

# Sustainable Innovation and the Prometheus Effect

*An Epistemological Theory of Sustainability*

Keynote Presentation By

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# I. Introductory Remarks

# Foreword

- This will not be a presentation about individual invention, but about social (and sustainable) innovation
- I will rely on a view of innovation not limited to products and technologies, but which includes innovation in much broader terms
- Innovation as knowledge-based creativity and related outcomes of all kinds
- Including business processes, strategies, and action in general, both in and outside of business

# Some First Principles

- Action and behavior in business (and in life) are nothing more than knowledge in use
- Knowledge consists of beliefs or claims about the world that we think are true (or truthlike)
- Truth consists of knowledge (beliefs or claims) that has survive our tests, upon which we take action that we believe will be effective over the long run
- All human states of affairs that follow from the actions we take (or do not take) can therefore be traced to the quality of the knowledge we use as a basis for action – so it goes for sustainability, too

# The Central Questions

- Why, despite our knowledge of the limits to growth and the destructive and unsustainable course of human affairs, do businesses, societies, and the global human community at large continue to carry on as if all is well?
- What is it about the behavioral choices we make that can account for the irrational disparity between what we know and the substance of our economic behaviors?
- Why do such irrational behaviors persist, as if held by something which locks them in place?
- Or is it that there really is no such disparity at all? That most of us do not in fact view our economic behaviors as irrational or unsustainable?
- Indeed, how do we come to know what we know? To regard some things as true and others as false – all in the service of deciding what actions to take and what values to embrace?
- Is it possible that the root of the problem lies in the manner in which we produce our knowledge as a basis for action, and that humanity in modern times is afflicted with dysfunctional learning and innovation systems?

# The Central Questions (cont.)

- Is it possible that such dysfunctional learning systems (if they exist) regularly provide us with specious information and knowledge, and are themselves, therefore, insidious and unsustainable?
- Is it possible, then, that it is not just our economic, political, and environmental behaviors that are unsustainable, but also the patterns and logic of our underlying social learning and innovation behaviors, which give rise to, and are the source of, the very beliefs and knowledge claims we depend on as the basis of our actions?
- I think the answer to this last question is a resounding 'yes'!
- This is the theory I intend to discuss today – precisely the theory that brings the sustainability movement to the doorstep of epistemology.
- For it is epistemology that can help us understand how we come by knowledge that we use as a basis for action, be it by knowledge processes that are reliable and sustainable, or those that are *unreliable* and *unsustainable*.

## II. Sustainable Innovation

“The ability to learn faster than your competitors  
may be the only sustainable competitive advantage.”

Arie De Geus, Former Head of Planning  
Royal Dutch Shell

# Is Fast Learning Really An Advantage?

- What about the learning process itself? Who cares how fast our learning is if it's not sustainable itself?
- Is learning that is *fast and unsustainable* more desirable than *slow sustainable* learning?
- And what about being competitive? What does that mean? Is a highly competitive but unsustainable business more desirable than a moderately competitive and sustainable one?

# How About Knowledge and Learning *Quality*?

- Is fast learning that produces false knowledge more desirable than slow learning that produces truth?
- Where is the focus on the *quality of knowledge* produced through learning, be it fast learning or slow learning?
- Where is the focus on the *quality of learning* itself, and *its* relative sustainability?
- Where is the connection between learning in general, and sustainability per se?

Shouldn't we be saying.....

“The ability to learn faster than your competitors *on a sustainable basis* may be the only sustainable competitive advantage.”

What does it mean for learning or innovation to be sustainable?

# Sustainable Innovation

- An ambiguous term with at least three common definitions:
  - “Outcome” (or product) sense #1 (deals with the sustainability of innovation *artifacts* relative to meeting financial or business goals)
  - “Outcome” (or product) sense #2 (deals with the sustainability of innovation *artifacts* relative to meeting social and/or environmental goals)
  - “Process” sense (deals with the sustainability of innovation *processes* relative to the validity of their outcomes and their internal authenticity)

## Example of *outcome* sense #1.....

“A sustaining innovation targets demanding, high-end customers with better [product or service] performance than what was previously available.”

Clayton M. Christensen and Michael E. Raynor  
*The Innovator's Solution –  
Creating and Sustaining Successful Growth* (2003)

## Example of *outcome* sense #2.....

“Sustainability means that your service or product does not compete in the marketplace in terms of its superior image, power, speed, packaging, etc. Instead, your business must deliver clothing, objects, food or services to the customer in a way that reduces consumption, energy use, distribution costs, economic concentration, soil erosion, atmospheric pollution, and others forms of environmental damage.”

Paul Hawken  
*The Ecology of Commerce* (1993)

Example of *process sense*.....

“A sustainable society is one that can persist over generations, one that is far-seeing enough, flexible enough, and wise enough not to undermine its physical or its social systems of support.”

Meadows, Meadows, and Randers  
*Beyond the Limits* (1992)

In other words, *sustainable society* depends upon the presence of *sustainable innovation*, which produces outcomes that help us, not hurt us, and which is *internally authentic* (i.e., consistent with how we learn)

# The Process View

- A view that pins sustainability *first* to the quality of learning processes, not outcomes:
  - Quality of knowledge production and related outcomes
  - Internally authentic vis a vis our innate learning behaviors
- Forces us to ask the question: *Are some patterns of learning more sustainable than others? And if so, why?*
- A view that takes us to the question of how we make our knowledge (i.e., how we learn) and how we distinguish between truth and falsity as a basis for action, and whether or not the way we do it is effective

# III. Epistemology

# The Prometheus Effect

- Prometheus – one of the Greek Titans, who defied Zeus by bestowing the gift of creativity and innovation to humans
- Human creativity and ingenuity flourished ever since, sparked by the hand of Prometheus (*a kind of 'Midas touch'*)
- Before the hand of Prometheus, humans lacked consciousness, self-awareness, intentionality, and the capacity to engage in critical thought
- Afterwards, we innovated continuously and autonomously, and still do – *the Prometheus Effect!*

# A Metaphor for Evolution

- Tale of Prometheus just a metaphor for evolution
- Symbolizes development of consciousness, self-awareness, intentionality, and language in humans – our capacity to consciously learn and adapt
- But it begs the question of what passed for knowledge for Prometheus – or for evolution and humanity in the past and present?
- What was Prometheus's theory of knowledge?
- What was (and is) our own in the real world?

# The Evolution of Epistemology

- Pre-Promethean (pre-language) humans were arguably rooted in a kind of *proto-epistemology* we can call Natural (or Biological) Pragmatism
- Action taken on the basis of knowledge about “what works” – no debates or argument, just trials
- Post-Promethean (linguaging) humans complicated matters by:
  - Applying capacity to innovate to *epistemology itself*
  - Creating many new competing epistemologies expressed and propagated linguistically

# A Mixed Blessing!

- Natural Pragmatism was arguably a crude kind of epistemology – trial and error by fire!
- But language later endowed us with a capacity to test and evaluate our ideas *before we use them* – an evolutionary advance
- *To kill our worst ideas before they kill us* by subjecting them to objective criticism (after Karl Popper and his notion of ‘objective knowledge’)
- But it also endowed us with the capacity to create and embrace *specious* epistemologies as a basis for learning and action

# Competing Epistemologies

- Can distinguish between *theories of truth* vs. *theories of evaluation*
- The former defines the meaning of truth, such as *correspondence between a statement and a fact* (the Correspondence Theory), or *what works* (Pragmatism), or *what fits with prior beliefs* (Coherentism) – this is the WHAT of truth
- The latter specifies the conditions or criteria that must be met *for any theory* in order to separate truth from falsity – this is the HOW of truth

# Today's Epistemological Landscape

- Most mainstream theories of truth rely on theories of evaluation that are either:
  - Justificationist or “Floating Foundationalist” (after Mark Notturmo), in the sense that their followers admit to not ever having access to truth with certainty, but who no less carry on as though they do
  - Criticalist (after Karl Popper's Critical Rationalism), who like the Justificationists also admit to the fallibility of human knowledge, but who *stick* to the doctrine and use *objective criticism* to get closer to the truth

# e.g., Most Corporate Epistemologies

- Rarely speak of having access to knowledge with certainty
- But still rely on a form of Justificationism that is either:
  - Authoritarian (what management says is true)
  - Communitarian (what the consensus says is true)
- Criticalism is discouraged – “not a team player”
- Conflates business processing level of behavior with knowledge processing level, and applies the authoritarian rules of the former to the latter

# What Some Innovation Gurus Say, e.g.

“In our theory of organizational knowledge creation, knowledge is defined as justified true belief. Therefore, new concepts created by individuals or the team need to be justified.....In a knowledge creating company, it is primarily the role of top management to formulate the justification criteria [for knowledge] in the form of organizational intention, which is expressed in terms of strategy or vision.”

Nonaka and Takeuchi  
*The Knowledge-Creating Company* (1995)

# Is This Progress?

- When compared even to Natural Pragmatism, is Justificationism a step forward or backwards?
- With Natural Pragmatism, we were at least basing our knowledge on results – what worked or didn't work, crude as that may be
- With Justificationism, we base it upon a notoriously fallacious *appeal to authority*, such as:
  - The authority of management (Nonaka and Takeuchi)
  - The authority of the community (as encouraged by today's very popular and influential *Communities of Practice* movement)

# IV. Epistemological Theory of Sustainability

# A Starting Premise

That action or behavior in life is nothing more than knowledge in situational use

Good or True Knowledge  $\Rightarrow$  Effective Action

Bad or False Knowledge  $\Rightarrow$  Ineffective Action

An idea with a strong heritage deeply rooted in a blend of organizational learning and adaptive systems theory

# Implication

- That the sustainability of human affairs ultimately depends upon the quality of our epistemology because:
  - 1) Sustainability of outcomes and conditions in human affairs depends upon quality of our actions
  - 2) Quality of our actions depends upon quality of our knowledge (because action is *knowledge in sit. use*)
  - 3) Quality of knowledge depends upon quality of our learning
  - 4) Quality of learning depends upon the quality of our epistemology, including our capacity to detect problems

# Hypothesis

That unsustainability in the conduct of human affairs is frequently, if not mostly, tied to the damaging effects of dysfunctional (and often mainstream) epistemologies, and that progress in reversing social and environmental degradation can come from making related interventions aimed at modifying our learning and innovation processes, so as to make them more sustainable.

# Discussion

- Here I rely the role of feedback in learning, and the importance of access to information about outcomes that follow from actions taken in order to judge their quality and the quality of the knowledge upon which action, in turn, is based
- But I do not claim that high-quality learning will necessarily lead to sustainability as an outcome
- I merely claim that sustainability cannot occur without it – *a necessary but insufficient condition*

# Feedback About What?

- Herman Daly's criteria for a sustainable society:
  1. One whose rates of use of renewable resources does not exceed their rates of regeneration
  2. One whose rates of use of nonrenewable resources does not exceed rate at which sustainable *renewable* resources are developed
  3. Whose rates of pollution do not exceed the assimilative capacity of the earth
- Information about these things must be available to decision makers, and must have impact on the decisions they make

“One of the most important tenets of systems theory....is that information should not be deliberately distorted, delayed, or sequestered.”

Meadows, Meadows, and Randers  
*Beyond the Limits* (1992)

But not all distortions are deliberate. They can also be imposed on a system by virtue of its systemic epistemology, the effects of which block information, or fail to produce or distribute it in the first place.

# What Bad Epistemologies Can Do

- Make it possible for us as individuals, organizations, and societies to base our actions and behaviors upon appeals to authority instead of holding our ideas continuously open to criticism in terms of the way the world really is
- Make it acceptable to institutionalize the externalization of social and environmental related to business and globalization, since our prevailing epistemologies legitimize such positions by resorting to the same fallacious appeals
- Permit our dysfunctional theories of truth and evaluation to not only cause us to engage in unsustainable behaviors, but to also “justify” and lock them in place
- Allow our prevailing theories of truth and evaluation to undermine our basic capacity to learn and adapt!

# V. Policy Implications

# Policy Implications (slide 1 of 8)

- First, let us recognize that when we ask questions about what our policies should be, we ourselves are initiating an innovation process – a policy innovation process.
- So we immediately confront the very issue I've raised today of what our own epistemology should be – that is, how should we go about closing our own epistemic gaps?
- *Physician heal thyself!*
- So this is a policy implication that is internal to the policy-making function itself.
- Next comes policy implications for application *externally* – in the social systems of interest to us. Here I distinguish between policies of 2 types:
  - One which is intended to have direct impact on the quality and patterns of learning and innovation
  - And the other which is intended to have a constraining and determinative effect on political, economic, business and operational behaviors

# Policy Implications (slide 2 of 8)

- The first of these two policies is actually a network or collection of policies aimed at improving the quality of knowledge produced in political and economic systems by specifying a series of related conditions and/or requirements that must obtain in the environments of interest to us.
- It may be helpful to think of these policies as those which have a quality-controlling effect on socially produced knowledge, which do so by improving the quality of related learning and innovation processes.
- Increasingly, my colleagues and I have come to regard this idea in fiduciary terms, suggesting that quality-controlling knowledge and related learning processes in organizations and other social systems should be viewed as a duty consisting in the corporate governance function, and that social and economic policy makers have the same duty by extension!
- Examples of this category include transparency and openness requirements in learning and innovation processes and practices found in political and economic systems.

# Policy Implications (slide 3 of 8)

- The second of the two external policy implications I spoke of is an even more controversial one, since it has impact not so much on learning, but on business behaviors and related decision domains more directly.
- Here I speak generally of the need to transform our economies, in particular, from systems founded on a quantitative growth ethic to those aimed instead at qualitative development. Whether or not this necessarily entails the idea of steady-state economics as put forth by Herman Daly, I cannot say. But I do think it suggests a fundamental shift from encouraging and taxing growth to the concept of natural resource and sink control, and to the idea of encouraging development, taxing growth, and not taxing development.
- Here I adopt Herman Daly's notion of development as "more utility per unit of throughput," whereas growth is defined as just "more throughput." What we need and want is more utility, not more growth, and more utility of a kind that takes us into the sustainability zone of operations.

# Policy Implications (slide 4 of 8)

- Our problem in society today is not so much that consumerism and consumption have run amuck.
- Rather, it is the absence of controls or limits in the extent to which we extract non-renewable resources from the earth at rates which exceed the development of new renewable ones; or the extent to which we consume renewable resources at rates which exceed their regeneration; or third, the extent to which our rates of pollution exceed the assimilative capacity of the earth.
- If our mission is to make policy that will have impact on the sustainability of business, in particular, let us then get on with it and abolish the false Gods of infinite natural resources, infinite sinks, and infinite growth.
- And in their place, let us install the conditions required to engender sustainable innovation processes of the sort that also shift the focus of creativity from quantitative growth propositions to qualitative development ones.

# Policy Implications (slide 5 of 8)

- What we need and want are innovations that help us to live within our means, not beyond them.
- But as long as we continue to condone the falsity of unlimited growth, either by directly encouraging it or failing to constrain it, no such innovations will occur, for so far as the managers of innovation in business are concerned, there is no need for it.
- Note here that this policy implication is, at first glance, not an epistemological one. Or is it? Actually I think it is in two ways:
  - First, from the perspective of a business organization whose managers are faced with the need to orient innovation resources in one direction or another, as long as we present them with a view of the world in which resources and sinks are not significantly limited, they will continue to carry on accordingly. For all intents and purposes, for them, sustainability is not an issue. It simply fails to merit a response on their epistemological radar. This is rational. What's an epistemic problem for us, need not be for them. Unless through policy we make it so.

# Policy Implications (slide 6 of 8)

- (Continued)
  - And so here I am simply suggesting that if we want them (managers) to see unlimited growth as a program, we have to make it a problem for them. And the best way to do that on the environmental front, I think, is to institute natural resource and sink controls (not production or supply controls, mind you). As long as a business complies with such controls, I say let them make all the toxic, silly, and self-indulgent products they wish. And let consumers consume to their hearts' content. We needn't worry about any of that; let the market take whatever natural course it wishes, but only within the resource and sink constraints we impose. I have no doubt that innovation will take care of the rest.
  - The second epistemological aspect of this operational policy intervention I speak of takes us back to my first recommendation, which was that before we can expect the epistemological processes and outcomes in the target systems of interest to us to improve, we must improve our own epistemological processes (i.e., the policy-makers').

# Policy Implications (slide 7 of 8)

- (Continued)
  - Still, I have no doubt that the kind of radical, growth-constraining intervention I speak of here would very likely die on the bureaucratic or political vine long before, if ever, it makes its way into practice, because I think most of even our own (policy-making) epistemologies are seriously flawed and Justificationist. But if we cannot even manage to embrace the kind of learning, innovation, and knowledge outcomes required to enact truly revolutionary policy, then shame on us! As I said before, ‘physician heal thyself.’ And until we do, we should lower our expectations that anyone else will, be it under the influence our own policy-making actions or otherwise.
- The last area of policy I wish to discuss involves research. Research, that is, into the very theory of sustainability I have shared with you today. More work needs to be done in this area, and policy-makers in the field of sustainable development are the logical ones to take the lead.

# Policy Implications (slide 8 of 8)

- The specifics of such a research agenda still need to be worked out, but I believe the potential return on related investments of effort is very promising indeed.
- But there are many questions raised by this epistemological theory of sustainability, and many different and even conflicting practice implications.
- Nonetheless, I do not believe that we have any choice in the matter, for the world is wasting away before us. The sooner we get started the better!

- End -

# Conclusion

- What Prometheus failed to provide us with is an *Innovation Users Manual*
- Instead, he gave us a capacity to not only innovate, but to *innovate innovation itself*
- In our quest to advance beyond Natural Pragmatism, we have created epistemological monsters that regularly provide us with false, unsustainable, self-destructive innovations
- The fix is in the learning system, not in our operational patterns of behavior!
- Our social and economic policies should be crafted accordingly

*Thank You!*

Mark W. McElroy

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