
Appreciating Or Deteriorating Systems Amidst Paradigm Shifts: Achieving an Integrated Natural and Social-Economic Capital System For Sustainable Development

Eric Gilder

School of Communication and Development Studies, Papua New Guinea University of Technology,
Private Mail Bag, Lae 411, Morobe Province, PNG.
eric.gilder@pnguot.ac.pg

Abstract: Drawing from the systems theory perspective articulated by economist and social thinker Kenneth Boulding (1970/1971/1978) and the paradigm-shifting thesis of Thomas Kuhn (1962), the author (building upon previously published works outlining Vadineanu's 2001 contribution on how Natural Capital [NC] and the Socio-Economic Systems [SES] interact) posits a multi-level framework to undergird specific policies to encourage the creation of energy systems that can foster sustainable development in OACPS. This goal needs to be achieved while mindful that the Asia-Pacific region is most affected by effects of unpredictable climate change and heavy fossil fuel energy resource depletion. As organizers of the 2018 SERI conference had stated, the "energy crisis 'worldwide' should be approached in a holistic manner. It is not enough that energy be clean, renewable, safe[,] and sustainable. It must be affordable and available to every consumer throughout their lifetime" in line with the Sustainable Development Goal number 7 (that articulates that people the world over have a right to "affordable and clean energy").

Keywords: Organisation of African, Caribbean and Pacific States (OACPS), K.E. Boulding, T. Kuhn, A. Vadineanu, Evolutionary/revolutionary change, Analogue/digital transition, Social-Economic Systems, Renewable energy, Climate change

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1. INTRODUCTION

In his seminal essay, "The Dodo Didn't Make It: Survival and Betterment" (1971), Kenneth Boulding states that the "lesson" taught us by the demise of the dodo is, "that survival has something to do with the peculiarly structured nature of ecological systems: they are heterogeneous, discontinuous and mathematically ill-behaved, and they have niches. It is this peculiar nicheness of the real world that makes almost any evolutionary predictions extraordinarily difficult. Evolutionary theories in general have very little predictive power. So, I shall set my sights a little lower and discuss what I might call a theory of betterment: that is, how do things go from bad to better instead of from bad to worse. This is related to the survival problem, obviously, because if a thing - anything - goes from bad to worse, for long enough, it won't survive" (p. 19). From this starting point, Boulding talks of economic valuation systems of "goods" versus "bads", of fostering "appreciating" systems over "deteriorating" ones. His Threat-Exchange-Integrative schema (Boulding, 1970) provides a workable framework for organizing varied perspectives and topics of presented at the conference into a productive organism of positive change.

The author also draws upon the "paradigm-shifting" perspective of Thomas Kuhn (1962), who compared and contrasted the steady, accumulative outputs of evolutionary "everyday" scientific work operating under a unified paradigm to the quickly changing operation of revolutionary science-making in times of revolutionary paradigm shift (he details the rapid shift in operating paradigms in theoretical physics between Newtonian and

Einstein's quantum physics in the early decades of the 20th century to support his thesis). In the era of "analogue to digital shift" Gilder has outlined (Gilder, 2013), exponential (*in lieu* of linear) rate of change is now the norm for both technical and the (often lagging) social economic systems that provide both the input basis and the test-bed of such engineered outputs, as detailed by Vadineanu (2001; Gilder & Pal 2015a, Gilder & Pal 2015b).

2. CHALLENGES OF ECOLOGICAL SYSTEMS, ACCORDING TO BOULDING (1971)

Ecological Systems, according to Boulding, are:

- Heterogeneous,
- Discontinuous,
- Mathematically ill-behaved,
- Have niches

Boulding continues, saying that these characteristics and the "peculiar nicheness of the real world [that they indicate] makes almost any evolutionary predictions extraordinarily difficult. Evolutionary theories in general have very little predictive power". In his "Theory of Betterment," Boulding (1971) seeks to ask/answer the question of "how do things go from bad to better instead of from bad to worse." He continues, "this is related to the survival problem, obviously, because if a thing - anything - goes from bad to worse, for long enough, it won't survive".

From this starting point, Boulding talks of economic valuation systems of "goods" versus "bads", of fostering "appreciating" systems over "deteriorating" ones. I believe his schema (Boulding, 1970) provides a workable framework for organizing varied perspectives and varied human development topics into a productive organism of positive change.

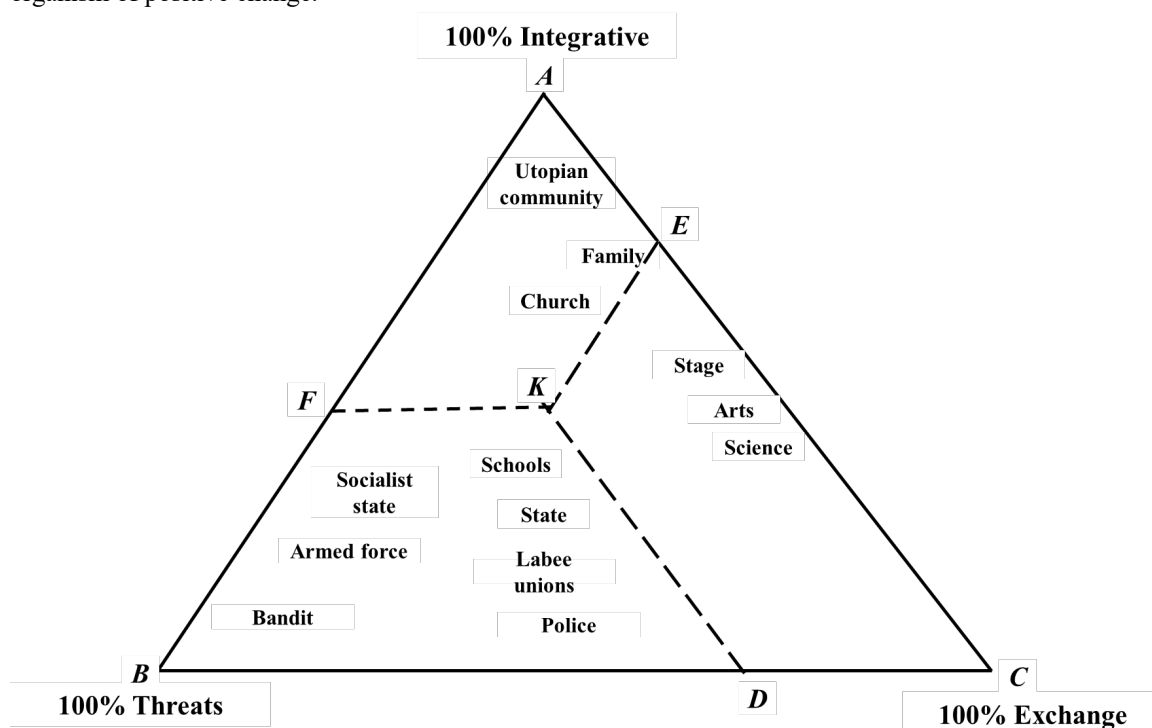


Figure 1; Boulding's TIE Diagram (*Primer of Social Dynamics.*, Boulding, 1970)

The TIE diagram shows the intersection of three "social organisers" posited by Boulding: Threat, Integration and Exchange. As described by Son, Hyun, Sung & Gilder (1999), drawing from Gilder (1987):

- A. 'Threat' is a social organizer based upon the premise that "You do something I want or I will do something that you do not want." Cultures can issue threats to their members on the assumptive level because such prohibitions are accepted by most people of that society as legitimate norms (Boulding, 1978). Threatening interactions are, in Boulding's view, a zero-sum game because one participant is bound to lose. However, if carried to extremes (such as in a nuclear war, all parties can lose.
- B. 'Exchange' is a relational pattern based upon classical liberal economics, i.e., "You do something I want and I'll do something that you want." (Next to the money economy, exchange is often seen as a *modus operandi* in democratic political systems. This method of social organization is more stable and productive than the threat system, in that, if handled properly, it is a positive-sum game (pp. 163-70). Participants in positive-sum interactions can come away from them fulfilled. Quite often, people are not conscious of the operation of exchange explicitly. Because of this subconscious element, exchange is a more powerful social organizer than it is assumed to be (Boulding, 1970).
- C. 'Integration' is a complex and diverse system of social organization that encompasses the creation of status relations, feelings of love or hatred, trust or mistrust, according to Boulding (Boulding, 1970). In integration, a person's or group's image of its identity is defined in relation to others (Boulding, 1978). In fact, one must be able to see the other's image of life in order to communicate at all. The operative statement here is "I will do something or I will ask you to do something because of what I am and because of who you are." This interaction is based upon the "roles" that individuals or groups play in society.

The important point to make here is that all human actions in society are an admixture of the three social organisers, Threat, Exchange, and Integration.

3. A "PARADIGM SHIFT" IN THINKING IS REQUIRED

I then draw upon the "paradigm-shifting" perspective of Thomas Kuhn (1962), who compared and contrasted the steady, accumulative outputs of evolutionary "everyday" scientific work operating under a unified paradigm to the quickly changing operation of revolutionary science-making in times of revolutionary paradigm shift. One shift that has occurred is what I have called the "analogue to digital" transition (Gilder, 2012; Gilder, 2013). Drivers of Present Change Requiring Paradigm Shift in Thinking (Gilder, 2012) include:

- *Technology*: Analogue to Digital transition allows greater spectrum capacity *and* data transmission/copying without added distortion.
- *Globalization*: Enabled by lower costs for more communicative traffic capacity (Moore's Law), leading to more self-serve interfaces and off-shoring of telecommunication-based services.
- *Neo-liberal politics*: "There is No Alternative," "End of History/Utopias"
- *More and more "scalable" "symbolic analyst" jobs* being subjected to "extremistan" market pressures (think pop stars and sports celebrities)
- *Move from "Doughnut Hole" Jobs to "Inverted Doughnut Hole" Jobs*, with less security and more stress for most workers.
- *"Unbundling" and "Deskilling"* of former professional "craft" ("free") careers into "managed" semi-professional piece-work jobs.
- *The move of systemic "manufactured risk" from government to the individual* with "casino" promise of high returns for the lucky.

4. AN INTEGRATION OF NATURAL CAPITAL (NC) AND SOCIAL ECONOMIC SYSTEMS (SES) IN THE ECOLOGICAL HIERARCHY

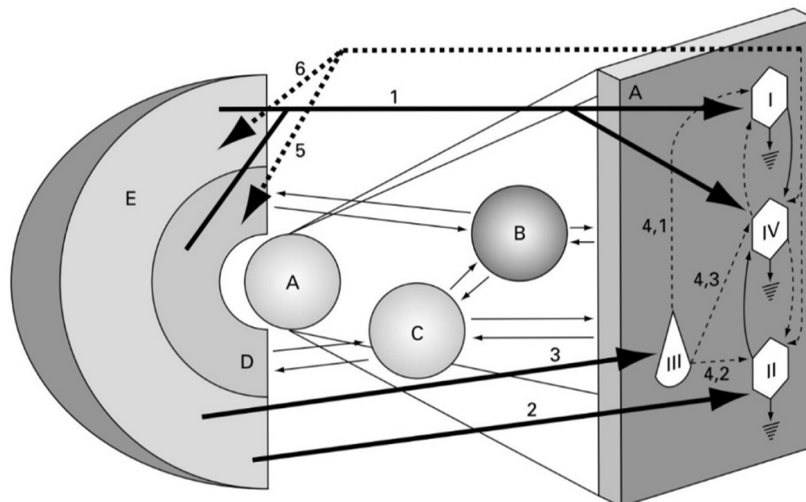
As detailed in Gilder & Pal (2015a), Vadineanu (2001) provided a comprehensive model of our environment, which, in his words, "integrate[s] both the components of the Natural Capital and those of the Socio-Economic

Systems” into the “troposphere and in the HGMU [Hydro Geomorphic Unit]” (p. 315). Vadineanu categorizes these components in this fashion:

- I. NC
 - A. Natural
 - B. Seminatural
- II. SES
 - A. Human-dominated
 - B. Human-created

As Gilder & Pal observed (2015a):

Vadineanu’s GST (General Systems Theory) approach colours his view of coming trends in both topics and approaches of ecological studies: “The relationships between «humans and nature» more recently referred to as ‘development and environmental’ relationships or between ‘economy and ecology’ should be further reformulated and recast as the mediated and dynamic relationships at local, regional and global scale between the structure and metabolism of Socio-Economic Systems, on one side, and the structure, productivity and carrying capacity of the natural, seminatural and human-dominated systems (NC), on the other side.”



The general physical model of the socio-economic system and its relationships with Natural Capital.

A - The man-made physical capital: I - the infrastructure of the economic subsystem dependent on the renewable resources provided by the components of the Natural Capital; II - the industrial infrastructure of the economic subsystem dependent on «non-renewable» resources; III - Systems* for commercial energy production using as primary resources: fossil and nuclear fuels and hydro-power potential; IV - the human settlements infrastructure. B - Social capital; C - Cultural capital; D - Man-dominated components of the Natural Capital; E - natural and semi-natural components of the Natural Capital: 1 - flow of renewable resources; 2 - flow of raw materials; 3 - flow of fossil and nuclear fuels; 4 - flows of electrical energy; 5 - material and energy inputs (fertilisation, pesticides, agrotechnical works, irrigation, selection etc.) to support the management of man-dominated systems; 6 - dispersion of heat of secondary products (wastes) in the troposphere and in the HGMU components.

Figure 2 and caption Vadineanu’s SES/NC Inter-Relational Model (2001, p. 25)

COMPONENTS OF THIS NECESSARY INTEGRATION FOR SUSTAINABILITY

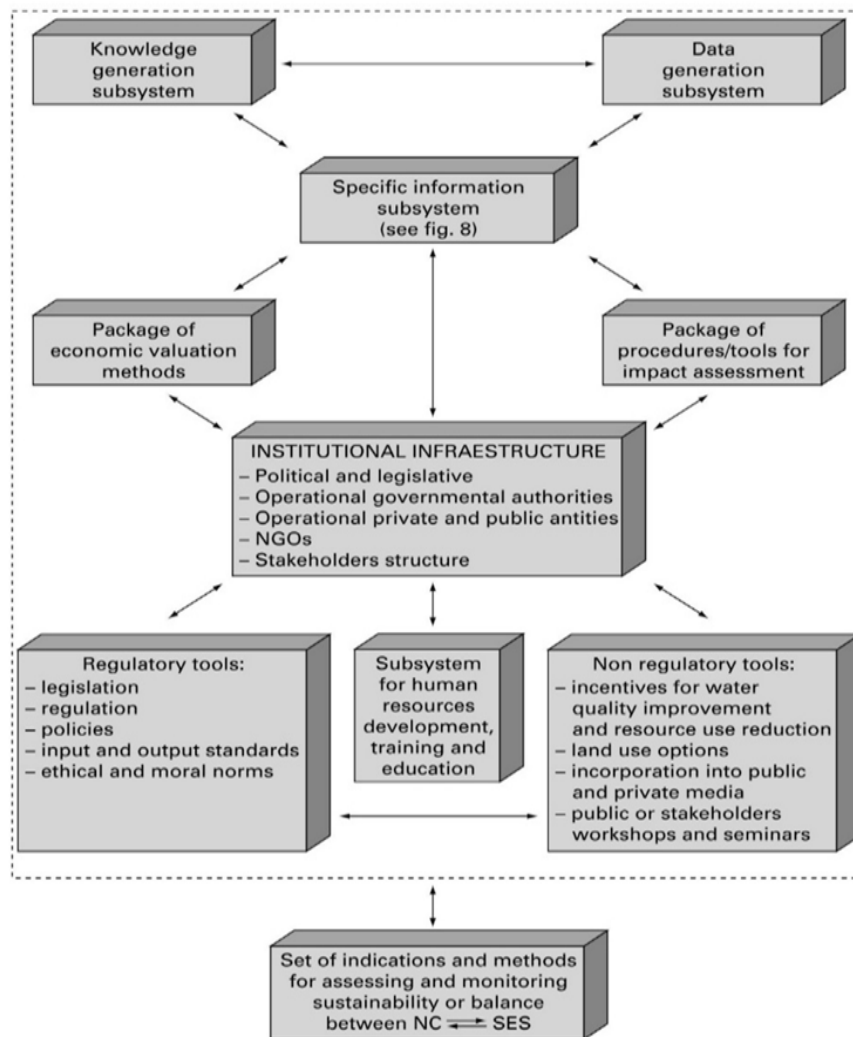
Vadineanu (2001) states, “according to the above statements, I use for the term ‘biodiversity’ the broader meaning which covers on one hand the components of Natural Capital together with their taxonomic and genetic diversity and on the other hand, human social organization, ethnic, linguistic and cultural diversity” (p. 23).

The basic components of integration necessary for achieving sustainability, Vadineanu claims, are four:

- I. “The assessment of the conceptual and methodological approach of development, establishment of state of the art in the field as well as the main gaps and shortages and the needs for further development and improvement” (p. 20);
- II. “Formulation of at least some of the basic elements of the dynamic model for ‘Co-development’ of socio-economic systems and Natural Capital/’Sustainable Socio-Economic development’ to be used as the ‘attractor’ in the local, regional and global transition” (p. 20);
- III. “Identification of the premises or advantages (opportunities) and the limits or constraints each country and region may rely on or be faced in the designing and implementation of long term ‘co-development’ strategies and action plans” (p. 20);
- IV. “Identification of the existing shortages and gaps in the policy and decision-making process dealing with sustainability and formulation of a comprehensive and dynamic model for the ‘decision support systems’ as the interface or the operational infrastructure, the only one enabling us to balance the spatio-temporal relationships and the mass and energy exchanges between the Natural Capital Structure, serving as foot print and the Socio-Economic Systems “ (p. 21).

5. VADINEANU’S DECISION SUPPORT SYSTEM (DSS) MODEL TO SUPPORT SES/NC INTEGRATION

Gilder and Pal (2015b, p. 92) noted that Vadineanu’s (2001) Decision Support System (DSS) Model sought to balance, in his words, the “development of SES and NC or in other terms for ‘integration ecology and economy’ at different spatio-temporal scales” (p. 27).



The Structure of the Decision Support System for balancing the development of SES and NC or in other terms for «integration ecology and economy» at different spatio-temporal scales.

Figure 3 and caption Vadineanu (2001)

Adept use of this DSS model by policymakers will be required if Papua New Guinea and the other OACPS countries are to meet the SDG 7 Energy Goals. These indicators by target are:

- 7.1. “By 2030, ensure universal access to affordable, reliable and modern energy services;
- 7.2. By 2030, increase substantially the share of renewable energy in the global energy mix;
- 7.3. By 2030, double the global rate of improvement in energy efficiency” (Sdgcounting, 2016).

But, as Gilder & Pal (2015b) noted, too many policymakers (and the public) are deeply wedded in their daily life practices to fossil fuels; the social costs of enacting needed climate-change policies will be great:

Before Vadineanu’s rational decision-making system (DSS) can be realistically implemented by policy makers, we all need to take heed of the danger of this public desensitization, and also realise that wilful blindness is in full operation among political and policy elites, given the overwhelming size of resources and fortunes tied to the continuing employment of “dirty” productive technologies.

Yet, in Papua New Guinea (where continuous power is still seen by many as a luxury good), real efforts to provide sustainable energy to remote villages have been undertaken, as noted by Lovo, et. al (2019). In their field research, “we assembled into a single hypothetical ‘energy basket’ all the varied renewable ‘green’ energy sources within PNG (as estimated by our energy research groups).” From this, they argued that, “there is sufficient renewable energy in PNG”, and they further stated that, “these available green energy sources should be tapped, for they can go a long way in the quest for climate change mitigation” (p. 117).

CONCLUSIONS

Which SDG 7 Targets can be realistically met, given present SES conditions?

To conclude, as Gilder & Pal (2015b) recalled, “W.I. Thomas . . . wrote: —It is not important whether or not the interpretation is correct—if men define situations as real, they are real in their consequences. . . . The key point of the Thomas Theorem is that an individual’s beliefs or perceptions about a circumstance—regardless of their basis in actuality—will have an effect on the individual’s related actions. Further, an individual’s interpretation of a situation may gain meaning and be reinforced as a result of the actions associated with it, beyond any objective significance this interpretation may have” (p. 92). In an age of seemingly ‘irrational’ policy decisions by some countries calling into question international agreements such as the Paris climate change agreement, policymakers in PNG and the OACPS region need to devise realistically attainable energy policies supporting ecological sustainability that they can enact with partners (public and private) willing to take on the charge to work towards a liveable world for all.

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