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Sustainability thought 185: The General Structural Falsification Theorem: A Conjunctural Approach with Application to Traditional Economic Development

By

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Abstract

Any framework based on unilateral maximization is structurally falsified whenever the system it represents is inherently conjunctural (K = L). And this means that development frameworks based on unilateral maximization under independent assumptions such as for example the traditional economic development framework (TED = B), the red Marxism framework (KM = A), the deep environmentalism framework (ENV = C) and so on can be structurally falsified whenever the system's component that drives them is shown to be inherent conjunctural, which means that the maximization of this system breaks conjunctural equality.

This paper starts from a simple but often overlooked observation: in practice, social, economic, and environmental outcomes are empirically interdependent. Changes in one dimension systematically affect the others, indicating that these components are not separable but co-determined. However, most deep development frameworks—whether associated with Adam Smith, Karl Marx, or environment-only approaches—are structurally formulated as if these dimensions were separable, either by assuming externality neutrality or by treating interdependencies as secondary adjustments. This creates a mismatch between how reality behaves and how it is modeled. The analysis that follows formalizes this mismatch: it shows that when inherently interdependent (conjunctural) systems are treated through additive, separable structures, structural inconsistencies necessarily emerge, and these inconsistencies manifest as sustainability gaps. The purpose of this paper is to make this structural issue explicit and to demonstrate, through the general structural falsification theorem and its application, frameworks like the traditional economic development model at work since Adam Smith's time, 1776 can be invalidated on structural grounds before empirical testing knowing they work on market-based separability, which allow them to treat social and environmental issues as externalities.

Relevant concepts within the text

Structural falsification, Maximization, Optimization, Independent components, Codependent components, Externality neutrality assumptions, No externality neutrality assumptions, Sustainability gaps, General structural falsification theorems, General structural validation theorems, Traditional economic development falsification theorems, Traditional economic development optimization inconsistency theorem

Introduction

Any framework based on unilateral maximization is structurally falsified whenever the system it represents is inherently conjunctural (K = L). And this means that development frameworks based unilateral maximization under independent assumptions such as for example the traditional economic development framework (TED = B), the red Marxism framework (KM = A), the deep environmentalism framework (ENV = C) and so on can be structurally falsified whenever the system's component that drives them is shown to be inherent conjunctural, which means that the maximization of this system breaks conjunctural equality. Karl Popper held the view that valid paradigms can be refuted by future observation and/or experiment(Popper 1965) to ensure the growth of scientific knowledge taking those valid paradigms as paradigms without structural inconsistencies that can generate predictions that can be tested in future events, however if a valid paradigm contains structural inefficiencies, then the negative impacts and accumulation of negative impacts driven by those structural inefficiencies should be expected and predicted to later in the future to corroborate themselves, leading to the world of structural falsification. These structural inconsistencies generate sustainability gaps that drive paradigm death, shift and paradigm evolution (Muñoz 2019). Then Thomas Kuhn gave us the scientific paradigm evolution loop(Kuhn 1970) governing how new ideas that address the weaknesses of old ideas after consensus for change take over as the new status quo paradigm, however Kuhn's ideas are not made from the point of view of the need for conjunctural paradigm evolution as old non-conjunctural ideas with structural embedded inefficiencies in them cannot be fixed from the inside, only managed; and when we think or assume that we can treat conjunctural problems as additive problems then we fall into the critical problem-solving impossibility zone as the case of the 1987 sustainable development idea shows (Muñoz 2025a) as the critical socio-environmental problems have continue to expand despite a world under sustainable development thinking and goals since then(1987-2026).

As Popper and Kuhn apparently placed their focus on the growth of scientific knowledge that comes from falsifying and evolving non-conjunctural ways of thinking, then they missed the possibility of structural falsification and validation and possibility conjunctural paradigm shifts as the full fixed for the structural inefficiencies embedded in non-conjunctural systems, for example when you move from non-conjunctural thinking to conjunctural thinking then the knowledge base of non-conjunctural thinking no longer works for example a move to true sustainability thinking leaves icons like the arrow impossibility theorem behind (Muñoz 2016). This means that a link is missing and has been missing since the work of Popper in 1965 and Kuhn in 1970, which is structural falsification and the conjunctural paradigm evolution thought that goes with it as for example the shift from traditional market thinking/non-conjunctural

thinking to true sustainability thinking/fully conjunctural thinking requires the fixing of the structural abnormalities embedded in traditional markets through cost internalization to shift it to true sustainability thinking, step by step or in one step (Muñoz 2025b) since only conjunctural thinking works under true sustainability(Muñoz 2026a). This paper focuses on the introduction of the general structural falsification theorem and on how it can be transformed into a tool to structurally falsify the traditional economic development framework at work since Adam Smith's time, 1776(Smith 1776).

Goals of this paper

1) To build step by step the general structural falsification and validation theorems; 2) To show how these conjunctural falsification and validation tools works in general; 3) To state in parallel steps the traditional economic development structural falsification and validation inconsistency theorems; and 4) To show how these conjunctural falsification and validation inconsistency tools works in this case.

Key operators and concepts

1) Optimization = *, *a joint operator process that fails under non-conjunctural assumptions or conditions.*

2) Maximization = MAX, *a unilateral operator process that breaks conjunctural systems*
3) Structural flaw, *the presence of abnormalities in the structure of the system or a system with abnormalities embedded in it.*
4) Structural consistency, *the absence of abnormalities in the structure of the system or a system without abnormalities embedded in it.*
4) Structural falsification, *the refutation of theories solely on the basis that they are not valid theories structurally, and therefore, this structural flaw invalidates them using maximization operators and optimization operators.*
5) Structural validation, *the verification of theories solely on the basis that they are valid theories structurally, and therefore, this structural consistency validates them using maximization operators and optimization operators.*
6) Truly conjunctural systems, *the ones with structural consistency.*
7) Distorted conjunctural systems, *conjunctural systems with inconsistencies.*
8) Truly independent systems, *the ones where there is component separability or independence.*
9) Distorted independent systems, *the ones where there is distorted component separability or independence.*
10) Non-distorted independent systems, *the ones where there is truly no distorted component separability or independence in reality or by assumption.*
11) Capitalism, *the economy only development model.*

The General Structural Falsification Theorem

A) The theorem building process

Let's assume that a system has the following conjunctural structural condition:

K = L

Where K and L are the codependent components that define the integral structure of the system. Please, notice that this is a balance condition — a conjunctural equality.
It tells us the system is in a state where two components are co-determined

1) The conjunctural consistency requirement

A method is structurally valid if and only if: it preserves or restores the requirement K = L through joint adjustments of K and L.

2) The structural falsification requirement

A method is structurally falsified if: It imposes unilateral change (e.g., maximization) on K or L such that $K \neq L$, thereby violating the defining conjunctural requirement.

3) The necessary Outcome of Falsification

If $K \neq L$, then: a structural gap necessarily emerges, defined by $|K - L| > 0$ or by $|L - K| > 0$, depending on where the unilateral change is applied indicating system distortion or sustainability gap (SG).

4) The expected overall result

Therefore: Any framework based on unilateral maximization is structurally falsified whenever the system it represents is inherently conjunctural (K = L).

5) Elucidation

You can optimize a conjunctural system, but you cannot maximize within it without structurally falsifying it. Notice in the method described above K = L before falsification there is structural admissibility, whether the paradigm structure is valid or not. If valid the paradigm is structurally consistent, and if invalid the paradigm is structurally flawed. If the paradigm is invalid but it is assumed valid it is structurally flawed. As for example, if social, economic, and environmental outcomes are empirically interdependent, then any model that treats them as separable components is structurally mis-specified, regardless of whether externalities are assumed away or internalized.

6) The maximization paradigm inconsistency and demonstration

Maximization is at the heart of additive thinking, let's pick side K, then we treat L as a constrain or left over and what we see in this case is that the equality breaks analytically when

we maximize K as K is maximized subject L. Therefore, the system is no longer K = L as maximizing K while holding L as fixed or adjustable term leads to losing the conjunctural balance and to transforming the system into a directional system or one sided pressure system; and since K increases without jointly adjusting L, then a distortion gap or sustainability gap is created ($|K - L| > 0$).

Implication 1:

Maximization is a special case of system distortion, not a neutral analytical tool as its application leads to the breaking of the balance K = L creating distortions gaps or sustainability gaps. *Hence, maxi****mization of K breaks or distorts K = L balance***

7) The optimization paradigm consistency and demonstration

Optimization in the conjunctural sense reflects the joint determination of K and L as it aims at seeking a best configuration of the system as a whole; and therefore when the equality is optimized[$(K = L)^*$] the equality is maintain or rebalanced($K^* = L^*$), and this means that optimization is not a directional process as it seeks the best combination (K,L) such that the system works best given their interdependence, which leads to no distortion gaps or sustainability gap creation since [$(|K - L|) = (|K - L|)^* = (|K^* - L^*| = 0$]. Therefore, the result of optimizing a conjunctural equality such as K = L is that the system remain coherent as there is component and system optimality consistency ($S = (K = L)^* = K^* = L^*$, adjustments are mutual, not unidirectional, and balance equality is maintained as systems expand or contract.

Implication 2:

Optimization is a special case of non-distorted systems, a neutral analytical tool as its application leads to maintaining the balance K = L without creating distortions gaps or sustainability gaps. *Hence, o****ptimization preservers or restores K = L balance***

8) Comparing the nature of structural falsification-structural validation

The implications of comparing the nature of structural falsification and structural validation are summarized in the table below:

Table 1

Maximization → creates divergence:

$K \neq L$

And this is the requirement for structural falsification

Optimization → manages convergence:

K ↔ L

And this is the requirement for structural validation

The comparison points out the gap-generating mechanism at play when maximizing and a gap fixing or elimination mechanism at work when optimizing.

We can see in table 1 above that while maximization creates distortions or sustainability gaps optimization eliminates distortions or sustainability gaps. The relevant implications of Table 1 above are: 1) with respect to maximization: the component K grows = K↑, the component L deteriorates K ≠ L, and gap emerges = sustainability gap; and 2) with respect to optimization: the component K and L jointly optimize (*) = (K = L)*, no component deteriorates K* = L*, and no gap emerges = no sustainability gap.

8) **The general structural falsification theorem through maximization**

You cannot maximize (MAX) a method that is inherently conjunctural without leaving K = L as if you MAX (K) subject to L or if you MAX (L) subject to K or when you maximize them separately, then K ≠ L and structural gaps or sustainability gaps are created since then $|MAX(K) - L| > 0$ and $|K - MAX(L)| > 0$***, and therefore, that method is structurally falsified through maximization as balanced equality is broken.***

Implication 3:

If the system's component that drives them is shown to be inherently conjunctural this means that the maximization of this system breaks conjunctural equality, and structural falsification occurs. In other words, you can optimize within K = L, but you cannot maximize without leaving K = L.

9) **The general structural validation theorem through optimization**

You can optimize (*) a method that is inherently conjunctural without leaving K = L as if you optimize K and L jointly [(K=L)*], then method optimality consistency exist and no sustainability gaps are created since $|K^* - L^*| = 0$***, and therefore, that method is structurally validated.***

Implication 4:

If the system's component that drives them is shown to be inherent conjunctural this means that the optimization of this system keeps conjunctural equality. In other words, if you

can optimize within K = L, then structural validation exist, but you cannot maximize without leaving K = L. And this means that if you can optimize within K = L while keeping the balanced equality the method is structurally validated. In other words, if you can optimize within K = L while keeping the balanced equality the method is structurally validated.

10) **The general structural falsification theorem through optimization**

If you have a system K = L that is not inherently conjunctural and hence it is a system that has component independency and component fixing properties or it is assumed to have component independency and component fixing properties to allow for the method to work, that method cannot be optimized in a way that results in system consistent optimality conditions [S = (K = L)*] so that K = L ≠ S = (K = L)*, and this optimality inconsistency leads to the creation of structural gaps or sustainability gaps since then $|K - L| > 0 = K^*-L^* = 0$ *and* $|L - K| > 0$ ***= L*-K* = 0; and therefore, that method is structurally falsified through optimization as balance equality is violated.***

Implication 5:

If the system's component that drives them is shown not to be inherent conjunctural or it is independent, then maximization can take place but not in ways consistent with system optimality consistency (S), which means that the maximization of this system breaks conjunctural equality as the system cannot be maximized without leaving K = L.

Summary application of the general theorem

If development K is pursued through the factor L-only model, then:

(1) Under maximization behavior:

L is maximized independently

Which implies?

K ≠ L

(2) Structural implication

The equality K = L is broken,

Therefore:

Development type K, as defined within L - only framework, is structurally falsified.

(3) Gap interpretation

The resulting gap:

$$|K - L| > 0$$

Represents:

--Ignored costs or cost externalization

And this explains the emergence of sustainability gaps or distortions gaps under non-conjunctural development thinking.

(4) Two-lines conclusion

Development type K cannot be validly represented or achieved within an L-only maximization framework without structural falsification. In other words, when a conjunctural reality ($K \leftrightarrow L$) is modeled as a separable system ($K \rightarrow L$) or ($K \leftarrow L$), any maximization or optimization procedure will generate structural inconsistency.

Implication 6:

A theory such that K = L can be invalid before testing, due to internal structure. And if an invalid theory such as K = L is tested through maximization and/or optimization it can be shown to be structurally falsifiable, and the nature of the sustainability gaps created by such a theory is explained; and then the need for the correction of those sustainability gaps or the existence of conjunctural paradigm shift avoidance behavior can be amplified or called for to allow for the growth of science based knowledge and practice.

Implication 7

There is structural inconsistency across all non-conjunctural frameworks or assumed conjunctural frameworks when they are not such as the framework K = L, and therefore when tested, all non-conjunctural systems or conjunctural systems by assumption such as K = L fail structurally.

The Thomas Kuhn's on structurally flawed or structurally inconsistent paradigms

Keeping in mind, that structurally flawed paradigms have embedded abnormalities which sooner or later will tend towards full unsustainability as pressures from the expansions of these structural flaws or sustainability gaps will drive them to that full unsustainability point and the only way they will keep their core paradigm values is if they follow vertical paradigm evolution routes available before collapse; otherwise they will be subjected to paradigm death and flip or paradigm death and flip-back depending on the origin of the structurally flawed paradigm reflecting the Thomas Kuhn's curse for structurally flawed paradigms in terms of science based paradigm evolution.

Summary of general food for thoughts

1) In terms of policy implication

Models at play that are based on unilateral maximization applied to an inherently conjunctural system such as K = L will tend to underestimate feedback effects and generate policy resistance even as unintended consequences pile up as these negative consequences are not expected since a distorted paradigm has been assumed to be a valid paradigm.

2) In terms of sustainability implication

Model gains in systems such as K = L lead to distortions, which lead to rebound pressures, which undermine the model goals themselves and accumulate unsustainability.

3) In terms of paradigm implications a la Thomas Kuhn

A model such as K = L is not just empirically incomplete—it is structurally unstable and therefore subject to inevitable paradigm pressure. And these pressures push this model towards vertical paradigm evolution a la Thomas Kuhn if saving its core responsibility value is the aim or they push this model towards horizontal paradigm evolution where it loses its core responsibility value.

4) In terms of paradigm testing implications a la Karl Popper

A model such as K = L is then a paradigm which known structural flaws, which allows us to predict the coming of crises based on these specific structural flaws before testing, which can then be tested by observation and/or experiment a la Karl Popper to corroborate the negative impact associated with those structural flaws, but since the practice has been to test any theory without a structural consistency test first this has created the possible paradigm testing inconsistency principle affecting a world that is focused on empirical testing only.

5) In terms of the paradigm testing inconsistency principle

A condition in which a model such as K = L is empirically tested using methods that are not structurally consistent with the nature of the system the model represents, leading to misleading or delayed falsification.

6) One-line conclusion

These implications above are not model-specific; they are structural consequences of applying unilateral reasoning to inherently conjunctural systems.

The Traditional Economic Development Structural Falsification Theorem

The theorem building process

Let's assume that K = D = Economic development and L = B = Economy-only model of Adam Smith so now the system has the following conjunctural structural condition:

D = B

Where D and B are the codependent components that define the integral structure of the system. Please, notice that this is a balance condition — a conjunctural equality. It tells us the system is in a state where two components are co-determined

1) The conjunctural consistency requirement

An economic development method is structurally valid if and only if: it preserves or restores the requirement D = B through joint adjustments of D and B.

2) The structural falsification requirement

An economic development method is structurally falsified if: It imposes unilateral change (e.g., maximization) on D or B such that $D \neq B$, thereby violating the defining conjunctural requirement.

3) The necessary Outcome of Falsification

If $D \neq B$, then: a structural gap necessarily emerges, defined by $|D - B| > 0$ or by $|B - D| > 0$, depending on where the unilateral change is applied indicating system distortion or sustainability gap (SG).

4) The expected overall result

Therefore: Any economic development framework based on unilateral maximization is structurally falsified whenever the system it represents is inherently conjunctural (D = B).

5) Elucidation

You can optimize a conjunctural economic development system, but you cannot maximize within it without structurally falsifying it. Notice in the method described above D = B before falsification there is structural admissibility, whether the traditional economic development paradigm structure is valid or not. If valid the traditional economic development paradigm is structurally consistent, and if invalid the traditional economic development paradigm is structurally flawed. If the traditional economic development paradigm is invalid, but it is assumed valid it is structurally flawed. In 1987 the Brundtland Commission (WCED 1987) documented in "Our Common Future' that the traditional economic development model was flawed in social and environmental terms; and in 2012 the United Nations Commission on

Sustainable development (UNCSD 2012a; UNCSD 2012b) reiterated in "The Future We Want" that the traditional economic development model was flawed in environmental terms. As a example consistent with the discussion above, if social, economic, and environmental outcomes are empirically interdependent, then any model that treats them as separable components is structurally mis-specified, regardless of whether externalities are assumed away or internalized, and this is the case in practice with traditional development thinking social and environmental issues are handled as separate or external or non-limiting issues when assumed away or not as traditional economic development models or economy first models assume economic supremacy and socio-environmental component separability.

6) The maximization paradigm inconsistency and demonstration

Maximization is at the heart of additive economic development thinking, let's pick side B, then we treat D as a constrain or left over and what we see in this case is that the equality breaks analytically when we maximize B as B is maximized subject D. Therefore, the system is no longer D = B as maximizing B while holding D as fixed or adjustable term leads to losing the conjunctural balance and to transforming the system into a directional system or one sided pressure system; and since B increases without jointly adjusting D, then a distortion gap or sustainability gap is created ($|B - D| > 0$).

Implication 1:

Maximization is a special case of economic development system distortion, not a neutral analytical tool as its application leads to the breaking of the balance D = B creating distortions gaps or sustainability gaps. *Hence, maxi****mization of B breaks or distorts D = B balance as maximization breaks conjunctural systems.***

7) The optimization paradigm consistency and demonstration

Optimization in the conjunctural sense reflects the joint determination of D and B as it aims at seeking a best configuration of the system as a whole; and therefore when the equality is optimized[$(D = B)^*$] the equality is maintained or rebalanced($D^* = B^*$), and this means that optimization is not a directional process as it seeks the best combination (D,B) such that the system works best given their interdependence, which leads to no distortion gaps or sustainability gap creation since [$(|D - B|) = (|D - B|)^* = (|D^* - B^*| = 0$]. Therefore, the result of optimizing a conjunctural equality such as D = B is that the system remain coherent as there is component and system optimality consistency ($S = (D = B)^* = D^* = B^*$, adjustments are mutual, not unidirectional, and balance equality is maintained as systems expand or contract.

Implication 2:

Optimization is a special case of non-distorted system or true conjunctural systems, a neutral analytical tool as its application leads to maintaining the balance D = B without creating distortions gaps or sustainability gaps. *Hence, o****ptimization of the non-distorted conjunctural system preservers or restores D = B balance; and this means that optimization fails in non-conjunctural systems and in distorted conjunctural systems.***

8) Comparing the nature of structural falsification-structural validation

The implications of comparing the nature of structural falsification and structural validation are summarized in the table below:

Table 2

Maximization → creates divergence:

D ≠ B

And this is the requirement for structural falsification

Optimization → manages convergence:

D ↔ B

And this is the requirement for structural validation

The comparison points out the gap-generating mechanism at play when maximizing and a gap fixing or elimination mechanism at work when optimizing.

We can see in table 2 above that while maximization creates distortions in the conjunctural system D = B or sustainability gaps optimization eliminates distortions or sustainability gaps in D = B. The relevant implications of Table 2 above are: 1) with respect to maximization: the economic component B grows = B↑, the component D deteriorates D ≠ B, and a socio-environmental gap emerges = socio-environmental sustainability gap; and 2) with respect to optimization: the component D and B cannot be jointly optimize (*) as D and B are independent in standard economic thinking so that (D = B)* ≠ D* = B* = S, and hence, independent components cannot be optimized in ways that satisfy system optimality consistent requirements, and therefore and socio-environmental gap emerges = socio-environmental sustainability gap.

9) **The general structural falsification theorem through maximization in the case of non-conjunctural traditional economic development systems**

You cannot maximize (MAX) a method that is inherently conjunctural without leaving D = B as if you MAX (D) subject to B or if you MAX (B) subject to D or when you maximize

them separately, then D ≠ B and structural gaps or sustainability gaps are created since then |MAX (D) − B| > 0 and |D – MAX (B)| > 0***, and therefore, that method is structurally falsified through maximization as balanced equality is broken. It is known that traditional economic development is linked to the creation and expansion of socio-environmental sustainability gaps as documented by the Brundtland Commission in 1987(WCED 1987) if both critical gaps are of concern or it has environmental sustainability gaps as indicated by the United Nations Conference on Sustainable development (UNCSD 2012a; UNCSD 2012b), sustainability gaps just being managed not fixed since 1987.***

Implication 3:

If the system's component that drives them is shown to be inherently conjunctural this means that the maximization of this system breaks conjunctural equality, and structural falsification occurs. In other words, you can optimize within D = B, but you cannot maximize without leaving D = B. As traditional market maximization is based on the idea of independent choices and so the maximization of independent choices leads to the creation of sustainability gaps and their expansions, and therefore it is structurally invalidated by maximization as it has a structural inefficiency embedded in its pricing mechanism.

10) **The structural validation theorem through optimization in the case of conjunctural economic development systems**

You can optimize (*) a method that is inherently conjunctural without leaving D = B as if you optimize D and B jointly [(D=B)*], then method optimality consistency exist and no sustainability gaps are created since |D* − B*| = 0, and therefore, that method is structurally validated. However, as traditional economic development is based on the core value of component independence or separability, it cannot be jointly optimized, again creating expanding sustainability gap pressures, and hence, it is also structurally invalidated by optimization as it has structural optimality inefficiency embedded in it.

Implication 4:

If the system's component that drives them is shown to be inherent conjunctural this means that the optimization of this system keeps conjunctural equality. In other words, if you can optimize within D = B, then structural validation exist, but you cannot maximize without leaving D = B. And therefore, if economic development thinking was based on conjunctural thinking it would be validated here, but since it is not, then it cannot be optimized in ways that meets system consistency optimality requirements (S), and therefore, failure to be validated through optimization is another way of structural falsification in the case of traditional development thinking.

11) **The general structural falsification theorem through optimization in the case of traditional economic development systems**

If you have a system D = B that is not inherently conjunctural, and hence it is a system that has component independency and component fixing properties or it is assumed to have

component independency and component fixing properties to allow for the method to work, as traditional economic development thinking does, that method cannot be optimized in a way that results in system consistent optimality conditions [S = (D = B)*] so that D = B ≠ S = (D = B)*, and this optimality inconsistency leads to the creation of structural gaps or sustainability gaps since then |D − B| > 0 = D*- B* = 0 and |B – D| > 0 = B*-D* = 0; and therefore, that method is structurally falsified through optimization as balance equality is violated.

Implication 5:

If the system's component that drives them is shown not to be inherent conjunctural or it is independent, then maximization can take place but not in ways consistent with system optimality consistency (S), which means that the maximization of this system breaks conjunctural equality as the system cannot be maximized without leaving D = B, and hence, it is structurally invalidated.

Summary application theorem for Economic Development Falsification

If economic development (D) is pursued through the economy-only model (B), then:

(1) Under traditional economic maximization behavior:

B is maximized independently (e.g., growth, output, profit),

Which implies?

D ≠ B

(2) Structural implication

The equality D = B is broken,

Therefore:

Economic development, as defined within the economy-only framework, is structurally falsified.

(3) Gap interpretation

The resulting gap:

|D − B| > 0

Represents:

--Ignored environmental costs or environmental cost externalization.

--Ignored social costs or social cost externalization.

And this explains the emergence of social and/or environmental sustainability gaps or distortions gaps under traditional economic development thinking.

(4) Two-lines conclusion

Economic development D cannot be validly represented or achieved within an economy (B)-only maximization framework without structural falsification. In other words, when a conjunctural reality (D ↔ B) is modeled as a separable system (D → B) or (D ← B), any maximization or optimization procedure will generate structural inconsistency.

Implication 6:

A development theory such that D = B can be invalid before testing, due to internal structure. And if an invalid theory such as D = B is tested through maximization and/or optimization it can be shown to be structurally falsifiable, and the nature of the (social and/or environmental) sustainability gaps created by such a theory is explained; and then the need for the correction of those (social and/or environmental) sustainability gaps or the existence of conjunctural paradigm shift avoidance behavior (such as shifts towards red markets or to green markets or to true sustainability markets) can be amplified or called for to allow for the growth of science based knowledge and practice.

Implication 7

There is structural inconsistency across all non-conjunctural frameworks or assumed conjunctural frameworks when they are not such as the traditional economic development framework (D = B), and therefore when tested, all non-conjunctural systems or conjunctural systems by assumption such as the traditional economic development market fail structurally.

The Thomas Kuhn's on structurally flawed or structurally inconsistent traditional economic development paradigms

Keeping in mind, that structurally flawed traditional economic development paradigms have embedded socio-environmental abnormalities which sooner or later will tend towards full unsustainability as pressures from the expansions of these socio-environmental structural flaws or socio-environmental sustainability gaps will drive them to that full unsustainability point and the only way they will keep their core paradigm values of economic responsibility is if traditional economic development paradigms follow vertical paradigm evolution routes available before collapse; otherwise they will be subjected to paradigm death and flip or paradigm death and flip-back depending on the origin of the structurally flawed paradigm reflecting the Thomas Kuhn's curse for structurally flawed paradigms in terms of science based paradigm evolution. It has been pointed out recently that as deep capitalism or deep economy thinking when

approaching full unsustainability has the routes of vertical paradigm evolution or of horizontal paradigm evolution (Muñoz 2026b), the first option keeps the core values of capitalism in the higher level paradigm and the second option leads to the lost of the core values of capitalism.

Summary of general food for thoughts

Summary of specific food for thoughts

1) In terms of policy implication

Traditional economic development models at play that are based on unilateral maximization applied to an inherently conjunctural system such as D = B will tend to underestimate feedback effects and generate policy resistance even as unintended socio-environmental consequences pile up as these negative consequences are not expected since a distorted traditional economic development paradigm has been assumed to be a valid paradigm.

2) In terms of sustainability implication

The traditional economic development model gains in systems such as D = B lead to socio-environmental distortions, which lead to rebound pressures, which undermine the model goals themselves and accumulate unsustainability.

3) In terms of paradigm implications a la Thomas Kuhn

A traditional economic development model such as D = B is not just empirically incomplete—it is structurally unstable in socio-environmental terms and therefore subject to inevitable paradigm pressure. And these socio-environmental pressures push this model towards vertical paradigm evolution a la Thomas Kuhn if saving its core value of economic responsibility is the aim or they push this model towards horizontal paradigm evolution where it loses its core economic responsibility value.

4) In terms of paradigm testing implications a la Karl Popper

A traditional economic development model such as D = B is then a paradigm with known socio-environmental structural flaws, which allows us to predict the coming of socio-environmental crises based on these specific structural flaws before testing, which can then be tested by observation and/or experiment a la Karl Popper to corroborate the negative impact associated with those socio-environmental structural flaws, but since the practice has been to test any theory without a structural consistency test first this has created the possible paradigm testing inconsistency principle affecting a world that is focused on empirical testing only.

5) In terms of the paradigm testing inconsistency principle

A condition in which a traditional economic development t model such as D = B is empirically tested using methods that are not structurally consistent with the nature of the system the model represents, leading to misleading or delayed falsification.

6) One-line conclusion

These implications above are not traditional economic development model-specific; they are structural consequences of applying unilateral reasoning to inherently conjunctural systems so they apply for example to the deep red socialism model of Karl Marx and to deep environmentalism models or green Marxism models E = C.

Conclusions

The general structural falsification theorem was built step by step. It tells as that both maximization and optimization procedures can be used to show that conjunctural systems cannot be handled without creating sustainability gaps as the maximization process breaks the balance between conjunctural components such as K = L and as the optimization process shows that separability leads to system optimality inconsistencies, and hence it generate sustainability gap creation and expansion problems. It was shown that optimization can be used to structurally falsify non-conjunctural structures since they cannot be optimized in ways that respect the system consistency optimality requirements, including non-conjunctural structures assumed to be conjunctural structures under externality production neutrality assumptions or component fixation. Specifically, it was pointed out that maximization leads to the breaking of the conjunctural system K = L, so that $K \neq L$ leads to sustainability gap creation of the form $|K - L| > 0$; and hence, development K depending solely on the maximization of L cannot be validly stated without structural falsifying itself. Only conjunctural systems can be structurally validated through maximization and optimization following this framework as in both cases conjunctural balance is maintained while all non-conjunctural systems can be structurally falsified through maximization and optimization. In summary, what these theorems change is the non-structural view of paradigm falsification a la Karl Popper and non-structural view of paradigm evolution a la Thomas Kuhn as now both falsification and vertical paradigm evolution are both structural, These theorems invalidate using maximization and optimization thinking that you can maximize and optimize component independent based systems in ways consistent with system consistent optimality requirements. These theorems show that you cannot invalidate or falsify non-distorted conjunctural systems using maximization and optimization thinking as conjunctural equality remains balanced, at the point where the maximum is the minimum optimal balance, and at the point of optimal system consistency respectively. However, these theorems show that you can invalidate or falsify distorted conjunctural systems. Therefore, these theorems open the door to look at critical development thinking from the embedded structural inconsistent point of view instead of the standard non-conjunctural view. And finally it was stated that when development models approach the point of full unsustainability they have two routes to follow, to evolve vertically and keep the core value of responsibility or evolve horizontally and lose its core value of responsibility.

On the other hands, the traditional economic development structural falsification theorem was built step by step. It indicates that both maximization and optimization procedures can be used to show that conjunctural development systems cannot be handled without creating sustainability gaps as the maximization process breaks the balance between conjunctural components such as D = B and as the optimization process shows that separability in economic development systems leads to system optimality inconsistencies, and hence it generate sustainability gap creation and expansion problems. It was shown that optimization can be used to structural falsify non-conjunctural development structures since they cannot be optimized in ways that respect the system consistency optimality requirements, including non-conjunctural economic structures assumed to be conjunctural structures under externality production neutrality assumptions or component fixation assumptions. Specifically, it was pointed out that maximization leads to the breaking of the conjunctural system D = B, so that $D \neq B$ leads to sustainability gap creation of the form $|D - B| > 0$; and hence, traditional economic development D depending solely on the maximization of B cannot be validly stated without structural falsifying itself. Only conjunctural economic systems can be structurally validated through maximization and optimization as in both cases conjunctural balance is maintained while all non-conjunctural economic development systems can be structurally falsified through maximization and optimization. In summary, what these economic development theorems change is the non-structural view of economic development paradigm falsification a la Karl Popper and non-structural view of economic paradigm evolution a la Thomas Kuhn as now both falsification and vertical paradigm evolution for distorted economic development systems are both structural, These theorems invalidate using maximization and optimization thinking that you can maximize and optimize component independent based economic development systems in ways consistent with system consistent optimality requirements. These theorems show that you cannot invalidate or falsify non-distorted conjunctural economic development systems using maximization and optimization thinking as conjunctural equality remains balanced, at the point where the maximum economic development is the minimum optimal economic balance, and at the point of optimal economic development system consistency respectively. However, these theorems show that you can invalidate or falsify distorted conjunctural economic development systems. Hence, these economic development theorems open the door to look at economic development thinking from the embedded structural inconsistent point of view instead of the standard non-conjunctural view. And finally it was indicated that when economic development models approach the point of full unsustainability they have two routes to follow, to evolve vertically and keep the core value of economic responsibility or evolve horizontally and lose its core value of economic responsibility. In general it can be said that the traditional economic development model does not fail because it prioritizes the economy, but because it attempts to do so within a structurally separable framework in a world that is inherently conjunctural in economic, environmental, and social terms.

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