
Research Paper

Short Elucidating Note 129: Extending the general true sustainability based structural falsification theory to capture win-win paradigm dynamics and horizontal and vertical win-win loops

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Abstract

The general true sustainability based falsification theorem for paradigms of the form $TS_i = XYZ$ tells us the following about the true sustainability balance that needs to be respected or violated: i) when it is fully respected we have full true sustainability conditions as the true sustainability gap is zero ($SG = 0$); ii) when it is partially respected we have partial sustainability and the presence of true sustainability gaps since $SG > 0$, but less than the critical threshold ($SG < CRT$); and hence, it has the seed that leads to the accumulation of true sustainability pressures that in the long term when they become binding will push partial sustainability paradigms towards full unsustainability; and iii) when it is fully violated we have full unsustainability, and the tendency towards paradigm collapse, shift or merger. The aim of this paper is to express the theorem described above in terms of win-win situations and link it to structural consistency conditions with the idea of pointing out representations of both horizontal and vertical win-win dynamic loops across general and domain-specific levels of abstraction.

Keywords: True sustainability, Falsification theorem, Sustainability gap, Structural consistency, Win-win situations.

Goals of this paper

1) To extend the general true sustainability based structural falsification theorem in a way that allows us to capture win-win paradigm dynamics and highlight horizontal and vertical win-win structural and true sustainability based dynamic loops; and 2) To point out the simple logic behind the general structural-true sustainability-based win-win development environment.

The general true sustainability falsification theorem

It has been pointed out (Muñoz 2026a) that in the general true sustainability falsification framework, the true sustainability balance to be respected or violated is the following:

$$TS_i = XYZ$$

The expression above indicates that the joint active interaction of components X, Y, and Z or their presence in active form at the same time as sets determines the existence of true sustainability paradigms of the form TS_i as if XYZ exist, then TS_i exist.

a) True sustainability thinking and validation

When the true sustainability balance is fully respected, we have full validation:

$$TS_i = XYZ \rightarrow \text{Full validation} \rightarrow SG = 0$$

The expression above tells us that when sustainability gaps do not exist ($SG = 0$) we have full validations; and hence we have true sustainability TS_i .

b) True sustainability and partial validation

When the true sustainability balance is partially respected, we have partial viability:

$$TS_i \approx XYZ \rightarrow \text{Partial viability} \rightarrow 0 < SG < CRT$$

The expression above tells us that when the true sustainability gap is positive ($SG > 0$), but less than the critical sustainability threshold ($SG < CRT$) we have partial viability; and therefore, we have partial true sustainability or dwarf sustainability; and when the sustainability gap's pressures accumulates to the point of being equal or greater than the threshold ($SG \geq CRT$), then the paradigm will be in the true unsustainability stage and would collapse or shift or merge.

c) True sustainability and invalidation/falsification

When the true sustainability balance is fully violated, we have full invalidity or full falsification:

$$TS_i \neq XYZ \rightarrow \text{Full invalidation} = \text{Full falsification} \rightarrow SG = \infty$$

The expression above tells us that when the sustainability gap is infinite ($SG = \infty$) there is full falsification or full invalidation so paradigms of the form TS_i are fully unsustainable or under true full unsustainability.

And hence, the true sustainability falsification theorem above describes the world of true sustainability-based development dynamics:

$$TS_i = XYZ \rightarrow \text{The world of true sustainability-based development dynamics}$$

The expression above tells us that true sustainability-based dynamics emanate from the nature of the true sustainability balance equality $TS_i = XYZ$.

Extending the true sustainability theorem

As X, Y, and Z are sets, then the theorem can be expanded as follows: If $X = X_1.X_2.X_3...X_n$, $Y = Y_1.Y_2.Y_3...Y_n$, and $Z = Z_1.Z_2.Z_3...Z_n$ assuming all of components of the system have the same numbers of subcomponents, then

$$TS_i = XYZ = (X_1.X_2.X_3...X_n)(Y_1.Y_2.Y_3...Y_n)(Z_1.Z_2.Z_3...Z_n)$$

Rearranging terms we have:

$$TS_i = XYZ = (X_1.X_2.X_3) (Y_1.Y_2.Y_3) (Z_1.Z_2.Z_3) (...X_nY_nZ_n)$$

If we make $W = (X_1.X_2.X_3)$, $I = (Y_1.Y_2.Y_3)$, $N = (Z_1.Z_2.Z_3)$ and $! = (...X_nY_nZ_n)$, and then the following is true:

$$TS_i = XYZ = (X_1.X_2.X_3) (Y_1.Y_2.Y_3) (Z_1.Z_2.Z_3) (...X_nY_nZ_n) = WIN!$$

And this means:

$$TS_i = XYZ \rightarrow WIN!$$

The expression above indicates that win-win conditions (WIN!) come from the nature of the true sustainability balance equality $TS_i = XYZ$.

Notice that once TS_i is expanded and expressed in terms of win-win situations then you create a positive look at paradigm dynamics as now we are not talking about in terms of collapsing conditions, but in terms of win-win conditions.

The general true sustainability falsification theorem in terms of win-win situations

The true sustainability balance to be respected or violated now is:

$$TS_i = XYZ = WIN!$$

The expression above tells us the nature of true sustainability TS_i in terms of win-win conditions.

a) True sustainability and win-win situations

When the true sustainability balance is fully respected, we have win-win situations:

$$TS_i = XYZ = WIN! \rightarrow \text{Full validation} \rightarrow SG = 0 \rightarrow \text{win-win situations}$$

This is the world of true sustainability, win-win situations are found when there is true sustainability and vice versa:

$$\text{Win-win situations (WIN!)} \leftrightarrow TS_i$$

b) True sustainability and partial win-win situations

When the true sustainability balance is partially respected, we have partial viability

$$TS_i \approx XYZ \approx WIN! \rightarrow \text{Partial viability} \rightarrow 0 < SG < CRT \rightarrow \text{partial win-win situations}$$

This is the world of partial sustainability or dwarf sustainability, where partial win-win situations coexist within a world under active sustainability gap pressures and a threshold boundary ($0 < SG < CRT$).

c) True sustainability and full invalidation/full falsification

When the true sustainability balance is fully violated, we have full invalidity or full falsification:

$TS_i \neq XYZ \neq WIN! \rightarrow \text{Full invalidation} = \text{Full falsification} \rightarrow SG = \infty \rightarrow \text{lose-lose situations}$

This is the world of true unsustainability, paradigm collapse or shift or merger as lose-lose situations are found when there is true full unsustainability.

And hence, the true sustainability theorem above describes the world of win-win true sustainability-based development dynamics:

$TS_i = XYZ \rightarrow WIN! \rightarrow \text{The world of true win-win sustainability-based development dynamics}$

The expression above tells us that when there are true win-win sustainability options there is true sustainability and vice versa:

True win-win sustainability-based development dynamics $WIN! \leftrightarrow TS_i$

The link true structural consistency and win-win situations

If we make structural consistency ($K_i = L_j$) be equal to true sustainability consistency ($TS_i = XYZ$), then the following holds true

$K_i = L_j = TS_i = XYZ \rightarrow WIN!$

So that

$K_i \rightarrow WIN!$

The expression above tells us that there that win-win situations ($WIN!$) emanate from structural consistency K_i .

The linking extended TS_i to general structural consistency K_i so that $TS_i = K_i = WIN!$ creates a general dynamic win-win framework where:

General true sustainability consistency = general structural consistency $\rightarrow WIN!$ Situations

Therefore, the existence of win-win situations requires the existence of general true sustainability consistency and general structural consistency. Notice that the idea of the general structural falsification theorem from the point of view of full structural consistency, partial structural consistency and full structural inconsistency and structural collapse has been recently shared (Muñoz 2026b).

The general structural falsification theorem in terms of win-win situations

The general structural balance to be respected or violated now is:

$$K_i = L_j = XYZ = \text{WIN!}$$

a) Structural consistency and full win-win situations

When the general structural balance is fully respected, we have win-win situations

$$K_i = XYZ = \text{WIN!} \rightarrow \text{Full validation} \rightarrow SG = 0 \rightarrow \text{structural win-win situations}$$

This is the world of full structural consistency, where there are structural win-win situations or vice versa:

$$K_i \leftrightarrow \text{Structural win-win situations}$$

b) Structural consistency and partial win-win situations

When the general structural balance is partially respected, we have partial viability

$$K_i \approx XYZ \approx \text{WIN!} \rightarrow \text{Partial viability} \rightarrow 0 < SG < CRT \rightarrow \text{partial structural win-win situations}$$

This is the world of partial structural consistency, a soft kill environment where structural gap pressures will accumulate in the long term and when these structural pressures become binding the structure will tend towards structural unsustainability and collapse.

c) Structural consistency and Full lose-lose situations

When the general structural balance is fully violated, we have full invalidity or full falsification

$$K_i \neq XYZ \neq \text{WIN!} \rightarrow \text{Full invalidation} = \text{Full falsification} \rightarrow SG = \infty \rightarrow \text{structural lose-lose situations}$$

This is the world of full structural inconsistency, a hard kill environment where structural lose-lose situations lead to full structural falsification and vice versa:

$$K_i \leftrightarrow \text{Structural lose-lose situations}$$

And hence, the theorem above describes the world of win-win structural consistency-based development dynamics:

$$K_i = XYZ \rightarrow \text{WIN!} \rightarrow \text{The world of true win-win structural consistency-based development dynamics}$$

And this means that if there is true win-win structural consistency-based development dynamics, and then there is true structural consistency and vice versa:

$$\text{True win-win structural consistency-based development dynamics} \leftrightarrow K_i = XYZ$$

Transforming the general structural and true sustainability framework into a domain-specific framework

If you make the general frameworks, structural and true sustainability, domain-specific then we arrive at the situation summarized below:

$$TS_i = K_i = \text{WIN!} \rightarrow TS_1 = K_1 = W_1 I_1 N_1 !_1$$

The expression above tells us that domain-specific paradigms are special cases of general paradigms.

Transforming the domain-specific structural and true sustainability frameworks in terms the of social (A), economic (B) and environmental (C) issue based traditional development framework

If there are only social ($W_1 = A$), economics ($I_1 = B$) and environmental components ($N_1 = C$) in a sustainability system as traditional viewed, then $!_1 = 0$, which means that we have here the following domain-specific implication:

$$TS_i = K_i = \text{WIN!} \rightarrow TS_1 = K_1 = W_1 I_1 N_1 !_1 = ABC$$

The expression above highlights the fact that traditional sustainability thinking based on social (A), economic (B), and environmental (C) components is a special case of domain-specific development paradigms.

The nature of horizontal bi-directional dynamics-based win-win loops

Based on the discussion above now we can state the nature of horizontal bi-directional dynamics win-win loops (WIN!) linking general structural consistency (K_i) and true sustainability consistency (TS_i) as it is indicated below:

i) The general horizontal win-win loop

The horizontal win-win loop linking general structural consistency (K_i) and general true sustainability consistency (TS_i) can be stated as follows:

$$K_i \leftrightarrow \text{WIN!} \leftrightarrow TS_i$$

The expression above tells us that if there are win-win conditions (WIN!) there is general structural consistency (K_i) and true sustainability consistency (TS_i) at the same time; and vice versa.

ii) The domain-specific horizontal win-win loop

The horizontal win-win loop linking domain-specific structural consistency (K_1) and domain-specific true sustainability consistency (TS_1) can be summarized as follows:

$$K_1 \leftrightarrow W_1 I_1 N_1 !_1 \leftrightarrow TS_1$$

The expression above shows that if there are domain-specific win-win conditions ($W_1I_1N_1!_1$) there is domain-specific structural consistency (K_1) and domain-specific true sustainability consistency (TS_1) at the same time; and vice versa.

iii) The traditional sustainability thinking horizontal win-win loop

The horizontal win-win loop linking traditional sustainability thinking with domain-specific structural consistency (K_1) and domain-specific true sustainability consistency (TS_1) can be summarized as indicated below:

$$K_1 \leftrightarrow ABC \leftrightarrow TS_1$$

The expression above shows that if there is traditional sustainability consistency (ABC) then there is domain-specific structural consistency (K_1) and domain-specific true sustainability consistency (TS_1) at the same time; and vice versa.

The vertical bi-directional dynamics based general structural and true sustainability framework-domain specific win-win loop

The win-win loop connecting general win-win conditions with domain-specific win-win issues vertically can be stated as follows:

$$\begin{array}{ccc} K_i \leftrightarrow WIN! & \leftrightarrow & TS_i \\ \updownarrow & & \updownarrow \\ K_1 \leftrightarrow W_1I_1N_1!_1 & \leftrightarrow & TS_1 \end{array}$$

The vertical loop above tells us that win-win conditions can go from domain-specific conditions upwards to general win-win conditions and vice versa.

The vertical bi-directional dynamics-based domain specific structural and true sustainability framework-traditional sustainability thinking win-win loop

The win-win loop connecting traditional sustainability win-win conditions with domain-specific win-win issues vertically can be stated as follows:

$$\begin{array}{ccc} K_i \leftrightarrow WIN! & \leftrightarrow & TS_i \\ \updownarrow & & \updownarrow \\ K_1 \leftrightarrow ABC & \leftrightarrow & TS_1 \end{array}$$

The vertical loop above indicates that win-win conditions can go from domain-specific conditions downwards to traditional sustainability win-win conditions and vice versa.

The logic behind the general structural-true sustainability-based win-win development environment of the form $K_i = TS_i = XYZ = WIN!$

a) There is structural and true sustainability balance; b) there is structural and true sustainability consistency; c) there is mutual structural and true sustainability reproduction; d) there is a universal inclusion of structural and true sustainability components; e) when the balance is fully respected we have structural and true sustainability based win-win sustainability situations; f) when the balance is partially violated we have partial structural and true sustainability based win-win situations; and g) when the balance is fully violated we have full structural and full true sustainability based lose-lose situations.

Conclusions

First, it was shown that the general true sustainability falsification theorem can be expanded and expressed in terms of win-win thinking, where fully respecting the true sustainability balance means full win-win conditions, partially respecting the balance means partial win-win situations and the presence of true sustainability gaps and fully violating the balance means full lose-lose conditions. Second, it was shown that when true sustainability consistency is made the same as full structural consistency, then the structural falsification theorem is expressed in terms of win-win situations, where full structural consistency means full win-win situations, partial structural consistency means partial win-win situations and full structural inconsistency means full lose-lose situations. Third, it was pointed out how we can transform the general structural falsification framework and general true sustainability framework under win-win conditions into domain-specific frameworks. Fourth, it was stressed how you can transform domain-specific frameworks under win-win situations into traditional sustainability-based frameworks reflecting social, economic and environmental concerns. Fifth, it was shown how horizontal win-win dynamic loops can be stated in bi-directional form, which means you can go from general win-win situations to domain-specific win-win situations or vice versa or from domain-specific frameworks to traditional true sustainability frameworks and vice versa. Sixth, it was indicated how vertical win-win dynamic loops can be stated in bi-directional form, which means you can go from general win-win situations to domain-specific win-win situations or vice versa or you can go from traditional sustainability thinking win-win situations to domain-specific win-win situations and vice versa. And seventh, the simple logic behind the structural and true sustainability-based win-win frameworks $K_i = TS_i = XYZ = \text{WIN!}$ rests on the existence of key characteristic like i) conjunctural balance; ii) structural consistency, iii) true sustainability consistency; iv) mutual reproduction; and v) universal inclusion of components; and if all of them exist we have win-win situations.

References

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