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Short Elucidating Note 125: Why Only Conjunctural Thinking Can Capture Sustainability thinking? An Optimization-Based Assessment of Red, Green, and true Sustainability Markets

By

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Abstract

Full paradigm variability theory can be structured around two fundamental assumption sets: independency assumptions, which lead to additive thinking, and codependency assumptions, which take you to conjunctural thinking. This distinction allows a formal comparison of how each framework represents sustainability conditions, and when both frameworks are subjected to optimization thinking and to maximization thinking at the same time they reveal structures that lead to sustainability based conditions in the first case, and structures that take you to unsustainability based conditions in the second case. This paper focuses on the application of optimization thinking. By applying optimization thinking to both structures, this paper derives the necessary and sufficient conditions for sustainability to exist and identifies how external and internal consistency condition or system-consistent optimality requirements are met. The analysis shows that additive structures are limited in capturing full sustainability conditions as they reflect independent conditions that create optimality inconsistencies while conjunctural structures can represent the joint conditions required for true sustainability. These results are then applied to three well-known sustainability paradigms—socio-environmental sustainability (sustainability markets), socio-economic sustainability (red markets), and eco-economic sustainability (green markets)—to assess whether each paradigm satisfies the necessary and sufficient conditions for sustainability. The findings clarify the structural limitations of additive sustainability approaches and highlight the conditions under which sustainability thinking can hold.

Goals of this paper

1) To state the total variability model; 2) To place the total variability model under independency assumptions to free the structure of additive thinking; 3) To place the total variability model under codependency assumptions to free the structure of conjunctural thinking; 4) To place the structure of additive thinking and conjunctural thinking under optimization theory to point out that only conjunctural thinking captures the characteristics of sustainability; 5) To apply the thinking of the above to red, green and true sustainability markets to show that they only make sense under conjunctural thinking.

The paradigm variability model:

If we have a paradigm Ki with 2 components, component L and component M, where

L = Dominant component L l = Passive component L

M = Dominant component M m = Passive component M

Then, the paradigm variability model can be stated as follows:

Ki = L + M

Paradigm Ki exists when only component L is present in dominant form or when only component M is present in dominant form or when both are present in dominant form (LM)

Implication 1

The presence of one component in active form or both in active for at the same time determines the structure of specific paradigms.

The three possible paradigm structures

i) When only component A is in dominant form

When only component A is active, then we have paradigm K1:

K1 = L

Paradigm K1 expands and contracts as L expands and contracts

ii) When only component B is in dominant form

When only component M is active, then we have paradigm K2:

K2 = M

Paradigm K2 expands and contracts as M expands and contracts

iii) When both component L and component M are in dominant form at the same time.

When both components L and M are active at the same time, then we have paradigm K3:

K3 = LM

Paradigm K3 expands and contracts as LM expands and contracts.

Implication 2

The presence of one component in active form indicates a one component dominant system, and both components in active form at the same determine a co-dominant system.

Full paradigm variability landscape

If we put together all possible paradigms in the system Ki we create the full paradigm variability landscape or possibilities as expressed below:

FPVL = L + M + LM

The expression above summarizes all possible paradigm variability under no externality assumptions.

Implication 3

The full paradigm variability landscape shows the collection of all relevant one component dominant systems and co-dominant systems possible.

The structure of sustainability

The requirements of sustainability are internal and external optimality consistency so if we have a sustainability system (S) with two components in optimal form such L* and M*, then the following is true:

S = L*M* = (LM)*

The expression above tells us that a system that has both internal component optimality consistency (L*M*) and external optimality consistency ((LM)*) at the same time has the requirements for being a sustainability based system. In other words, since (LM)* = S, conjunctural optimization satisfies both internal and external consistency conditions simultaneously. In other words, system-consistent optimality (S) defined as simultaneous internal and external optimality consistency.

Implication 4

The requirement for system sustainability (S) to exist is the presence of internal and external optimality conditions at the same time

The structure of additive thinking

If we place the full paradigm variability structure (FPVL) under independent assumptions (IA), then the independent variability landscape at the heart of additive thinking (AT) is produced as indicated below:

IA (FPVL) = IA (L + M + LM) = L + M = AT since LM = 0 = codependent

So that:

AT = L + M

Implication 5

Additive thinking reflects all the one component dominant systems as independent parts.

The structure of conjunctural thinking

If we place the full paradigm variability structure (FPVL) under codependent assumptions (CA), then the codependent variability landscape at the heart of conjunctural thinking (CT) is produced as described below:

CA (FPVL) = CA (L + M + LM) = LM = CT since L + M = 0 = independent parts

So that:

CT = LM

Implication 6

Conjunctural thinking captures all the co-dominant parts as codependent part.

Comparing the structure of additive thinking and conjunctural thinking

Additive thinking takes the component of the system as independent components so the structure of the system is additive, AT = L + M, what one component does it does not affect the other, that is the central structural implication; and conjunctural thinking takes components as codependent components so the structure of the system is conjunctural, CT = LM, what one component does affects the other, that is the central structural implication.

Implication 7

In conjunctural thinking one component's actions such as L affect the other while in additive thinking the actions of one component such as L does not affect the other.

Additive thinking under optimization theory

If we optimize (*) the additive thinking structure (AT) on both sides we have the following expression:

$(AT)^* = (L + M)^* \neq S$

The expression above tells us that we need to optimize an additive structure, but additive optimal separability cannot guarantee system-consistent optimality (S) when system optimality requires joint feasibility across interdependent dimensions or components or parts.

Implication 8

There is an internal joint optimal inconsistency that comes out when optimizing independent components as separate parts; and this internal joint optimal inconsistency leads also to external inconsistency

$(L + M)^* = \infty \neq S$

Where the symbol ∞ is used to denote non-feasible under system-consistent optimality requirements.

Therefore, optimizing additive independent components leads to joint component optimality inconsistency, and hence, to system optimality (S) inconsistency.

Implication 9

System-consistent optimization is not achievable in additive systems because the necessary conjunctural requirements for general system optimality conditions(S) to hold do not exist in those additive systems.

The additive system optimization impossibility theorem:

No additive system can be optimized, other things being equal, in ways that guarantee system-consistent optimality when optimality needs joint feasibility across interdependent components so additive independent thinking does not lead to system-consistent optimality (S) when optimized, which manifest as distorted optimality and sustainability gap pressures. This is because internal non-optimal conditions mean external non-optimality.

Conjunctural thinking under optimization theory

If we optimize (*) the conjunctural thinking structure (CT) on both sides we have the following expression:

(CT)* = (LM)*

The expression above tells us that we need to optimize a conjunctural structure, which is possible as you can optimize codependent components in a way that leads to system-consistent optimization.

Implication 10

There is an internal consistency that comes out when optimizing codependent components, which leads also to external consistency, reflecting system-consistent optimality (S). In other words, you can achieve system-consistent optimality only when optimizing codependent components:

(LM)* = L*M* = S

*Therefore, optimizing codependent components leads to component optimality consistency (L*M*) and system optimality consistency(S).*

Implication 11

Optimization is possible in conjunctural systems because the necessary conjunctural requirements for general system optimality conditions(S) do exist.

The conjunctural system optimization possibility theorem:

All conjunctural systems can be optimized, other things being equal, in ways that satisfy sustainability requirements, as codependent thinking leads to system-consistent optimality (S), which manifest as non-distorted optimality free of sustainability gap pressures. This is because internal optimal conditions mean external optimality.

Red, green, and sustainability markets as additive corrections of traditional economic thinking (B)

Correcting traditional markets (B) of Adam Smith (Smith 1776) to reflect social and/or environmental sustainability concerns as requested in 1987 by the Brundtland Commission (WCED 1987) using additive thinking leads to red markets, green markets, and true sustainability markets in additive forms as shown below:

1) Correcting for social concerns (A)

If we add social concerns (A) to traditional economic thinking (B), we get the following:

AT = B + A = RM

The expression above indicates that social concerns (A) are external add-ons to the working of traditional economic thinking (B) leading to additive red markets (RM), markets where social issues are exogenous issues.

2) Correcting for environmental concerns(C)

If we add environmental concerns (C) to traditional economic thinking (B), we arrive to the following:

AT = B + C = GM

The expression above indicates that environmental concerns (C) are external add-ons to the working of traditional economic thinking (B) leading to additive green markets (GM), markets where environmental issues are exogenous issues.

3) Correcting for social and environmental concerns (A + C)

If we add social and environmental concerns (A + C) to traditional economic thinking (B), we create to the following:

AT = B + A + C = TSM

The expression above indicates that both social concerns (A) and environment concerns (C) are external add-ons to the working of traditional economic thinking (B) leading to additive true sustainability markets (TSM), markets where social and environmental issues are exogenous issues.

Implication 12

Additive systems-red markets (RM), green markets (GM) and true sustainability markets (TSM) - reflect different types of additive corrections to traditional linearity issues, social, environmental, and socio-environmental issues respectively.

Red, green, and sustainability markets as conjunctural corrections of traditional economic thinking (B)

Correcting traditional markets (B) of Adam Smith (Smith 1776) to reflect social and/or environmental concerns as requested in 1987 by the Brundtland Commission (WCED 1987) using conjunctural thinking leads to red markets, green markets, and true sustainability markets in conjunctural forms as indicated below:

1) Correcting for social concerns (A)

If we internalize social concerns (A) in traditional economic thinking (B), we create to the following:

CT = BA = RM

The expression above indicates that social concerns (A) are internal add-ons to the working of traditional economic thinking (B) leading to conjunctural red markets (RM), markets where social issues are endogenous issues.

2) Correcting for environmental concerns(C)

If we internalize environmental concerns (C) in traditional economic thinking (B), we produce the following:

CT = BC = GM

The expression above indicates that environmental concerns (C) are internal add-ons to the working of traditional economic thinking (B) leading to conjunctural green markets (GM), markets where environmental issues are endogenous issues.

3) Correcting for social and environmental concerns (AC)

If we internalize social and environmental concerns (AC) in traditional economic thinking (B), we generate the following:

CT = BAC = TSM

The expression above indicates that both social and environmental concerns (AC) are internal add-ons to the working of traditional economic thinking (B) leading to conjunctural true sustainability markets (TSM), markets where social and environmental issues are endogenous issues.

Implication 13

Conjunctural systems-red markets (RM), green markets (GM) and true sustainability markets (TSM) - indicate different types of conjunctural corrections to traditional linearity issues, social, environmental, and socio-environmental issues respectively.

Additive red, green and true sustainability market corrections under optimization theory

Placing the structure of additive red markets (RM), green markets (GM), and true sustainability markets (TSM) under optimization thinking (*) produces the following structures and implications:

(AT)* = (B + A)* = (RM)*

(AT)* = (B + C)* = (GM)*

(AT)* = (B + A + C)* = (TSM)*

We can see that all expressions above have internal optimality inconsistency and external optimality inconsistency since you cannot achieve general system-consistent optimality simply by adding optimal independent components, and therefore:

(AT)* = (B + A)* = (RM)* = $\infty \neq$ S

(AT)* = (B + C)* = (GM)* = $\infty \neq$ S

$(AT)^* = (B + A + C)^* = (TSM)^* = \infty \neq S$

Where the symbol ∞ is used to indicate non-feasible under system-consistent optimality requirements.

All additive expressions above, red markets (RM), green markets (GM), and true sustainability markets (TSM), indicate that optimizing (*) additive thinking is structurally not possible as it does not lead to general system optimality consistency (S), and if we assume it can be done, it leads to distorted optimal conditions under sustainability gap pressures.

Implications 14

Additive markets are not optimal ways to correct traditional market's social and/or environmental problems. In other words, additive thinking is not a suitable way to correct traditional market thinking as independent optimal additive conditions lead to internal optimization inconsistency that result in general system optimization inconsistency; and therefore, additive red markets, additive green markets, and additive true sustainability markets are not optimal ways of fixing the social and/or environmental issues associated with the working of traditional market thinking.

Implications 15

Additive thinking is not the appropriate way to address the social or environmental or socio-environmental issues linked to the working of traditional market thinking due to the existence of internal joint optimality inconsistencies.

Applied additive system optimization impossibility theorem:

No additive red market or green market or true sustainability market can be optimized in ways that lead to system-consistent optimality (S), which manifest as distorted optimality and sustainability gap pressures in each of those markets, ceteris paribus. This is because internal non-optimal conditions in red markets or green markets or true sustainability markets mean external non-optimality in each of those markets. Optimization requires the existence of internal and external optimality conditions, and all the additive markets above violate this condition.

Conjunctural red, green and true sustainability market corrections under optimization theory

Placing the structure of conjunctural red markets (RM), green markets (GM), and true sustainability markets (TSM) under optimization thinking (*) leads to the following structures and implications:

(CT)* = (BA)* = (RM)*

(CT)* = (BC)* = (GM)*

(CT)* = (BAC)* = (TSM)*

We can see that all expressions above have internal optimality consistency and external optimality consistency since codependent component based structures can be optimized (*) leading to system consistent optimality (S), and therefore:

(CT)* = (BA)* = (RM)* = S

(CT)* = (BC)* = (GM)* = S

(CT)* = (BAC)* = (TSM)* = S

All conjunctural expressions above, red markets (RM), green markets (GM), and true sustainability markets (TSM), indicate that optimizing conjunctural thinking is structurally possible, and it leads to optimal conditions under no sustainability gap pressures. In other words, all structures above show the unity of sustainability, the unity of red markets (RM* = (BA)*), the unity of green markets (GM)* = (BC)*), and the unity of true sustainability markets (TSM)* = (BAC)*). The unity of true sustainability markets in terms of the interaction of optimal producers and optimal lifestyles has been recently shared (Muñoz 2025), reflecting internal and external consistency.

Implications 16

Conjunctural markets are optimal ways to correct the traditional market's social and/or environmental problems. In other words, conjunctural thinking is a suitable way to correct traditional market thinking as codependent conjunctural conditions lead to internal optimization consistency that result in general system optimization consistency; and therefore, conjunctural red markets, conjunctural green markets, and conjunctural true sustainability markets are optimal venues to fixing the social and/or environmental issues associated with the working of traditional market thinking.

Implications 17

Conjunctural thinking is the appropriate way to address the social or environmental or socio-environmental issues linked to the working of traditional market thinking due to the existence of optimality consistencies.

Applied conjunctural system optimization possibility theorem:

All conjunctural red, green and true sustainability market can be optimized as codependent thinking leads to system-consistent optimality (S), which manifest as non-

distorted optimality free of sustainability gap pressures in each of those markets, ceteris paribus. This is because internal optimal conditions in red markets or green markets or true sustainability markets mean external optimality in each of those markets.

Extracting the necessary and sufficient conditions for market sustainability to exist

We can extract internal optimality consistency from each of the conjunctural market structures above, red markets, green markets and true sustainability markets as indicated below:

(CT)* = (BA)* = (RM)* = B*A* = S

(CT)* = (BC)* = (GM)* = B*C* = S

(CT)* = (BAC)* = (TSM)* = B*A*C* = S

And then the expressions above says the following: i) that the necessary and sufficient condition for red market sustainability to exist (RM* = S) is the interaction of the optimal economic and optimal social components, which reflects full econ-social cost internalization; ii) that the necessary and sufficient condition for green market sustainability to exist (GM* = S) is the interaction of the optimal economic and optimal environmental components, which indicates full econ-environmental cost internalization; and iii) that the necessary and sufficient condition for true sustainability markets to exist (TSM* = S) is the interaction of the optimal economic, optimal social, and optimal environmental components, which shows full econ-socio-environmental cost internalization.

Implication 18

Internal and external optimality consistency exist because there is no social cost externalization in red markets, there is no environmental cost externalization in green markets and there is no socio-environmental cost externalization in true sustainability markets.

Implication 19

Under full social cost internalization red markets have internal and external optimality consistency as social issues are now endogenous issues; under full environmental cost internalization green markets have internal and external optimality consistency as environmental issues are now endogenous issues; and under full socio-environmental cost internalization true sustainability markets have internal and external optimality consistency as social and environmental issues are now endogenous issues.

Optimization requires system-consistent optimality (S), and all the conjunctural markets above satisfy this condition.

Conclusions

Among specific conclusions are the following: 1) The paradigm variability model is a useful tool to generate all logical paradigms that make up the total paradigm variability landscape or possible active paradigms. 2) Subjecting the total paradigm variability landscape to independent assumptions and conjunctural assumptions leads to unlocking the structure of additive thinking and of conjunctural thinking, respectively. 3) Subjecting additive thinking to optimization requirements shows the nature of the additive thinking optimization impossibility theorem. 4) Subjecting conjunctural thinking to optimization requirements highlights the nature of the conjunctural thinking optimization possibility theorem. 5) Subjecting the structure of additive red markets, additive green markets, and additive true sustainability markets to optimization requirements shows that none of them is an optimal tool to correct the social and/or environmental limitations of traditional market thinking. 6) Subjecting the structure of conjunctural red markets, conjunctural green markets, and conjunctural true sustainability markets to optimization requirements shows that all of them are optimal tools to correct the social and/or environmental limitations of traditional market thinking, depending on what correction is the priority. 7) The optimization of conjunctural red markets, conjunctural green markets and conjunctural true sustainability markets brings out the necessary and sufficient conditions of each type of sustainability to exist, in the case of red markets it is the interaction of optimal economic and optimal social components, in the case of green markets is the interaction of optimal economic and environmental components, and in the case of true sustainability markets is the interaction of optimal economic, social, and environmental components.

In general, it was shown that only conjunctural thinking can capture the nature of sustainability thinking as this thinking is the only one that reflects internal optimization and external optimization consistency since additive thinking breaks down under optimization thinking, and this over-all system optimality requirement is met by red markets, green markets, and true sustainability markets only when they are under conjunctural forms. In other words, sustainability requires conjunctural (non-separable) optimality, be it red market or green market or true sustainability market sustainability; and therefore, any system based on additive independence or separable optimality cannot guarantee sustainability, and this is because as shown system-consistent optimality (S) requires non-separability (conjunctural structure), which means that sustainability is structurally a non-separable (conjunctural) optimization problem.

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