

TEN WAYS TO KNOW THE KNOWLEDGE-BASED ECONOMY

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Prologue/Presentation

In this presentation I begin with the postscript to the article then explain its disciplinary origins then briefly outline my findings and finally offer an additional way to know the knowledge-based economy.

Postscript

I became an economist in my first year of study - 1968. While Paris students rioted and American cities burned I was presented with the *Solow Residual*: $Y = f(K, L, T)$ which reads national income (Y) is some function (f) of capital (K), labour (L) and technological change (T). At the time it was claimed that over the last one hundred years 25% of growth of national income was attributable to changes in the quantity and quality of capital and labour and 75% to technological change but we have no idea of why something are invented and others not; and, why some things are successfully innovated and brought to market and others are not. The residual was, and remains to me, *the measure of our economic ignorance*. It should be noted that ignorance means lack of knowledge. Any discipline that admitted 75% of its subject was unknown needed help and I became an economist.

Subsequently I learned that technological change in economics means the impact of new knowledge on the production function of firm or nation. The nature of that knowledge, however, is not considered; only its quantitative impact on the production function. Put another way, economics has limited knowledge about knowledge. My career has been and remains dedicated to gaining such knowledge and this paper represents a summary of some of my findings to date.

Disciplinary Origins

I am what Mark Blaug calls in *Economic Theory in Retrospect*, one of the “few economists today who would consider themselves disciples of Veblen, Commons and Mitchell’ that is of American Institutionalism, the dominant school of economics in North America until the 1960s. Blaug calls the school “that greatest of all efforts to persuade economists to base their theories not on analogies from mechanics, but on analogies from biology and jurisprudence”. What

Blaug does not consider is why the school withered and died on the vine?

Arguably a factor was Thomas Kuhn's 'new' philosophy of science defining the position of science in the ideological struggle called the Cold War. Kuhn's 1962 *The Structure of Scientific Revolutions* was written over a fifteen-year period (1947-1962) during which he taught the General Education in Science curriculum designed by Harvard President James Bryant Conant. Conant wrote the foreword to Kuhn's first 1957 book *Copernican Revolution* and it is to him that *Structures* is dedicated (Fuller 1992, 262).

Conant's agenda was to protect: (a) funding for 'pure science'; (b) young scientists from Marxist influences; and, (c) academic science from "antiscientific academics [by having them] become scientists themselves" (Fuller 1992, 241). In this regard Feyerabend, a noted philosopher of science of the time, described *Structures* as "ideology covered up as history" (Fuller 2000, 71, 90n).

In the Humanities this led, among other things, to 'Scientific English'. In Economics it caused a rush to quantitative studies. Numbers seemingly have no ideology. They appear 'scientific'. American Institutionalism, on the other hand, appeared most unscientific (relative to deductive physics) in its use of inductive methods. Politically more damning, was its emphasis on collective action (including the union movement) and the role of Law in the economic process. Effectively it was deemed a 'fellow traveller' in the Communist conspiracy. It faded away, stage left, as new students went elsewhere – just as Kuhn said they would - paradigm death.

Survey of the 10

I will now briefly outline findings reported in the main article. These findings emerge from [trans-disciplinary induction](#) of the meaning of knowledge in 17 disciplines and sub-disciplines of thought.

1. Economics

In Economics, knowledge is a public good for which a natural market cannot exist. In short, without Government there can be no knowledge-based economy.

2. Biology

In Biology, knowledge is orientation in an active environment consisting of environmental invariants and affordances. Knowledge is co-evolutionary demonstrated in economic terms by comparative advantage and complimentary goods and services. Physical technology or tooled knowledge allows humanity like other species not only to adjust to an environment but also to adjust the

environment to its own needs – ant colonies, beehives and beaver dens being examples. Technological knowledge involves enframing and enabling Nature to serve human purpose.

3. Comparative Terminology

In comparative terms, knowledge is organized, systematized and retrievable information. It is not necessarily ‘truth’. Rather the meaningfulness of knowledge requires understanding and its application requires wisdom.

4. Culture

Constrained maximizing or economic behaviour takes place within the context of culture and law. Failure to account for culture gets one into the cannibal’s cooking pot, failure to account for law gets one into jail. Neither is a maximizing outcome.

5. Epistemology

The Natural & Engineering Sciences generate physical technology, *i.e.*, the ability to enframe and enable Nature to serve human purpose. The Humanities & Social Sciences generate organizational technology, *i.e.*, the ability to shape and mold human personalities, communities, enterprises, institutions and societies. The Arts generate design technology, *i.e.*, the ability to make the best looking thing that works. In effect the Arts provide the technology of the heart.

6. Law

Law takes a public good called knowledge and for a limited period of time converts it, if fixed in material form, into a private good that can be bought and sold – copyrights, patents, registered industrial design and trademarks. Eventually, however, it returns to the public domain where, to quote Newton, we all stand on the shoulders of giants.

7. Linguistics

In English the verb ‘to know’ veils four distinct meanings represented by separate and distinct verbs in German. Thus we know by: the senses; by experience; by the mind; and, by the doing. Arguably the knowledge-based economy is based on knowing by the doing, *i.e.*, a ‘can do’ economy.

8. Morphology

Knowledge takes three forms. Codified knowledge is fixed in matter/energy as meaning. Tooled knowledge is fixed in matter/energy as function. Personal knowledge is fixed in the Natural Person as neuronal memory and reflexes of muscle and nerve. Ultimately, however, all knowledge is personal. Only the Natural

Person knows how to decode codified knowledge and push the right button for tooled knowledge to function.

9. Psychology

Neuropsychology tells us that knowledge is the epiphenomenal result of the gestalt-like interaction of dedicated brain modular. In the simplest terms: the left lobe is responsible for speech; the right lobe for pattern recognition, the front or temporal lobes for reasoning; and, the back or occipital lobes for visualization. The latter involves not just physical sight but also imagination, *i.e.*, “that faculty of the mind by which are formed images or concepts of external objects not present to the senses” (OED, *imagination*, 3).

Then there are psychological ways of knowing, for example, those identified by Carl Jung and applied in industry and the public sector using The Myers-Briggs Type Indicator ®. Thus we know by:

Thinking - interpreting what is perceived;

Intuition – perceiving possibilities inherent in the present;

Feeling - judging what something or someone is worth, and,

Sensation - perceiving immediate physical reality

10. The Last Ideology Standing

The Republican Revolution survives. It gave birth to market economics with its political and legal corollaries of popular democracy and private property. The Communist Revolution failed. It was about the economic rights of the worker birthed through a command economy and dictatorship of the proletariat by the Party. Ironically Perfect Communism and Perfect Competition agree on an end state with no government and therefore of no knowledge-based economy. Arguably both political and economic rights are required to realize humanity’s potential. Nonetheless, to the victor go the spoils.

Purely for the quants among us I attach a production function for a knowledge-based economy reproduced from my dissertation. And I have a few more findings if time permits...

References

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- Chartrand, H.H., *The Competitiveness of Nations in a Global Knowledge-Based Economy – Ideological Evolution*, VDM Verlag Dr Muller, ISBN 978-3-8364-2804-0, 2007.
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- Fuller, S., *Thomas Kuhn: A Philosophical History of Our Times*, University of Chicago Press, 2000.

Exhibit 2
Production Function of a Knowledge-Based Economy

$$Y = f^{s,p} (K^e, L^e, N^e)^{d,n,x,g} \quad (1)$$

where:

Y = Person, Code & Tool
 K = codified & tooled capital
 L = personal & tacit labour
 N = toolable natural resources
 f = some function of
 s = space
 p = time period or era
 d = disembodied technological change *
 e = embodied technological change *
 n = endogenous technological change *
 x = exogenous technological change *
 g = government **

and,

$$e = h(P, O, D) \quad (2)$$

$$d = g(P, O, D) \quad (3)$$

$$n = i(P, O, D) \quad (4)$$

$$x = j(P, O, D) \quad (5)$$

where,

g, h, i & j = some function of

and,

P = physical technology ***

O = organizational technology ***

D = design technology ***

where,

$$P = \alpha(p, c, t) \quad (6)$$

$$O = \beta(p, c, t) \quad (7)$$

$$D = \gamma(p, c, t) \quad (8)$$

and,

α, β, γ = some function of

where,

$$p = \text{personal \& tacit knowledge} \quad (9)$$

$$c = \text{codified knowledge} \quad (10)$$

$$t = \text{tooled knowledge} \quad (11)$$

and,

$$p, c \& t = \sum Q (\text{WIT, PSI, EPI, PED, IPR, FLX}) \text{ ****} \quad (12)$$

where,

Q = a combinatory set of knowledge Qubits

Notes

* Technological Change: impact of new knowledge on the production function of a firm or nation,; disembodied (systemic) or embodied (localized); and endogenous or exogenous to the firm or nation

** Government: as 'rule maker' of intellectual property rights and national innovation systems. While government partners with private owners decision making is political and exogenous to the economic system. It acts as Custodian, Facilitator, Patron, Architect and/or Engineer of the national knowledge-base.

*** Physical Technology from the Natural & Engineering Sciences (NES); Organizational from the Humanities & Social Sciences (HSS); Design from the Arts - literary, media, performing & visual.

**** A Qubit is a four-fold unit of knowledge including the etymological WIT (knowing by the senses, mind, doing, experience); psychological PSI (knowing by Reason, Revelation, Sentiment, Sensation); epistemological EPI (knowing by the NES, HSS, Arts, Practices); pedagogic PED (knowing by domain/practice, discipline, sub-discipline, speciality); legal IPR (knowledge fixed in a utilitarian or non-utilitarian matrix, Person or public domain); and, economic FLX (knowledge as disembodied, embodied, endogenous or exogenous technological change)