



Pansystems ecology, management and knowledge rediscovery

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Abstract

Purpose – The purpose of this paper is to state the pansystems ecology, management and related principles and methods of knowledge rediscovery. Related contents include: generalized life, vitality, resource, circulation, environs, periodicity, phenology, eco-niche in pansystems space, evolution, intelligence development, philosophy of science, epistemology, psychology, pedagogy and teaching.

Design/methodology/approach – The paper is an application of pansystems principles to approach an ecology-styled world outlook and methodology, related topics include: pansystems rediscovery to ecology and the world; generalized relativity, resource, environs, ecology, circulation, life; pansystems models on evolution, eco-niche, pyramid law, recap law, phenology, management and knowledge rediscovery.

Findings – All of the logoi concerned with are reduced to the actualization of pansystems variational principle and related OR-concretion. The pansystems ecology presents a new outlook to world, society, management, methodology, pedagogy and knowledge rediscovery.

Originality/value – Provides the framework and concretion principles of pansystems research on generalized resource, circulation, environs, ecology and related applications. They lead to some new comprehension of evolution, psychology, epistemology, society, management.

Keywords Ecology, Resources, Evolution, Epistemology, Performance management, Systems theory

Paper type Research paper

1. Pansystems ecology: knowledge rediscovery to ecology and the world

I am yours, as you jump on the dewdrops with the poems on myriad dreams of my childhood;

I am yours, as you chase the brook in forest: Over far hills, and calling my rainbow;

I am yours, as fantastic dreams in chaotic paradoxes with homesickness and fond moonlight: I fly with spring breeze over forest-sea [...]

I am yours, because I fly over mountains, rivers, seeking the whispering pool with vagarious sunglow, mysterious starlit sky [...] (Pansystems poems 200).

$0^{**}/\text{pansystems extremum logos}/(dy/dx = 0)^* \rightarrow (d/dx)^* xy^* = 0^{**}/\text{extremum}^*$.

Perfection^{*}(13V^{*}//13 factors: overall consideration for macro^{*}micro^{*}, whole^{*}part^{*}, far^{*}near^{*}, vertical^{*}horizontal^{*}, multipartners^{*}comprehensiveness^{*}coordination^{*}, optimization^{*}development^{*}).

OR^{*}//PRFS^{*} < perfection^{*}regret^{*}restraint^{*}flexibility^{*}suboptimization^{*} > .



COR** < repetition *classification *OR* > .
 SS* < simplification *strengthening* > . M* < mutuality* > . N* < negation* > .
 F* < resource* > . C* < F*circulation* > . C** < C*COR** with C*; C*M*COR**;
 C* of C* > . SD* < F*C*supply*demand* > .
 CK*
 < CD*(clustering*discoupling*)OC*(observation*control*)SK*(shengke*promotion*
 restraint*) > .
 WHF* < world*history*future*forecast* > . MOFF* < macro*order*forcus*fast* > .
 PCR** < by min*PCR* to deal with max*PCR*:
 paradox*contradiction*regret*restraint*; max*PCR**//COR** → min*PCR* > .
 V** < derivative */D*/(d/dx)*, change-change relation, meet change with change > .
 SK** < WHF*SS*SD*F*C*CK*perfection*V**PCR**MOFF*0**COR** > .
 R** < relativity* of R-SOME (S/M//E//O → *R):
 subject*/media*/environs*/object* → *R (relations, results, relativities) > (Pansystems
 logoi 200).

Confucius *et al.* (1992) said: “By nature all men are much alike; it is the influences of environs that set them wide apart.” “The quality of humanity consists in restraining yourself and making your words and deeds conform to decorum (norms, constitution or institution of supersystems or big-environs).”

Laozi (1995) said: “Man takes earth as his model; Earth takes heaven as its model; Heaven takes the Tao as its model; The Tao takes what is natural as its model.”

Ecology is the branch of biology to study the relationship between bioses and the environs, and the relationship among bioses.

If we extend, embody, reform (EE*V*) the related concepts to some generalized ones within the framework of pansystems sublation (sublation*), then the investigations form a developing research called pansystems ecology (ecology*).

The basic logoi of ecology* were taped from 1982 (Wu, 1982, 1983-1985, 1984, 1990, 1994, 2005, 2008a, b, c). Within the Conference on Mathematical Ecology (1982, Wuhan, China, 500-odd participators), there was a special workshop on pansystems ecology to be organized.

Bioses → *bioses*, vitality*/life*(7logoi*+ +)//general living systems → *S* (systems*), R*(relation* relationship*), M*(mutuality*), P*(pansystems, S*R*CB* <combination*>), subject*, process*, reasoning*, thinking*, egos*, subegos*, KD*(knowledge discovery//redis-covey*), TM(logoi, principles, categories, laws, theory-methods, theorem, formula, thesis, concretion forms of PMT//philosophy* mathematics*technology*), OT*(operation*transfor-mation*), F*(resource*), C (F*circulation*thoroughfare*, communication*traffic*transporta-tion*telecommunication*flow*connection*OT* (I/O)*), interior*//EI*(exterior*interior*)//x**xy*(yinyang*, binary*), etc.

Environs → *environs*(background*, super-S* super-subject*superegos*, exterior*, exterior-S*R* conditions*, natural-social-ego environs*, referential S*, coordinates*, second subject* or n-th subject*) → *exterior*//EI*(exterior*interior*)//y**xy*(yinyang*, binary*, duality*), etc.

VTM(various TM) of traditional ecology → *VTM**//ecology**//VE* <vitality*environs*>//VE*M**//sub BTM*CB*.

The sublation* possesses related characteristics of PMT-CB*, in general we use the superscript to realize the SS* <simplification*strengthening*>.

Consequently, ecology* is a specific research or applications to TM* of P*, R*, S*, EI*, xy*, SCS* (subsystems*systems*supersystems*)//SPB*(sea*pails*bowls*), environs*, etc. Its TM*background//environs* is VTM of ecology and BTM*(basic TM*)//200logoi*++ ~ ~ BTM*(200logoi*++).

Using the train of thought of ecology for reference, within the BTM*, ecology* develops the transfield research on the M* between S*P*vitality* or general dynamic systems and environs*.

Ecology* = subEI*//M*//0**COR**. Ecology* = *P*environs*//VE*.

We may interpret the ecology* from the view of pansystems relativity.

The pansystems relativity(R**, relativity*) is a subtheory concerning general absoluteness and relativity within the basic pansystems logoi. The absoluteness, relativity and related relations are reduced to W*(whole*part*body*shadow*). In R**, the relative M* of R-SOME//SOME*(subject* object*media*environs*, S*/D*//0**//S* → *R//M* ~ ~ R = f(S, O, M, E, M*, etc.) are investigated with a lot of concretion logoi.

S/M//E//O → *R//(relativities; results; relations)//M* → *R = f(subject*environs*), f(object*environs*), f(media*environs*), f(environs*environs*), f(VE*), etc. → *Ecology* vitality*, epistemology*logic*paradox*KD*methodology*axiomatization*, linguistics*, psychology*egos*, aesthetics*poetics*, fractal*, computer*AI*, philosophy* of science, physics*, cybernetics*feedback*, WHF*SEM*, Q**//Q**, etc. → * a series of KD* of VTM.

R**-set (S, M, E, O, R)(n) → *M* → *R**-set (S, M, E, O, R)(n + 1). R**-set-M* = * new R**-set.

R**: R = SME*(O) = F(S, O, M, E, M*/R**set//R-SOME).

The typical media* include the ten items (10logoi*++): CD*OC*SK*M*C*OT*QS*Q*COR**predicate*.

The typical environs* include 20 items (20logoi*++): M*DIO* (equivalence*difference* order*)C*OC*CB*Q*, second egos, super egos, super-S*, background, potential 0**COR** SD*(4logoi*++), institution*, potential governing laws of WHF*SEM*, potential governing max*PCR*, potential governing apriority-styled factors, potential governing TM, F*C*-base//infrastructure, etc.

The extended concepts of media and environs lead to some new comprehension to ecology//ecology*.

The adaptation of vitality* embodies the COR** with environs*. Especially, the response, sensitivity weight* to subclasses are different each other ~ ~ a potential 0**//R**.

Weber-Fechner law, new-fast-strong stimulations, unhappy stimulation, sudden changes, catastrophes, etc.

All happy families are like one another; each unhappy family is unhappy in its own way (Tolstoy, L.)

Another 0**//R** law is embodied as the response difference with same exterior environs*, different interior environs*//vitality* leads to different result: VE*DIO*M*C**COR**.

Almost any situation – good or bad – is affected by the attitude we bring to (ancient Rome, Seneca, L.).

Every tragedy makes heroes of common people (Stephens, N.).

An optimist sees an opportunity in every calamity; a pessimist sees a calamity in every opportunity (Churchill, W.).

Jovons saw the kettle boil and cried out with the delighted voice of a child; Marshal too had seen the kettle boil and sat down silently to build an engine (Keynes, J.).

It is a curious fact that in bad days we can very vividly recall the good time that is now no more, but that in good days we have only a very cold and imperfect memory of the bad (Schopenhauer, A.).

A sharp (EE*V*) form of R** is the R***: D*0*symmetry*0**COR**R**Q**. By using dynamic feedback R*** step by step, pansystems mathematics presents a flexible settlement to Hilbert 6th/23rd problems, sublates many important basic theorems in some subbranches of mathematics and a series of KD* of VTM(100TM++), and so embody potentialities of ecology*0**COR** (Wu, 1990, 2005, 2008a, b, c).

By using the R*(relativity*)//R-SOME*: S/M//E///O → R ~ ~ subject*/media*//environs*///object* → *R(relativities*R*results*), we have the related formula as follows:

Subject*/media*(CK*KD*OT*D*M*sublation*EE*V*)//environs*(VTM of ecology + BTM*(200logoi*+))//object*(VTM of ecology, EI*(S*environs*)//xy*, environs*) → *R(ecology*/ecology*VTM*).

Where CK*: CD*(clustering*discoupling*, integration*disintegration*, cooperation* division* of labor*, convergence*divergence*, concentration*deconcentration*, etc.) + OC*(observation*control*, observability* controllability*, cybernetics*) + SK*(shengke*, inter-promotions*interrestraints*, cooperation* conflict*, SD*SK*(supply*demand*SK*), N*PCR*(non-PCR*)-PCR*(paradox* contradiction*regret*restraint*), min*PCR*-max* PCR*.

Consequently, this kind of ecology* is connected with the recognition, re-comprehension, KD* for almost VTM of various disciplines, topics, processes, vitality* of WHF*SEM* (world*history*future*forecast*, society*economy* management*), this is of a specific sublation*EE*V* ecology-view, a specific P*-windows with PMT-CB*: world outlook, epistemology, methodology, logic, value theory, systematics, cybernetics, informatics, biology, evolution theory, economics, mathematics*Q*(quantification*), Q**(degree*scale* distance*, Q*.theory), F*C*.theory, OT*.theory, internet-styled academic research, EI*, xy*, SD*, V*(variation*variable*factor*), etc.

And VTM* related to them all are reduced to the pansystems variational principle ~ ~ 0**/(dy/dx = 0)* ~ ~ pansystems extremum logos → * pansystems variational OR principle ~ ~ 0**OR**/0**COR**(repetition*classification*OR*) ~ ~ truth*goodness*.

And so the pansystems research or ecology* and related VTM* themselves are just like a generalized evolution-ecology-growth mode, and in here the 0** or 0**COR** is a TM*stemcell*, which is/are differentiated into BTM*/VTM* on occasions with different environs*, and then into VTM of biology//vitality* and ecology//ecology* and so forth.

0** → *0**COR** → *BTM* → *VTM* → *vitality*ecology* → *VTM
0**: (0*/extremum*; (dy/dx = 0)*; eq*/equation*; app*/approximation*/(distance*xy* = * 0*)/(y* = *x* + 0*); 0**OT*; 0**P*).

0^{**} is the sublation* of the Leibniz's extremum formula $dy/dx = 0 \rightarrow *(d/dx)^*xy^* = *0^* \sim \sim D^*P^* = *0^*$.

A 0^{**} -model on ecology* is the QS*//translation*: $y^* = *x^*(m)//D^*(y^*, m) + 0^*(m) \Downarrow^* \rightarrow y^* = x^*(m)//environs^*(m)$. It is a specific concretion of COR***. Namely, under the condition of environs*(m), the $x^*(m)$ in fact is the SS*-embodiment, agent, representative of y^* . This mode is useful in IT or in common technology. For example, sample, abstract, summary, quantification, A/D, D/A, multimedia, encoding, decoding, SS*, data compression, storage technique, PR (pattern recognition), sensor techniques, CAD, CAM, CAX (computer-aided printing, typesetting, detecting, diagnosing, treating, nursing, etc.).

A QS* model is $y^*//prototype \rightarrow *epitome^*//x^*(m)//environs^*(m) \rightarrow *embodiment^*//environs^*(n) \rightarrow *y^*(n)//models$.

This model can be considered as KD*(knowledge rediscovery) for many phenomena such as beauty feeling, art appreciation, acceptance aesthetics, translation mechanism, heteromorphism, cell differentiation, individuality formation, heuristics, Plato philosophy, Hegel philosophy, neo-Confucianism, etc.

The moon (prototype and substance) shines thousand rivers, and every river has its own specific moon (model and shadow).

0^{**} : $d(EV^*) = *0^*(mmcm)//0^*(min^*mid^*chaos^*max^*) \rightarrow *ecology^*//vitality^*//0^*//growth-ring^* = f(0^*(mmcm), environs^*//0^*)$.

Ecology*: vitality* is the epitome*//0**COR** of environs*. growth-ring* is embodied as a certain class of derived 0^* .

The primitive definition of ecology is due to Haeckel in 1869, just the ten year long after Darwin's evolution theory (1859). And just in the 1869, Mendeleev discovered the period law, the mechanism is of a specific KD* over all chemistry elements in a whole environs*, it is of a potential process of ecology*.

And then onwards through a hundred years, in 1959 (corresponding to Darwin's evolution theory), the second generation computer, and correspondingly in 1969 (corresponding to Haeckel's idea about ecology), the internet came out, they EE*V* the environs* of human, and meanwhile EE*V* the M*VE* of human, including the mode of KD*.

All ideas of ecology//ecology*-rationality are based on $0^{**}COR^{**}$.

OR*//PRFS* <perfection*regret*restraint*flexibility*suboptimization*>.

PCR*-weakening principle//PCR**: $OR^*//R^{**}-great\ PCR^* \rightarrow *small\ PCR^*) \& OR^*//(<small\ PCR^*>//<great\ PCR^*>)$ and repeatedly OR*-making $\sim \sim MOFF^*//Fast-OR^*//FOR^*//Fast-SS^*SPB^*KF^{**}CB^*Q^*OR^*$.

PCR** <big PCR* $\Downarrow^* \rightarrow$ small PCR*, long OT*//big PCR* \rightarrow *small PCR*; long OT*//small PCR* \rightarrow *big PCR*; PCR*(n+1)//PCR*(n) \rightarrow *PCR*(n+2)>. $\sim \sim PCR^* \rightarrow *PCR^*(n+1)$. Where " $\Downarrow^* \rightarrow$ " means " $\Downarrow M^*C^{**}COR^{**} \rightarrow$ ".

OR** <COR**//repetition*classification*OR*; PRFS**; PCR**; CB*OR*; CB**//hand*, etc.>.

Various OR and social supersystems operations and related mechanism and various strategies can be reduced to $0^{**}COR^{**}$, and within it the PRFS** is in general of SS*, pansystems developed many tens of concretion TM*, specially including the so-called 7 flexibilities*8 TM*.

Perfection*//utopia*//perfect-optimization $\sim \sim$ a sub-TM* of OR* $\sim \sim$ Overall, optimization $\sim \sim$ Overall, consideration must be given to simultaneously the macro and the micro, the whole and the part, the long-term and the short-term, and the

vertical and the horizontal, and so forth to multivariant synthesis in coordination with optimization and development.

Perfection* can be used as many R** roles: ideal goals//indexes, adjustment referential system, environs*, potential subject* for the feedback processes in COR**//PRFS**//PCR**.

PRFS* can be considered as a sublation* of LMM//LMM* (Lagrange multiplier method) for restricted extremum analysis, corresponding to a generalization to the TM* of curved geodesic* in cosmos*//everything. The thesis of that the nature possesses an economic tendency can be sublated* to that the cosmos* is of OR*//PRFS*//COR**//road*boundary*P*.

PRFS** <PCR**>; PRFS* (n + 1)//PRFS*(n) → PRFS*(n + 2); CB**>~ ~ PRFS*(n) → *PRFS*(n + 1):

A hundred mountains and no bird,
A thousand paths without a footprint;
A little boat, a bamboo cloak,
An old man fishing in the cold river-snow (Liu Zongyuan<River-snow>).

Every real poem is a comprehension to ecology*! Every real poem is an image-styled description of R* between subject* and EI*environs* implicitly or explicitly. So do VLA* <various literature*arts*>.

R**: VLA*/image-styled description//(0**COR**//PCR**abnormality*)
///F(subject*object*environs*M*+ +)//VE* → *R.

Ecology* → *0**COR**//EI*//VE*.

Ecology* is a specific class of (dy/dx = 0)**//0**//min*mid*chaos*max**//MMCM**//COR**. It is a specific class of TM* of xy*M**//xy*BTM*M*: (x**//interior**//S**//vitality*↓* → y**//exterior**//environs*) → *0**COR**.

xy*BTM* → *20-100BTM*: P*S*R*W*DIO*OT*V*D*0*0**COR*Q*CD*OC*SK* SD*F*C*, vitality*, clustering*, PCR**, PRFS**R**, symmetry* periodicity*phenology* symphony*, maneuvers*M*, min*max*, MMCM*, etc.

Ecology* is a specific class of xy*, 0**COR** with concretion expansion ~ ~ a class of yinyang *xy* derived from EI*SD*CK*MMCM*.

And then OT*0**COR** ~ ~ 0**(EI*SD*CK*) COR** → *d(xy) = 0**//MMCM**//COR** → *ecology* ~ ~ (dy/dx = 0)**//0* <MMCM*>//COR**.

Where the concretion focal points include:

- EI* ~ ~ xy* ~ ~ exterior*interior*, the concretion expansion in respect to ecology* includes the following types: environs*systems**//vitality**//biosystems; function*structure*; software*hardware*; superegos*egos**//subegos* in R** <relativity*>.
- SD* ~ ~ xy* ~ ~ 4SD**//F*C*.
- xy* ~ ~ CK* <CD*OC*SK*>, including the SK**//SK*-law. SK**: perfection*COR**PCR**PRFS**(V**//V*)0**SS**//MOFF*.
- Macro-EE*-COR**//max*PCR*.

Ecology* = 0**COR**//P*Vitality*R*Environs*: research and applications of 0**COR** of R**//M* between P**//vitality* and P**//environs* ~ ~ a specific xy*0**COR** ~ ~ a specific 0**(4SD*EI*)COR**.

Where $R^*: xy^*$, W^* , DIO^* , $S^*environs^*$, EI^* , SD^* , $function^*structure^*$, OT^* , $CK^*//CD^* OC^*SK^*///mF^*C^*$, $4SD^*(SD^*//distribution^*, SD^*//needs, COR^*//SK^*$, $SS^*SD^*Causality^* \sim \sim SS^*//0^*SN^* \sim \sim MSMN^*//min^*cost-sufficiency \& max^*cost-necessity)$, etc.

In the ecology*operations, in general people should by using $COR^*//PRFS^*$ to review, estimate, assess the human himself activities, so the important 0^* -biases or 0^* -overemphasis must be corrected in time, specially the following $SS^*TM^*//frameworks^*$ should be referred:

- Overall, planning ($SS^*causality^*$, $macro-EE^*$, bird's-eye-view, quotientization, overall $COR^*//8TM^*//SS^*//<0^*(max^*, max^*cost-necessities>)$).
- Systems engineering principle (CB^* of two-layer- DIO^*COR^*).
- Value engineering ($SS^*causality^*$, $COR^*//8TM^*//SS^*//min^*cost-convenient-sufficiency)$).
- Vitality*-strengthening & evolution & development: $CK^*//mF^*C^*M^*0^*COR^*//vitality^*environs^* \rightarrow^*vitality^*\#$.
- Ecology-framework*($SS^*causality^*$, $perfection^*// <macro-EE^*, bird's-eye-view, quotientization, overall situation, synthesis, feedback, sustainable development, sort-term, middle-term, long-term, 3S^*, mF^*C^*M^*0^*COR^* >COR^*$).

Ecology*type//Ecotype*: is the clustering* on VE^* due to the environs*clustering*. $Environs^*CD^* \rightarrow^* P^*CD^* \sim \sim Ecology^*type = P^*CD^*//environs^*CD^*$, the $math^*TM^*$ unifies the TM such as: Biota, biotype, community, biosystems, population, etc. Especially, based on the neighborhood, connectedness or CD^* of time-space to derive the subclasses of VE^* , this D^* leads the model* of ecosystems.

Recap* is a sublation* of the eco-recap law due to Haeckel.

The energy-C*-clustering* to ecosystems* leads to the sublation* of Lindemann's pyramid ecology law.

Phenology*//ecology*: $Environs^*0^*(mmcm)//periodicity^* \rightarrow^*vitality^*0^*(mmcm)periodicity^*$.

There were many concretion modes of vitality* developed in the pansystems books (1990, 2005).

$W^* \rightarrow^*OT^* \rightarrow^* recap^*//environs^*//COR^*//DIO^*//equivalence^*$.

$S^*//COR^*//DIO^*//difference^*order^* \rightarrow^*hierarchy^*layer^*clustering^*CD^*$.

The gift of the Nile: Ancient Egypt in the earliest human slavery countries. Western scholars have respected the "Father of History" – the famous ancient Greek historian Herodotus who had a statement: "Egypt is the gift-giving Nile." Indeed, the ancient inhabitants of Egypt, the Nile is the source going vitality, the oldest of human civilization, it is the first cradle of various types of human civilization. Nile originates in the landlocked central African Lake Victoria, a total length of 6,000 km, from south to north through Egypt throughout. In its side, a narrow valley, in its lower reaches near to the sea, the alluvial created verdant delta. Egypt, the earliest human national slavery, was born in this valley.

Ecology*: various civilizations, empires, countries, communities, cities, courses, river channels, doctrines, social subsystems, political institutions and various religions were born and developed within certain natural and historical $mF^*C^*environs^*$.

The “identical” religion self-reforms its own substantial content in order to adapt with the economy development of the belief nationalities.

$mF^*C^*environs^*SK^*M^*//0^*COR^* \rightarrow^*decisions^*$.

Ecology*: various psychology egos* were born and developed within certain $mF^*C^*environs^*$ consisting of subegos* and superegos*.

Ecology*: $cosmos \quad mF^*C^*environs^*//0^*COR^* \rightarrow^*solar \quad system$
 $mF^*C^*environs^*//0^*COR^* \rightarrow^*earth \quad mF^*C^*environs^*//0^*COR^* \rightarrow^*earth$
biosphere-biota-biotic formation $mF^*C^*environs^*//0^*COR^* \rightarrow^*human \quad society$
 $mF^*C^*environs^*//0^*COR^* \rightarrow^*$, etc.

Micro-environs*//macro-environs*: $COR^*//searching, \quad testing, \quad co-diagnosing,$
solving, joining forces to settlement by successive extension, evaluation,
semi-inverse method, counter with searching, reasoning, etc.

Environs* $\rightarrow^*SS^*Q^*//environs^*embodiment^* \rightarrow^*SS^*$: encoding, C*, recognition,
switching, identification, classification, concretion, detailing, differentiation,
clarification, understanding, translation, explanation, exchange, etc.

History of social development// R^*C^* : $institution^* \downarrow^* \rightarrow^*mF^*C^*environs^*SD^*$
 $SK^*M^*D^*//0^*$ (mmcm).

2. Pansystems resource, environs, ecology, circulation and life

Resource, environs, ecology, circulation and life, etc. there are a M*-logoi in realistic world. The survival, activities, reproduction, development of organisms need some space, matter and energy. In the long-term process of evolution, the bioses develop gradually some specific needs for certain physical conditions and chemical components of surrounding environment such as air, light, moisture, heat and inorganic salts, etc.

The required material, energy and the physical and chemical conditions they adapt to, etc. all are different from each other. Such property is called the ecological characteristics.

$SD^*EI^*life^*perfection^*COR^*$ is the main subjects in ecology//ecology*. It is reduced to SD^* for pansystems resource(F^*), circulation(C^*). These TM can be sublated EE^*V^* to such as $F^*C^*SD^* = F(environs^*vitality^*) \sim \sim F(EI^*) \sim \sim F(EI^*SD^*) \sim \sim F(xy^*) \sim \sim 0^*(EI^*SD^*)COR^*$.

$F^*//PF^*//resources^* <elements^*factors^*force^*vitality^*input^*resources^* of$
production*, $CK^*-force, \quad C^*//F^*C^*> \sim \sim PF^*//F^*//F^*C^*(27V^*++)//27F^*$: (time;
space; matter; energy; information//information*; knowledge//science//
technology; tools; methods//methodologies//methods*; management; power//
right//ownership; laws; institution; distribution-systems// DS^* ; finance; social
relations; social systems; health; psychology force, psychology governing deterrent;
laws//institution*//regulations//distribution*; maneuvers*// $PRFS^*//flexi-bility^*$;
 $0^*-ability//0^*(mmcm)-ability$; artificial systems; productive force or its bearers;
 F^*C^* ; vitality*//vitality*-bearers; F^*-OT^* ; $F^*-recursion^*$).

$F^*C^*(5V^*)$: $5F^*//(\text{time; space; matter; energy; information})$.

$F^*C^*(8V^*) <might^*finance^*R^*reputation^*information^*maneuvers^*potence^*$
law* $> \sim \sim$ a typical social F^*C^* -mode with governing power.

Might* $<power^*right^*ownership^*distribution^*>$.

Politics* ($8F^*C^*$)//e-government// $F^*C^*(8V^*) \rightarrow^*CK^*//CD^*//integration^* \rightarrow^*$
governing $SD^*value^*institution^* \rightarrow^*F^*C^*//IT^*Hi^*//RFID^*DB^*//Internet^*C4ISR^*$.

There is an important TM*: F*C*M*COR**.

F*C*space* <the SI*, direct product//product*, embodiment*, EE*, EEE* or CB* of mF*C*, in fact is a certain resource*space*, resource*base, supply* in SD**//SD**>. In general is realized as CB*mF*C*, CB*F*C*(k), CB*F*C*(k, r), {mF*C*}, {F*C*(k)}, {F*C*(k, r)}, \cup F*C*(k, r), \cup F*C*(k), \prod F*C*(k, r), \prod F*C*(k), P(\prod F*C*(k, r)), etc.>.

F*C*process*//process* <sub*F*C*space**//sub*CB*mF*C**//sub* \prod F*C*(k)//sub* \prod F*C*(k, r), in general it is realized as a certain element of P(\prod F*C*(k, r)), or a certain series, sequence, vector, tensor, matrix, CB*, subclass, etc. of different F*C*(k, r), the idea leads to the P*-styled TM* of process*(in OS of computer science), train-number*, vehicle-number*, etc. \rightarrow *F*C*process*>.

Eco-niche is a specific F*C*process*.

F*C*Hi* <a specific R**>: S//O \rightarrow *R//S $\sim \sim$ S/CK*M**//P*(8TM*++)//Hi*(7TM*++)//O(8TM*++) \rightarrow *R/CK*M**//P*(8TM*++)//Hi*(7TM*++)//S>. Where P*(8 TM*++): 0**, COR**, SD*(4TM*), SK**, traffics**//traffics**, 8TM*(1-4), distribution*institution*, mF*C* M**COR**, etc; Hi*(7TM*++): Hi**CK**M** COR** C4ISR**IT*DB*, etc; O(8TM*++): real-P**//logistics* \downarrow M*QS*COR** \rightarrow information*P**//processes*: sub P(\prod F*C*(k, r)).

EV*M**//periodicity* \rightarrow *phenology law (Hopkins) \rightarrow *processes*periodicity**//F*C*space**//eco-niche**//classification*.

In ecology*, there are a lot of TM* to be P*-developed such as: city, traffic, bio-recap, eco-pyramid, synthetic geography district division, eco-niche, dynamic FN* <field*net*> of population, etc. including the EE*V*-PMT-CB* for many TM in ecology. Consequently, it is of a transfield research combining systems science, ecology, KD* and other topics.

The TM* is the basic one for modern IT-styled logistics*, C4ISR*, traffics**//traffics**, control systems, cost-OR, WEM*, systems engineering, military, OS, internet, network, maneuvers//maneuvers*, e-business, e-government, digital engineering, digital manufacturing//prototyping manufacturing, virtual enterprise, etc.

F*C*Hi* can be considered as a EE*V**//Hi* of the TM* $\sim \sim$ mF*C*IO*OT*COR** montage*in the BTM*.

P*-thesis: the various activities of WHF*SEM* can be considered as SD*(4TM*)EI** 0**COR** on FN* ($\subset (A \cup A2) \times W$) with base A $\sim \sim$ some EEE*EE*V*space**//P(\prod F*C*(k, r)), specially the modernization activities are mainly abnormality* normality* M**0** (mmcm)COR**//PCR**initiative*superiority** scheme**SD**CK**OT**maneuvers**//F*C*Hi**//C4ISR** on FN* with base A $\sim \sim$ constantly developing or EEE*EE*V*space**//P(\prod F*C*(k, r)).

C* is F*circulation*, a specific F*M**//M* of things//F*FN*, the related prototypical logoi include: circulation, communication, transportation, bus, transaction, connection, flow, pipeline, road, language, translation, reasoning, method, methodology, media, network, browser, driver, interface, market, exchange, etc. The TM* of C* is a category with large extension connected with mTM such as recap, memory, storage, translation, information*, dialectics*, reproduction, paste, vitality*, WHF*SEM*, traffics*, math*, logic*, internet*, search engine, topology*, EI*, transaction, M*, institution*, knowledge, knowledge base, DB, bus, OS, education, etc.

The concretion actualizations of C* include: F*P*OT*CK*M*; F*P*OT*CK*M*COR**; F*C*P* OT*CK*M*; F*C*P* OT*CK*M*COR**;
C*(mn): F*C*P*address*(m)//car* → F*C*P* address*(n), etc.

C** : C*/CK*OT*M*SS*//0**COR**//C*F* → *vitality*/C**COR**.
C** : 0**COR**SS*/CK*OT*M*C*///mF*C*0*D*0**COR**//100T*//vitality
* → *Hi*// computer-Internet → *0**COR** SS*/CK*OT*M*C*///DBS → *max*
vitality*.

C** is an important logos* for F*C*vitality*traffics*WHF*SEM*ecology*war*
politics*medicine*//0**COR**.

C*(100 modes+)//QS*(100 modes+): C*, memory, storage, copy, heredity, modeling, paste, preservation, print, preview, title, subhead, summary, keywords, sketches, illustrations, blueprint, forecasting, metaphor, analogy, depictions, science, technology, transfer, transmission, paint, representatives, United Nations, writing, learning, teaching, differentiation-styled growing of stemcell, holograph, fractal, repetition, the relationship between the existence and consciousness, data, information, performance, symmetry*, periodicity*, symphony*, literature, arts, dance, the relationship among the four levels of database, the relationship of the multi-level computer language translation, the relationship among of seven level structures of the internet, and so on; and the QS* implies in general certain related 0**C* apparently or potentially. Furthermore, C*: supply chain, city chain, market chain, industrial chain, knowledge chain, food chain, bank, channel, tube, road, etc.

Vitality*/biosystems*/strength*: COR**CK*C**M*//0**R**Q**//adaptation*
life*(7 TM*+)//mF*C* → *vitality*/strength*.

A specific class of xy*Q**D*0*0**COR** connected with SD*EI*F*C*
CK* ~ ~ 0**(SD*EI*) COR** ~ ~ D*EI*(structure*function*, systems*
environs*) = *0**//OR** ~ ~ vitality*/strength*.

3. Pansystems evolution, ecology and KD*

There are various modes of evolution: biosystems, vitality, cognition, intelligence, genetic epistemology, society, social organization, science and technology, TM, thoughts, culture, religion, KD*, etc. And the P*-common mode is reduced to R**ecology*.

Evolution*: subject*vitality*(n)/M*CK*OT*D*EE*V*//0**COR**apriority*(n)//
en-virons*object*(n) → *R(n)//subject*vitality* (n + 1)environs*object*(n + 1)0**
COR**apriority*(n + 1).

In general, evolution* is CB*M*min*V*max*V*//CB*M*0**(min*)0**(max*) →
*0**(mm)periodicity*.

In general, biosystems, inherence is corresponds to min*V*//0**(min*)//
[D*xy* = *0**//min*], and the adaptation//variation to max*V*//0**(max*)//
[D*xy* = *0**//max*].

The more complex periodicity or CB* is the 0**(mmcm)-periodicity* or CB* ~ ~
M*COR**//0** (min*mid*chaos*max*).

They are typical modes of evolution*.

In eighteenth centenary, the lifework of Kant was to argument the TM:
knowledge = CB*experience* apriority*(14 categories).

The BTM*(200logoi*++) can be considered as a sublation* of Kant's 14
categories.

The Darwin's evolution can be considered as another EE*V* recap of Kant's conception potentially.

In the field of the philosophy of science and KD*, Kuhn's history theory is another EE*V* recap.

Based on the observation of children intelligence growth, the genetic epistemology due to Piaget is a specific development of Kant's conception into psychology growth and KD*.

The evolution*/R**ecology* is a unified TM* to CB* many TM: Kant, Darwin, Haeckel, Piaget, Kuhn, etc.

The academic research of Kant, Piaget and Kuhn, in substance all are of the investigations on KD*.

4. Pansystems management and ecology

Laozi said in his doctrine Taoism: the normality will be changed into abnormality, and vise versa, the abnormality will be changed into normality ... by using normality to manage the state, and abnormality to operate warfare.

The management to state and warfare concentrates the great intelligence of powerful people, so they present the most important background and source material to the development of various logoi of management. Pansystems management, in his own developing course, combines the western science and eastern philosophy, and pays attention to the point mentioned sufficiently and moreover to the general OR of common social systems with biology-physiology conception of complexity and transfield internet-styled academic exploration.

The prototypical semantic meaning of the term cybernetics is concerned with the state management: Helmsman craft to OT* large-scale systems.

But even if for the state management, every state has its own specific environs*: history, geography, culture, religion, habitat of nationality, national relations, national consciousness, historical reconciliations, collective unconsciousness and subculture, PCR*, mF*C*-conditions, etc. So the related management has to have corresponding suitable mode, style or institution.

For example, in the recent world, France, German, Italy, Canada, Brazil, South Africa, Egypt, Austria, Australia, Poland, Holland, China, Britain, the USA, Russia, Japan, European Communities, Sweden, Switzerland, Korea, India, Iran, Iraq, Lebanon, Israel, Cuba, etc. they are quite different each other. Some people attempted to build a unified political institution to govern the whole world; this is nothing but a dreamlike Utopia. The realistic world has to be multivariant coexistence with PCR*/COR**. Indeed, interrelationship among the human society and other bio-communities should also adhere to this ecology* logos.

The so-called pansystems management (management*) is a research and applications of pansystems logoi to management.

Within the COR** (with expansion of 25 or more logoi* ~ ~ 10153 TM*: 10 laws*15 methods*3 OR*), in 1990, pansystems theory has developed an exploration-styled investigation to summarize 20 or more logoi about management and behaviorism (Wu, 1990). And now within the new history comprehension, we present a developed framework with 50 TM* or more concerning basic logoi* concerning management*:

Ecology*, P*S*R*EI*S*F*C*perfection*0** COR**L*R**SD*CK*C4ISR*, SS*0* min*mid*chaos*max*OT*, knowing-practicing(KP**/KP**), M*, V**//contingency**/adaptation*: L* meets change//V**/environs* with change//V**, derivative(D**/V**), dif-ference-identity-order(DIO*, =*), maneuvers*, eq*(0**//equations-equalities-inequalities), simulation(QS*), quantification(Q*), value, war(war**(11logoi*++)), yinyang-duality-binary(xy*), field-network(FN*), scale, weight, paradox-contradiction-regret(PCR**/PCR**), variational principle (0*), approximation (app*, 0**), perfection (OR*, 0*), generalized suboptimization and OR(OR*, 0*), satisfaction criterion (OR*, 0*), flexi-bility(OR*), macro-order-focus-fast(MOFF*), forecast-maneuvers-decision-game(FMDG*), etc. In general, the 50concepts* + + are SS* as certain forms 50xy*++.

Management**/ecology**/contingency**/0**: management*V* = F(environs*V*).

Behaviorism*. The famous Hawthorne experiments in fact is of a specific COR**, which unveiled a 0**-ecology*-law: enthusiasm*V* = F(max*social-environs*V*, min*natural-technical-environs*V*).

In a common-sense, management is a behavior of the members of the organization in a certain environs; it is in order to achieve the purpose of organization with improving the efficiency of organizational resources. It is connected with ecology*.

According to R**, management* is a behavior//CK*C*OT*M* of the members of the organization//subject* in a certain environs*, it is in order to achieve the purpose of organization with improving the efficiency of organizational resources//EI*SD*(4TM*++) COR**SK**Hi*C4ISR**/BTM*(200logoi*++)//0**COR**.

In fact, all management are in pursuit of certain COR**//SK*laws//CK**//F*C**//Vitality*. Management* is of specific CK*C*OT*M**//COR**. CK*M*COR**//((social-S**//mF*C*) → *survival//development//promotion of vitality**//ecology*; (PCR*COR**//EI*SD**//PCR*)//O(F*C*vitality**//social-S* → *survival//development//promotion of vitality*.

In other words, management* is embodied as OT*CK*M**//mTM**//0**COR**SD*(4logoi*++)EI*SK*(11logoi*++)//mTM**//Objects* nF*C* → SS*COR**max*vitality*.

OT*CK*M**//mTM**//mTM**//vitality* → SS*COR**max*vitality*.

OT*CK*M*C*COR**C4ISR* → SS*COR**max*vitality*.

And the modern management is mainly embodied as: S*QS*Hi*decision*COR**. CK**//COR**//processes**//FC*space* → SS*PRFS*vitality*.

R**: management*subject*(n)/CK*C*OT*M*(n)//EI*SD*(4TM*++)COR**SK**Hi* C4ISR*(n)//BTM*(200logoi*++) //0**COR**//F*C*process*vitality*(n) → F*C*process*vitality*(n + 1).

The gist of pansystems philosophy of management is: CK*M*C*OT**//((overall D*distri-bution*perfection*COR**//mEI* <multilayer-EI*: systems*environs*structure*function*>// 0**Q**methods*)//((social-S**//mF*C*process* vitality*) ~ ~ 0**COR**/d(xy) = 0*:

(mxy*: F*C*distribution*engineering*design* and SS*social-S*, etc) → PRFS**//social-S* ~ ~ 0** COR**Q*methods**//((computer, internet, automation, organization)//(DM, DH, DB)//information(financial accounting, ON* <operating the old to creating the new>design*).

Another related expansion is: Management* <CK*M*C*OT*COR*/// (social-S*//mF*C*) → *survival//development//promotion of vitality*; (PCR*COR*// EI*SD*///PCR*)//O(F*C*vitality*)///social-S* → survival// development//promotion of vitality*>.

Management subjects* <R**//subjects*, R**//environs*//sub-subjects*super-subjects*invisible-subjects*//culture*legality*religion*geography*history*, policy*, distribution*, politics*, institution*, diplomacy*, economy-condition*environs*, F*C*, War* <arms-styled abnormality*CK*///social abnormality* PCR*>>.

From the P*-view mentioned we can rediscover VTM of various schools of management in the history: classical management, behaviorism-styled management, modern management with social organization theory, systems science, decision theory, mathematical modeling, OR, IT, etc. including the following management-TM (concretion logoi, categories, principles, theories and methods):

ERP, OS, Unix, DBS, MBO, C4ISR, PERT, internet, logistics, principle of systems, feedback principle, composite control principle, elasticity principle, ABC method, the 14 principles, decision theory, contingency theory, need hierarchy theory, the basic 5-10 functions of management, integration-division-synthesis principle, Hawthorne effect, etc. including 50 or more logoi about management and behaviorism.

5. More on pansystems KD and ecology

The knowledge rediscovery is connected closely with the ecology*//environs*. From the development history of science and technology, the history environs* of the Renaissance leads to the science revolution. The history environs* of Spring and Autumn Period (770-476 BC) and the Period of Warring States (475-221 BC) lead to the academic prosperity contention of a hundred schools of thought, like a hundred flowers in bloom, like ten thousand horses galloping ahead. The social environs* of freedom of speech, publication, academic research, and well-being social environs* promote the progress of KD*, science and technology and academic research. The basic policy of a state, the education policy, institution, methodology, and related diplomacy lead to the environs* to cultivate talents. The internet forms a new history information environs* which propels the society forward with radical changes.

The ecology*-exploration of KD* is connected with the pansystems research on pedagogy, teaching, leaning. And the potential mechanism is connected with the EI*environs*M*COR**, practice in the social environs, EI*goals*//PRFS*M*COR**.

The typical TM* on teaching* include 24 logoi* or more (Wu, 2008a, b, c), every one can be rediscovered//KD* from the viewpoint of ecology*//environs*.

Here, we list several TM* to detail-styled explanation: SS*, RRR*, RWTAP*.

SS*/D*/0*/0**//OR*. Learning and teaching is the social specific function of C*/C** to lead to max*vitality*. A basic teaching methodological principle is to teach people fishing (methods, methodology, KD*-modes, innovation principles, wisdom and C*-methods) but not supply something fishes (results, knowledge and C*-results). And the SS*-refined epitome of methods, methodology, KD*-modes, innovation principles, wisdom is the SS* itself. SS* is a SS*-summarization of various methods, methodology, KD*-modes, innovation principles, wisdom. The emphasis on SS* in substance is to use the alive process-method-styled environs* to substitute of dead knowledge-styled environs*. The successful teaching mode is heuristics with initiative association, innovation and KD*, and in order to practice//KP**, from practice to learn

flexible practical knowledge, skills, methods and TM; the fail-styled teaching mode is instillation to deal with exams. Through practice to learn various concretion TM of SS*, the mode itself is embodied as an active environs* to mould a talent figure.

In the organization of teaching, we should develop the environs* to realize the practical processes, activities or drama-playing to teach SS* itself: to learn SS* for some complex or complicated cases, every partner is both director and performer in SS*-drama.

This is an era of information explosion, data explosion and knowledge explosion. And the explosion is of chain-style. This is just a specific era-environs* with C**//C*N*C*. Every branch, every field, every topic are full of a lot of message or TM, and to find and master related SS*-TM and SS*-skills needed for serving the survival and development is the basic capacity of freedom-people.

There is a TM* called 358** realizing SS*: SS*-knowledge base (358*: 3-5-8 or more basic TM) + SS*-flexibility-method base (358*: 3-5-8 or more basic TM) → * SS*-successful learning-teaching → * max*vitality*//survival and development.

The concretion practice of 358** is connected with potential ecology*//environs*.

RRR* (recap, re-proof, rediscovery). The TM* stresses on the recap of the process-environs* of innovation, creation, discovery, proof, etc.

RWTAP* <reciting, writing, transformation*//OT*, translation*, aim-drawing, problem* HMO*-quizzing//0**COR**EI* SD*8TM*BTM* with interior interest, hobby, infatuation, habit and even addiction>. The TM* presents some concretion modes or contents for training, learning and teaching, in the practical OT*perform to SS*RRR* they replenish C**//C*-details or QS*-plots, and so strengthen the EI*environs* of wisdom development.

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