Citation:

Muñoz, Lucio, 2022. **Sustainability thought 172: What is the structure of the general Thomas Kuhn's paradigm evolution loop when the traditional market is a golden paradigm and when it is a flawed paradigm?,** In: ***CEBEM-REDESMA Boletin*,** Año 16, Nº 9, September, La Paz, Bolivia. https://doi.org/10.5281/zenodo.15708191

Sustainability thought 172: What is the structure of the general Thomas Kuhn's paradigm evolution loop when the traditional market is a golden paradigm and when it is a flawed paradigm?

By

Lucio Muñoz*

*** Independent Qualitative Comparative Researcher / Consultant, Vancouver, BC, Canada Email: munoz@interchange.ubc.ca**

Abstract

Since 1776 when Adam Smith shared with us the perfect market theory it was presented as a golden paradigm, a model that does not produce social and environmental abnormalities no matter how much it grows. When social and environmental externalities accumulated to the point of producing extreme social and environmental crises which could no longer be ignored it was accepted that the traditional market model was a flawed model, a model that produces social and environmental abnormalities as it grows; and therefore, a model in need of abnormality corrections. As flawed models are the raw materials that feed the Thomas Kuhn's revolution loop leading towards paradigm shift and the growth of knowledge when the abnormalities embedded in those models are corrected; and golden models are neutral material for the Kuhn's revolution loop as they have no abnormalities to correct, then this situation raises important questions such as What is the structure of the general Thomas Kuhn's paradigm evolution loop when the traditional market is a golden paradigm and when it is a flawed paradigm? What are the implications of this?

Key concepts

Scientific revolutions, status quo model, model abnormalities, paradigm crisis, paradigm death, academic consensus, paradigm shifts, academic integrity, willful academic blindness,

scientific truth, academic facts, alternative academic facts, golden paradigm, flawed paradigm, new paradigms, paradigm evolution loop, social externalities, environmental externalities.

Introduction

a) The structure of scientific revolutions a la Thomas Kuhn under academic integrity

It has been indicated recently(Muñoz 2022) that the structure of scientific revolutions a la Thomas Kuhn(Kuhn 1970) under academic integrity can be in general represented in a loop of 6 components as indicated in Figure 1 below:

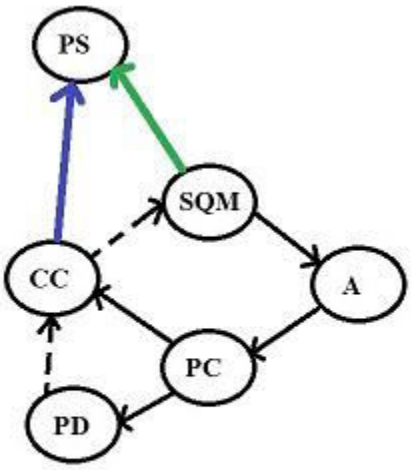

Figure 1 The Thomas Kuhn's revolution loop under academic integrity
The paradigm shift PS supported by the academic consensus CC actually takes place.

Figure 1 above in general says that the Kuhn's revolution loop after the consensus CC to change paradigm to internalize the abnormality A is reached leads to paradigm shift PS due to academic integrity as represented by the blue arrow between academic consensus CC and paradigm shift PS, which stimulates the growth of knowledge through the closing of paradigm shift knowledge gaps as indicated by the green arrow from SQM to PS.

The Kuhn's revolution loop in Figure 1 above works as follows: i) The status quo paradigm SQM produces abnormalities A as indicated by the arrow from SQM to A; ii) The accumulation of abnormalities A leads to a paradigm crisis PC as indicated by continuous black arrow from A to PC and this crisis PC brings academic discourse between the status quo ideas and the new ideas on how to correct the abnormalities affecting the status quo paradigm once and for all; iii) When the accumulation of abnormalities become extreme they become a real threat of paradigm death PD as indicated by the continuous black arrow from PC to PD, and if nothing is done to correct the abnormalities the paradigm will die; iv) To avoid paradigm death PD the

paradigm crisis PC leads an academic consensus to change paradigm CC accepting formally that the status quo paradigm SQM is not working; and accepting formally too the new ideas supporting paradigm change, which is indicated by the continuous black arrow from PC to CC and by the broken black arrow from PD to CC; v) As the academic consensus for paradigm change CC now reached is supported by academic integrity as indicated by the blue arrow, then the paradigm shift PS actually takes place as indicated by blue arrow from CC to PS; and vi) The paradigm shift PS leads to the growth of scientific knowledge leaving the old knowledge base behind as indicated by the green arrow as resulting paradigm shift knowledge gaps needed to correct the abnormalities of the status quo paradigm are closed either through the new ideas or updated old ideas. It has been recently stressed that when paradigm shift takes place the knowledge based of the old paradigm is left behind as it no longer works in the new paradigm(Muñoz 2016).

b) The traditional market as a golden paradigm and a flawed paradigm

Since 1776 when Adam Smith(Smith 1776) shared with us the perfect market theory it was presented as a golden paradigm, a model that does not produce social and environmental abnormalities no matter how much it grows. When social and environmental externalities being produced accumulated to the point of leading to extreme social and environmental crisis, which could no longer be ignored, then it was accepted that the traditional market model was a flawed model, a fact pointed out by the 1987 Brundtland Commission(WCED 1987), a model that produces social and environmental abnormalities as it grows; and hence, it is a model in need of abnormality corrections. And this leads to the two cases detailed below with respect of specific abnormality assumptions.

i) The perfect traditional market under abnormality neutrality assumptions

If we assume that the traditional market works under abnormality neutrality assumptions, the world before the 1987 WCED commission's findings, then in theory this model is a golden model as traditional market growth can happen without producing social and environmental abnormalities. If this assumption is wrong, then the accumulation of social and environmental abnormalities happens while we assume they do not exist.

ii) The perfect traditional market under no abnormality neutrality assumptions

Based on the evidence of accumulated social and environmental abnormalities by 1987 the WCED commission(WCED 1987) concluded that the business as usual model was a flawed model in social and environmental terms and it needed to be corrected to go to a world beyond traditional economic thinking. In other words, under no abnormality neutrality assumptions the traditional market model is a flawed model, with social and environmental abnormalities that need to be corrected through abnormality internalization. Therefore, the traditional market under these conditions is a distorted market, where social and environmental externalities are externalized. However, efforts have only been taken formally, at least initially, to correct

environmental abnormalities only since 2012(UNCSD 2012a: UNCSD 2012b) to go to the world of green markets, green economies and green growth.

c) Linking the Thomas Kuhn's revolution loop to the traditional market as golden paradigm and as a flawed paradigm

As flawed models are the raw materials that feed the Thomas Kuhn's revolution loop in Figure 1 above leading towards paradigm shift and the growth of knowledge when the abnormalities embedded in those models are corrected through abnormality internalization; and golden models are neutral material for the Kuhn's revolution loop as they have no abnormalities to correct through abnormality internalization, then this situation raises important questions such as What is the structure of the general Thomas Kuhn's paradigm revolution loop when the traditional market is a golden paradigm and when it is a flawed paradigm? What are the implications of this? Where does the traditional market shifts when the Thomas Kuhn's revolution loop corrects social and environmental abnormalities at the same time or it corrects only social abnormalities or it corrects only environmental abnormalities? Among the goals of this paper is provide an answer to the questions posted above.

Goals of this paper

a) To point out the Thomas Kuhn's revolution structure when the traditional market as the status quo market is a golden paradigm and a flawed paradigm; b) To stress that when the Thomas Kuhn's revolution loops corrects social and environmental abnormalities there is a shift to sustainability markets; c) To highlight that when the Thomas Kuhn's revolution loops corrects social abnormalities only there is a shift to red markets; and d) To indicate that when the Thomas Kuhn's revolution loops corrects environmental abnormalities only there is a shift to green markets.

Methodology

First the terminology used in this paper is shared. Second, the Thomas Kuhn's revolution structure when the traditional market as the status quo market is a golden paradigm as well as the implications of this are shared. Third, the Thomas Kuhn's revolution structure when the traditional market as the status quo market is a flawed paradigm as well as the implications of this are stressed. Fourth, the shift to sustainability markets when Thomas Kuhn's revolution loops corrects social and environmental abnormalities at the same time as well as the implications of this are highlighted. Fifth, the shift to red markets when Thomas Kuhn's revolution loops corrects social abnormalities only as well as the implications of this are pointed out. Seventh, the shift to green markets when Thomas Kuhn's revolution loops corrects

environmental abnormalities only as well as the implications of this are indicated. And finally, some food for thoughts and relevant conclusions are listed.

Terminology

SQM = Status quo model

A = Abnormality

PC = Paradigm crisis

PD = Paradigm death

CC = Academic consensus to change paradigm

PS = Paradigm shift

DM = Dwarf model

GOM = Golden model

FLM = Flawed model

SFLM = Super flawed model

TM = Traditional market model

SM = Sustainability market model

RM = Red market model

GM = Green market model

a = Social abnormality

c = Environmental abnormality

ac = Socio-environmental abnormality

PCa = Paradigm crises due to social abnormality

PCc = Paradigm crises due to environmental abnormality

PCac = Paradigm crises due to socio-environmental abnormality

PDc = Paradigm death due to environmental abnormality

PDa = Paradigm death due to social abnormality

PDac = Paradigm death due to socio-environmental abnormality

E(AC) = ac = Externalization of social and environmental abnormalities

I[ac] = AC = Internalization of social and environmental abnormalities

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Operational concepts, paradigm structures, relevant market structures, Kuhn's loop transformations, and abnormality externalization and internalization rules

A) Operational concepts

1) Science, the *world based on the scientific truth, this world falls if invalidated.*

2) Ideology, *the world based on the non-scientific truth, this world will tend to persist even if invalidated.*

3) The theory-practice general consistency principle, *the world where the theory of the model must match the practice.*

4) The different model general inconsistency principle, *the world where the theory and practice of different models are inconsistent with each other.*

5) Academic facts, the *science based truth.*

6) Alternative academic facts, *the non-science based truth.*

7) Academic blindness, *the inability to see academic facts due to the existence of knowledge gaps, paradigm shift based or otherwise.*

8) Willful academic blindness, *the willingness to ignore academic facts and consensus.*

9) Sustainability, the world where the interplay of sustainability theory and sustainability practice is aimed at fixing or correcting embedded externality problems.

10) Sustainable development, the world where the interplay of sustainable development theory and sustainable development practice is aimed at patching or managing embedded externality problems.

11) Academic integrity, the duty to respect and defend academic facts and consensus.

12) Golden paradigm, one that does not creates abnormalities.

13) Flawed paradigm, one that creates abnormalities.

14) Kuhn's loop, the science based mechanism that leads to paradigm shift through abnormality correction.

B) Paradigm structures

1) A golden paradigm

If we have a dominant paradigm R and it is a golden paradigm GOM, then it produces no externalities or no abnormalities A

i) GOM = R

As it can be seen in expression i) above the golden model GOM does not produce abnormalities.

2) A flawed paradigm

If we have a dominant paradigm R and it is a flawed paradigm FLM, then it produces "n" externalities or abnormalities A so as A1,A2,….

ii) FLM = R(A1, A2,….An)

As it can be appreciated in expression ii) above the flawed model FLM produces "n" abnormalities.

C) The Thomas Kuhn's transformation loop(TKTL) under academic integrity

1) Impact on the golden paradigm

If we subject a golden paradigm GOM = R to the Thomas Kuhn's transformation loop(TKTL), the process will have no impact on it as it has no abnormalities A to correct, golden paradigm GOM remains a golden paradigm GOM

iii) TKTL(GOM) = TKTL(R) = R = GOM

The expression iii) above tells us that the golden model displays TKTL loop neutrality as it has no abnormalities to remove.

2) Impact on the flawed paradigm

If we subject a flawed paradigm FLM = **R(A1,A2,….An)** to the Thomas Kuhn's transformation loop(TKTL), the loop process will be active until all abnormalities are corrected and a golden paradigm GOM arises

iv) TKTL(FLM) = TKTL[R(A1,A2,….An) -------→R = GOM

The expression iv) above tells us that the TKTL loop process transforms flawed dominant paradigms FLM in the end into golden paradigms GOM by correcting the abnormalities A1…..An affecting them and shifting them in the process.

D) Relevant market structures

If we have the following: a = social abnormality, c = environmental abnormality, A = dominant society, C = dominant environment, and B = the dominant economy, then the structure of relevant markets can be stated as indicated below:

1) The traditional market as a golden model

i) TM = B

Under externality neutrality assumptions the traditional market TM in section i) above is a golden paradigm, it produces no abnormalities.

2) The traditional market under social abnormalities(a)

ii) TM = aB

Under no social externality neutrality assumptions, the traditional market TM in section ii) above produces social abnormalities "a". It is a flawed paradigm as it has social abnormalities to correct.

3) The traditional market under environmental abnormalities(c)

iii) TM = Bc

Under no environmental externality neutrality assumptions, the traditional market TM in section iii) above produces environmental abnormalities "c". It is a flawed paradigm as it has environmental externalities to correct.

4) The traditional market under socio-environmental abnormalities(ac)

iv) TM = aBc

Under no socio-environmental externality neutrality assumptions, the traditional market TM in section iv) above produces socio-environmental abnormalities "ac". It is a flawed paradigm as it has social and environmental externalities to correct.

5) The red market under environmental abnormalities(c)

v) RM = ABc

Under no environmental externality assumptions, the red market RM in section v) above produces environmental abnormalities. It is a flawed paradigm as it has environmental externalities to correct. Notice that in the red market RM, both society(A) and economy(B) are in dominant form.

6) The green market under social abnormalities(a)

vi) GM = aBC

Under no social externality assumptions, the green market GM in section vi) above produces social abnormalities. It is a flawed paradigm as it has social externalities to correct. Notice that in the green market GM, both the economy(B) and the environment(C) are in dominant form.

7) The sustainability market has no abnormalities

vii) SM = ABC

The sustainability market SM in section vii) above produces no abnormalities as all components are in dominant form since all components are now endogenous to the model. It is a golden paradigm as it has no abnormalities to correct.

E) Abnormality externalization and internalization rules

If y, x, z are three abnormalities and Y, X, Z are the corrected variables and if E[ ] = externalization and I[ ] = internalization, then the following holds true:

a) E[Y] = y **b) E[X] = x** **c) E[Z] = z**

d) I[y] = Y **e) I[x] = X** **f) I[z] = Z**

g) I{E[Y]} = Y **h) E{I[y} = y** **i) E[YX] = yx**

The structure of the Kuhn's revolution loop when the traditional market is assumed to be a golden paradigm

If the status quo paradigm SQM in Figure 1 above is the traditional market of Adam Smith TM as a golden model GOM so that SQM = GOM = TM = B, then we do not need the Thomas Kuhn's revolution loop as there are no abnormalities A, social and/or environmental, to correct, a situation summarized in Figure 2 below:

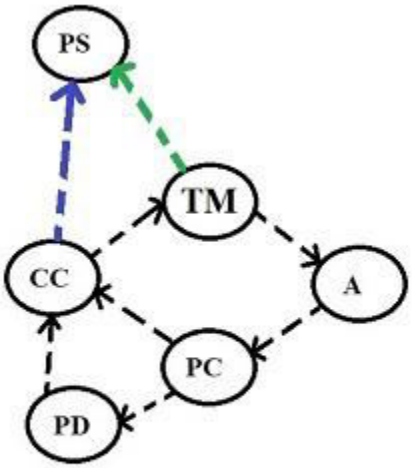

Figure 2 The traditional market(TM) as a golden paradigm It is assumed not to produce abnormalities so it has no limits for growth

We can appreciate in Figure 2 above that when the status quo paradigm SQM in Figure 1 in the introduction is the traditional market TM as a golden model(GOM = TM = B) it does not

need to Kuhn's revolution loop as indicated by all broken arrows. Figure 2 above simple says that i) the traditional market TM as a golden paradigm does not produce abnormalities A, social and/or environmental abnormalities; ii) no accumulation of social and environmental abnormalities A means that traditional market expansions do not lead to social and/or environmentally driven paradigm crises PC; iii) no social and/or environmental driven paradigm crises PC means no threat of paradigm death PD for the traditional market TM, and hence, no need for academic consensus to change paradigm CC; iv) No need for paradigm shift PS means no need for the growth of knowledge related to how to correct abnormalities; and v) Academic integrity support that there is no need to implement changes as golden paradigms have no abnormalities . Notice that as a golden paradigm the traditional market TM has no limits to growth as it can grow for ever without producing abnormalities A.

Implication 1: ***We do not need the Thomas Kuhn's revolution loop when we have golden paradigms such as a traditional market TM that does not produce abnormalities, social(a) and/or environmental(c), as there are no abnormalities to correct.***

The structure of the Kuhn's revolution loop when the traditional market is a flawed paradigm

If the status quo paradigm SQM in Figure 1 above is the traditional market of Adam Smith TM as a flawed model FLM in social(a) and environmental terms(b) so that SQM = FLM = TM = aBc, then we need the Thomas Kuhn's revolution loop as there are abnormalities A, social and/or environmental, to correct through abnormality internalization, a situation indicated in Figure 3 below:

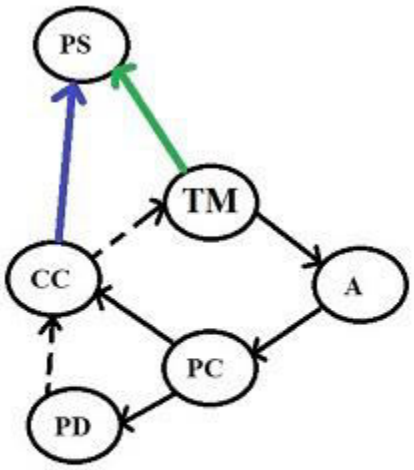

Figure 3 The traditional market(TM) as a flawed paradigm
It produces abnormalities as it grows, which when they become extreme they lead to paradigm shift PS under academic integrity.

We can see in Figure 3 above that when the status quo paradigm SQM in Figure 1 in the introduction is the traditional market TM as a flawed model(FLM = TM = aBc) it needs the Kuhn's revolution loop as indicated by all continuous arrows from TM to A to PC to CC to PS to correct the abnormalities A. Figure 3 above highlights that i) the traditional market TM as a flawed paradigm produces abnormalities A, social and/or environmental abnormalities; ii) The accumulation of social(a) and environmental(c) abnormalities A means that traditional market expansions lead to social and/or environmentally driven paradigm crises PC; iii) that social(a) and/or environmental(c) driven paradigm crises PC bring a real threat of paradigm death PD, and hence, they lead to the need for academic consensus to change paradigm CC; iv) The need for paradigm shift PS means need for the growth of knowledge related to how to correct abnormalities affecting the traditional market TM, social(a) and/or environmental(c) ; and v) Academic integrity ensures the implementation of the paradigm shift that correct the abnormalities A, social and/or environmental. Notice that as a flawed paradigm the traditional market TM has limits to growth, social and/or environmental limits.

Implication 2 : ***We do need the Thomas Kuhn's revolution loop when we have flawed paradigms such as a traditional market TM that produces abnormalities, social(a) and/or environmental(c), as there are abnormalities to correct. Hence, if there are abnormalities to correct the Kuhn's revolution loop will lead to specific paradigm shifts depending on the nature of the extreme abnormalities that are deemed relevant and corrected.***

The general structure of the paradigm shift after correcting extreme abnormalities A consistent with the Kuhn's revolution loop under academic integrity in Figure 3 above can be stated as:

Shift

1) TM = aBc----------→ PS

I[ac],I[a], I[c]

When the abnormalities A affecting the traditional market TM are internalized, social and/or environmental(I[ac],I[a], I[c]), the paradigm shift to PS takes place. In other words, when extreme abnormalities embedded in the traditional market TM are corrected through abnormality internalization, social(a) and/or environmental(c), a paradigm shift PS takes place, which is directly related to the nature of the correction through abnormality internalization made. For example, if socio-environmental abnormalities(ac) are corrected through socio-environmental abnormality internalization, a shift to sustainability markets takes place PS = SM. If social abnormalities(a) are corrected through social abnormality internalization, a shift to red markets take place PS = RM. And if environmental abnormalities(c) are corrected through environmental abnormality internalization, a shift to green markets takes place PS = GM.

The structure of the Kuhn's revolution loop when the traditional market under extreme socio-environmental abnormality pressures and shifts to sustainability markets

If the status quo paradigm SQM in Figure 1 above is the traditional market of Adam Smith TM as a flawed model FLM in social(a) and environmental(c) terms so that SQM = FLM = TM = aBc; and both extreme abnormalities, social(a) and environmental(c), are deemed relevant and corrected through socio-environmental abnormality internalization to avoid paradigm death, then we need the Thomas Kuhn's revolution loop to correct socio-environmental abnormalities "ac", a situation highlighted in Figure 4 below:

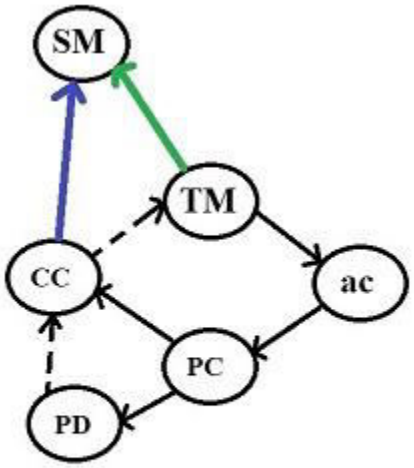

Figure 4 The traditional market(TM) under extreme socio-environmental abnormalities(A = ac) shifts towards the sustainability market(SM) under academic integrity.

We can appreciate in Figure 4 above that when the status quo paradigm SQM in Figure 1 in the introduction is the traditional market TM as a flawed model(FLM = TM = aBc) and both extreme social and environmental abnormalities (ac) are taken as relevant and corrected at the same time it needs the Kuhn's revolution loop to correct the abnormalities as indicated by all continuous arrows from TM to "ac" to PC to CC to SM. Figure 4 above points out the following i) the traditional market TM as a flawed paradigm produces social and environmental abnormalities "ac"; ii) The extreme accumulation of social and environmental abnormalities 'ac' means that traditional market expansions lead to a socio-environmentally driven paradigm crises PC; iii) that socio-environmentally driven paradigm crises PC bring a real threat of paradigm death PD to the traditional market TM, and hence, they lead to the need for academic consensus to change paradigm CC towards sustainability markets SM; iv) The need for paradigm shift PS to sustainability markets SM means the need for the growth of knowledge related to how to correct the socio-environmental abnormalities affecting the traditional market TM and creating in the process the knowledge base of sustainability markets; and v) Academic integrity ensures the implementation of the paradigm shift that corrects the socio-environmental abnormalities "ac" and hence, the shift to sustainability markets SM actually take place. Notice that as a flawed paradigm that produces extreme socio-environmental abnormalities(ac) the traditional market TM has socio-environmental limits to growth.

Implication 3 : ***We do need the Thomas Kuhn's revolution loop when we have flawed paradigms such as a traditional market TM that produces socio-environmental abnormalities(ac), as there are abnormalities to correct. And when both extreme social and environmental(ac) abnormalities are relevant and corrected at the same time the Kuhn's revolution loop will lead to a shift from traditional markets TM to sustainability markets SM.***

The general structure of the paradigm shift after correcting socio-environmental abnormalities "ac" through socio-environmental abnormality internalization consistent with the Kuhn's revolution loop under academic integrity in Figure 4 above can be stated as:

Shift

2) TM = aBc ----------→ PS = SM = ABC

I[ac]

When the socio-environmental abnormalities "ac" affecting the traditional market TM are both deemed relevant and internalized(I[ac]) the paradigm shift to sustainability markets PS = SM takes place. Notice that there are no social and environmental abnormalities in sustainability markets SM as the sustainability market is socially and environmentally friendly market. In other words, when extreme socio-environmental abnormalities(ac) are corrected through socio-environmental abnormality internalization(I[ac]), a paradigm shift to sustainability markets PS = SM takes place, a shift to socially and environmentally friendly capitalism. Finally, notice that

since there are no abnormalities in sustainability markets SM then there are no limits to sustainability market growth.

The structure of the Kuhn's revolution loop when the traditional market under extreme social abnormality pressures and shifts to red markets

If the status quo paradigm SQM in Figure 1 above is the traditional market of Adam Smith TM as a flawed model FLM in social(a) and environmental(c) terms so that SQM = FLM = TM = aBc; but only extreme social(a) abnormalities are taken as relevant and are corrected through social abnormality internalization to avoid paradigm death, then we need the Thomas Kuhn's revolution loop to correct social abnormalities "a", a situation highlighted in Figure 5 below:

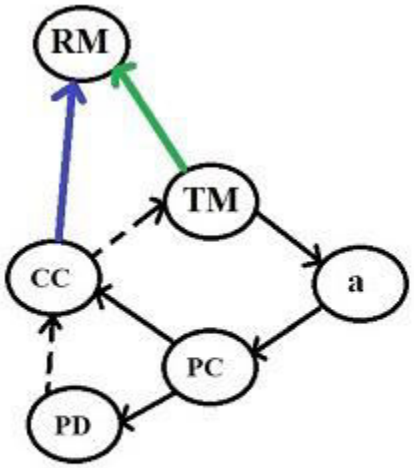

Figure 5 The traditional market(TM) under extreme social abnormality pressures(A = a) leads to a shift to red markets(RM) under academic integrity.

We can stress based on Figure 5 above that when the status quo paradigm SQM in Figure 1 in the introduction is the traditional market TM as a flawed model(FLM = TM = aBc), but only extreme social(a) abnormalities are taken as relevant and are corrected it needs the Kuhn's revolution loop to correct the social(a) abnormalities as indicated by all continuous arrows from TM to "a" to PC to CC to RM. Figure 5 above highlights the following i) the traditional market TM as a flawed paradigm produces social abnormalities "a"; ii) The extreme accumulation of social abnormalities 'a' means that traditional market expansions lead to socially driven paradigm crises PC; iii) that socially driven paradigm crises PC bring a real threat of paradigm death PD to the traditional market TM, and hence, they lead to the need for academic consensus to change paradigm CC towards red markets RM; iv) The need for paradigm shift PS to red

markets RM means the need for the growth of knowledge related to how to correct the social abnormalities "a" affecting the traditional market TM and creating in the process the knowledge base of red markets; and v) Academic integrity ensures the implementation of the paradigm shift that corrects the social abnormalities "a" and hence, the shift to red markets RM actually take place. Notice that as a flawed paradigm that produces extreme social abnormalities(a) the traditional market TM has social limits to growth.

Implication 4 : ***We do need the Thomas Kuhn's revolution loop when we have flawed paradigms such as a traditional market TM that produces social abnormalities(a), as there are abnormalities to correct. And when only extreme social(a) abnormalities are taken as relevant and are corrected the Kuhn's revolution loop will lead to a shift from traditional markets TM to red markets RM.***

The general structure of the paradigm shift after correcting social abnormalities "a" through social abnormality internalization consistent with the Kuhn's revolution loop under academic integrity in Figure 5 above can be indicated as:

Shift

3) TM = aBc ----------→ PS = RM = ABc

I[a]

When only the social abnormalities "a" affecting the traditional market TM are found relevant and are corrected through social abnormality internalization(I[a]) the paradigm shift to red markets PS = RM takes place. Notice that there are no social limits to growth in red markets RM as red markets are socially friendly markets, but there are environmental limits to red growth as there are environmental abnormalities(c) in red markets RM. In other words, when extreme social abnormalities(a) only are taken as relevant and are corrected through social abnormality internalization(I[a]), a paradigm shift to red markets PS = RM takes place, a shift to socially friendly capitalism.

The structure of the Kuhn's revolution loop when the traditional market under extreme environmental abnormality pressures and shifts to green markets

If the status quo paradigm SQM in Figure 1 above is the traditional market of Adam Smith TM as a flawed model FLM in social(a) and environmental(c) terms so that SQM = FLM = TM = aBc; but only extreme environmental(c) abnormalities are taken as relevant and are corrected through environmental abnormality internalization to avoid paradigm death, then we need the Thomas Kuhn's revolution loop to correct environmental abnormalities "c", a situation highlighted in Figure 6 below:

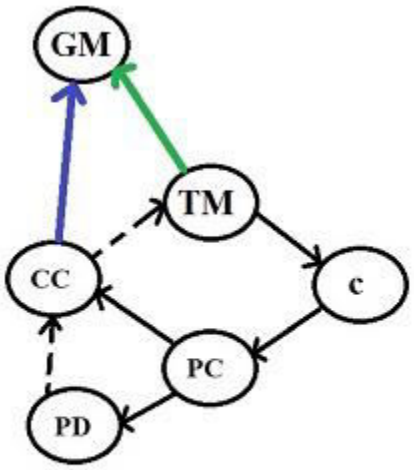

Figure 6 The traditional market(TM) under extreme environmental abnormalities(A = c) leads to a shift to green markets(GM) under academic integrity.

We can point out based on Figure 6 above that when the status quo paradigm SQM in Figure 1 in the introduction is the traditional market TM as a flawed model(FLM = TM = aBc), but only extreme environmental(c) abnormalities are taken as relevant and are corrected it needs the Kuhn's revolution loop to correct the environmental(c) abnormalities as indicated by all continuous arrows from TM to "c" to PC to CC to GM. Figure 6 above indicates the following i) the traditional market TM as a flawed paradigm produces environmental abnormalities "c"; ii) The extreme accumulation of environmental abnormalities 'c' means that traditional market expansions lead to environmentally driven paradigm crises PC; iii) that environmentally driven paradigm crises PC bring a real threat of paradigm death PD to the traditional market TM, and hence, they lead to the need for academic consensus to change paradigm CC towards green markets GM; iv) The need for paradigm shift PS to green markets GM means the need for the growth of knowledge related to how to correct the environmental abnormalities "c" affecting the traditional market TM and creating in the process the knowledge base of green markets; and v) Academic integrity ensures the implementation of the paradigm shift that corrects the environmental abnormalities "c" and hence, the shift to green markets GM actually take place. Notice that as a flawed paradigm that produces extreme environmental abnormalities(c) the traditional market TM has environmental limits to growth.

Implication 5 : ***We do need the Thomas Kuhn's revolution loop when we have flawed paradigms such as a traditional market TM that produces environmental abnormalities(c), as there are abnormalities to correct. And when only extreme environmental(c) abnormalities are taken as relevant and are corrected the Kuhn's revolution loop will lead to a shift from traditional markets TM to green markets GM.***

The general structure of the paradigm shift after correcting environmental abnormalities "c" through environmental abnormality internalization consistent with the Kuhn's revolution loop under academic integrity in Figure 6 above can be shown as:

Shift

4) TM = aBc ----------→ PS = GM = aBC

I[c]

When only the environmental abnormalities "c" affecting the traditional market TM are found relevant and corrected through environmental abnormality internalization(I[c]) the paradigm shift to green markets PS = GM takes place. Notice that there are no environmental limits to growth in green markets GM as green markets are environmentally friendly markets, but there are social limits to green growth as there are social abnormalities(a) in green markets GM. In other words, when extreme environmental abnormalities(c) only are taken as relevant and are corrected through environmental abnormality internalization(I[c]), a paradigm shift to green markets PS = GM takes place, a shift to environmentally friendly capitalism.

Food for thoughts

1) Does the 2012 green market paradigm shift avoidance means that the environmental abnormality that led to the environmental sustainability crisis in the first place is still active? I think yes, what do you think?; 2) Does the 2012 green market paradigm shift avoidance means that we are living today in an environmental black hole under management? I think yes, what do you think?; and 3) Does the 2012 green market paradigm shift avoidance means that the smooth transition path to the clean economy world is blocked? I think yes, what do you think?

Conclusions

First, it was shown that golden models like the traditional market under abnormality neutrality assumptions do not need the Kuhn's revolution loop structure to correct abnormalities as they do not produce abnormalities. Second, it was indicated that flawed models like the traditional market model under no abnormality neutrality assumptions need to Kuhn's revolution loop to correct abnormalities as they produce social and environmental abnormalities that need to be corrected. Third, it was stressed that when the Kuhn's revolution loop corrects both social and environmental abnormalities embedding in the flawed traditional market model at the same time it leads to a shift to sustainability markets SM. Fourth, it was pointed out that when the Kuhn's revolution loop corrects only the social abnormalities embedding in the flawed traditional market model it leads to a shift to red markets RM. And fifth, it was highlighted that when the Kuhn's

revolution loop corrects only the environmental abnormalities embedding in the flawed traditional market model it leads to a shift to green markets GM.

In general, it was described in detail when the Thomas Kuhn's revolution loop is needed and when it is not needed. It is needed when the traditional market is a flawed model. in practice or reality, to correct it through abnormality internalization to shift it either to sustainability markets if all abnormalities are corrected at the same time or to shift it to red markets if only social abnormalities are corrected or to shift to green markets if only environmental abnormalities are corrected. And the Kuhn's revolution loop is not needed when no abnormalities are produced, in theory or by assumption, as then the traditional market is assumed to be a golden paradigm.

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Citation:

Muñoz, Lucio, 2022. **Sustainability thought 172: What is the structure of the general Thomas Kuhn's paradigm evolution loop when the traditional market is a golden**

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