

Revisiting Deming's Management Theories in the 21st Century

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Prepared in February 2002 for a special edition of the Journal of Management History that will
be dedicated to the work of Dr. W. Edwards Deming.

Abstract

The challenge facing management systems is to avoid organizational erosion towards a state of sub-optimization. A fragmented implementation of continuous improvement activities (i.e., "faster, better, cheaper"), without the guidance of systemic thinking, will inevitably induce sub-optimization. Without a strong sense of interconnectedness, segments may be improved upon (or removed) without sufficient consideration to indispensable relationships between the system elements. Lacking this awareness, the resulting damage is often overlooked or misinterpreted. Further damage will follow. By contrast, an awareness of systemic interdependencies, as embodied by "Investment Thinking", offers organizations a superior competitive advantage. This paper introduces Investment Thinking, a pragmatic interpretation of the management philosophy of Dr. W. Edwards Deming.

Keywords: Deming, water logic, rock logic, investment thinking.

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A Personal Beginning

At the close of an evening presentation in February 1990, Dr. W. Edwards Deming fielded questions from the audience at Western Connecticut State University in Danbury, Connecticut. This would be his third presentation that day, which was given to a public audience. I was among the handful that attended all three lectures. Earlier in the day I was introduced to his “system of profound knowledge”, the name he chose for his management theory (Deming, 1993), when I attended his afternoon presentations. These sessions also included a time for questions and answers. Approaching ninety years of age, this self-described “Consultant in Statistical Studies” (W. E. Deming, personal communication, February 11, 1990) had no doubt heard many of them before. For me, the questions and answers revealed both counter intuitive perspectives and enticing possibilities. I sorted the questions and answers, like pieces to a puzzle, and began to arrange them. This is how my search for a pattern and a deeper perspective within his message began. This was also my personal introduction to what I now know as water logic, rock logic, and Investment Thinking. Years later I would be reminded again and again of the need to seek an appreciation of the patterns. In the words of H. Thomas Johnson, “How the world we perceive works depends on how we think. The world we perceive is a world we bring forth through our thinking.” (Johnson, 1997, p.5).

I can recall one student in the evening audience seeking insight on the issue of staff cutting. His question went something like this...“Dr. Deming, what do you think about the recent trend towards reducing the number of levels of management ?” Before presenting his answer, please consider how you would respond. Then again, pause and consider the question. Although I was not a middle-level manager, I was captivated by prospects of Dr. Deming's

answer, for it would offer another piece to the puzzle. With little hesitation, Dr. Deming answered “Why have more levels than you need ?”

How does this compare to *your* answer ? As for me, it was not the answer I had anticipated nor the direction I had expected Dr. Deming to move. For some reason, I was expecting a response with advice on how many levels of management were appropriate. Perhaps 5. Perhaps 3. Either solution might be interpreted as “one size fits all”. Dr. Deming re-framed the issue with a question revealing a profound understanding of organizational interactions. In time I could appreciate that this was a classic reply from Dr. Deming. But, I could not see it coming the first time. Could you ? More than I could have ever expected, his answer allowed me to further assemble the puzzle. As my thinking evolved, I was beginning to see a pattern and the relationship between the pieces. In keeping with Gregory Bateson's observation, “reality is relationships” (Capra, 1989).

My interpretation of Dr. Deming's answer was that the number of levels of management would be *dependent* on the specifics of the organization, not “one size fits all”. Given a specific situation or system (which includes one's level of thinking), one would need an appropriate number of levels. More than this would be costly. Less than this would be costly. Trial-and-error often leads to an answer. Should the situation change, I might expect the solution to change as well. Instead of a “one size fits all” solution, I would define this activity as “managing the system”.

Now, consider what questions might have followed this question. Perhaps a series of questions, such as;

“Dr. Deming, what do you think about the recent trend towards reducing variation in our processes ?”, or

“Dr. Deming, what do you think about the recent trend towards reducing the number of parts in our products ?”, or

“Dr. Deming, what do you think about the recent trend towards reducing the costs of our operations ?”

I would anticipate Dr. Deming approaching each of these questions with a deep understanding of the nature of organizational dynamics. In each case, he would suggest the need for understanding the nature of the systemic behaviors. He would suggest the value of having no more than necessary and not less. Answering “it depends” reveals an appreciation of what it means to think systemically. Instead of *reducing* variation, a more systemic approach would be to *manage* variation and provide the appropriate levels throughout the system. Instead of *reducing* part count and cost, a more systemic approach would be to *manage* part count and cost and provide the appropriate levels throughout the system.

Water Logic and Rock Logic

Systemic thinking implies an awareness of the relationships between the elements, or pieces, of a system. Lacking awareness of these interactions, a system only appears as a collection of independent pieces. This perception would lead one to count the number of parts in a product, the number of steps in a process, the number of employees in an organization, and the number of states in the country; all without regard to the interplay of greater systems. The elements combined “work together” as a product, a process, or an organization of people. The degree to which the system “works together” can be enhanced with a better understanding of Dr. Deming’s management theory, his so-called “system of profound knowledge”. The elements of Deming’s system of profound knowledge (Deming, 1993) consist of the four parts below, and their interrelationships.

1. Appreciation for a system
2. Knowledge about variation
3. Theory of knowledge
4. Psychology

In combining these bodies of knowledge, Deming's management philosophy offers a holistic appreciation of organizations that anticipates the role of systems thinking linked to variation management linked to a theory of knowledge linked to an understanding of people.

The existence of the relationships between the elements of a system can be defined with questions such as "what is this part of ?", "where did this come from ?", and "what will this lead to ?". From a systemic perspective, the sequence of these questions may be represented by the connection (or *flow*) of the parts (pieces or events) below;

From Where ? → This Part → Lead To ?

From Where ? → This Piece → Lead To ?

Further definition of a given system can be achieved by repeated use of these questions, or logic (as in, "where does the "to" lead to ?"). As defined by Edward de Bono (de Bono, 1993), a noted authority on thinking and a prolific author, one's awareness of the existence of the "flow" pattern connecting these elements stems from the use of "water logic". To use the three questions above is to utilize water logic. The inability to connect the pieces gives rise to a part perspective.

Under such circumstances, one would be aware of the "part count", but unaware of a flow. de Bono defines this situation as the use of "rock logic".

Rock logic also leads to disconnected, mechanistic perspectives, such as "black"/"white", "good"/"bad", "left"/"right", and "us"/"them". Compare this with water logic and its holistic, continuous perspectives, such as "continuous shades of gray", "faster, better, cheaper",

“continuous learning”, and the sense of unity reflected by wholeness, as in the vision of a global community. It follows that to view the world with “water logic” is to view it as a continuous series of relationship, as in the environmental sentiment of the “circle of life” and the reminder “what goes around, comes around”. Such a view reveals exciting formations of relationship patterns in the world.

It does not follow, however, that water logic is better than rock logic. It can only be said that they are different. For example, the passage of time can be measured using an analog watch or a digital watch. Better thinking is needed to recognize the benefits of the “analog”, continuous perspective presented by water logic and the benefits of the “digital” perspective represented by rock logic. It can also be said that water logic depends upon rock logic, but the corollary does not hold true. Parts can be counted without regard to interactions, but we cannot discuss relationships without referencing the parts. Careful consideration is needed to understand the relative strengths and weaknesses of water and rock logic. In doing so, one makes a conscious choice of logic and utilizes the appropriate logic in the appropriate situation. This explanation is consistent with my understanding of the systemic approach that Dr. Deming would encourage.

Investment Thinking

Given this introductory perspective on water and rock logic and the relationship of these concepts to systemic thinking, let me now draw a connection to what I refer to as “Investment Thinking”. If I were to explain the concept of an investment to my nine-year old daughter, I might approach it as “putting \$10 in the bank and getting \$12 back”. I might add that the bank is borrowing the money from me and paying me back for its use. In essence, the money is growing. I might then restate the action as “spending money to make money”. From a business

perspective, such thinking is well understood. The well-used concept of a “loss leader”, as a pricing strategy in a supermarket or as applied to automobile sales, is a ready example of Investment Thinking. The simplicity of this action can be extended to include spending time to save time or, in general, allocating resources in order to receive a greater return on those resources. The investment is made *here* and the return takes place *there*. As in the banking example for my daughter, *here* may refer to a time frame, as in the present, and *there* may refer to the future. I also liken the simple action of picking up a nail in a parking lot as a precious act of Investment Thinking. In doing so, I am spending time (my time, mere seconds) to save time (someone else's time, perhaps hours). More broadly, *here* may be a particular piece of the organization that allocates the resources and *there* may be a connected piece of the organization that achieves the predicted gain.

The Investment Thinking philosophy is dependent on water logic and rock logic, for how else could the connection be made between “allocating resources” *here* in order to achieve a gain *there* ? With rock logic one would only see parts (*here* and *there*), numbers, individuals, and events; all as disassociated elements of a system. Lacking the systemic insights and the sense of relationships of water logic, Investment Thinking would be severely hampered. In doing so, worthy investment opportunities would be missed. Likewise, would-be investment opportunities might readily be replaced by losses, as in the possible consequences of a nail in a parking lot not being picked up or in the relationship between a customer and a bank being neglected.

The judgment offered by the (digital) dictum, “if its not broken, don't fix it” might also lead to overlooked investment opportunities. Equipped with this logic, consider the resulting economics of delaying building maintenance until necessary repairs are more easily justified and possibly more expensive. The same can be said of not seeking personal medical care until illness

sets in. Such a pattern of practice represents the essence of sub-optimization – the unwillingness, inability, or lack of sufficient systemic appreciation and insights to intervene earlier. The alternative action to waiting for “failure” or “illness” would be to monitor the slowly changing shades of gray, as a gas gage monitors gasoline levels in a car or as a routine medical check-up is useful in providing timely awareness of a changing health condition. A wiser investment than waiting for trouble could also include the use of a run chart, if not a control chart (Wheeler, 1993), to monitor changes in equipment performance levels, using the continuum of “shades of gray” as an indicator of subtle, or not so subtle, changes that precede greater trouble.

Waiting for trouble, as in not collecting less expensive data and then reacting when trouble sets in, may well represent a needless expense. To borrow from another expression, the “ounce of prevention” (here, the less expensive collection and analysis of continuous data) was overlooked and now requires “a pound of cure” in its place. Conversely, individuals of an organization (a system itself) that are accomplished with water logic and rock logic could participate in Investment Thinking as a naturally occurring, every day activity. They would be able to judge the relative merits of using the digital nature of “rock logic” or the continuum represented by “water logic”. Replacing a light bulb after it fails may well be a sound investment in a home kitchen, where alternate indications of light bulb health would require a more expensive proposition, or the trouble caused by failure is minimal. Using a gage to monitor gasoline levels in a car is well understood to be a worthwhile investment and an economically valuable use of water logic and variable data.

Within an organization, Continuous Investment Thinking is defined as the action of Investment Thinking, when practiced continuously by all participants of the organization. Such

a degree of choreography would result in an amazing degree of thinking together, learning together, and working together; with results that would be enviable and inimitable.

The Prevailing Style of Management

Dr. Deming used the term “the prevailing style of management” (Deming, 1993) to describe the administration style of organizations that are characterized by activities that tend to promote widespread sub-optimization. One symptom of this management style is “reductionism”, as practiced in the number of levels of management, variation, part count, and cost. Additional symptoms of these organizations are the apparent existence of a “most important part” (as opposed to a strong sense of the purpose and relatedness of all parts), a prevalence of blame placed on individuals (rather than the system in which they operate), and a general lack of creativity on the part of a significant percentage of the work force. The management actions (and thinking) that unknowingly sustain such non-systemic behaviors are driven by an unrecognized and, therefore, un-stated, set of beliefs and assumptions. A telltale sign of these beliefs are management practices that focus on parts and ignore, if not underestimate, relationships, flow, and interdependencies.

Contrast the rock logic view of these organizational actions and activities with the recursive model of “production viewed as a system” that Deming advocated (Deming, 1993), where a so-called “zeroth stage” action set the system in motion with the initial “design” idea. Organizations that follow the Deming management model are characterized by a keen sense of flow, of patterns, of relationships, of continuity, of water logic. Deming-based organizations embody a widespread awareness of non-linear system dynamics, as related to the “plan-do-study-act” (PDSA) learning cycle (Deming, 1993). When coupled with a high value placed on

innovation and a spirit of unity (“one company”), these attributes will result in lower levels of sub-optimization and superior profitability.

Thinking Together, Learning Together, and Working Together

Transformation of an organization, from one that resembles the “win-lose” environment of the “prevailing style of management” to one that is Deming-based (“win-win”), has been shown repeatedly to require systemic change. Vital to this transformation is “better thinking” by individuals in these organizations about systems, variation, knowledge, and psychology. The aim of this article is to introduce the principles of water logic and rock logic and Continuous Investment Thinking and demonstrate a valuable connection of these concepts to Deming’s management system.

The benefits of a better appreciation of connectedness are not limited to business organizations. The principles presented in this paper also apply to other organizational structures, such as in education and government, as well as the communities in which we live. To think together is to share assumptions and predictions and thereby learn together about the system. To think and learn together in a system is to work together and prosper as “one team”. Beyond this article, an introduction to some essential elements of *thinking together* can be achieved by studying the work of W. Edwards Deming (Deming, 1986), Genichi Taguchi (Taguchi, 1992), H. Thomas Johnson (Johnson, 2000), Edward Baker (Baker, 1999), Peter Senge (Senge, 1990), and Edward de Bono (de Bono, 1991).

References

- Baker, E.M. (1999). Scoring a Hole in One. Menlo Park, CA: Crisp Publications
- Capra, F. (1989). Uncommon Wisdom: Conversations with Remarkable People. New York: Simon and Schuster.
- de Bono, E. (1993). Water Logic. The Alternative to I am Right You are Wrong. London: Viking Press.
- de Bono, E. (1991). Handbook for the Positive Revolution. London: Penguin Books.
- Deming, W.E. (1986). Out of the Crisis. Cambridge, MA: MIT Press.
- Deming, W.E. (1993). The New Economics. Cambridge, MA: MIT Press.
- Johnson, H.T. (1997). A Different Perspective on Quality: Bringing Management to Life. Keynote presentation to The Deming Institute Fall 1997 Meeting, Washington, D.C., October 11, 1997, p.5.
- Johnson, H.T., and A. Broms. (2000). Profit Beyond Measure - Extraordinary Results Through Attention to Work and People. New York: The Free Press.
- Senge, P.M. (1990). The Fifth Discipline: The Art and Practice of the Learning Organization. New York: Currency/Doubleday.
- Taguchi, G. (1992). Taguchi on Robust Technology Development: Bringing Quality Engineering Upstream. New York: ASME Press.
- Wheeler, D.J. (1993). Understanding Variation – The Key to Managing Chaos. Knoxville, Tennessee: SPC Press, Inc.