's culture. Doing so can lead to improved effectiveness in both strategies and the systems to implement those strategies—ultimately paying dividends in terms of firm performance.

Keywords: *worldview; knowledge building; strategic insights; firm performance; organization performance*

1. INTRODUCTION

The sharply different worldviews held by top management at Kmart and Walmart were decisive in the outcome of their competitive battle with each other. A worldview is a part of, and a result of, one's process for building knowledge. It basically represents ideas and beliefs through which one interprets and interacts with the world. In system dynamics, the term "mental model" is analogous to worldview in that it reflects beliefs about a system's underlying causal mechanisms.

A firm is a system with the goal to efficiently provide value to customers. Management's worldview needs to be attuned to changes in the world that can erode the firm's competitive position. Kmart is a classic example of failure in that regard. The decline and eventual bankruptcy of Kmart in 2002 is well known. Less well known is that Kmart's stock had actually outperformed the S&P 500 by a huge 32-fold from 1960 to 1972. That

reflected a surge in profitability due to Kmart's then innovative development of the discount store concept. During the early 1970s, as Walmart was aggressively expanding, Kmart management was complacent and continued to believe that its future would mirror its past success. The difference between Kmart management's worldview and Sam Walton's was reflected in their polar-opposite strategies.

Kmart's strategy circa 1970s, when it was the dominant retailer in the United States, was to cover the high fixed costs of big stores by locating these stores in big towns. Walmart's strategy was to build big stores in small towns and deliver high value to those underserved customers. What is the hidden assumption that reveals the weakness in Kmart's strategy versus the enormous potential for wealth creation in Walmart's strategy?

The hidden assumption is the definition of "a store" (Rumelt 2011). In Sam Walton's worldview, a store was a part of a networked system. For Kmart management, a store was a stand-alone operation and, based on their successful retail experiences in the past, this assumption exerted a heavy hand in creating their "reality."

Walmart networked stores and distribution centers in order to achieve system-wide efficiency, thereby profitably serving small towns (Vance and Scott 1994). Over time, Walmart greatly expanded and improved its business processes at a far more rapid pace than Kmart. In the last decade before bankruptcy, Kmart had a revolving door of new CEOs with "turnaround" plans that always focused on short-term, accounting cost improvements.

There was yet another aspect of Kmart management's worldview that constrained possibilities for improving their competitiveness. For Kmart, new technology was viewed as a means to reduce costs (Turner 2003), whereas Sam Walton perceived new technology as potential ways to improve the overall Walmart system of networked stores (Basker 2007). Consequently, when barcode scanners were introduced in the early 1980s, Walmart benefited more than Kmart. Kmart did reduce its in-store checkout costs, as did Walmart, but failed to achieve firm-wide leverage. In contrast, Walmart management used the new bar coding information to feed into their inbound logistics system leading to a greatly more efficient process for maintaining just-in-time deliveries and low inventory. *In a nutshell, the worldview in which organizational computing and analytics initiatives are designed and implemented is a key factor in determining the degree of their contribution to firm performance and competitiveness.*

Worldviews matter. To get a better handle on how worldviews take shape, a good starting point is the brain itself.

2. TIES TO THE PAST

We operate much of the time as if on autopilot in order to avoid sensory overload (Gazzaniga, Ivry, and Mangun 2008). Our brains have evolved so that we can act much more quickly than would be possible if every action called for conscious processing. Making a process subconscious leads to increased brain efficiency (Eagleson 2011). Apparently, the brain's efficiency is a result of how it stores past experiences in ways that facilitate making predictions by analogy to the past (Hawkins 2004). The neuropsychologist Richard Gregory (2009, p. 10) noted:

For perception, there is always guessing and going beyond available evidence. On this view, the closest we ever come to the object world is by somewhat uncertain hypotheses, selected from present evidence and enriched by knowledge from the past. Some of this knowledge is inherited—learned by the statistical processes of natural selection

and stored by the genetic code. The rest is brain-learning from individual experience, especially important for humans.

The neuroscientist Chris Frith (2007, pp. 17, 132) put it this way:

By hiding from us all the unconscious inferences it makes, our brain creates the illusion that we have direct contact with objects in the physical world. . . . What I perceive are not the crude and ambiguous cues that impinge from the outside world onto my eyes and my ears and my fingers. I perceive something much richer—a picture that combines all these crude signals with a wealth of past experience. My perception is a prediction of what ought to be out there in the world. And this prediction is constantly tested by action.

This brief summary of how our brains function is representative of the scientific consensus that supports the following:

Key Point #1—Our perceptions are rooted in assumptions based on what has proven useful in the past.

Similarly, at an organizational level, the collective perceptions of a firm's employees are rooted in assumptions of what has proven useful to the firm in the past. These are embedded in the organization's digital and human knowledge bases and knowledge-building processes. Organizational computing initiatives should incorporate feedback capable of identifying assumptions that no longer apply in an ever-changing environment. It follows that these kinds of initiatives need to be designed with Key Point #1 in mind.

3. IMPROVING OUR WORLDVIEWS

The prior discussion about how our brains function illustrates that we *participate* in our perceptions of the world.¹ Our participation goes unnoticed because it happens automatically for the most part. Consider the situation where, when driving, one decides to wait before turning left because of the *fact* that an approaching car is too close. Upon closer examination, one *perceives* the car as closer due to the *assumption* that bigger is closer. That assumption has proven especially reliable in the past, although it is not always true as can be demonstrated with a variety of visual “illusions” (Gregory 2009). Sureness about our “facts” tends to be reinforced by our use of language, which works to camouflage the role of assumptions and greatly simplify the world.

English, like most Western languages, is rooted in linear cause and effect, noun-verb-noun sentence construction. Language implicitly assigns an independent existence to “things,” “facts,” and such. The words we choose to use can subtly promote separations of subject vs. object, organism vs. environment, observer vs. observed, and so on (Madden 1991).

¹The concept of individuals participating in creating their own “reality,” as opposed to an independent reality, was central to John Dewey's later work in philosophy. Dewey had a strong influence on Adelbert Ames, Jr. who pioneered innovative visual demonstrations that clearly showed the effect of one's assumptions, based on past experiences, on perceptions of the world out there (Bamberger 2006; Kilpatrick, 1961; Madden 2011). For an insightful window into the thinking of Ames, including correspondence with Dewey, see Cantril (1960).

For example, consider the accounting-based word “cost.” System thinkers who focus on business problems (Goldratt 2008; Johnson 2007) are skeptical of claims that efficiency must have improved because some accounting costs declined. The hidden assumption here is that system components are *independent* of one another and that enables the sum of local efficiencies to directly translate into efficiency of the entire system. The point being that system components are actually *interdependent*. Therefore, optimizing local efficiencies is not at all the same as optimizing the overall system. Furthermore, the use of the word “cost” can easily lead to a worldview in which almost everything becomes an important source of improvement, leading to a lack of focus on the biggest leverage points for improvement.

Systems thinkers point out that managing to hit accounting targets constrains opportunities for employees to continuously improve business processes. But, management worldviews that assume employees should work to “make the accounting numbers” are all too easy to find. The undesirable result is an extreme focus on quarterly earnings (Graham, Harvey, and Rajgopal 2006), a loss of integrity (Jensen 2003), and all sorts of quick “fixes” that are the antithesis of a continuous, process improvement environment. Toyota management strives for continuous improvement by uncovering problems in delivering process results (not accounting results) and mentoring employees to help them gain deep understanding that yields practical solutions (Rother 2010). A Toyota manufacturing plant operates as a pull system in which upstream activities do work in response to downstream requests. A pull system operates with much lower inventory levels compared to a push system that produces big inventories based on questionable forecasts of demand. Valuable feedback is achieved when there are low inventory buffers because problems become visible that would have been hidden with big inventories.

Ideally, feedback should also scrutinize management’s worldview. Peter Drucker, in a highly quoted article (1994, p. 96) described a company’s theory of the business as the core assumptions “that shape any organization’s behavior, dictate its decisions about what to do and what not to do, and define what the organization considers meaningful results.” Drucker emphasized the need for continual feedback in order to evaluate the validity of core assumptions. In this regard, Drucker pointed out that information about noncustomers can reveal at an early stage fundamental changes that are taking place.

Feedback typically improves when it involves diverse opinions, but we should be cognizant of the difference between an open mind and an open sink (Kurtz 1992). An open sink accepts all sorts of ideas for extended analysis (especially those compatible with one’s existing worldview) without demanding any type of evidence to indicate that a particular hypothesis may have merit. On one hand, we benefit from an open-mindedness that allows for competing hypotheses. On the other hand, how best do we avoid crossing the line between an open mind and an open sink?

The answer lies in one’s concerted effort to orchestrate feedback so it quickly reveals if certain hypotheses are worth pursuing. It is all too easy to develop an idea that then turns into a quest to find data that confirms its usefulness. However, progress is much more rapid if one can assemble relevant multiple hypotheses and then seek out ways to clearly disconfirm particular hypotheses (Platt 1964).

Consider the very tough, ill-defined problems faced by design firms such as IDEO. Progress is not due to extremely abstract thinking in order to produce a breakthrough solution. To the contrary, design firms make extensive use of prototyping (cycles of building and evaluating rough models of design ideas) because that gives them quick feedback to filter widely diverse ideas about ways to reach the client’s goal (Brown 2009). Prototyping is a way to clearly disconfirm unproductive ideas and eliminate wasted time that would have

been spent endlessly engaging with a faulty idea because someone finds it highly appealing. This repetition of cycling through a knowledge-building loop is especially valuable to top management in developing and auditing strategies and tactics.

Knowledge and ignorance grow together because new answers lead to new questions (Weick and Sutcliffe 2007). Nevertheless, one can discover the clearly erroneous assumptions and move ahead always being wary about saying, “We know something for certain.”

Key Point #2—We improve our worldviews by embracing the diverse opinions of others as part of organizing feedback that can identify: (a) the outright obsolescence of one or more of our key assumptions, and (b) promising new ideas that may be inconsistent with our existing worldviews.

This point is not rigorously practiced in the business world. Let us look at how a premier company lost sight of the previous key point and how it recovered. In 1993, when Lou Gerstner became CEO, IBM was hemorrhaging cash. Revenue from mainframe computers had fallen off a cliff, and IBM’s other businesses were tied to mainframe sales. Many institutional owners of IBM stock argued for the breakup of IBM in order to achieve an organizational form suited to the new environment of specialized hardware providers. Note that these owners viewed an integrated firm as being built on a common hardware platform. Gerstner’s past job assignments had given him a deep appreciation of the potential benefits to be derived from an integrated firm focused on a customer solutions platform. IBM’s board backed Gerstner and so began a remarkable turnaround of a very large and bureaucratic firm.

Gerstner made the following astute observations (Gerstner, 2002, pp. 117, 189) about the worldview of IBM employees (especially upper management) and their perceptions of the computer industry, plus the severe consequences of their being out of touch with a changing world while sheltering obsolete assumptions:

When there’s little competitive threat, when high profit margins and a commanding market position are assumed, then the economic and market forces that other companies have to live or die by simply don’t apply. In that environment, what would you expect to happen? The company and its people lose touch with external realities, because what’s happening in the marketplace is essentially irrelevant to the success of the company.

. . . This hermetically sealed quality—an institutional viewpoint that anything important started inside the company—was, I believe, the root cause of many of our problems . . . [leading to] a general disinterest in customer needs, accompanied by a preoccupation with internal politics. There was a general permission to stop projects dead in their tracks, a bureaucratic infrastructure that defended turf instead of promoting collaboration, and a management class that presided rather than acted. IBM even had a language all its own.

Gerstner’s worldview was shaped by what he had learned throughout his life, in particular his business career. Whether a businessman, scientist, or carpenter, one’s worldview is a part of, and a result of, one’s process (Bennet and Tomblin 2006) for building knowledge (i.e., learning).

Those charged with designing and executing firm strategy seek innovation and competitive advantage. But an undisciplined approach to innovation can easily lead to an open sink instead of an open mind. The organizational objective should be an open mind that

helps to identify faulty assumptions while gaining genuine insights that pave the way to achieve competitive advantage. Faulty assumptions may lurk within the firm's culture, as was the case with IBM in its belief that all important advancements in the computer industry began inside IBM.

4. THE KNOWLEDGE BUILDING LOOP

The implications of our participation in creating our “reality” and the crucial role of language in building knowledge have long been addressed by scholars (Dewey and Bentley 1949). But those immersed in practical problem solving, such as business people, can easily dismiss this subject as abstract philosophy. The counterargument is that breakthrough insights into many problem situations can often happen if there is significant understanding of our perceptual (knowing) process and our use of language.

Let us consider a very practical and serious problem—airplane crashes. The challenge involves much more than pinpointing the “cause” as a mechanical failure or a human error. Sidney Dekker in his book, *Ten Questions About Human Error* (2005, pp. 2, 4, 5) noted the following:

Any language, and the worldview it mediates, imposes limitations on our understanding of failure. . . . Language, if used unreflectively, easily becomes imprisoning. Language expresses but also determines what we can see and how we see it. If our metaphors encourage us to model accident chains, then we will start our investigation by looking for events that fit in that chain.

. . . Our most entrenched beliefs and assumptions often lie locked up in the simplest of questions. The question about mechanical failure or human error is one of them. . . . The question . . . embodies a particular understanding of how accidents occur, and it risks confining our causal analysis to that understanding. . . . It sets out the questions we ask, provides the leads we pursue and the clues we examine, and determines the conclusions we will eventually draw.

After Alaska Airlines flight 261 crashed in 2000, the “cause” was determined to be a mechanical failure of the horizontal stabilizer jackscrew unit due to a lack of lubrication. The challenge was to gain insights into how Alaska Airlines management and maintenance employees failed to perceive the emerging safety problem. The real need was to understand, from the participants' perspective, how they perceived the world during the many years leading up to the fatal crash. That is far more useful than simply pinpointing mechanical failure, which is the end result of a subtle and complex process (Starbuck and Milliken 1988). A deeper understanding involves using language that avoids “could have” or “should have” and is attuned to the context in which people behave, including the constraints on, and opportunities for, action (Dekker 2006). The failure of the jackscrew unit was primarily the result of an incremental drift over many years of making reasonable (to those involved) adjustments to maintenance procedures.

On one hand, language, which broadly includes how we understand and communicate about situations, can constrain our vision and interfere with knowledge building. On the other hand, the creative use of language is crucial for uncovering flawed assumptions and dealing with root causes of problems. Figure 1 displays knowledge building as interrelated components—all influenced by language (Madden 2010).

This figure applies to any kind of learning experience, such as business, science, or even personal. For example, in the eighteenth century, people lived in fear of a deadly

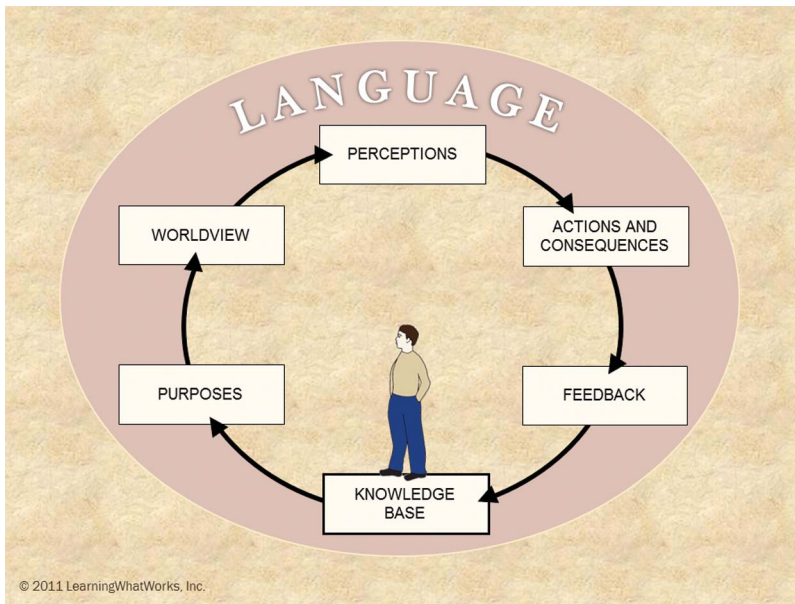


Figure 1 Knowledge building loop (reprinted with permission, LearningWhatWorks, Inc.) (color figure available online).

disease called smallpox. Edward Jenner, a medical doctor in England, spent 20 years developing his knowledge base that led to vaccination and the eventual eradication of smallpox.

The medical establishment and Jenner shared a common purpose, i.e., how best to help people avoid smallpox, which is often fatal, and those who did survive frequently suffered terrible scarring or blindness. Jenner's worldview (i.e., his ideas and beliefs for interpreting and interacting with the world) differed markedly from many of his medical colleagues. Jenner had a passion for observing and studying nature. And his mentor was John Hunter, a noted scientist, who instilled in him the importance of generating hypotheses and experimenting (Rodriguez 2006).

Consider the different perceptions made by Jenner versus the medical establishment upon hearing milkmaids claim they did not get *smallpox* because they were protected by prior exposure to *cowpox*. Due to milking cows, milkmaids would occasionally get cowpox, which was a mild disease that produced pus-filled blisters on their hands for a few weeks. Jenner was immediately interested in further investigation while other doctors dismissed the idea. The other doctors pointed out that some milkmaids who were exposed to cowpox subsequently avoided smallpox, but others nevertheless did get it. Moreover, the other doctors' worldview was so constrained that they simply could not allow for the possibility that a cow disease could protect against a human disease.

But, Jenner's perception of the milkmaid situation immediately led him to focus on observing actions and consequences. Specifically, how the action of exposure to cowpox sometimes had the consequence of immunity from smallpox. Jenner was skeptical about the perception of "exposure" versus the reality of "exposure." With a honed, scientific way of thinking, he was keenly aware that the use of language and our perception of reality are intertwined. To Jenner, "exposure" was not a fact, but a fruitful area for

investigation. Through experimentation, he discovered that there were many cowpox-like diseases, but only one could protect against smallpox. Furthermore, he discovered that it was the large, bluish blisters that occurred midway through the cowpox cycle that contained pus potent enough to protect against smallpox. Jenner's observations and experiments provided feedback to him that, over time, continually improved his knowledge base.

Clearly, Jenner's worldview facilitated his investigation of new relationships that did not fit within existing medical knowledge—much more so than the worldviews of many of his medical colleagues. It is noteworthy that he submitted a paper reporting his findings to England's Royal Society and received this reply: “. . . would more likely keep his colleagues' esteem in this respectable society by withdrawing his manuscript and forgetting about it as quickly as possible” (Bazin 2000, p. 39). That faulty perception of his work was soon forgotten in the wake of demonstrated health benefits from following Jenner's recommendations. Edward Jenner died in 1823 after being widely acknowledged and revered during his lifetime as the conqueror of smallpox. Vaccine technology improved over time and in 1967 the World Health Organization began a campaign to totally eradicate smallpox. In 1977, the last person to become infected with smallpox was reported in Somalia, Africa.

In summary:

Key Point #3—Our perceptions of reality, our use of language, and knowledge building are intertwined.

A firm can gain competitive advantage by perceiving the world differently than its competitors and obsoleting a business assumption that its competitors cannot easily abandon. Prior to the arrival of Southwest Airlines, the accepted knowledge within the airline industry was that a hub and spoke organization for routing planes yielded the highest operating *efficiency* for a firm's planes. Within this environment, computerized systems clearly helped management in the learning process for routing planes in ways that incrementally improved the performance metrics tied to individual plane efficiency. But, firm performance requires a comparison against its competitors.

As for competition, Southwest's management uprooted the assumption about efficiency from a hub and spoke organization with an innovative network of direct, city-to-city flights that was better suited to accomplish the goal of efficiently moving passengers to their destinations (Gittell 2003). Routinely, Southwest's profits have exceeded the aggregate profits of all their competitors.

So far, Key Points #1, #2, and #3 distill insights that are commonly used by scientists in their work. The next section addresses new work that deserves a wide audience, especially in the business community.

5. HOW THE WORLD OCCURS

Werner Erhard, Michael Jensen, and their Barbados Group colleagues (hereafter EJB) have developed a new paradigm of individual, group, and organizational performance. The theoretical underpinnings of this approach are covered in a series of working papers available at <http://ssrn.com/link/Barbados-Group.html>. EJB's new paradigm emphasizes how one's worldview shapes and constrains each individual's perceptions. The paradigm takes one to the source of performance, which is not available by merely explaining performance through linear cause and effect analysis, such as the failure of the jackscrew unit on Alaska Airlines flight 261 causing the plane to crash.

EJB argues that the source of performance resides in how actions correlate naturally with the way circumstances occur for the performer. Further, language (including what is said and unsaid in conversations) plays a dominant role in how situations occur and so is instrumental in improving performance. By dealing with the source of performance, management is better equipped to design change initiatives that will, in fact, deliver improved performance. Contrary to conventional cause and effect thinking, various initiatives to motivate employees (e.g., bonus incentives) do not cause action. Actions are a correlate of how the initiatives occur for employees.

. . . Action is a correlate of the way the circumstances on which and in which a performer is performing occur (show up) for the performer. . . . “Occur” does not require the performer to pay any attention to, think about, understand, analyze, or interpret that which is registered.

. . . The world we *interact* with (act on and by which we are acted on) is the so-called objective world. However, while most of us don’t give any thought to it, in a fundamentally important sense the world we actually *respond to* and *react to* is the world as we perceive it, what we have termed the *occurring* world.

. . . if we are dealing with life *as lived*, or performance *as lived* (the perspective of this new paradigm of performance), seeing and treating the objective and occurring worlds from the perspective of them being two distinct and separate worlds obscures the way we actually live life and live performance. . . . the *as-lived* perspective allows access to the *source* of performance.

EJB (2010, pp. 49, 52)

An insightful presentation of the application of these ideas is provided by Barbados Group members Steve Zaffron and Dave Logan in their book, *The Three Laws of Performance*. Briefly, Zaffron and Logan describe how employees (and people in general) have a deeply felt default future; that is, what they know will happen. This strongly influences how the world occurs for them, and hence, performance. We all use descriptive language to create “facts” (our reality) that, in turn, bind and constrain us. Rewriting the future involves dealing with the past so that it no longer constrains us so we, in effect, create space for new possibilities. Rewriting the future involves generative language—a language comprised of declaration, commitment, promises, and requests (Winograd and Flores 1986). Generative language is really about transforming (not describing) how a situation occurs.

A created future that has high potential rewards for all participants is most likely to be achieved, as noted by Zaffron and Logan, through effective leadership, which means: (1) leaders have a say, and give others a say, in how situations occur; (2) leaders master the conversational environment; and (3) leaders listen for the future of their organization.²

A centerpiece of EJB’s new paradigm is its emphasis on integrity (keeping one’s word), which has significant impact on performance as noted by Jensen (2009):

Integrity is important to individuals, groups, organizations and society because it creates *workability*. Without integrity, the workability of any object, system, person, group or organization declines; and as workability declines, the opportunity for performance declines. Therefore, integrity is a necessary condition for maximum performance. As an

²The teaching of being an effective leader is a major part of EJB’s work (Erhard, Jensen, and Granger 2011).

added benefit, honouring one's word is also an actionable pathway to being trusted by others.

To summarize:

Key Point #4—The success of management's change initiatives depends on their analysis of how the world occurs for employees.

There is much more involved with the EJB paradigm than can be covered in this short summary. What comes to mind initially is its application to the alignment between employees' personal goals (purposes) and management's goals for the firm. However, these ideas apply broadly throughout an organization, including detailed work tasks as highlighted in the following example.

Smith (2000, p. 4) described a situation in which a plant's key constraint was some complex machinery that was frequently down due to mechanical problems. Management was measuring the performance of maintenance personnel by how long it took them to get the machinery up and running after a breakdown. Then the performance measurement was changed to how long the machinery was operational between breakdowns. *This changed the way the world occurred for maintenance personnel* and caused them to focus much more earnestly on discovering the root causes of breakdowns and how to prevent them. The result was longer run times between breakdowns and higher productivity.

6. CONCLUDING THOUGHTS

Almost everyone would agree that a change that results in sustained improvement in a firm's operations involves "getting smarter" in some way. How we get smarter is summarized in the Knowledge Building Loop, which shows that management's worldview is one component of a process highly influenced by the use of language (Ferraro, Pfeffer, and Sutton 2005).

A worldview is but a lens through which we perceive and make sense of the world, based on our existing knowledge base. We take actions in hopes of achieving our purposes that, in turn, provide feedback that can confirm or refute our existing assumptions. But, assumptions strongly rooted in repeated successful actions in the past can become so entrenched that contrary evidence is not even perceived (Key Point #1).

Importantly, management needs to follow Drucker's advice and continually bring into play constructive skepticism directed at the core assumptions that determine the viability of their business (Key Point #2). In general, assumptions are primarily thought about and discussed through the use of language in conversation as well as our open-mindedness to new ideas. Attention to language usage can lead to a more effective lens for perceiving the world and building knowledge (Key Point #3). The payoffs can be huge. Sam Walton's assumptions about the role of a store within a networked system literally changed the world of retailing. The eradication of smallpox was due in no small way to Edward Jenner raising the initial question about whether the word "exposure" was a satisfactory description of the milkmaid experience. Through electronic commerce, Jeff Bezos, CEO of Amazon, changed the conventional meaning of "book distribution" and expanded what the word "book" means through the introduction of Amazon's Kindle ebook.

Key Point #4 stresses the idea that performance follows naturally from how the world occurs for the performer. Along these lines, in a 2011 video of his last public appearance,

Eli Goldratt talked about the very successful adoption in Japan of the Theory of Constraints approach to project management (Realization Technologies 2010).³ During a presentation by Japanese management, Goldratt noted that he asked them why they had not yet presented their results. They replied that they already had. That is, employees had greatly increased their enthusiasm; workplace harmony as well as the level of collaboration had sharply risen; and employees had a deep appreciation of why their new project methodology should lead to much improved performance. In the eyes of the Japanese leaders, these were the important results. They anticipated a favorable change in the project performance metrics would follow naturally, which, in fact, did happen.

The four points described are exceptionally important to building knowledge in general, and problem solving in particular. Computer-based technology (CBT) is an integral part of the knowledge building process. This is seen both in Walmart's CBT-based supply chain innovations, which spread throughout the retail industry, as well as in pharmaceutical R&D progress. These examples and many more strongly suggest that there is a direct connection among CBT, knowledge building, and firm performance (Holsapple and Wu 2011).

Consider this significant challenge for those on the front lines responsible for designing and operating CBT and those on the academic research side of CBT. There is a growing recognition that the hierarchical organizational structures of firms rely excessively on accounting-based controls. The basic problem is that accounting data, as previously discussed, promote local efficiencies to the detriment of identifying and fixing the key constraints that interfere with achieving the overall goal of the system. The core faulty assumption here is thinking that improving any particular accounting performance metric will automatically translate into improved system performance. Overcoming this problem is at the heart of lean thinking (Womack and Jones 2003), the Toyota Production System (Liker 2004), and the Theory of Constraints (Cox and Schleier 2010).

The CBT challenge is to facilitate an evolutionary path away from "managing" accounting results (Johnson and Bröms 2000) and toward a worldview focused on managing the processes (including knowledge building) that produce the performance that ultimately is reflected in financial statements. Progress in this area may well involve explicit application of the four points that are central to this article.

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