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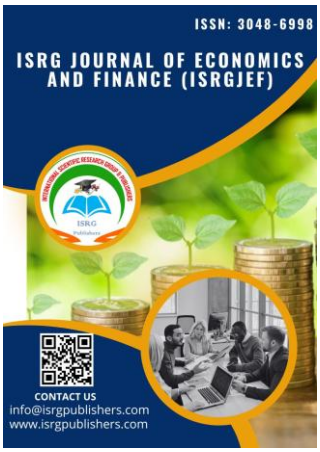

True Sustainability Thinking 107: Placing the critical problem-solving impossibility Theorem and the full critical problem-solving possibility theorem under the degree of externality production framework: Revealing the externality production continuum from full cost externalization to full no cost externalization.

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Abstract

The degree of externality production framework treats externality production as a cost externalization continuum ranging from full cost externalization to full no cost externalization. Within this continuum, the critical problem-solving impossibility theorem is structurally admissible only at the endpoint characterized by full cost externalization and a full externality production reduction technology gap. Because producers bear no responsibility for externality costs under this structure, no endogenous incentives exist to eliminate pollution production. As the degree of externality production declines through increasing cost internalization and technological improvement, the structural admissibility of the impossibility theorem progressively weakens. Once the system moves away from the full externalization endpoint, transition conditions emerge under which partial forms of the critical problem-solving possibility theorem become admissible. At the limiting case of no cost externalization and no externality production reduction technology gap, the full critical problem-solving possibility theorem becomes structurally admissible, while the critical problem-solving impossibility theorem becomes fully structurally falsified. As the degree externality production decreases, the critical problem-solving impossibility theorem is progressively relaxed. Consequently, the theorem loses structural admissibility outside the full externality production endpoint, creating the transition conditions under which the critical problem-solving possibility emerges. And this raises important questions such as how to place the critical problem-solving impossibility theorem and the full critical problem-solving possibility theorem under the degree of externality production framework? How can this framework be used to highlight the externality production continuum from full cost externalization to no cost externalization?

Objectives

a) To place the critical problem-solving impossibility theorem and the full critical problem –solving possibility theorem within the Degree of Externality Production Framework; b) To characterize the externality production continuum linking full, partial, and full no cost externalization; and c) To show that structural admissibility shifts systematically along this continuum, thereby identifying the domains in which each theorem is valid.

Methodology

First, the terminology used in this paper is shared. Second, the two ways mapping of the degree of externality production is introduced. Third, the degree of externality production framework is linked to the degree of cost externalization. Fourth, the degree of externality production framework is linked to the degree of cost internalization. Fifth, the degree of externality production framework is linked to the degree of critical problem. Sixth, the degree of externality production framework is linked to the degree of externality production reduction technology gap. Seventh, the critical problem-solving impossibility theorem, the bounded critical problem-solving possibility theorem, and the full critical problem-solving possibility theorem are placed within the degrees of externality production framework. Eight, some general implications, a summary of comparisons, and a summary of specific degree of externality production implications are shared. And finally, ninth, some relevance conclusions are listed.

Terminology

DEP = Degree of externality production FPOP = Full pollution production

PPOP = Partial pollution production NPOP = No pollution production

DPOP = Degree of pollution production

DCE = Degree of cost externalization FCE = Full cost externalization

PCE = Partial cost externalization NCE = No cost externalization

DCI = Degree of cost internalization NECI = No externality cost internalization

PECI = Partial externalitity cost internalization DCP = Degree of critical problem

FECI = Full externality cost internalization/ FCP = Full critical problem

PCP = Partial critical problem NCP = No critical problem/

DEPRTG = Degree of externality production reduction technology gap

FEPRTG = Full externality production reduction technology gap

PEPRTG = Partial externality production reduction technology gap

NEPRTG = No externality production reduction technology gap

CPSIT = Critical problem-solving impossibility theorem

CPSPPT = Critical problem-solving partial possibility theorem

CPSFPT = Critical problem-solving full possibility theorem

The two ways mapping of degrees of externality production

Externality production can be seen as going from full externality production(FEP) to partial externality production (PEP) to no externality production (NEP) so there are different degrees of externality production (DEP) that comes along as the degree of pollution production (DPOP) changes as shown below:

DEP
↕
FEP
↕
PEP
↕
NEP

Notice that there is a direct relation between the degrees of externality production (DEP) and the degrees of pollution production (DPOP).

Vertical implication:

There is a one to one relationship between changes in the degree of externality production (DEP) and changes in the degree of pollution production (DPOP).

Linking degrees of externality production to the degree of cost externalization

Full externality production (FEP) needs full cost externalization (FCE) and hence there is full pollution production (FPOP), partial externality production (PEP) requires partial cost externalization (PCE), and therefore, there is partial pollution production; and no externality production (NEP) implies full no-cost externalization (FNCE) as there is no pollution production (NPOP), as expressed below:

DEP	↔	**DCE**
↕		↕
FEP	↔	**FCE**
↕		↕
PEP	↔	**PCE**
↕		↕
NEP	↔	**NCE**

Notice that as the degree of externality production (DEP) decreases, then the degree of cost externalization (DCE) taking place decreases too.

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Vertical implication:

There is a one to one relationship between the changes in the degree of externality production (DEP) and the changes in the degree of cost externalization (DCE)

Horizontal implication

There is horizontal consistency between degree of externality production (DEP), the degree of pollution production (DPOP) and the degree of cost externalization (DCE).

Linking degree of externality production to the degree of cost internalization

Full externality production (FEP) means no externality cost internalization (NECI) exists so that full pollution production (FPOP) is taking place, partial externality production (PEP) indicates partial cost internalization (PECI) is going on and the structure then is partially viable in reality or by assumption ; and no externality production (NEP) means there is full externality cost internalization (FECI) as shown below:

DEP ↔ DCE ↔ DCI
↕ ↕ ↕
FEP ↔ FCE ↔ NECI
↕ ↕ ↕
PEP ↔ PCE ↔ PECI
↕ ↕ ↕
NEP ↔ NCE ↔ FECI

Notice that as the degree of externality production (DEP) decreases, then the degree of cost internalization (DCI) increases.

Vertical implication:

There is an inverse relationship between changes in the degree of externality production (DEP) and changes in the degree of externality cost internalization (DCI).

Horizontal implication

There is horizontal consistency between degrees of externality production (DEP), degrees of pollution production (DPOP), degrees of cost externalization (DCE), and degrees of cost internalization (DCI).

Linking degree of externality production to the degree of critical problem

Full externality production (FEP) reflects the conditions for full critical problem (FCP) as there is full pollution production (FPOP) and hence there are full sustainability gaps (FSG); partial externality production (PEP) indicates the conditions for partial critical problem (PCP) as there is partial pollution production (PPOP) and therefore, there are partial sustainability gaps (PSG); and no externality production (NEP) means that there no critical problem (NCP) as there are no pollution production problems (NPOP) and there are no sustainability gaps (SG = 0) as pointed out below:

DEP ↔ DCE ↔ DCI ↔ DCP
↕ ↕ ↕ ↕
FEP ↔ FCE ↔ NECI ↔ FCP(SG = ∞)
↕ ↕ ↕ ↕
PEP ↔ PCE ↔ PECI ↔ PCP(0 < SG < CRT)
↕ ↕ ↕ ↕
NEP ↔ NCE ↔ FECI ↔ NCP(SG = 0)

Notice that as the degree of externality production (DEP) decreases, then the degree of critical problem (DCP) decreases.

Vertical implication:

There is a one to one relationship between changes in the degree of externality production (DEP) and changes in the degree of critical problem (DCP).

Horizontal implication:

There is horizontal consistency between degrees of externality production (DEP), degrees of pollution production (DPOP), degrees of cost externalization (DCE), degrees of cost internalization (DCI) and degrees of critical problems (DCP).

Linking degrees of externality production to the degrees of externality production reduction technology gap

Full externality production (FEP) indicates the existence of a full externality pollution reduction technology gap (FEPRTG) as there is no incentive to address the pollution production problem (POPP); partial externality production (PEP) means that there is a partial externality production reduction technology gap problem (PEPRTG) as there are partial incentives to address the pollution production problem (POPP); and No externality production (NEP) tells us that there is no externality production reduction technology gap problem (NEPRTG) as there are full incentives to address the pollution production problem (POPP) fully as summarized below:

DEP ↔ DCE ↔ DCI ↔ DCP ↔ DEPRTG
↕ ↕ ↕ ↕ ↕
FEP ↔ FCE ↔ NECI ↔ FCP(SG = ∞) ↔ FEPRTG
↕ ↕ ↕ ↕ ↕
PEP ↔ PCE ↔ PECI ↔ PCP(0 < SG < CRT) ↔ PEPRTG
↕ ↕ ↕ ↕ ↕
NEP ↔ NCE ↔ FECI ↔ NCP(SG = 0) ↔ NEPRTG

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Notice that as the degree of externality production (DEP) decreases, then degree of the externality production reduction technology gap (DEPRTG) decreases.

Vertical implication:

There is a one to one relationship between changes in the degree of externality production (DEP) and changes in the degree of externality production reduction technology gap (DEPRTG).

Horizontal implication

There is horizontal consistency between degrees of externality production (DEP), degrees of pollution production (DPOP), degrees of cost externalization (DCE), degrees of externality cost internalization (DCI), degrees of critical problem (DCP), and degrees of externality production reduction technology gap (DEPRTG).

Placing the critical problem-solving impossibility theorem and the critical problem-solving possibility theorem inside the full mapping of degrees of externality production

The critical problem-solving impossibility theorem (CPSIT) works on the assumptions of full externality production (FEP), of full cost externalization (FCE) and of full externality production reduction technology gap (FEPRTG) neutrality, reflecting an impossibility point. If the degree of externality production (DEP) decreases from full externality production to partial externality production , then we have a bounded system or partial critical problem solving possibility point(PCPSIT), which relies on the existence of partial externality production (PEP), partial cost externalization (PCE), and partial externality production reduction technology gap (PEPRTG). If the degree of externality production (DEP) decreases from full externality production (FEP) and full pollution production (FPOP) to no externality production (NEP)and no pollution production (NPOP),, then a higher level system appears, which is supported by the existence of no externality production reduction technology gaps (NEPRTG), creating a full critical problem-solving possibility point (FCPSPT); and when we reach the no externality production point (NEP) , then full critical problem solving impossibility theorem (FCPSIT) reaches invalidity and it is no longer admissible; and hence at this highest point then the full critical problem-solving possibility theorem (FCPSPT) becomes valid and admissible, a situation summarized below by placing the full critical problem-solving impossibility theorem, the partial or bounded critical problem-solving possibility theorem (PCPSPT), and the full critical problem-solving possibility theorem (FCPSPT) as pointed out below:

DEP ↔ DCE ↔ DCI ↔ DCP ↔ DEPRTG

↕ ↕ ↕ ↕ ↕

FEP ↔ FCE ↔ NECI ↔ FCP(SG = ∞) ↔ FEPRTG

The full critical problem-solving impossibility theorem

↕ ↕ ↕ ↕ ↕

PEP ↔ PCE ↔ PECI ↔ PCP(0 < SG < CRT) ↔ PEPRTG

The bounded critical problem-solving possibility theorem

↕ ↕ ↕ ↕ ↕

NEP ↔ NCE ↔ FECI ↔ NCP(SG = 0) ↔ NEPRTG

The full critical problem-solving possibility theorem

The degree of externality production framework above tell us the following things: 1) at the horizontal level of full externality production the critical problem-solving impossibility theorem is valid and admissible, which means that the full critical problem impossibility theorem is in essence a full pollution production reduction impossibility theorem; 2) at the horizontal level of partial externality production the partial or bounded critical problem-solving possibility theorem becomes the valid and admissible theorem; 3) at the horizontal level of no externality production the full critical problem-solving possibility theorem becomes then the valid and admissible theorem; 4) As the level of externality production decreases, the full critical problem-solving impossibility theorem ceases to work and in the end it becomes fully invalid; 5) When the full critical problem-solving impossibility theorem becomes fully invalid, then the full critical problem-solving possibility theorem becomes the valid and admissible theorem; 6) The full critical problem-solving impossibility theorem has the seeds of full unsustainability embedded in its original structure as it has full sustainability gaps; and as the accumulation of sustainability gap pressures become binding in the long term it will need consistent structural replacement: Long term **full critical problem-solving impossibility theorem → requires full consistent structural critical problem-solving possibility theorem replacement or long-term the critical pollution production reduction problem-solving impossibility theorem → Requires a full consistent critical problem solving paradigm replacement** ; 7) Since the partial or bounded critical problem-solving possibility theorem exist within active structural or active sustainability gaps (SG) when the pressures coming from these active sustainability gaps accumulates in the long-term and become binding this partial critical problem-solving possibility theorem(PCPSPT) will then tend towards full unsustainability (FUN) so that: **Partial critical problem-solving possibility theorem (PCPSPT) → Full unsustainability (FUN)** since then SG ≥ CRT→ ∞ and SC → 0 ; and 8) the full critical problem-solving possibility theorem(FCPSPT) describes a paradigm that does not need structural replacement as it has a full structural consistency (SC = 1) and no sustainability gaps (SG = 0), and therefore, it has no externality production and pollution production problem and no externality production reduction technology gap problems, so that : **Full critical problem-solving possibility theorem → no need for paradigm replacement.**

More over, we can notice that the horizontal elements in the degrees of externality production framework above describe the conditions and assumptions under which each of theorem is valid, admissible, and works: i) The full critical problem-solving impossibility theorem works under full externality production, full

pollution production, full cost externalization, full cost internalization and full externality production reduction technology gap based neutrality assumptions; ii) The partial or bounded critical problem-solving possibility theorem works under partial externality production, partial pollution production, partial cost externalization, partial cost internalization and partial externality production reduction technology gap neutrality assumptions; and iii) The full critical problem-solving possibility theorem works under full no externality production, full no pollution production, full no cost externalization, full cost internalization, and full no externality production reduction technology gap assumptions. In few words, at level 1 in the degree of externality production framework above we have a full critical problem and a full critical problem-solving impossibility zone; at level 2, we have a partial critical problem and a partial critical problem-solving possibility zone under remaining sustainability gap pressures; and at level 3 we have no critical problems and a full critical problem possibility zone.

Finally, the degree of externality production framework above can be seen as at a continuum full externality production / full pollution production → partial externality production / partial pollution production → full no externality production / full no pollution production; and this continuum idea has relevance for the understanding in simple terms that the degree of transition (no transition, partial transition, full transition) and the degree of pollution production (Full, partial, no pollution) associated with the critical problem-solving tools use in the past and today to solve critical problems such as the pollution production problem associated with the working of the traditional market of Adam Smith (Smith 1776) are relevant to predict whether we should expect those tools to solve critical pollution production problems, especially under existing critical problem-solving based knowledge gaps that come along as you move away from the full externality production point in the externality production or pollution production framework shared above, which leads to the following relevant cases and questions of problem solving effectiveness : i) The case of the use of full pollution production based non-transition tools to solve externality production problems, can they be expected solve the critical pollution production problem?; ii) The case of the use of partial pollution production based non-transition tools to solve externality production problems: can they be expected solve the critical pollution production problem?; iii) the case of the use of partial and full pollution reduction based transition tools to solve externality production problems: can they be expected solve the critical pollution production problem?; and iv) The case of the impact of critical problem-solving knowledge gaps on the proper way to solve externality production problems and the need to close those critical problem-solving knowledge gaps.

The case of the use of full pollution production based non-transition tools to solve externality production problems and their expected effectiveness

The level 1 in the degree of externality production framework above is a full pollution production level so we cannot expect the use of full pollution based non-transition tools such as more efficient versions of linear thinking or more resource use efficiency versions of circular thinking to solve the externality production problem as they are pollution production markets or tools. For example, we cannot expect the circular traditional economy to solve the pollution production problems of the linear traditional economy as it too is a pollution production market as the structural consistency issues that drive the pollution problem in linear markets are still embedded in the structure of the circular market (Muñoz 2026a). And that is why level 1 is the level where the critical problem-solving impossibility theorem is at work. In other words, level 1 is a full unsustainability zone that requires a full true sustainability solution, not a full pollution production non-transition solution. Moreover, in level 1 pollution reduction is not a good profit making opportunity, full pollution production is, which explains why in this level we have a full pollution production reduction technology gap.

Specific implication:

We should not expect to solve the critical pollution production problem at all through the use of fully polluting non-transition tools, linear or circular, the system in the end then will tend towards full unsustainability, leading to the need of consistent full true sustainability paradigm replacement.

The case of the use of partial pollution production based non-transition tools to solve externality production problems and their effectiveness

The level 2 in the degree of externality production framework above is a partial pollution production level so we cannot expect the use of partial pollution based non-transition tools such as sustainable development, dwarf sustainability markets, dwarf red markets, dwarf green markets and so on to solve the externality production problem as they are partial pollution production markets or tools or partial solutions or patches as the have a remaining pollution production problem under a partial sustainability gap and as the pressures from these remaining sustainability gaps accumulate and become binding in the long term they will tend towards full unsustainability. For example, we cannot expect sustainable development based markets, be it socially friendly or environmentally friendly or socio-environmentally friendly the circular traditional economy to solve the pollution production problems of the linear traditional economy fully as they are pollution problem patching tools that leave active a remaining pollution production problem(Muñoz 2026b) so the socio-environmental pollution problem today is worse than the one documented by the Brundtland Commission in 1987(WCED 1987) and we cannot expect dwarf green markets to solve the environmental pollution production problems of the linear traditional economy fully as they are environmental pollution problem patching tools that leave an active remaining environmental pollution problem(Muñoz 2025a) as the environmental pollution problem today is worse than that documented by the United Nations Commission on Sustainable Development in 2012(UNCSD 2012a; UNCSD 2012b). And that is why level 2 is the level where the partial critical problem-solving possibility theorem is at work. In other words, level 2 is a partial sustainability zone that requires a partial true sustainability solution, not a partial pollution production non-transition solution. Moreover, in level 2 pollution reduction is a good partial profit making opportunity, not a full profit making opportunity, which explains why in this level we have a partial pollution production reduction technology gap.

Specific implication

We should not expect to solve the critical pollution production problem fully through the use of partially polluting non-transition tools, sustainable development based or dwarf sustainability based, as these are partial fixes, which will tend sooner or later towards

full unsustainability as the pressures from its remaining pollution production problem becomes binding, leading to the need for consistent true sustainability based paradigm replacement, full replacement if dominant components are tending towards collapse or partial replacement if dominant components shift to higher level state paradigms or merge before collapse to produce higher level paradigms.

The case of the use of partial and full pollution reduction based transition tools to solve externality production problems and their effectiveness.

The level 3 in the degree of externality production framework above is the no pollution production level so we can expect the use of partial and full pollution reduction based transition tools such green markets, red markets, and true sustainability markets, to partially or fully solve the externality production problems as they are partial or full pollution production reduction markets or tools or solutions or fixes as they do not have a remaining pollution production problem, and hence, they do not have sustainability gap problems (SG = 0). For example, we can expect true sustainability markets to solve the socio-environmental pollution production problems of the linear traditional economy fully if that was the priority as they are socio-environmental pollution reduction markets that can be transition to socio-environmentally pollution-less markets closing socio-environmental sustainability gaps and the socio-environmental pollution reduction technology gap problem (Muñoz 2022) and we can expect green markets to solve the environmental pollution production problems of the linear traditional economy fully as they are environmental pollution reduction markets that can be transition to environmentally pollution-less markets after closing environmental sustainability gaps and the environmental pollution reduction technology gap problem (Muñoz 2024). And that is why level 3 is the level where the full critical problem-solving possibility theorem is at work. In other words, level 3 is a true partial or full sustainability zone that requires a partial and true sustainability solution. Moreover, in level 3 pollution reduction is a good full profit making opportunity, which explains why in this level we have no pollution production reduction technology gap problem.

Specific implication

We should expect to solve the critical pollution production problem fully through the use of no pollution production transition tools, component specific or system specific transition tools, and hence there is no need here of consistent paradigm replacement.

The case of the impact of critical problem-solving knowledge gaps on the proper way to solve externality production problems and the need to close those critical problem-solving knowledge gaps.

Perhaps the difficulty of addressing the critical pollution production problem so far had to do perhaps with the existence of paradigm shift knowledge gaps as there is a full sustainability problem at level 1 in the degree of externality production framework above which required full or partial sustainability solutions depending on the priorities, but decision makers have sorted to simply patch the problem through sustainable development means (WCED 1987) with unsustainable results (Muñoz 2025b) or dwarf green market means (UNCSD 2012a; UNCSD 2012b) with worsening results (Muñoz 2025a). Attempts have been recently made in trying to close critical problem-solving knowledge gaps (Muñoz 2025c; Muñoz 2025d) so future attempts can have at least a positive impact of critical pollution production problem-solving.

Specific implication

Had paradigm shift knowledge gaps not been present in 1987 and in 2012 perhaps development action would have gone the true sustainability way as the true sustainability nature of critical pollution production problems could have been difficult to pass-by. However, the moving from linear economic thinking circular economic thinking has taken place when there are no longer paradigm shift knowledge gaps just apparently done due to the need to improve economic efficiencies under the same assumptions of socio-environmental pollution production neutralities that exist at level 1 in the degree of externality pollution production framework shared above.

General implications:

Hence, the degree of externality production framework supports the following implications: i) the problem-solving impossibility theorem is admissible under a fully pollution production structure, ii) the partial critical problem-solving possibility theorem under sustainability gaps is admissible under partial viability or partially pollution production structure, iii) the fully critical problem-solving possibility theorem is admissible under full no pollution production conditions, which means that under full critical problem-solving conditions the fully critical problem-solving impossibility theorem is fully falsified; and therefore, iv) the degree of externality production framework can be use to reveal the structural continuum from full externality production to no externality production. A dynamic look at the degree of externality production framework from level 1/Full externality production towards level 3/Full no externality production goes like this: i) Level 1 contains embedded structural pollution production inconsistency; ii) Those pollution production inconsistencies generate sustainability-gap pressures; iii) Those pressures accumulate; iv) Once they become binding, consistent structural replacement becomes necessary; and v) The framework therefore explains not only where pollution production theories belong, but also why pollution production paradigms evolve over time.

Summary of comparisons

Features	Full pollution Based framework	Partially pollution Based framework	Fully no pollution Based framework
Externality cost Reality	Fully relevant	Fully relevant	Fully relevant
Externality cost Reality assumed	Fully irrelevant	Partially relevant	Fully relevant
Pollution type market	Fully polluting	Partially polluting	No pollution

Externality Internalization	Fully ignored	Partial internalized	Fully internalized
Externality Externalization	Fully externalized	Partially externalized	Not externalized
Critical problem type	Fully critical	Partially critical	Fully absent
Pollution production Reduction technology Gap type	Full gap	Partial gap	No gap
Problem solving type	Impossible	Partially possible	Fully possible
Policy implications	Expected policy Failure Permanent	Expected partial Success Temporary	Expected full Success Permanent
Actual policy Consistency	Full inconsistency	Partial consistency	Full consistency

Two ways shift implication continuum

Full externality production/full pollution production ↔ Partial externality production/partial pollution production ↔ No externality production/ no pollution production

Where the meaning of the direction of arrows is:

→ = Constraining externality/pollution production

← = Relaxing externality/pollution production

So that: i) placing full pollution production systems under increasing externality production constrains leads to full no pollution production systems as the structural gaps and sustainability gaps are increasingly closed through increasing cost internalization or decreasing cost externalization until they are fully closed; and ii) placing full no pollution production system systems under increasing pollution production relaxation leads full pollution production systems through less cost internalization or more cost externalization until externality production is fully relaxed creating fully pollution production systems and pollution production gaps seeding.

Summary of degree of externality production implications

a) Full externality production

Full externality cost externalization theory and full pollution production theory are internally aligned in the degree of externality production framework's assumptions under full sustainability gap pressures and full externality production neutrality assumptions.

b) Partial externality production

Partial externality cost externalization theory and partial pollution production theory are internally aligned in the degree of externality production framework's assumptions under partial sustainability gap pressures and partial externality production neutrality assumptions.

c) Full conjuncturality

Both cost externalization theory and pollution production theory are reformulated on a fully non-pollution basis: No externality cost externalization theory and no pollution production theory are internally aligned in the degree of externality production framework's assumptions under no sustainability gap pressures and no externality production neutrality assumptions.

Conclusions

First it was highlighted that the critical problem-solving impossibility theorem is perfectly admissible inside the full externality production domain. Hence, the crucial problem-solving impossibility theorem is internally coherent under its stated or implied assumptions of externality production neutrality. In other words, the critical problem-solving impossibility theorem is fully admissible under full structural gap neutrality assumptions. Second it was indicated that when the externality production structure is transformed into a partial externality production structure, those assumptions are no longer satisfied. A distinct critical problem-solving possibility theorem is therefore required. Second it was pointed out that partial externality production is not simply halfway between two extremes. It represents a structurally mixed externality cost situation where some cost internalization relationships are acknowledged while others remain excluded. Third, it was indicated that if one simultaneously assumes an inherently structural non-polluting environment while retaining fully externality production neutrality assumptions, there is a mismatch between assumptions and the non-polluting structure being represented, which through time leads to the need for consistent paradigm replacement, and the idea of the full critical problem-solving possibility point/theorem emerges, one where there is full no externality production or pollution production, full structural consistency and no sustainability gaps. And therefore, the degree of externality production framework can be used to reveal a continuum level 1/full externality production/full pollution production →level 2 / Partial externality production/partial pollution production → level 3 / full no externality production / full no pollution production, and this continuum can be used as a tool to understand current critical paradigm solving or critical development problem-solving dilemmas such as shifting paradigms without fixing embedded structural problems or simplifying paradigms assuming at the same time that the structural externality production gaps or pollution production gaps created when doing

so do not matter or fixing internal problems without fixing external market failures or simply assuming that pollution production paradigms are no pollution production paradigms when they are, and hence, assuming that externality production or pollution production can be manage as we please without creating critical sustainability problems when it should be expected that embedded externality production structurality problem will sooner or later lead to the need of non polluting paradigm replacement or lead to a cycle of moving from one pollution production paradigms to another pollution production paradigm unsustainable paradigm in order to avoid to fully fix the flawed pollution production paradigms structurally or truly sustainably.

It general it was shown that structural admissibility is conditional upon the degree of externality production; and therefore, i) at full externality production, the full critical problem-solving impossibility theorem is admissible; ii) at partial externality production, the bounded partial critical problem-solving possibility theorem is admissible; and iii) at no externality production, the fully critical problem-solving possibility theorem is admissible; iv) consistent no pollution production paradigm replacement is a consequence of moving along the degree of externality production continuum away from level 1; v) a fully structural inconsistent system under full externality production or full pollution production, full externalization, no internalization, and full externality production reduction technology gap problem and one under which the fully critical problem-solving impossibility theory works, it is valid and it is fully admissible; vi) each level in the degree of externality production framework is a specific point of validity and admissibility for specific externality production based paradigms; vii) The flow of the continuum from full externality production to partial externality production to fully no externality production is a flow of paradigm evolution that comes along when the pollution production sustainability gaps driven by cost externalization forces embedded in higher level pollution production paradigms become binding and need consistent no pollution production based paradigm replacement or when the pollution production or structurality or sustainability concerns change towards increasing pollution production reduction responsibility; viii) There is horizontal methodological consistency for paradigm admissibility at each of the three levels of the degree of externality production framework and there is vertical inconsistency for paradigm admissibility as cost internalization or cost externalization conditions change vertically, upwards or downwards, for example a relaxation of no externality production or no cost externalization leads you in the end to the conditions under which the fully critical problem-solving impossibility theorem works; and a tightening of the full pollution production scenario to the end leads to the full critical problem-solving possibility theorem; and therefore, the degree of externality production framework tells as: 1) About the degree of externality production continuum implications: that the full critical problem-solving impossibility theorem is structurally admissible within one specific region of the degree-of-externality production continuum, while different structural polluting conditions require different admissible theorems; 2) About methodological implications: that admissibility or validity depends on the structural assumptions at each level of the degree of externality production; 3) About theoretical implications: that different degrees of externality production imply different critical problem-solving theorems; 4) About paradigm evolution implications: that paradigm replacement becomes a structural consequence of changing externality production conditions, and if the main pollution production externality neutrality based theory in each level falls, it leads to a full house fall-down effect as theories supported on or based on or expanding on this externality production neutrality theory, and from this main externality production neutrality theory become structurally inconsistent themselves (Muñoz 2016); 5) About policy implications: that policy prescriptions become conditional on where a critical problem system lies in the degree of externality production continuum; and 6) About general structural admissibility implications: that every pollution production theory in the degree of externality production framework has a domain of structural admissibility. When the structural polluting conditions move along the degree of externality production continuum, the admissible theory changes, a pollution thought that goes across domains, economics, social policy, development thinking, sustainability, and so on.

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