

Short Elucidating Note 128: How can a general true sustainability consistency theory that goes across domains $K_i = L_j$ be structured and operated?

By

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Abstract

The general structural falsification theory for paradigms of the form $K_i = L_j$ tells us that a) if there is full structural consistency, then we have full validation, no need for empirical testing and no need for paradigm replacement; b) if we have partial structural consistency, then we have partial viability, need for empirical testing, structural gap pressures, and soft kill situations, and hence, the dynamic accumulation of structural gap pressures will in the future push the paradigm towards full structural inconsistency, collapse or shift or merger; and c) if we have full structural inconsistency, then we have full falsification or full invalidation and collapse, no need for empirical testing and there is a need for consistent form of paradigm replacement as there is hard kill. If we link structural inconsistency with true sustainability paradigm inconsistency we can express the structural falsification theorem in terms of true sustainability falsification theorem creating that way a general true sustainability consistency theory that goes across domains $K_i = L_j$ in terms of full validation, partial viability, full falsification, and consistent form based paradigm replacement. In other words, we create a framework where true sustainability is treated and works as a general property of structural consistency applicable to any paradigm, system, or domain. This paper is focused on showing how such a general true sustainability consistency theory (TSi) that goes across domains $K_i = L_j$ can be structured and operated.

The central goal of this paper

This paper is focused on showing how such a general true sustainability consistency theory (TSi) that goes across domains $K_i = L_j$ can be structured and operated.

Methodology

` a) A short overview of the general structural falsification theorem for paradigms of the form $K_i = L_j$ is highlighted together with implications; b) The idea of domain-specific true sustainability based falsification thinking for paradigms of the form $TS_1 = ABC$ is pointed out

together with implications; c) The idea that domain-specific true sustainability based falsification theory can be generalized to form the general true sustainability falsification theorem for paradigms of the form $TS_i = XYZ$ is stressed together with implications; d) The idea of linking general structural validity ($K_i = L_j$) with general true sustainability validity ($TS_i = XYZ$) to create a true sustainability falsification theorem that goes across domains shared together with implications; and finally, e) Some relevant conclusions are listed

The structural falsification theorem for paradigms of the form $K_i = L_j$

The structural falsification theorem for paradigms of the form $K_i = L_j$ has been recently shared (Muñoz 2026a); and it can be summarized as follows:

a) The idea of general structural consistency and validation

If the balance equality is respected so that $K_i = L_j$ after being under conjunctural external pressures (e.g. maximization, optimization), then there is structural consistency, and hence, there is validation, which can be represented by a simple chain:

$K_i = L_j \rightarrow \text{Structural consistency} \rightarrow \text{Validation}$

Hence, validation flows from structural consistency, and structural consistency emanates from respecting the balance equality $K_i = L_j$.

b) The idea of full structural consistency and full validation

If balance equality is fully respected so that $K_i = L_j$ after being under fully conjunctural external pressures (e.g. maximization, optimization), then there is full structural consistency; and therefore, there is full validation, which can be indicated by a simple chain

If $K_i = L_j \rightarrow \text{Full structural consistency} \rightarrow \text{Full validation}$

Hence, full validation flows from full structural consistency, and full structural consistency comes from respecting fully the balance equality $K_i = L_j$. Here, there is no separability, no substitutability, there is full viability, and therefore, there is no need for consistent form paradigm replacement.

c) The idea of partial structural consistency and partial validation

If balance equality is partially respected so that $K_i \approx L_j$ after being under partially conjunctural or unilateral external pressures (e.g. maximization, optimization), then there is partial structural consistency; and therefore there is partial validation, which can be indicated by a simple chain:

If $K_i \approx L_j \rightarrow \text{Partial structural consistency} \rightarrow \text{Partial validation}$

Hence, partial validation flows from partial structural consistency, and partial structural consistency comes from respecting partially the balance equality $K_i = L_j$. Here, there is partial

separability, partial substitutability, partial viability, soft kill, and therefore, here you have the seeds that will feed the dynamic accumulation of structural gaps pressures until they become binding and create the conditions for consistent form paradigm replacement.

d) The idea of full structural inconsistency and full invalidation/full falsification

If balance equality is fully violated so that $K_i \neq L_j$ after being under partially conjunctural or unilateral external pressures (e.g. maximization, optimization), then there is full structural inconsistency; and therefore there is full invalidation or full falsification, which can be indicated by a simple chain

If $K_i \neq L_j \rightarrow$ Full structural inconsistency $\rightarrow$ full invalidation = full falsification

Therefore, full invalidation or full falsification flows from full structural inconsistency, and full structural inconsistency comes from fully violating the balance equality $K_i = L_j$. Here, there is full separability, full substitutability, full non-viability, hard kill, and therefore, here you have the need for consistent form paradigm replacement.

Implication:

Structural validity across domains $K_i = L_j$ flows from structural consistency across those domains.

e) The three key concepts emanating from the discussion above

i) Definition 1: General consistency

A paradigm is structurally consistent if its defining structural relationships remain internally consistent.

ii) Definition 2: Partial consistency

A paradigm is partially structurally consistent when structural consistency and structural inconsistency coexist, generating structural-gap pressures.

iii) Definition 3: Full inconsistency

A paradigm is fully structurally inconsistent when its defining relationships become fully structurally inconsistent.

Implication:

Notice that the ideas discussed above extend the ideas of Karl Popper (Popper 1965) by adding a pre-empirical validation test to traditional empirical testing thinking; and they extend the ideas of Thomas Kuhn (Kuhn 1970) in terms of traditional paradigm replacement thinking by requiring structural consistent form paradigm replacement for fully structurally inconsistent paradigms (see details in Muñoz 2026b).

The idea of specific domain based true sustainability thinking

Sustainability thinking is usually presented as requiring the balancing of the components that belongs to the system, such as social components, environmental components, economic components, institutional components and so on; and this means that usually sustainability thinking has the structure of specific domain based paradigms. Hence, the question relevant to traditional sustainability thinking as domain-specific thinking is what is Sustainability? The idea of true sustainability thinking as specific domain system where social, economic, and environmental issues are in balanced form is now known (Muñoz 2009; Muñoz 2003) and this idea was recently shared again as a domain specific true sustainability thinking based paradigm(TS₁) (Muñoz 2026c) as stated below:

$$TS_1 = ABC$$

The expression above reflects the structure of specific domain based true sustainability (TS₁) as it requires the presence of specific components, social (A), economic (B) and environmental(C) components, in full codependence form or full active form at the same time in order to exist. Notice that partial sustainability thinking is possible if not all those specific components are in active form at the same time, for example if only the economic component is in active form we have the traditional market (TM) of Adam Smith (Smith 1776), where TM = aBc or if the only the social component is in active form we have the red socialism model (KM) of Karl Marx (Marx and Engels 1848) where KM = Abc.

a) The idea of domain-specific true sustainability consistency and validation

If the balance equality is respected so that TS₁ = ABC after being under conjunctural external pressures (e.g. maximization, optimization), then there is domain specific true sustainability consistency, and hence, there is validation, which can be represented by a simple chain:

$$TS_1=ABC \rightarrow \text{domain-specific true sustainability consistency} \rightarrow \text{Validation}$$

Hence, validation flows from domain-specific true sustainability consistency, and domain-specific true sustainability consistency emanates from respecting the balance equality TS₁ = ABC.

b) The idea of full domain-specific true sustainability consistency and full validation

If balance equality is fully respected so that TS₁ = ABC after being under fully conjunctural external pressures (e.g. maximization, optimization), then there is full domain-specific true sustainability consistency; and therefore there is full validation, which can be indicated by a simple chain

$$\text{If } TS_1=ABC \rightarrow \text{full domain-specific true sustainability consistency} \rightarrow \text{Full validation}$$

Hence, full validation flows from full domain-specific true sustainability consistency, and full domain-specific true sustainability consistency comes from respecting fully the balance equality TS₁ = ABC. Here, there is no component separability, no component substitutability, there is full viability, strong sustainability, and therefore, there is no need for consistent form paradigm replacement.

c) The idea of partial domain-specific true sustainability consistency and partial validation

If balance equality is partially respected so that $TS1 \approx ABC$ after being under partially conjunctural or unilateral external pressures (e.g. maximization, optimization), then there is partial domain-specific consistency; and therefore there is partial validation, which can be indicated by a simple chain

If $Ki \approx Lj \rightarrow$ Partial domain-specific true sustainability consistency $\rightarrow$ Partial validation

Hence, partial validation flows from partial domain-specific consistency, and partial domain-specific consistency comes from respecting partially the balance equality $TS1 = ABC$. Here, there is partial component separability, partial component substitutability, partial viability, soft kill, weak sustainability, dwarf sustainability, and therefore, here you have the seeds that will feed the dynamic accumulation of sustainability gaps pressures until they become binding and create the conditions for consistent form paradigm replacement.

d) The idea of full domain-specific true sustainability inconsistency and full invalidation/falsification

If balance equality is fully violated so that $TS1 \neq ABC$ after being under partially conjunctural or unilateral external pressures (e.g. maximization, optimization), then there is full domain-specific inconsistency; and therefore there is full invalidation or full falsification, which can be indicated by a simple chain

If $TS1 \neq ABC \rightarrow$ Full domain-specific inconsistency $\rightarrow$ full invalidation = full falsification

Therefore, full invalidation or full falsification flows from full domain-specific inconsistency, and full domain specific inconsistency comes from fully violating the balance equality $TS1 = ABC$. Here, there is full component separability, full component substitutability, full non-viability, full unsustainability, hard kill, and therefore, here you have the need for consistent form paradigm replacement.

Implication:

Domain-specific true sustainability becomes a general property of domain-specific structural consistency across domains.

e) Key concepts emanating from the discussion above

i) Definition 1: Domain-Specific General True Sustainability Consistency

A domain-specific paradigm is fully sustainable if it's defining structural make up remains internally consistent.

ii) Definition 2: Domain-Specific Partial True Sustainability

A domain-specific paradigm is partially sustainable when component consistency and inconsistency coexist, generating sustainability-gap pressures.

iii) Definition 3: Domain-Specific Full True unsustainability

A domain-specific paradigm is fully unsustainable when its defining relationships become fully domain-specific inconsistent.

The idea of general true sustainability thinking

The domain specific true sustainability thinking ($TS_1 = ABC$) can be generalized into general true sustainability thinking (TS_i) as follows:

In a system of with components X, Y, and Z, the structure of domain-specific true sustainability (TS_1) is the following:

$$TS_1 = X_1Y_1Z_1$$

Hence, the structure of general true sustainability (TS_i) can be then expressed set form as follows:

$$TS_i = XYZ,$$

Where $X = X_1X_2X_3 \dots X_n$, $Y = Y_1Y_2Y_3 \dots Y_n$, and $Z = Z_1Z_2Z_3 \dots Z_n$ assuming all components have the same number of subcomponents, which does not have to be the case for the theorem to hold.

Notice that if $X_1 = A$, $Y_1 = B$ and $Z_1 = C$, then we have the following structure reflecting social (A), economic (B), and environmental (C) responsibilities:

$$TS_1 = X_1Y_1Z_1 = ABC = \text{Domain-specific true sustainability consistency.}$$

Therefore, the chain from domain-specific true sustainability (TS_1) to general true sustainability (TS_i) can be indicated as follows:

$$TS_1 = ABC \rightarrow TS_i = XYZ$$

And this means general true sustainability consistency flows from domain-specific true sustainability consistency as highlighted below:

Domain-specific true sustainability consistency $\rightarrow$ Generalized true sustainability consistency

Hence, the question that becomes relevant here is what emerges when we moved from domain-specific true sustainability consistency exists to general true sustainability-consistency exists?

a) The idea of general true sustainability consistency and validation

If the balance equality is respected so that $TS_i = XYZ$ after being under conjunctural external pressures (e.g. maximization, optimization), then there is general true sustainability

consistency, and hence, there is validation, which can be represented by a simple chain:

$TS_i = XYZ \rightarrow \text{general true sustainability consistency} \rightarrow \text{Validation}$

Hence, validation flows from general true sustainability consistency, and general true sustainability consistency emanates from respecting the balance equality $TS_i = XYZ$.

b) The idea of full true sustainability consistency and full validation

If balance equality is fully respected so that $TS_i = XYZ$ after being under fully conjunctural external pressures (e.g. maximization, optimization), then there is full true sustainability consistency; and therefore there is full validation, which can be indicated by a simple chain

If $TS_i = XYZ \rightarrow \text{full true sustainability consistency} \rightarrow \text{Full validation}$

Hence, full validation flows from full true sustainability consistency, and full true sustainability consistency comes from respecting fully the balance equality $TS_i = XYZ$. Here, there is no component separability, no component substitutability, there is full viability, strong sustainability, and therefore, there is no need for consistent form paradigm replacement.

c) The idea of partial true sustainability consistency and partial validation

If balance equality is partially respected so that $TS_i \approx XYZ$ after being under conjunctural or unilateral external pressures (e.g. maximization, optimization), then there is partial true sustainability consistency; and therefore there is partial validation, which can be indicated by a simple chain.

If $TS_i \approx XYZ \rightarrow \text{Partial general true sustainability consistency} \rightarrow \text{Partial validation}$

Hence, partial validation flows from partial general true sustainability consistency, and partial general true sustainability consistency comes from respecting partially the balance equality $TS_i = XYZ$. Here, there is partial component separability, partial component substitutability, partial viability, soft kill, weak sustainability, dwarf sustainability, and therefore, here you have the seeds that will feed the dynamic accumulation of general sustainability gaps pressures until they become binding and create the conditions for consistent form paradigm replacement.

Implication:

General true sustainability becomes a general property of general structural consistency across domains.

d) The idea of full true sustainability inconsistency and full invalidation/falsification

If balance equality is fully violated so that $TS_i \neq XYZ$ after being under conjunctural or unilateral external pressures (e.g. maximization, optimization), then there is full general true sustainability inconsistency; and therefore there is full invalidation or full falsification, which can be indicated by a simple chain

If $TS_i \neq XYZ \rightarrow$ Full general true sustainability inconsistency $\rightarrow$ full invalidation = full falsification

Therefore, full invalidation or full falsification flows from full general true sustainability inconsistency, and full general true sustainability inconsistency comes from fully violating the balance equality $TS_i = XYZ$. Here, there is full component separability, full component substitutability, full non-viability, full unsustainability, hard kill, and therefore, here you have the need for consistent form paradigm replacement.

Implication:

General true sustainability becomes a general property of general structural consistency across domains.

e) The key concepts emanating from the discussion above

i) Definition 1: General True Sustainability

A paradigm is fully sustainable if its defining structural relationships remain internally consistent.

ii) Definition 2: General Partial True Sustainability

A paradigm is partially sustainable when consistency and inconsistency coexist, generating general structural-gap pressures, structural gaps that becomes the points where pressures accumulate until they become binding leading the paradigm towards full unsustainability created in the process the need for later consistent form paradigm replacement.

iii) Definition 3: General Full True Unsustainability

A paradigm is fully unsustainable when its defining relationships become structurally inconsistent.

Linking general true sustainability validity/consistency with general structural validity/consistency

If we equate general structural consistency/validity ($K_i = L_j$) with general true sustainability consistency/validity ($TS_i = XYZ$) so that $K_i = TS_i$ and $L_j = XYZ$, then,

If $K_i = L_j = TS_i = XYZ \rightarrow$ general structural validity = general true sustainability validity

And the expression above tells us that now True Sustainability becomes a general property of structural consistency across any domain, where general true sustainability thinking flows from general structural consistency thinking as indicated in the two chains below:

. If $K_i = L_j \rightarrow TS_i = XYZ \rightarrow$ general structural validity $\rightarrow$ general true sustainability validity

The above expression tells us i) general true sustainability stability flows from general

structural consistency; and ii) general true sustainability validity emanates from general structural validity.

a) The idea of full structural consistency and full general true sustainability consistency and validation

If the balance equality is fully respected so that $K_i = L_j = TS_i = XYZ$ after being under conjunctural external pressures (e.g. maximization, optimization), then there is general structural consistency and general true sustainability consistency, and hence, there is validation, which can be represented by a simple chain:

$K_i = L_j = TS_i = XYZ \rightarrow$ full general structural and true sustainability consistency $\rightarrow$ Full Validation

Hence, validation flows from full general structural and true sustainability consistency, and full general structural and true sustainability consistency emanates from respecting the balance equality $K_i = L_j = TS_i = XYZ$.

b) The idea of partial structural and true sustainability consistency and partial validation

If balance equality is partially respected so that $K_i \approx L_j \approx TS_i \approx XYZ$ after being under conjunctural or unilateral external pressures (e.g. maximization, optimization), then there is partial structural consistency and partial true sustainability consistency; and therefore there is partial validation, which can be indicated by a simple chain

$\text{If } K_i \approx L_j \approx TS_i \approx XYZ \rightarrow$ Partial general structural and true sustainability consistency $\rightarrow$ Partial validation

Hence, partial validation flows from partial general structural and true sustainability consistency, and partial general structural and true sustainability consistency comes from respecting partially the balance equality $K_i = L_j = TS_i = XYZ$. Here, there is partial component separability, partial component substitutability, partial viability, soft kill, weak sustainability, dwarf sustainability, and therefore, here you have the seeds that will feed the dynamic accumulation of general structural and general true sustainability gap pressures until they become binding and create the conditions for consistent form paradigm replacement.

c) The idea of full structural and true sustainability inconsistency and full invalidation/falsification

If balance equality is fully violated so that $K_i \neq L_j \neq TS_i \neq XYZ$ after being under conjunctural or unilateral external pressures (e.g. maximization, optimization), then there is full general structural and true sustainability inconsistency; and therefore there is full invalidation or full falsification, which can be indicated by a simple chain

$\text{If } K_i \neq L_j \neq TS_i \neq XYZ \rightarrow$ Full general structural and true sustainability inconsistency $\rightarrow$ full invalidation = full falsification

Therefore, full invalidation or full falsification flows from full general structural and true sustainability inconsistency, and full general structural and true sustainability inconsistency

comes from fully violating the balance equality $K_i = L_j = TSi = XYZ$. Here, there is full component separability, full component substitutability, full non-viability, full unsustainability, hard kill, and therefore, here you have the need for consistent form paradigm replacement.

Implication:

General structural consistency and general true sustainability consistency are different expressions of the same validity conditions across domains.

The General True Sustainability Consistency Theorem: Compressed

In compressed form the theorem can be stated as below:

$K_i = L_j = TSi = XYZ \rightarrow \text{Structural consistency} = \text{True sustainability consistency}$

And the expression above tells us that structural validity and true sustainability validity become different expressions of the same underlying consistency condition so that if we expand the thinking from structural validity to true sustainability validity then;

1) $K_i = L_j \rightarrow TSi = XYZ = \text{Structural consistency} \rightarrow \text{true sustainability consistency}$

2) $K_i \neq L_j \rightarrow TSi \neq XYZ = \text{Structural inconsistency} \rightarrow \text{true sustainability inconsistency}$

And therefore, True sustainability consistency flows from structural consistency and true sustainability inconsistency flows from structural inconsistency.

□

General Sustainability Consistency Theorem extended

For any paradigm of the form $K_i = L_j = TSi = XYZ$, the following holds true:

i) If $K_i = L_j \rightarrow TSi = XYZ$, the paradigm is fully structurally sustainable and validated.

ii) If $K_i \approx L_j \rightarrow TSi \approx XYZ$, the paradigm is partially structurally sustainable and only conditionally structurally viable.

iii) If $K_i \neq L_j \rightarrow TSi \neq XYZ$, the paradigm is fully structurally unsustainable and falsified.

And therefore, the general sustainability consistency theory applies across domain as in this framework true sustainability is treated as a general property of structural consistency applicable to any paradigm, system, or domain.

The general implication of the General Sustainability Consistency Theorem Replacement Logic

The main implications can be summarized as stressed below:

1) A paradigm is not replaced merely because it is challenged empirically; 2) It is replaced because structural inconsistency reaches the point where a consistent alternative becomes necessary; and therefore, 3a) Any paradigm that is fully structurally consistent is fully sustainable relative to its defining assumptions; 3b) Any paradigm that is partially structurally consistent is partially sustainable relative to its defining assumptions until the point where unsustainability dynamically accumulates creating full unsustainability conditions; 3c) any paradigm that is partially structurally inconsistent is partially unsustainable relative to those assumptions; 3d) any paradigm that is fully structurally inconsistent is fully unsustainable relative to those assumptions.

Summarizing the structural and true sustainability links

Structural side	True sustainability side
$K_i = L_j$	$TS_i = XYZ$
Full validation	Full true sustainability consistency
Partial viability conditions	Partial true sustainability consistency
Full falsification	True sustainability failure

Summary of implications:

a) With respect to $K_i = L_j = TS_i = XYZ$:

Full consistency → Full true sustainability → Fully stable codependence → full win-win viability

b) With respect to $K_i \approx L_j \approx TS_i \approx XYZ$

Partial consistency → Partial true sustainability → Partial Stable relationships → Partial win-win viability

c) With respect to $K_i \neq L_j \neq TS_i \neq XYZ$

Full inconsistency → Full true unsustainability → Fully unstable relationships → Full lose-lose non-viability.

And the summary of implications above raises a new research question: if sustainability consistency generates win-win viability, can win-win situations themselves be formalized structurally? This question follows naturally from the framework developed here and will be formally addressed in a subsequent paper.

Conclusions

First, the implications of the general structural falsification theorem for paradigms of the form $K_i = L_j$ were highlighted where full validity means full structural consistency, partial validity means partial structural consistency and full invalidation/Full falsification means full structural inconsistency. Second, the implications of the domain-specific true sustainability based falsification theorem for paradigms such as $TS_1 = ABC$ were stressed where full domain-specific true sustainability validity means full true sustainability conditions, partial domain-specific true sustainability validity means partial true sustainability conditions and seeds for the creation of the need for consistent form of domain-specific paradigm replacement, and fully domain-specific true sustainability inconsistency means full domain-specific paradigm unsustainability. Third, the implications of the process of generalizing domain-specific true sustainability thinking to arrive to general true sustainability thinking ($TS_1 = ABC \rightarrow TS_i = XYZ$) were described showing that general true sustainability conditions flow from consistent domain-specific true sustainability conditions. Fourth, the implications of the general true sustainability based falsification theorem for paradigms such as $TS_i = XYZ$ were pointed out where general true sustainability validity means full general true sustainability conditions, partial general true sustainability validity means partial general true sustainability conditions, and seeds for the creation of the need for consistent general form paradigm replacement, and fully general true sustainability inconsistency means full general true sustainability unsustainability. And fifth, the implications of linking the general structural falsification theorem with the general true sustainability falsification theorem were listed where full structural and full true sustainability consistency means full validity, partial structural and partial true sustainability validity means partial validity; and where full structural and full true sustainability inconsistency means full invalidity or full falsification, transforming this way the general true sustainability falsification theorem into a tool embedded within the general structural falsification theory, which applies to any paradigm or system or domain of the form $K_i = L_j = TS_i = XYZ$.

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