

**Sustainability thoughts 120: How are paradigm shift knowledge gaps created? In which ways can they lead to the mishandling of expected paradigm shifts?**

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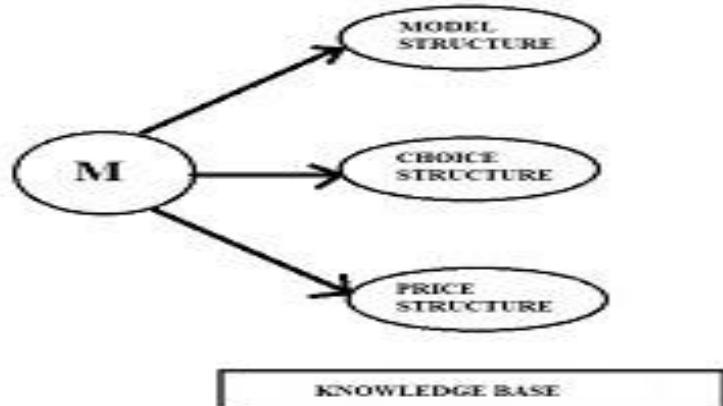
**Abstract** – It can be said that all market paradigms have a knowledge base that supports their model structure, their choice structure, and their price structure. We know that there are lower level market paradigms and higher level market paradigms. It can be said that the higher level the market is the higher level its model structure, its choice structure, and its price structure are. According to paradigm death and shift expectations, we expect that after death lower level market paradigm will shift individually to or will merge if in groups into higher level markets in order to preserve their core values. And when they shift or merge they create paradigm shift knowledge gaps, which can affect in different ways the expected evolution of market paradigms as decision makers do not have the correct tools and understanding needed to properly set up and manage a new market paradigm when paradigm shifts are taking place. In other words, the creation of knowledge gaps brings along different types of implementation problems. For example, under knowledge gaps decision makers may mishandle expected paradigm shifts as knowledge gaps may make it impossible if not difficult for decision makers to set up properly higher level market structures and supporting institutions or knowledge gaps may lead them to see market patching as a solution when the problem is not yet fixed or knowledge gaps can lead decision makers to flip the model under sustainability pressures and take the structure of another lower level model that has a knowledge base as they cannot see the way to manage the shift from the lower level market to the higher level market. Yet now much is written about how paradigm shift knowledge gaps come along and how they may affect the proper way to handle or manage expected paradigm evolution paths. And this raises the question, how are paradigm shift knowledge gaps created? In which ways can they lead to the mishandling of expected paradigm shifts?

**Keywords:** Sustainability, paradigm shift, sustainability gaps, knowledge gaps, lower level markets, higher level markets, paradigm merger, model structure, choice structure, price structure, externality management, paradigm fix, paradigm patch.

## Introduction

### a) The nature of perfect market paradigms

It can be said that all free market paradigms (M) have a knowledge base that supports their model structure, their choice structure, and their price structure, a situation summarized in Figure 1 below:



**Figure 1 The structure of perfect markets(M)**

Figure 1 above let us see that there is a knowledge based in perfect markets (M) that supports the model structure, the choice structure, and the price structure of that market paradigm. For example, if M were the traditional market then its knowledge base would be micro-economics and macro-economics, the knowledge base that supports the structure of the perfect market, its independent choice base and its economic cost based pricing mechanism. The knowledge based of one market does not work supporting the working of a different market as for example micro-economics and macro-economic are inconsistent with green market structures (Muñoz 2016a).

### b) The types of perfect market paradigms

It can be said that there are lower level market paradigms and higher level market paradigms; and we know that the higher level the market is, the higher level its model structure, its choice structure and its price structure are as it has a lower number of sustainability gaps or it has no sustainability gaps (Muñoz 2016b). For presentation purposes, let's assume that there are 3 markets in a world with two system components T and R, which could be in active or passive form, where  $M1 = Tr$ ,  $M2 = tR$ , and  $M3 = TR$ ; and therefore, in this world  $M1$  and  $M2$  are lower level markets and  $M3$  is a higher level market as  $M1$  and  $M2$  have sustainability gaps,  $SG = r$  and  $SG = t$  respectively while  $M3$  has no sustainability gaps. The structure of these 3 models is shared in Figure 2 below:

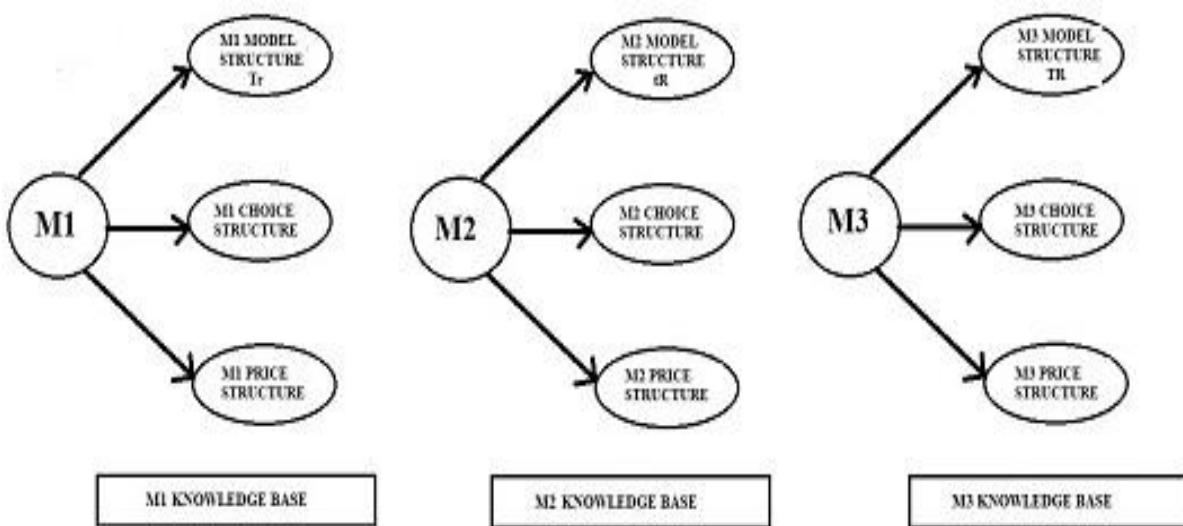


Figure 2 The structure of lower level markets and higher level markets

We can see the following in Figure 2 above: i) Each model has a unique knowledge base, which does not work if applied to the other models; ii) Each model has a different model structure,  $M1$  and  $M2$ , with different sustainability gaps and  $M3$  with no sustainability gap; iii) each model has a different choice structure,  $M1$  has  $T$  led independent choice and  $M2$  has  $R$  led independent choice, and  $M3$  has a  $TR$  led codependent choice; and iv) Each model has a different price structure,  $M1$  accounts for only the costs associated with  $T$ ,  $M2$  accounts for only the costs associated with  $R$ , and  $M3$  accounts for both, the cost of  $T$  and  $R$  at the same time. For example, traditional economic thinking works only inside the traditional market world, it does not work in red markets (Muñoz 2016c) or sustainability markets (Muñoz 2016d).

### c) The sustainability gaps between lower level and higher level paradigms

There are sustainability gaps (SG) separating lower level markets from higher level markets in Figure 3, which can be appreciated as shown below:

$M1 = Tr = T(SG)$ , since there is a sustainability gap ( $SG = r$ )

$M2 = tR = (SG)R$ , since there is a sustainability gap ( $SG = t$ )

$M3 = TR = TR(SG) = TR$ , as there is no sustainability gap ( $SG = 1$ ).

The sustainability gap(SG) separating model M1 from M3 and separating M2 from M3 in Figure 3 above affects the sustainability of model M1 and M2 respectively; and as model M1 and M2 expand their sustainability gaps  $SG = r$  and  $SG = t$  expand too, shifting to the left as they move further away from model M3.

**d) The need to understand the link between paradigm shift knowledge gaps and the mishandling of expected paradigm evolution paths**

According to paradigm death and shift expectations(Muñoz 2019a) we expect that after death lower level market like model M1 and M2 market paradigms will shift individually to or will merge if in groups into higher level markets in order to preserve their core values. And when they shift or merge they create paradigm shift knowledge gaps, which can lead to the mishandling of expected paradigm evolution paths as the existence of knowledge gaps means that decision makers do not have the correct tools and understanding needed to properly set up and manage a new market paradigm when paradigm shifts are taking place. In other words, the creation of knowledge gaps brings along different types of implementation problems. For example, under knowledge gaps decision makers may mishandle expected paradigm shifts as knowledge gaps may make it impossible if not difficult to set up properly higher level market structures and supporting institutions such as in the case of green markets since 2012(UNCSD 2012a; UNCSD 2012b) or knowledge gaps may lead them to see market patching as a solution to the sustainability problem when the problem is not fixed yet as in the case of environmental externality management markets(UN 2001; WB 2012; WB2019; OECD 2019) and pricing(OECD 2018; CPLC 2019; UN 2019) at work right now or knowledge gaps can lead decision makers to flip the model under sustainability pressures and take the structure of another lower level model that has a knowledge base as they cannot see the way to properly manage the shift from the lower level market to the higher level market as it was the case of the 1991 flip back from red socialist markets to traditional markets when red socialism fell(Muñoz 2019b). Yet now much is written about how paradigm shift knowledge gaps come along and how they may affect the proper way to handle or manage expected paradigm evolution paths. And this raises the question, how are paradigm shift knowledge gaps created? In which ways can they lead to the mishandling of expected paradigm shift?

### Goals of this paper

i) To link lower level market with higher level markets through the sustainability gaps separating them; ii) To show how when these sustainability gaps are closed the paradigm shifts creating in the process paradigm shift knowledge gaps; and iii) To highlight the different ways in which knowledge gaps can lead decision makers to mishandle the expected paradigm evolution paths.

### Methodology

i) The terminology and operational concepts and rules are introduced; ii) The way lower level models like M1 are linked to higher level models like M3 through sustainability gaps is shown both analytically and graphically; iii) The way knowledge gaps are created when sustainability gaps are closed and the paradigm shifts is highlighted both analytically and graphically; iv) The three types of problems associated with the creation of knowledge gaps are stressed both analytically and graphically; and v) Some food for thoughts and conclusions are shared.

### Terminology

A = Active social system	a = Passive social system
B = Active economic system	b = Passive economic system
C = Active environmental system	c = Passive environmental system
S = Sustainability	SG = Sustainability gap
X = System X	$X_i$ = System $X_i$
SSG = Social sustainability gap	ECSG = Economic sustainability gap
ESG = Environmental sustainability gap	TM = Traditional market
ENM = Environmental market	GM = Green market
$Q_G$ = Green quantity	$Q_E$ = Environmental quantity
$Q_T$ = Traditional quantity	$S_G$ = Green supply
$S_E$ = Environmental supply	$S_T$ = Traditional supply

## Operational concepts and paradigm merging and shift rules and expectations

### i) Operational concepts

- 1) **Red socialism market**, the society only market.
- 2) **Red socialism market price**, the price that reflects only the social cost of production.
- 3) **The traditional market**, the economy only market.
- 4) **The traditional market price**, the general market economic only price or the price that covers the cost of production at profit ( $TMP = ECM + i = P$ ) or zero profit ( $TMP = ECM = P$ ).
- 5) **The environmental market**, the environment only market.
- 6) **The environmental market price**, the price that reflects only the environmental cost of production.
- 7) **The socio-environmental market**, the society and environment only market.
- 8) **The socio-environmental market price**, the price that reflects the social and environmental costs of production.
- 9) **The red market**, the society and economy only market.
- 10) **The red market price**, the price that reflects the social and economic costs of production.
- 11) **The green market**, the economy and environment only market.
- 12) **The green market price**, the price that reflects both the economic and the environmental cost of production or the price that covers the cost of environmentally friendly production.
- 13) **The sustainability market**, the society, economy and environment market.
- 14) **The sustainability market price**, the price that reflects the social, economic, and environmental costs of production.
- 15) **The economic margin**, to cover the economic cost of production.
- 16) **The environmental margin**, to cover the extra cost of making business environmentally friendly.
- 17) **The social margin**, to cover the extra cost of making business socially friendly.
- 18) **Full costing**, all costs are reflected in the pricing mechanism of the market.
- 19) **Partial costing**, not all costs are reflected in the pricing mechanism of the market.
- 20) **No costing**, all costs are not reflected in the pricing mechanism of the market.
- 21) **Full responsibility**, when a market uses full costing.
- 22) **Partial responsibility**, when a market uses partial costing.
- 23) **Full irresponsibility**, when a market uses no costing.

### ii) Paradigm merging and shift rules and expectations

#### 1) Paradigm merging rules (PMR)

If "A" and "B" are dominant characteristics; and "a" and "b" are their dominated or passive counter parts, the following is expected:

##### a) Merging under dominant-dominant interactions

Under these conditions, dominant or active state prevails as indicated:

$$\begin{array}{ll} (AA) \rightarrow A & (BB) \rightarrow B \\ (AA)(BB) = (AB) & (AB) \rightarrow AB \end{array}$$

##### b) Merging under dominated-dominated interactions

Under these conditions, the dominated or passive form prevails as shown:

$$\begin{array}{ll} (aa) \rightarrow a & (bb) \rightarrow b \\ (aa)(bb) = (ab) & (ab) \rightarrow ab \end{array}$$

##### c) Merging under dominant-dominated interactions and win-win solutions

Under these conditions, the dominant or active system prevails as the system merge as shown below:

$$\begin{array}{ll} (Aa) \rightarrow A & (bB) \rightarrow B \\ (Aa)(bB) = (AB) & (ab) \rightarrow AB \end{array}$$

**d) Merging under dominant-dominated interactions and no win-win solutions**

Under these conditions, the dominated or passive system prevails and the system collapses as shown below:

$$(Aa) \rightarrow a$$

$$(Aa) (bB) = (AB)$$

$$(bB) \rightarrow b$$

$$(ab) \rightarrow ab$$

**2) Paradigm death expectations and shift under sustainability gaps**

If we have three systems  $X_1 = Bc$  and a system  $X_2 = bC$  and  $X_3 = BC$ , where  $c = ESG$  and  $b = ECSG$ , then the following is true:

**a) Expressing models in terms of sustainability gaps**

$$X_1 = Bc = B(ESG) \quad X_2 = bC = (ECSG)C, \text{ where } 0 \leq ESG < 1 \text{ and } 0 \leq ECSG < 1$$

$$X_3 = BC = B(SG = 1)C = BC$$

**b) Expressing inverse opposite models in conflict**

$$X_1 \cdot X_2 = B(ESG) \cdot (ECSG)C$$

**c) Paradigm death and shift expectations under no win-win conditions**

When  $ESG \rightarrow 0$  and/or  $ECSG \rightarrow 0$  under no win-win conditions, we have the paradigm death and shift expectation where the paradigms that die take the form of the higher level paradigm, in this case the higher level paradigm is  $X_3 = BC$

$$X_1 \cdot X_2 = B(ESG \rightarrow 0) \cdot (ECSG \rightarrow 0)C = \text{the death of paradigm } X_1, X_2, \text{ or both}$$

and shift  $X_1 \cdot X_2 \rightarrow X_3 = BC$

**d) Paradigm death and shift expectations under win-win conditions**

When  $ESG \rightarrow 1$  and/or  $ECSG \rightarrow 1$  under win-win conditions, we have the paradigm shift and merger shift expectation where the paradigms that die take the form of the higher level paradigm, in this case the higher level paradigm is  $X_3 = BC$

$$X_1 \cdot X_2 = B(ESG \rightarrow 1) \cdot (ECSG \rightarrow 1)C = \text{paradigm shift } X_1 \text{ or } X_2 \text{ or merger of } X_1 \text{ and } X_2 \text{ as}$$

$ESG \rightarrow 1 = C$  and  $ECSG \rightarrow 1 = B$  so that  $X_1 \cdot X_2 = B(C) \cdot (B)C = BB \cdot CC = BC = X_3 = \text{merger}$

You can find more details about the working of paradigm death and shift expectations and merging rules in the publication **Paradigm Evolution and Sustainability thinking** (Muñoz 2019a).

**Linking lower level markets with higher level markets**

As indicated in the introduction, between lower level market models and higher level market models there are sustainability gaps(SG), a situation shown in Figure 3 below with respect to model M1 and M3:

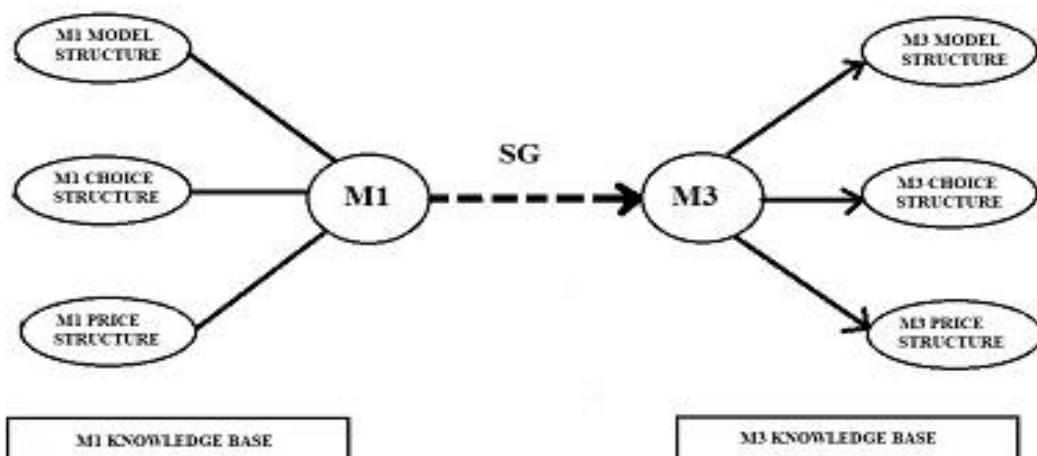


Figure 3. Linking lower level market M1 with the higher level market M3

The following relevant aspects can be highlighted based on Figure 3 above: i) There is a sustainability gap(SG) separating model M1 and M3, which expands as model M1 expands; ii) the knowledge based of model M3 is different than that of the knowledge based of model M1; and therefore, the knowledge base of one model does not work if applied in the other model.

### The closing of sustainability gaps and the creation of paradigm shift knowledge gaps

Again as mentioned in the introduction, the closing of sustainability gaps (SG) leads to paradigm shift and creates paradigm shift knowledge gaps as summarized in Figure 4 below:

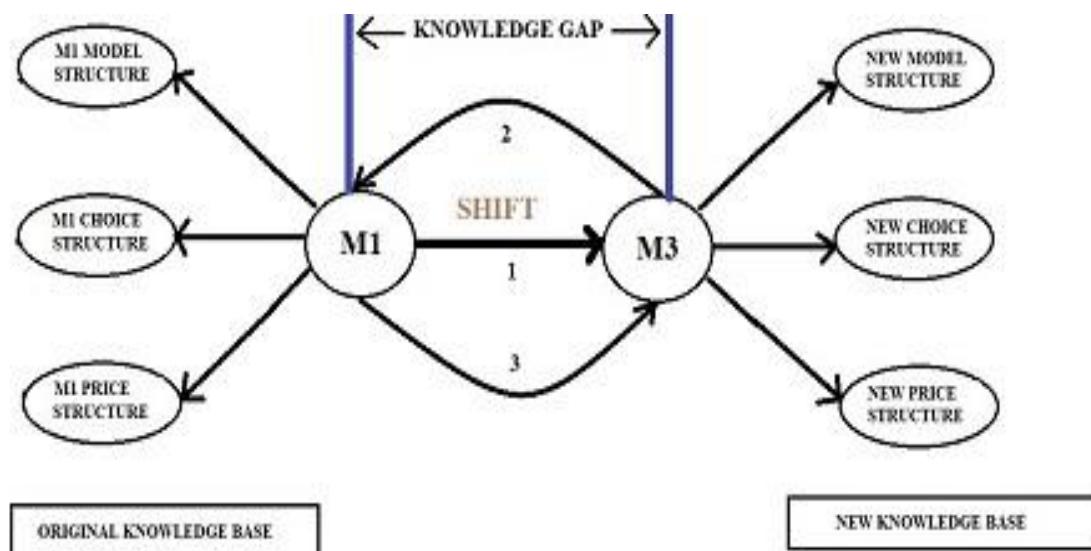


Figure 4 Shifting from lower level markets like M1 to higher level markets like M3 leads to the creation of paradigm shift knowledge gaps

The following important aspects can be extracted from Figure 4 above: i) When we close the sustainability gap(SG--→1) model M1 shifts to model M3 as indicated by the black arrow 1 from M1 to M3; ii) the model structure, the choice structure and the price structure of model M1 all shift at the same time taking the model structure, choice structure and price structure of model M3 as indicated by the black arrow 3 from M1 to M3 creating knowledge gaps in the process ; iii) When the shift from M1 to M3 takes place the original knowledge base of model M1, including its model structure, its choice structure, and its price structure are left behind as indicated by the black arrow 2 from M3 to M1; and iv) and therefore, to be able to properly implement the paradigm shift we need to develop a new knowledge base as the previous knowledge base no longer works.

### Highlighting the three ways knowledge gaps can lead to the mishandling of an expected paradigm shift

There are 3 ways in which knowledge gaps can affect the proper implementation of expected paradigm shifts such as the shift from model M1 to model M3 shown in Figure 4 above: i) they can make it difficult, even impossible to set up the proper structures needed to transition the old paradigm M1 to the new paradigm M3; ii) they can make it possible to see the dealing with the consequences of the sustainability problem driving the paradigm shift through externality management approaches(EMM) as a solution; and iii) they can make it possible to flip the core values of a paradigm like M1 and take the core values of a competing paradigm like M2 as knowledge gaps make it impossible to see the way towards paradigm shift to M3, these 3 situations are indicated in Figure 5 below:

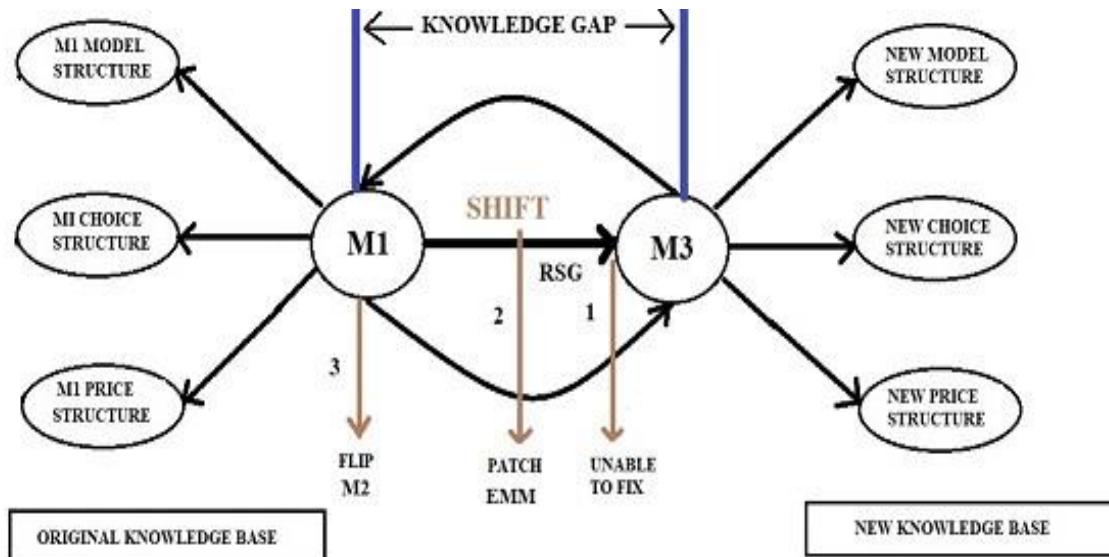


Figure 5 Pointing out three ways in which the knowledge gap can lead to the mishandling of the expected paradigm shift process: unable to fix at point 1, lead to paradigm patching at point 2 or lead to paradigm flip at point 3.

We can use Figure 5 above to highlight the three implementations problems that arise when the paradigm shift knowledge gaps are created and we do not have yet the new knowledge base needed to properly support the paradigm shift, as described below:

**a) The paradigm implementation problem:**

There is a paradigm implementation problem at point 1 in Figure 5 above as without having ready the new knowledge base for the new paradigm we are unable to fix it to complete efficiently the paradigm shift from model M1 to model M3. This is what has happened with the failure to implement the shift from traditional markets to green markets since 2012 as to properly implement the shift we need to think in terms of green microeconomics and green macro-economics, but that knowledge base was not ready in 2012.

**b) The paradigm consequence implementation problem:**

There is a paradigm consequence implementation problem in point 2 in Figure 5 above as without having the new knowledge base ready then making dealing with the consequences of the sustainability problem driving the paradigm shift through externality management(EMM) a solution becomes attractive; and by using this solution to patch model M1 we are still leaving a remaining sustainability gap(RSG) active between point 2 and point 1, and this remaining sustainability gap(RSG) affects the sustainability of the patching of model M1 leaving still a sustainability gap between M1 and M3. This remaining sustainability gap (RSG) is found in all externality management approaches (EMM) and pricing, including environmental externality management approaches (EEMM) and pricing being promoted since 2012 by government and international institutions and organizations referenced in the introduction.

**c) The paradigm flip implementation problem:**

There is a paradigm flip implementation problem at point 3 in Figure 5 above as the knowledge gap is so severe that decision makers cannot see the way forward in the expected paradigm shift to M3, and they flip their model structure to the competing model structure. Like instead of shifting  $M1 = Tr$  to  $M3 = TR$ , they flip  $M1 = Tr$  to  $M2 = tR$ . This is the case of the flip from red socialism markets to capitalism markets in 1991 when the soviet bloc fell as there was a red market paradigm shift knowledge gap then as there was no red micro-economics and red macro-economic thinking; and this red market knowledge gap did not allow red socialist countries to see how red socialism could be made economy friendly or see how economic externalities could have been managed to ensure a smooth paradigm shift to red markets, so they flip to capitalism instead as there is no knowledge gap if you go under traditional market thinking as highlighted in the introduction.

## Implications

Specific sustainability gaps separate lower level markets from higher level markets. The closing of sustainability gaps shifts lower level markets towards higher level markets creating paradigm shift knowledge gaps. Decision makers do not have at the moment of paradigm shift the new knowledge base of the new paradigm to properly manage the paradigm shift, leading to three type of implementation problems: i) the paradigm implementation problem or inability to fix or properly implement the paradigm shift; ii) the paradigm consequence implementation problem or the idea that patching the paradigm to deal with the consequence of the sustainability problem the paradigm shift is trying to fix is the solution; and iii) the paradigm flip implementation problem or the idea that being unable to see how to transition from lower level markets to higher level markets decision makers simply flip the model structure of the paradigm under sustainability pressures to that of a competing or opposite lower level market paradigm which has a known knowledge base. Therefore, developing the knowledge base of the new paradigm like M3 before the paradigm shift actually takes place would solve the knowledge gaps problems mentioned above and would provide the tools needed for a smooth transition from the old paradigm to the new paradigm.

### **Liking the nature of the knowledge base of the new paradigm relevant to addressing the sustainability gap at hand and the mishandling of the paradigm shift by decision-makers**

Knowing the knowledge base of the new paradigm would facilitate the fixing of the sustainability gap(SG) in Figure 5 above that exists from M1 to M3 as the paradigm implementation problem at point 1 would disappear since decision-makers know then how to close that specific sustainability gap(SG), and then there is no need for paradigm patching or for paradigm flip. Hence, not knowing the knowledge base of the new paradigm needed to address that specific sustainability gap(SG) creates all the paradigm implementations problems in Figure 5 above. And this has the following implications for decision-makers: i) if the knowledge base of the new paradigm is not put together before the paradigm shift takes place to guide the shift, we cannot fix the relevant sustainability gap; and then we cannot shift to the new paradigm; ii) if the knowledge base of the old paradigm can be used to partially address the sustainability gap at hand, the old paradigm will be patched leaving part of the relevant sustainability gap or a remaining sustainability gap(RSG) still active such as at point 2; and iii) if the knowledge base of the new paradigm is unknown and the way the knowledge base of the old paradigm can be used to handle partially the relevant sustainability gap is not clear, then we will see a paradigm flip towards a competing paradigm with a known knowledge base such as a flip from M1 to M2 at point 3 in Figure 5 above. In other words, if the way the old paradigm knowledge base can be used to partially address the relevant sustainability gap is clear under unknown new paradigm knowledge base, then decision makers will implement paradigm patches using externality management approaches(EMM) as at point 2 in Figure 5 above as they do not know how to fully implement the shift; and when it is unclear how the old paradigm knowledge base can be used to patch the model, they will implement paradigm flips as that in point 3.

## Food for thoughts

- i) Is there a green trickledown effect within traditional market thinking? I think no, what do you think?; ii) Is there an environmental trickledown effect hidden within traditional market thinking? I think yes, what do you think?; iii) Can knowledge gaps lead to academic blindness? I think yes, what do you think?; and iv) Can paradigm shifts be affected by willful academic blindness? I think yes, what do you think?

## Conclusions

i) It was shown that sustainability gaps are the links between lower level markets and higher level markets; ii) It was stressed that when sustainability gaps are closed, lower level paradigms shift towards higher level paradigms creating paradigm shift knowledge gaps in the process; iii) It was highlighted that these knowledge gaps can lead to paradigm shift mishandling as they create three types of problems for decision makers, a paradigm implementation problem, a paradigm consequence implementation problem, and a paradigm flip problem, as the knowledge base of the new paradigm is either unknown or incomplete; and iv) it was pointed out that developing the knowledge based of the new paradigm before the paradigm shift actually takes place would solve the knowledge gap problems and would provide the tools needed for a smooth transition from the old paradigm to the new paradigm.

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