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Original Paper

Short Elucidating Note 126: Stating the structural falsification theorem for specific paradigms of the form K = L, its main conceptual applications and its extension of Popperian logic and of Kuhnian logic all in compressed form using set theory and sustainability gap theory?

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Abstract

The specific paradigm's structural falsification theory suggest that paradigms of the conjunctural form K = L or inherently conjunctural paradigms that claim to have such a form invalidate themselves when applying unilateral pressures (e.g. Maximization, optimization, growth, de-growth) either to K so K → L or to L so L → K as then as the conjunctural equality (K = L) becomes structurally destabilized creating sustainability gaps (SG › 0), which leads to falsification. This paradigm specific's structural falsification theory above can be adapted to accomplish two paradigm specific compressing goals 1) to capture and state key concepts in compressed form using set theory and sustainability gap theory such as model consistency/inconsistency, methodology consistency/inconsistency, frameworks of true sustainability/dwarf sustainability, hard/soft structural kill, strong/weak sustainability, and the theory-practice consistency principle; and 2) to extend Popperian falsification and Kuhnian paradigm replacement evolution into explicitly compressed conjunctural structural system thinking. The paper has the following goals: 1) To state the structural falsification theorem for specific paradigms of the form K = L, its main conceptual applications and its extension of Popperian logic and of Kuhnian logic all in compressed form using set theory and sustainability gap theory; and 2) to point out how this component specific structural falsification logic, in terms of concepts and of Popperian thinking and Kuhnian thinking extensions to conjunctural thinking can be generalized as the next step of this line of research/thinking to point out that this logic applies across specific paradigms and across academic fields where inherently conjunctural systems are assumed to be separable.

Keywords: Structural Falsification Theory, Conjunctural Paradigms, Sustainability Gap Theory, Set Theory, Popperian Falsification, Kuhnian Paradigm Evolution, Conjunctural System Thinking

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Key concepts

1) Conjunctural structure, a system in which all core components must remain simultaneously active and mutually reproduced for the system to preserve its defining identity as no full or partial component separability exists.

2) Non-conjunctural structure, a system in which not all core components do not need remain simultaneously active and mutually reproduced for the system to preserve its defining identity as full or partial component separability exist.

3) Empirical testing, the popperian way of falsifying paradigms.

4) Structural testing, the pre-empirical evaluation of whether a paradigm preserves its internal conjunctural balance conditions.

5) Paradigm replacement, the Kuhnian way of paradigm evolution.

6) Conjunctural paradigm evolution, the process through which structurally invalidated paradigms are replaced, adjusted, or reorganized to restore structural validation.

7) Conjuncturality, the condition in which system components are mutually dependent for the preservation and reproduction of the system's defining structure.

8) Separability, the assumption that conjunctural systems or inherently conjunctural systems can be modeled as fully or partially independent components, thereby permitting unilateral optimization or pressure application.

9) Structural equality, the conjunctural balance condition whose preservation or restoration leads to structural validation, and whose violation leads to structural falsification.

10) Sustainability gaps, the structural deviations that emerge when unilateral pressures are applied to non-distorted conjunctural systems, or to inherently conjunctural systems assumed to be fully or partially separable.

Terminology

K = L means a specific conjunctural system

K = KL = LK = L means a structural reproduction condition, not arithmetic identities

"=" means structural co-reproduction;

"→" means directional pressure or implication;

"SG" measures deviation from conjunctural balance;

"M" denotes managed status.

A = Active social component B = Active economic component

C = Active environmental component a = Passive social component

b = Passive economic component c = Passive environmental component

A_M = Managed social component B_M = Managed economic component

C_M = Managed environmental component

S = Sustainability

TS = ABC = True sustainability → Components in active form

DWS = $A_MB_MC_M$ = Dwarf sustainability → Components in managed form

DGM = A_MBC = Dwarf green market → Social component in managed form

DWRM = ABC_M = Dwarf red market → Environmental component in managed form

SG = Sustainability gap → Structural gap or measurement gap

CRT = Critical threshold → Partial viability

CTR = Bounded critical threshold

SC = Structural consistency → No sustainability gaps present

SIC = Structural inconsistency → Sustainability gaps present

MAX = Maximization/maximum * = Optimization/optimal

G = Growth as unilateral pressure D = De-growth as unilateral pressure

FSC = Full structural consistency SICb = Bounded structural inconsistency

FC = Full conjunctural structure NFC = No full conjunctural structure

FUN = Full unsustainability SSU = Strong sustainability

WSU = Weak sustainability ≺ = Logically prior

PSICb = Partially bounded structurally inconsistency

FSV = Full structural validity PSV = Partial structural validity

FSF = Full structural falsification FSIV = Full structural invalidity

FSIC = Full structural inconsistency FSICu = Unbounded full structural inconsistency

PSC = Partial structural consistency Ku = Unbounded development type K

ED = Economic development model B = The economy active

M = Red socialism model A = The society active

E = Environmentalism model C = The environment active

Introduction

A) The nature of the specific paradigm's structural falsification theorem

The nature of the structural falsification theorem for specific paradigms of the form K = L has been recently shared (Muñoz 2026a). And some known specific cases that claim to have the inherently conjunctural form K = L, but assume component separability are i) the traditional market of Adam Smith where K = D = traditional economic development and L = B = economy; ii) the red socialism model of Karl Marx where K = M = social development and L = A = society; and iii) the deep environmentalism model where K = E = Environmental development and L = C = Environment.

B) The balance condition of the specific paradigm structural falsification theorem

Here the balance condition to be respected or violated here is:

K = KL = LK = L

Notice that the specific equalities here are not arithmetic identities, but specific structural reproduction conditions indicating mutual conjunctural dependence. In other words, structural equalities in this paper are not arithmetic equalities. They denote mutual reproduction conditions among conjuncturally dependent components.

1) Structural validation

A paradigm K is structurally validated if unilateral pressures (→ or ←) do not lead to sustainability gaps as system equality K = L is maintained or restored.

[K→L or K←L] → SG = 0

Maintaining conjunctural equality K = L means no sustainability gaps. Structural validation in K or L arises when inherently conjunctural systems are treated as fully codependent systems under joint optimization or maximization pressure.

2) Structural falsification

A paradigm K is structurally falsified if unilateral pressures (→ or ←) do lead to sustainability gaps as system equality K = L is not maintained or it is violated.

[K→L or K←L] → SG > 0

Violating conjunctural equality K = L so that K ≠ L leads to sustainability gaps (SG). Structural falsification in K or L arises when inherently conjunctural systems are treated as fully separable systems under independent optimization or maximization pressure.

Objectives

1) To state the structural falsification theorem for specific paradigms of the form K = L, its main conceptual applications and its extension of Popperian logic and of Kuhnian logic all in compressed form using set theory and sustainability gap theory; 2) to show how this component specific structural falsification logic, in terms of concepts and of Popperian thinking and Kuhnian thinking extensions to conjunctural thinking can be applied to falsify well-known deep development paradigms and to indicate that their falsification leads to the need of conjunctural paradigm replacement; and 3) to point out how this component specific structural falsification logic, in terms of concepts and of Popperian thinking and Kuhnian thinking extensions to conjunctural thinking can be generalized as the next step of this line of research/thinking.

Stating the links between structural falsification theory for specific conjunctural systems of the form K = L in compressed form and their implications

The detailed links were highlighted recently both in specific and general terms (theorem and application to concepts and expansions) (Muñoz 2026b), below is the compressed form of the links between structural falsification theory for specific conjunctural systems of the form K = L in compressed form and their implications

i) The core conjunctural condition of the structural falsification theorem for specific paradigms of the form K = L

The core condition to be respected or to be violated is the following:

K = L

Where equality (=) means mutual structural reproduction, not arithmetic identity.

ii) The specific paradigm's Structural State Theorem

1. Full Structural Validity (FSV)

A paradigm of the form K = L is fully structurally valid (FSV) when conjunctural equality is preserved under transformation:

K ≡ L

In other words, the fully structurally valid paradigm (FSV) has the following set form:

K⊆L ∧ L⊆K

Therefore:

K= L

And this implies:

SG = 0

Then the absence of sustainability gaps (SG = 0) tells us that there is full structural consistency (FSC);

SG = 0 → FSC

Hence:

FSV⇒FSC⇒TS,

Where TS = True sustainability

In other words, the respect of the conjunctural condition for specific paradigms of the form K = L means a) Full structural consistency (FSC); b) No sustainability gaps; c) True sustainability (TS); d) No replacement pressure; and e) No hard kill condition at the same time, and this can be summarized by means of the following compressed chain:

K = L⇒ SG = 0 ⇒FSC⇒TS⇒ Full Viability

2. Partial Structural Validity (PSV)

A paradigm of the form K = L is partially valid (PSV) when conjunctural equality is only partially preserved:

K ≈ L

In other words, the partially structurally valid paradigm (PSV) has the following set form:

K∩L ≠ ∅, but **K ≠ L**

The above expressions tell us a) That some conjunctural overlap exists; b) that some structural reproduction remains; and c) that sustainability gaps are bounded.

Therefore,

0 < SG < CRT,

Where CRT = Critical threshold

And the existence of the critical threshold (CRT) tells us that there is partial structural inconsistency (PSIC), which is bounded (PSICb), which means:

$0 < SG < CRT \rightarrow$ PSICb

Where PSICb = Bounded partial structural inconsistency

Hence, partial structural validity (PSV) means bounded partial structural inconsistency (PSICb) so that:

PSV⇒PSICb

Where: PSICb = bounded partial structural inconsistency

In other words, the partial respect of the conjunctural condition for specific paradigms of the form K = L means a) Partial structural consistency (PSC); b) Sustainability gaps exist but bounded; c) dwarf sustainability (DWS); d) Some replacement pressure exist; and e) Soft kill condition exist at the same time, and this can be summarized by means of the following compressed chain:

$K \approx L \Rightarrow 0 < SG < CRT \Rightarrow$ Bounded PSIC⇒ Partial viability

And partial viability means that partial viability is consistent with the following operational concepts: a) Weak sustainability; b) Dwarf sustainability; c) Constrained viability; d) Partial compensability; and e) Managed sustainability as all of them required bounded partial structural inconsistency (PSICb), which can be stated as done below:

$K \approx L \Rightarrow 0 < SG < CRT \Rightarrow$ PSICb

And in the long term the accumulation of structural inconsistency pressure (SIC) will expand sustainability gap pressures (SG) and binding accumulation of pressures leads towards full unsustainability (FUN), which can be stated as:

$K \approx L \Rightarrow 0 < SG < CRT \Rightarrow$ PSICb ⇒ FUN

So that in the long term bounded partial structural inconsistency (PSICb) will tend towards full unsustainability (FUN) as the biding sustainability gap (SG) expands and approaches the critical threshold (CRT).

3. Full Structural Falsification (FSF)

A paradigm of the form K = L is fully structurally falsified (FSF) when conjunctural equality collapses:

$K \not\equiv L$

In other words, the fully structurally invalid paradigm (FSIV) has the following set form:

$K \cap L = \emptyset$

And this means that in fully structurally invalid paradigms of the form K = L, a) the sustainability gap (SG) tends toward infinity or the sustainability gap (SG) is greater or equal than the critical threshold (CRT) so that:

$SG \rightarrow \infty$ or $SG \geq CRT$

And when the sustainability gap (SG) tends to infinity (SG→∞) or it is equal and greater than the critical threshold (SG ≥ CRT), then there is full structural inconsistency (FSIC), which is unbounded (FSICu)

Therefore:

FSF⇒ FSICu

Where FSICu = unbounded full structural inconsistency

In other words, the violation of the conjunctural condition for specific paradigms of the form K = L means a) Full structural inconsistency (FSIC); b) Sustainability gaps are unbounded; c) Full unsustainability (FUN); d) Full replacement pressure exist; and e) hard kill condition exist at the same time, and this can be summarized by means of the following compressed chain:

K∩L = ∅ ⇒SG → ∞ = SG ≥ CRT⇒ Full collapse

And full collapse means non-existence so the compressed chain can be expanded to:

K∩L = ∅ ⇒SG → ∞ = SG ≥ CRT⇒ Full collapse ⇒Hard Kill ⇒Non existence

iii) The specific paradigm's Master Structural Classification table

The nature of the structural conditions is the beginning of a chain of conditions that lead to different paradigm existence possibility and to the sense of expected dynamic paradigm evolution depending on the nature of the respect of the structural balanced condition:

Master Structural Classification table for paradigms of the form K = L

Structural Relation	Gap Condition	Structural State	Sustainability Meaning	Kill Condition
K = L	SG=0	Full consistency	True sustainability	None
K ≈ L	0<SG<CRT	Bounded inconsistency	Weak/dwarf sustainability	soft kill
K∩L= ∅	SG≥CRT	Full structural collapse	Full unsustainability	Hard kill

The table above links structural conditions, sustainability gap, structural consistency, nature of sustainability and structural nonexistence possibilities providing a sense of dynamic mobility from full respect to partial respect to violation of the structural balance condition and its consequences in terms of full or partial paradigm existence while also given the sense that the dynamic accumulation of sustainability gaps under bonded viability will sooner or later push the partially viable paradigm towards full unsustainability.

iv**) The compressed logic of true and dwarf sustainability thinking:**

Sustainability thinking can be divided into two subsets, true sustainability (TS) and dwarf sustainability (DWS), as explained below:

a) True Sustainability

When all components, social (A), economic (B) and environmental (C), are present in active or dominant form, we have true sustainability (TS):

TS=ABC

Hence, true sustainability implies full conjuncturality (FC) or full structural consistency (FSC), which can be expressed in set form as:

TS = FC = FSC = A∩B∩C ≠ ∅

And this means that all components are mutually reproducing so that:

A≡B≡C

And therefore, true sustainability does not produce sustainability gaps (SG) as indicated below:

TS⇒SG= 0

And the whole process above can be expressed in chain form as indicated below:

TS=ABC⇒FC⇒FSC⇒SG= 0

Hence, true sustainability (TS) means a) Full conjuncturality (FC); b) Full structural consistency (FSC); c) No sustainability gaps; c); d) No replacement pressure; and e) No hard kill condition at the same time. The idea of the structure of the true sustainability markets as markets without sustainability gaps or perfect conjunctural structure has been pointed out (Muñoz 2016).

b) Dwarf Sustainability

When components, social (A), economic (B) and environmental (C) are assumed separable under management (M), then we have dwarf sustainability (DWS):

DWS=$A_M B_M C_M$

Where DWS = dwarf sustainability

Or mixed forms of dwarf sustainability such as for example Dwarf green markets (DGM), markets under environmental management (C_M); and Dwarf red markets (DRM), markets under social management (A_M), with the following structures:

DGM=A_MBC

DRM=ABC_M

Where DGM = Dwarf green market and DRM = Dwarf red market

Therfore, the above implies that there is a sustainability gap (SG) in which there is a critical threshold (CRT) leading to partial viability or partial existence, which can be indicated as follows:

0< SG < CRT⇒ Partial viability

And partial viability means that dwarf sustainability (DWS) has a critical threshold (CRT) that is bounded (CRTb); and therefore, it has a bounded partial structural inconsistency (PSICb) so that:

DWS⇒PSICb

And this partial bounded structural inconsistency (PSICb) will accumulate sustainability gap pressures (SG) that become dynamically binding in the long terms leading dwarf sustainability (DWS)'s soft kill structure towards full unsustainability (FUN), a situation that can be expressed in chain form as:

DWS ⇒Bounded SG ⇒ Soft Kill ⇒ Long Run Instability⇒ FUN

In other words, dwarf sustainability means: a) Partial structural consistency (PSC); b) Sustainability gaps exist but bounded; c) Full conjuncturality does not exist (FC = 0); d) Some replacement pressure exists; and e) Soft kill condition exist; but in the long-term accumulation of inconsistency pressures will push dwarf sustainability towards full unsustainability. The idea of dwarf sustainability as structurally incomplete markets under management and different economic logic has been recently pointed out as compare to its perfect counterpart (Muñoz 2019a).

v) The compressed compensability logic behind strong sustainability and weak sustainability as it relates to paradigms of the form K = L

In terms of compensability or substitution sustainability thinking can be divided into two groups, strong sustainability (SSU) and weak sustainability (WSU), as indicated below

a) No substitutability and Strong sustainability

Under strong sustainability thinking (SSU) there is no substitution of critical capital by another form of capital so that:

K= L as the structural balance condition is respected

Hence: there is full structural consistency (FSC) in strong sustainability (SSU) and therefore, it is consistent with the concept of true sustainability (TS) so that

SSU⇒FSC⇒TS

Strong sustainability thinking (SSU) is fully conjunctural (FC), and hence is consistent with true sustainability (TS).

b) Partial substitutability and Weak sustainability

Under weak sustainability thinking (WSU) there is partial substitution of critical capital by another form of capital so that:

K≈ L

And this means that there is a partial bounded structural inconsistency (PSICb) in weak sustainability (WSU), which makes it consistent with dwarf sustainability (DWS), as indicated below:

WSU⇒PSC⇒ PSICb⇒DWS

Therefore, weak sustainability thinking (WSU) is not fully conjunctural (NFC), and hence is inconsistent with true sustainability (TS).

c) Full substitutability assumption

When you assume that the components of the conjunctural system K = L can be fully separability, then you can have full substitution, which means:

K∩L= Ø

And when there is full separability and full substitution then there is full structural falsification (FSF):

K∩L= Ø ⇒FSF

So the system is fully unsustainable (FUN):

FSF→FUN

Where FUN = Full unsustainability

vi) Compressed Theory–Practice Consistency Principle (T-P principle)

The theory-practice consistency principle (T-P principle) can be compressed as follows:

a) Validity condition

The validity condition can be expressed in general and in conjunctural terms as indicated below:

1) **The structure and method consistency requirement:**

Structure (K=L) ↔Method (K=L)

2) **The conjunctural structure and conjunctural method consistency requirement:**

The conjunctural consistency requirement works both ways is:

Conjunctural Structure ↔ Conjunctural Method

A conjunctural method for a conjunctural structure and visa a verse is the conjunctural consistency requirement.

3) Implication

When structure is consistent with method, then full structural validate (FSV) exist so that

Conjunctural Structure ↔ Conjunctural Method ⇒FSV = Full structural validity

And this means the theory-practice consistency principle (T-P principle) is fully respected.

b) **Violation condition**

The violation condition can be expressed in general and in conjunctural terms as shown below:

1) **The structure and method inconsistency requirement:**

Structure (K = L) ↔ Method (K ≠ L)

Where ↔ means structure-method inconsistency.

2) **The conjunctural structure and conjunctural method inconsistency requirement:**

Conjunctural Structure ↔ Non-conjunctural Method

So, there is a mismatched method and structure.

3) Implication

When structure is inconsistent with method, then full structural invalidity (FSIV) exist so that:

Conjunctural Structure ↔ Non-conjunctural Method ⇒Structure-method inconsistency

And this means the theory-practice consistency principle (T-P principle) is fully violated.

c) The consistent form principle

The theory practice consistency principle (T-P principle) requires consistency across structure, testing method, and paradigm replacement, which means:

TPC ↔ Structural Form = Testing Form = Replacement Form

Hence, the paradigm testing form and the paradigm replacement form must be consistent with the structural form; and the theory-practice consistency principle (TPC) is respected.

vii) Compressed Extension of Popper

The extension of Popper's idea (Popper 1965) into the conjunctural world can be compressed as follows:

a) Traditional Popper

The world of Popper (Popper 1965) is about empirically testing paradigms (P), which can be indicated as done below:

P⇒Empirical Testing

Where: P=paradigm

b) Structural Popper Extension

That method can be extended by adding a structural validity test before empirical testing so that:

1) If there is structural validity so that K = L, then

K =L ⇒Structural Admissibility⇒Empirical Testing

2) If there is structural invalidity so that K ≠ L, then

K ≠ L ⇒Pre-Empirical Falsification

3) The main implication:

Structural inconsistency ≺ Empirical inconsistency

Where: ≺ = logically prior

In other words, before empirical inconsistency there is structural inconsistency

viii) Compressed Extension of Kuhn

a) Traditional Kuhn

The paradigm replacement idea of Kuhn (Kuhn 1970) based on anomalies can be extended to the conjunctural world as indicated below:

PA⇒Paradigm Shift

Where PA = Paradigm with anomalies

b) Structural Kuhn Extension

1) The case of a structurally falsified paradigm

A structurally falsified paradigm needs conjunctural replacement, a situation summarized as shown below:

K ≠ L ⇒Structural Anomalies⇒Conjunctural Replacement

2) The case of a structurally validated paradigm

A structurally validated paradigm does not need replacement, a situation summarized as indicated below

K =L ⇒No Structural Replacement Needed

3) The implication

Replacement necessity comes when there is structural inconsistency so that then:

Structural inconsistency ⇒ Replacement necessity

ix) The Separability Curse in Fully Compressed Form

The assumption that conjunctural systems or inherently conjunctural systems like K = L can be treated as separable components leads to paradigm falsification as summarized in the following chain:

(K = L) ⇒Separability ⇒Asymmetry ⇒ SG ⇒ Falsification

In other works, conjuncturally under separability leads to paradigm collapse:

Conjuncturality ⇒ Separability ⇒ Collapse

And the existence of falsification or collapse indicates needs of consistent form of paradigm replacement to respect the theory practice consistency principle as indicated below:

Conjunctural (K = L) ⇒Separability ⇒ Asymmetry ⇒ SG ⇒ Falsification or collapse ⇒Conjunctural paradigm replacement

x) The conjunctural structure-structural co-reproduction principle

1) The nature of the interaction model structure and co-reproduction

This interaction can be stated as full or partial or non-existence

a) Full interaction state

Full conjunctural structure requires full structural co-reproduction and vise a versa, as stated below:

Full conjunctural structure (K = L) ↔ Full structural Co-Reproduction

And structure and co-reproduction consistency leads to full structural paradigm validation (FSV):

Full conjunctural structure (K = L) ↔ Full structural Co-Reproduction → FSV

b) Partial interaction assumption

Conjunctural structure under partial separability requires partial structural reproduction as stated below:

Conjunctural structure (K = L) under partial separability → Partial structural reproduction

And partial structural reproduction leads to partial validation, partial existence, soft kill, and in the long-term it drives the paradigm towards full unsustainability (FUN) as sustainability gap dynamically accumulate:

Partial structural reproduction → Short term partial viability

c) The full no interaction assumption or full independent assumption

Conjunctural structure under full separability leads to structural non-reproduction as stated below:

Conjunctural structure (K = L) under full separability → Structural non-reproduction

And loss of structural reproduction or structural non-reproduction leads to paradigm falsification, collapse, hard kill, and consistent replacement

Structural non-reproduction → Paradigm collapse

2) The main implications of falsification and full validation thinking in compressed form as shared above

The two main implications that can be pointed out here are:

a) The separability-based implication:

Structural falsification flows from the separability assumption,

Separability ⇒ Structural Falsification

And this means that separable thinking cannot fix non-separable thinking.

b) The pre-empirical based implication:

Structural inconsistency comes before empirical inconsistency:

Structural inconsistency ≺ Empirical inconsistency

Where ≺ = logically prior

c) The need for consistent form of paradigm replacement implication

When structural inconsistency is found then there is a need for consistent paradigm replacement:

Structural inconsistency → Need for consistent paradigm replacement form

d) Few lines summary

A summary of what is being proposed above in compressed form is: i) there is a need for a pre-empirical falsification layer; ii) there is a need for a conjunctural admissibility criterion; iii) there is a need for a structural extension of Popper's paradigm testing thinking; iv) there is a need for a structural extension of Kuhn's paradigm replacement thinking; v) there is a need for a

generalized sustainability consistency theorem; and vi) there is a need for a unified viability/collapse logic. .

xi) Future line of research

a) Linking the general structural falsication theory Ki = Lj to current approaches aiming at looking at reality from the structural point of view

b) Extending the general structural falsification theorem Ki = Lj across domains using general true sustainability theory

A practical application of the conjunctural falsification theory above and its extensions

We can show here in simple terms that well-known paradigms such as the traditional economic development a la Adam Smith, traditional social development or red Marxism a la Karl Marx and deep environmentalism thinking do not pass the pre-empirical test, why only the true sustainability paradigm or socio-environmentally friendly development market(TS) can pass the pre-empirical test, and that all deep development thinking roads lead at the end towards consistent conjunctural paradigm replacement a la true sustainability (TS), which is done below:

1) Stating the structure of known development models based on present-absent true sustainability theory:

The three well-known deep development paradigms are:

a) Traditional market = ED = Bac, where B = Economy only model

b) Red socialism market = M = Abc, where A = Society only model

c) Deep environmental market = E = Cab, where C = Environment only model

The well-known true sustainability paradigm is:

a) True sustainability market = TS = ABC,

Where ABC = Society-economy-environment model.

2) The paradigms that do not pass the pre-empirical structural validity test:

All deep models above, economy only model (Smith 1776), society only/red socialism model (Marx and Engels 1848), and environment only model, fail the pre-empirical structural test as all of them have abnormalities embedded in them since each of them is in essence a different expression of the same inherently conjunctural true sustainability paradigm (TS = ABC) as each of them uses specific, but different full separability assumptions and therefore, uses different unilateral pressures when violating balance equality and creating sustainability gaps as indicated below:

ED ≠ Bac → Falsification as SG > 0

Unilateral economic pressures under socio-environmental abnormalities lead to falsification

M ≠ Abc → Falsification as SG > 0.

Unilateral social pressures under eco-economic abnormalities lead to falsification

E ≠ Cab → Falsification as SG > 0.

Unilateral environmental pressures under socio-economic abnormalities lead to falsification

Hence, unilateral pressures and the structural inconsistencies introduced by separability assumptions lead to falsification and to the need for consistent paradigm replacement form, and as all of them are inherently conjunctural paradigms assumed to be separable the consistent paradigm replacement for each of them is true sustainability (TS) as only then all abnormalities are removed and structural consistency restored, and the theory-practice consistency principle is then respected. Paradigm replacement after falsification and paradigm death or merger or shift as indicated above are ideas consistent with sustainability theory already out there (Muñoz 2019b).

3) The paradigm that do pass the pre-empirical structural validity test:

Only the true sustainability paradigm (TS) passes the pre-empirical structural validity test as it has no social, economic, and environmental abnormalities as it can be seen below:

True sustainability market = TS = ABC → Validation since SG = 0.

4) The road of all deep development paradigm leads to true sustainability (TS) as the proper paradigm replacement tool:

We know that the theory-practice consistency principle requires structure-method-paradigm replacement consistency, and since all deep development paradigms are inherently conjunctural under different separability assumptions, then all of them are different forms of inconsistent conjunctural systems with sustainability gaps (SG > 0) which sooner or later become binding; and binding pressures led to the need for conjunctural paradigm replacement (CPR) so each of them removes its separability assumptions as indicated below:

CPR

ED ≠ Bac →→→→ TS = ABC and now SG = 0

Socio-environmental inconsistencies are internalized.

CPR

M ≠ Abc →→→→ TS = ABC

Eco-economic inconsistencies are internalized.

CPR

E ≠ Cab →→→→ TS = ABC

Socio-economic inconsistencies are internalized.

We can see that each deep paradigm above is structurally falsified and each of them needs conjunctural paradigm replacement (CPR) to eliminate their inconsistencies, which means that all paradigm evolution roads lead in the end to true sustainability (TS): Non-conjunctural paradigm replacement cannot restore or fix paradigm falsification or structural invalidity.

O) A two-line summary

No empirical finding can fix a structurally invalid paradigm K = L; and no non-conjunctural paradigm replacement can fix a structurally invalid paradigm. In other words, some paradigm fail before empirical testing because their structural assumptions already violate the reproduction conditions of the systems they claim to model, which means that we are moving the dynamics of failure from empirical contradiction to structural contradiction.

P) Generalizing the specific structural paradigm falsification theorem (K = L)

Future research will be focused on generalizing the specific paradigm structural falsification theorem to link its dynamic accumulation of sustainability gap affecting different academic domains in terms of paradigm statement, empirical testing, and replacement thinking so they can be unified by a general conjunctural theory:

K = L----------→ Ki = Lj

The shift leads to the general structural falsification theorem, to the general application to key concepts and to the general extension of Popperian thinking and of Kuhnian thinking into the general conjunctural dynamic theory, where separability, full or partial, creates sustainability gaps, and their accumulation leads to long term instability, paradigm death, merger or collapse; and where non-separability or restoring non-separability leads to true sustainability.

Conclusions

First, the paper states the structural falsification theory for specific paradigms of the type K = L. and use it to present a unified structural logic linking conjunctural balance, sustainability gaps, falsification, viability, paradigm replacement, methodological consistency, and the systematic application of all above to well-known deep development paradigms to show they all do not pass the pre-empirical structural validation test and that all of them are in need of conjunctural paradigm replacement in order to correct structural abnormalities. Second, the paper stresses that there is a transition from empirical contradiction to structural contradiction as structural inconsistency comes before empirical inconsistency (Structural inconsistency $\prec$ Empirical inconsistency) reframing falsification thinking from the old "the data failed the model" to the new 'the structure of the model already violates the reproduction conditions of the system under separability'. Third, the paper ties replacement necessity directly to structural inconsistency (Structural inconsistency $\Rightarrow$ Replacement necessity) as if there is conjunctural inconsistency then you need conjunctural paradigm replacement in order to respect the theory practice consistency principle. Fourth, the paper helps to see that at the heart of the structural falsification theorem presented above is the one directional logic where conjuncturality under separability leads to system collapse (Conjuncturality $\Rightarrow$ Separability $\Rightarrow$ Collapse). And finally fifth, the paper offers links to sustainability theory, weak/strong sustainability, market distortion, compensability, paradigm falsification, hard kill, soft kill, theory-practice consistency, structural viability, pre-empirical testing, paradigm evolution, and current need for conjunctural paradigm replacement of well-known deep development paradigms that fail the structural validity test such as the deep economy paradigm, the deep socialism paradigm, and the deep environmentalism paradigm.

In general, the paper highlights in logical terms with respect to specific conjunctural paradigms of the form K = L that a) Structural inconsistency precedes empirical inconsistency; b) Separability assumptions generate sustainability gaps; c) Sustainability gaps accumulate dynamically; d) Replacement necessity flows from structural inconsistency; and e) Only conjunctural replacement can restore conjunctural systems, a logic that can be summarized with the following chain: (K=L) → Separability → Asymmetry → SG → Falsification → Conjunctural paradigm replacement.

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