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# SUSTAINABILITY THOUGHTS 128: HOW CAN THE THINKING BEHIND SUSTAINABILITY BASED MARKET EXPANSIONS AND TRADITIONAL MARKET BASED ECONOMIC EXPANSIONS BE CONTRASTED USING PARETO OPTIMALITY THINKING? HOW ARE THESEEXPANSIONS LINKED TO SUSTAINABILITY GAP DYNAMICS?

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## ABSTRACT

It can be said that pareto optimality thinking works in parallel fashion across markets as it is associated one to one with the structure of the price of each market, which in turn is linked to specific production and consumption bundles in those markets. For example, pareto optimality in sustainability markets is associated with the structure of the sustainability market price, which is linked to sustainability based production and consumption bundles. In traditional markets, pareto optimality is associated with the structure of the traditional market price, which is linked to traditional production and consumption bundles. It can also be said that pareto optimality points can be linked by a pareto optimality sustainability line, which indicates two things i) the existence of higher and lower level pareto optimality points; and ii) the direction of optimality when we go from higher level markets to lower level markets or vice versa. For example, linking sustainability based pareto optimality with traditionally based pareto optimality through this pareto optimality sustainability line helps see that when the traditional markets were created we created socio-environmental sustainability gaps in the process that separates them from sustainability markets, and when traditional markets expand, they also expand this embedded socio-environmental sustainability gap as they move away from sustainability markets. The 2012 shift from traditional market thinking to green market thinking suggest a shift from traditional pareto optimality thinking to green pareto optimality thinking as green markets are higher level responsibility markets. If we would have shifted to sustainability market thinking instead then, that would have required a shift from traditional pareto optimality to sustainability based pareto optimality. The knowledge to go beyond traditional pareto optimality thinking and to understand the nature and implications of green market expansions or of sustainability market expansions or of any other possible type of market expansions is not yet here so we cannot link it to what we know about traditional market expansions. Hence, there is a need to close this type of paradigm shift knowledge gap. And a good way to start is by asking relevant questions such as how can the thinking behind sustainability based market expansions and traditional market based economic expansions be contrasted using pareto optimality thinking? How are these expansions linked to sustainability gap dynamics? What would be the resulting optimality point if we correct the traditional market optimality point to account for social externalities only or to account for environmental externalities only or to account for both types of externalities at the same time? Among the goals of this paper is to provide an answer to the questions posed above.

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**Key Words**: Sustainability, pareto optimality, green pareto optimality, sustainability based pareto optimality, market expansion, market contraction, paradigm shift, cost internalization, market responsibility, cost externalization, production frontier, social indifference curve, market price line. pareto improvement, pareto optimal sustainability line.

## 1. INTRODUCTION

It can be said that pareto optimality thinking works in parallel fashion across markets as it is associated one to one with the structure of the price of each market, which in turn is linked to specific production and consumption bundles in those markets. The optimal point of all possible markets has recently been linked to their respective production and consumption bundles(Muñoz 2021). For example, pareto optimality in sustainability markets is associated with the structure of the sustainability market price, which is linked to sustainability based production and consumption bundles. In traditional markets, pareto optimality is associated with the structure of the traditional market price, which is linked to traditional production and consumption bundles. Below there is a brief discussion about how the different pareto optimality structures look and work, how they can be linked through pareto optimal sustainability lines, and how important is to understand how pareto optimality thinking can be used to contract the implications of market expansions and contractions.

### a) The sustainability based pareto optimality structure

It can be said that the pareto optimality sustainability point is found where the sustainability market price line($PL_1$) is tangent to the sustainability production frontier($PF_1$) and to the sustainability based social indifference curve($SIC_1$), as shown in Figure 1 below:

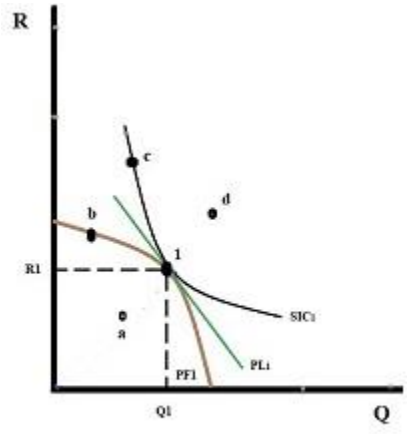


Figure 1 The structure and working of sustainability based pareto optimality thinking

We can see in Figure 1 above that at point "1" we have a sustainability based pareto optimality point as the sustainability market price line $PL_1$ is tangent to the sustainability production frontier $PF_1$ and to the sustainability social indifference curve $SIC_1$ at the same time; and hence, the optimal sustainability based quantities to be produced and consumed are $R_1$ and $Q_1$. Notice that point "d" in Figure 1 above is a more desirable sustainability based production

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and consumption point, but it is not available as it falls outside the sustainability based production frontier; and also notice that point "a" is a less desirable sustainability based production and consumption point than for example point "1" since it is sustainability based pareto inefficient while point "1" is pareto efficient. We can also see in Figure 1 above that point "b" is pareto efficient in sustainability production and that point "c" is pareto efficient in sustainability based consumption, but both of them are not optimal; hence, the only pareto efficient and optimal sustainability point is point "1". The sustainability based pareto optimality point is the highest level optimality point possible(Muñoz 2021a).

**b) The traditional market based pareto optimality structure**

It can be said that the traditional pareto optimality point is found where the traditional market price line($PL_2$) is tangent to the traditional production frontier($PF_2$) and to the traditional social indifference curve($SIC_2$), as shown in Figure 2 below:

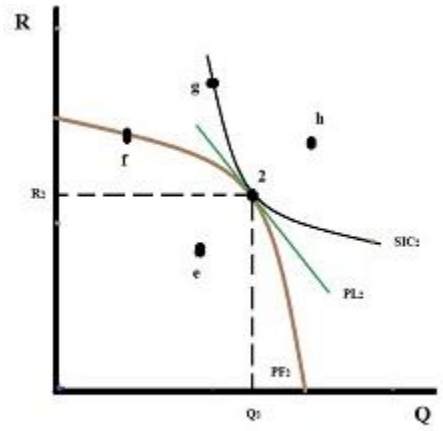


Figure 2 The structure and thinking of economy based pareto optimality thinking

We can see in Figure 2 above that at point "2" we have a traditional pareto optimality point as the traditional market price line $PL_2$ is tangent to the traditional production frontier $PF_2$ and to the traditional social indifference curve $SIC_2$ at the same time; and therefore, the optimal traditional quantities to be produced and consumed are $R_2$ and $Q_2$. We can see that point "h" in Figure 2 above is a more desirable traditional production and consumption point than point "2', but it is not available as it falls outside the traditional production frontier; and we can also see that point "e" is a less desirable traditional production and consumption point than for example point "2" as it is pareto inefficient and point "2" is pareto efficient. We can also notice in Figure 2 above that point "f" is pareto efficient in traditional production and that point "g" is pareto efficient in traditional consumption, but both of them are not optimal; and therefore, the only pareto efficient and optimal traditional market point is point "2". How traditional pareto optimality thinking works compared to green pareto optimality thinking was recently highlighted(Muñoz 2020a).

**c) The pareto optimality sustainability line**

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Since the traditional market price(P) does not account for environmental and social cost of production and the sustainability market price(SP) does, that means that SP > P, and therefore, we should expect the sustainability pareto optimal point to be to the left of the traditional market optimal pareto point; and if we link those optimality points using the pareto optimality line the structure would look as indicated in Figure 3 below:

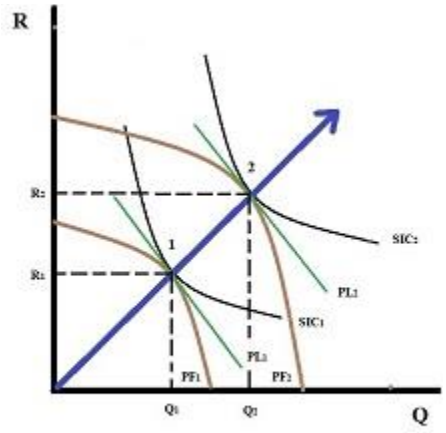


Figure 3 The increasing sustainability pareto optimality line connecting the optimal points of the sustainability market and the traditional market

The blue line in Figure 3 above is the pareto optimal sustainability line, which connects higher optimality points like point "1" with lower optimality points like point "2". In other words, at any given production and consumption bundle on the pareto optimality sustainability line, higher level optimality markets are found to the left of it and lower level optimality markets are found to the right of it. Notice that if we externalize all social and environmental cost that are accounted for at point "1", then the sustainability pareto structure would collapse and production and consumption would be driven by pareto improvements dynamics towards production and consumption at point "2. And this is why, at lower level optimality points like point "2"there is more production and consumption than at higher level optimality points like point "1". For example, we can see in Figure 3 above that since prices are lower in traditional markets(P < SP) we produce and consume more($Q_2 > Q_1$ and $R_2 > R_1$) in traditional markets at point "2" than in sustainability markets at point "1", which means that point "1" is a point of higher level pareto optimality than point "2". It has been recently stressed that cost externalization goes one to one with model structure and price structure(Muñoz 2020b) inducing optimality trends from higher level optimality points to lower level optimality point; and it has also recently been shown that any market, perfect market or dwarf market and their consumption and production bundles, that are located to the right of any optimality point such as the green market optimality point for example falls outside the production frontier, in this case outside the green market production frontier(Muñoz 2021b ) so those bundles are not available in that market. Another thing that can be highlighted based on Figure 3 above is that at point "1", the pareto optimal sustainability point, there are no sustainability gaps while at point "2", the traditional pareto optimality point, there is a sustainability gap, the distance from point "1" to

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point "2". We know today that Adam Smith could have stated the theory of the perfect sustainability market in his time(Muñoz 2015), but he gave us the theory of the perfect market instead( Smith 1776) with the embedded socio-environmental externality gap due to his assumption of socio-environmental externality neutrality which created a sustainability problem(Muñoz 2020c), a situation that is forcing us to address currently those sustainability corrections backwards in terms of economic thinking(Muñoz 2012).

**d) The need to link pareto optimality thinking with sustainability market based expansion and contraction**

The 2012 shift from traditional market thinking to green market thinking(UNCSD 2012a; UNCSD 2012b; OECD 2012; UN 2012; WB 2012; UNDESA 2012) consistent with the Brundtland Commission called related to the need for environmentally friendliness in development(WCED 1987) suggest a shift from traditional pareto optimality thinking to green pareto optimality thinking as green markets are higher level responsibility markets. If we would have shifted to sustainability market thinking instead then, that would have required a shift from traditional pareto optimality to sustainability based pareto optimality. The knowledge to go beyond pareto optimality thinking and to understand the nature and implications of green market expansions or of sustainability market expansions or of any other possible type of market expansions is not yet here so we cannot link it to what we know about traditional market expansions. Hence, there is a need to close this type of paradigm shift knowledge gap; and the attention in this paper is on sustainability market based pareto optimality expansions and contractions. And a good way to start is by asking relevant questions such as how can the thinking behind sustainability based market expansions and traditional market based economic expansions be contrasted using pareto optimality thinking? How are these expansions linked to sustainability gap dynamics? What would be the resulting optimality point if we correct the traditional market optimality point to account for social externalities only or to account for environmental externalities only or to account for both types externalities at the same time? Among the goals of this paper is to provide an answer to the questions posed above.

**Goals of this paper**

a) To highlight that there is a sustainability gap separating the sustainability pareto optimality point from the traditional market pareto optimality point; b)To share the structure and implications of sustainability market expansions using pareto optimality thinking; c) To point out the structure and implications of traditional market expansions using pareto optimality thinking; and d) To stress the structure and implications of correcting the traditional market to reflect partial or full cost of production.

## 2. METHODOLOGY

a) The sustainability gap separating the sustainability pareto optimality point from the traditional market pareto optimality point is highlighted; b) The structure and implications of sustainability market expansions in the absence of sustainability gaps are stressed using pareto optimality thinking; c) The structure and implications of traditional market expansions in the

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presence of an embedded sustainability gap are pointed out using pareto optimality thinking; d) The structure and implications of correcting the traditional market to reflect social cost of production are shared; e) The structure and implications of correcting the traditional market to reflect environmental cost of production are indicated; f) The structure and implications of correcting the traditional market to reflect social and environmental cost of production at the same time are given; and g) Some food for thoughts and relevant conclusions are provided.

**Terminology**

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| | |
|---|---|
| A = Active social component | a = Passive social component |
| B = Active economic component | b = Passive economic component |
| C = Active environmental component | c = Passive environmental component |
| R = Product R | Ri = Production and consumption level Ri |
| Q = Product Q | Qi = Production and consumption level Qi |
| PF = Production frontier | PFi = Production frontier "i" |
| PL = Price line | PLi = Price line "i" |
| SIC = Social indifference curve | SICi = Social indifference curve "i" |
| KM = Red socialism market | KMP = Red socialism market price |
| ENM = Environmental market | ENMP = Environmental market price |
| TM = Traditional market | TMP = Traditional market price |
| SENM = Socio-environmental market | SENMP = Socio-environmental market price |
| RM = Red market | RMP = Red market price |
| GM = Green market | GMP = Green market price |
| S = Sustainability market | SP = Sustainability market price |
| EM = Environmental margin | SM = Social margin |
| ECM = Economic margin | i = Profit |

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**Operational concepts, models and tables**

**A) Operational concepts**

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**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.*

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**23) Full irresponsibility,** *when a market uses no costing.*

**24) Cost externalization,** *the leaving out of the pricing mechanism of the market relevant costs associated with production.*

**26) Social cost externalization,** *the leaving out of the pricing mechanism of the market the social costs associated with production.*

**27) Environmental cost externalization,** *the leaving out of the pricing mechanism of the market the environmental costs associated with production.*

**28) Cost externalization assumption neutrality,** *the assumption that production has minimal or no cost impact on external factors to a market model.*

**29) Fully independent development choices,** *when we have individual development choices unrelated to each other or pure choices such as society only(A), economy only(B), and environment only(C). In this world only fully independent development choices exist so the set = {A, B, C}. This is the world of the Arrow Impossibility theory and theorem.*

**30) Partially codependent development choices,** *when we have mixed/paired development choices such as socio-economy(AB), socio-environment(AC), and eco-economy(BC). In this universe only codependent development choices exist so the set = {AB, AC, BC}. This is outside the normal world of the Arrow Impossibility theory and theorem.*

**31) Fully codependent development choices,** *when all development choices are mixed together such as the socio-economy-environment(ABC) model. In this paradigm only fully codependent development choices exist so the set = {ABC}. This is outside the world of the Arrow Impossibility theory and theorem.*

**32) Full cost externalization,** *all costs associated with production are not reflected in the pricing mechanism of the market.*

**33) Partial cost externalization,** *some costs associated with production are not reflected in the pricing mechanism of the market.*

**34) No cost externalization,** *all costs associated with production are reflected in the pricing mechanism of the market.*

**35) Full cost internalization,** *all costs associated with production are reflected in the pricing mechanism of the market.*

**36) Partial cost internalization,** *some costs associated with production are reflected in the pricing mechanism of the market.*

**37) No cost internalization,** *all costs associated with production are not reflected in the pricing mechanism of the market.*

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**38) Externalities,** *factors assumed exogenous to a model*

**39) Full externality assumption,** *only one component is the endogenous factor in the model; the others are exogenous factors.*

**40) Partial externality assumption,** *not all factors are endogenous factors at the same time in the model.*

**41) No externality assumption,** *all factors are endogenous factors at the same time in the model.*

**42) Economic externality,** *the economic costs associated with production not reflected in the pricing mechanism of the market.*

**43) Social externality,** *the social cost associated with production not reflected in the pricing mechanism of the market.*

**44) Environmental externality,** *the environmental cost associated with production not reflected in the pricing mechanism of the market.*

**45) Profit,** *the incentive to encourage economic activity*

**46) Full cost price,** *a price that reflects all costs associated with production.*

**47) Some cost price,** *a price that reflects only some costs associated with production.*

**48) No cost price,** *a price that does not reflect any cost associated with production.*

**49) Traditional Pareto optimal,** *the levels of production and consumption determined by the traditional market price.*

**50) Green pareto optimal,** *the levels of green production and green consumption determined by the green market price.*

**51) Red market based pareto optimal,** *the levels of production and consumption determined by the red market price.*

**52) Socio-environmental based pareto optimal,** *the levels of production and consumption determined by the socio-environmental market price.*

**53) Red socialism based pareto optimal,** *the levels of production and consumption determined by the red socialism market price.*

**54) Environmental market based pareto optimal,** *the levels of production and consumption determined by the environmental market price.*

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**55) Sustainability based pareto optimal,** *the levels of production and consumption determined by the sustainability market price.*

**B) Operational models**

**i) The development variability model**

If we have a system with three components, society(A), the economy(B) and the environment(C), the development variability model(D) can be stated as:

**1) D = A + B + C + AB + AC + BC + ABC**

Expression 1) above simple says that there is development when one or two or all components at the same time are in active or dominant form. We can also see in expression 1) above, going from left to right, that i) there can be different types of one component only based development or deep development models( A, B, C); ii) there can be different types of two components only based development or partial partnership based models(AB, AC, BC); and iii) there can be one type of all component based development(ABC) or full partnership based model. In other words, we can see in expression 1) above three things; i) that going from left to right, component inclusion increases; ii) that going from right to left, component exclusion increases; and that 7 different types of development(Di) are possible.

**ii) The anti-development model**

If none of the three components, A, B and C mentioned above are in active form or dominant form then we have the anti-development model(d), where passivity or no clear dominance leads to a free for all full unsustainability:

**2) d = abc = full unsustainability model(USM)**

Notice that in expression 2 all components, a, b, c, are in passive or dominated form

**iii) The development model in terms of market structures**

If we add the passive components to each of the dominant structures in the development variability model(D) above, we transform it into development market structure(DM) with all possible individual market structures as follows:

**3) DM = Abc + aBc + abC + ABc + AbC + aBC + ABC**

And the anti development market is:

**4) dM = abc = USM, where USM = the unsustainable market**

Notice that Abc = the red socialism market = KM

aBc = the traditional market = TM

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abC = the environmental market = ENM

ABc = the red market = RM

AbC = the socio-environmental market = SENM

aBC = the green market = GM

ABC = the sustainability market = S

Based on the information above, expression 3) above can be restated in terms of the names of the markets associated with each market structure as follows:

**5) DM = KM + TM + ENV + RM + SENM + GM + S**

If we look at expression 1) and compare it with expression 5) we can see the following: a) that under independent choice assumptions three forms of development are possible(A, B, C); and therefore, 3 types of markets(KM, TM, ENM); b) that under partial codependent choice assumptions three forms of development are possible(AB, AC, BC); and therefore, 3 types of markets(RM, SENM, GM); c) that under full codependent assumption only one form of development is possible(ABC); and hence, only one type of market is possible(S); and d) if we assume that only the independent economic choice matters as the perfect traditional market indicates then only one type of development is possible(B) as well as only one type of market(TM), and hence in this case, the traditional market(TM) drives development.

**iii) The development model in terms of market price structures**

The price structure of each market reflects only the cost margin or the sum of cost margins associated with each component in each specific market in active form or dominant form, the society(A) reflects a social margin(SM), the economy(B) reflects an economic margin plus profits(ECM + i = P), and the environment(C) reflects an environmental margin(EM); and if we apply this thought then to the market price for each market present in expression 5 above associated with the active components in expression 1) above we arrive to the following development market prices(DMP):

**6) DMP = (KMP = SM) + (TMP = P) + (ENMP = EM) + (RMP = SM + P) + (SENMP = SM + EM) + (GMP = EM + P) + (SP = SM + EM + P)**

And the price structure of the anti-development model

**7) dMP = USMP = 0 = free**

Where USMP = the unsustainability market price with a zero cost margin

Notice that ideas related to how market pricing and cost externalization are linked(Muñoz 2020) and related to how market prices can be derived from the sustainability market price(Muñoz 2015e) have been recently stressed in detail.

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**C) Operational table**

If we assume that EM > SM > P > 0 = free price, then all models, markets and prices presented above can be organized in terms of the highest market price to the lowest market price as well as in terms of type of cost externalization and type of cost internalization under each market is operating as shown in Table 1 below:

**Table 1**

| Development Type | Market Structure | Price Structure | Type of Externalization | Type of Internalization |
|---|---|---|---|---|
| D1 = ABC | S = ABC | SP = SM + GM + P | None | Full |
| D2 = AC | SENM = AbC | SENMP = SM + EM | Type I | Type II |
| D3 = BC | GM = aBC | GMP = EM + P | Type I | Type II |
| D4 = AB | RM = ABc | RMP = SM + P | Type I | Type II |
| D5 = C | ENM = abC | ENMP = EM | Type II | Type I |
| D6 = A | KM = Abc | KMP = SM | Type II | Type I |
| D7 = B | TM = aBc | TMP = P | Type II | Type I |
| D8 = dM | USM = abc | USMP = 0 = free | Full | none |

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We can see in Table 1 above that SP > SENMP > GMP > RMP > ENMP > KMP > TMP > USMP, this and the other information in Table 1 is used below to place the position of production frontiers and indifference curves and optimality points of markets with respect to other markets or to drive markets to the right or to the left depending on whether we are externalizing costs or we are internalizing costs.

**The sustainability gap separating traditional markets from sustainability markets**

When Adam Smith gave us the traditional market theory in 1776, he assumed full social and environmental externality neutrality, which means that there is an embedded social and environmental sustainability gap($SESG_1$) in that model, a situation highlighted in Figure 4 below:

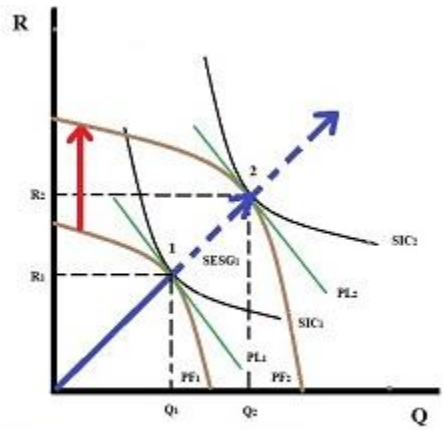


Figure 4 The sustainability gap separating sustainability based pareto optimality point from economy only based pareto optimality

As highlighted in the introduction, had Adam Smith given us the theory of the perfect sustainability market(S) we would be at point "1" in Figure 4 above with no sustainability gaps, but he gave us the theory of the perfect traditional market(TM) so we are at point "2" with a socio-environmental sustainability gap($SESG_1$) that separates sustainability markets(S) from traditional markets(TM) from point "1" to point "2".

We can see in Figure 4 above that social and environmental externality assumption made by Adam Smith breaks the pareto optimality sustainability line as indicated by the broken blue line; and this allows the pareto optimality point to migrate from point "1" to point "2"as sustainability conditions break down creating a socio-environmental sustainability gap($SESG_1$ = SSG + ESG) between point "1" and point "2" that generates traditional pareto improvement dynamics that expand production and consumption from point "1" to point "2" as indicated by the continuous red arrow. Hence, when a market assumes that some costs do not matter; and therefore, they are not accounted for in the pricing mechanism of that market as in the case of the traditional market at point "2" we create sustainability gaps; and that market optimality structure will be at the right of the sustainability pareto optimality structure as it has a lower market price

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since the sustainability market price at point "1" is greater than the traditional market price at point "2"( $SP_1 > TMP = P_2$); and hence, traditional markets have a higher production and consumption bundle than that in the sustainability based pareto optimality structure. And finally, notice that if we were living in the sustainability world at point "1", all traditional production and consumption bundles outside the sustainability based production frontier would not be available as they fall outside sustainability based pareto optimality; and because we live in the world at point "2", the traditional market world, we are assuming away social and environmental costs associated with production, making point "1" by assumption, "a lower level pareto inefficient point" so consumption and production will migrate from point "1' to point '2" as social and environmental costs are externalized or left out. In reality, as social and environmental externality costs are real and do matter, point "1" is a higher level pareto efficient and optimal point than point "2".

**The structure and implications of sustainability market expansions**

When the sustainability market price($SP = SP_1$) decreases due to technological advances and innovations in reducing social, environmental and economic costs of production, then the sustainability production frontier($SPF = PF_1$) and sustainability based social indifference curve($SSIC = SIC_1$) shift to the right each time the sustainability price($SP = SP_1$) decreases as more production and consumption takes place at a lower sustainability market price, as indicated in Figure 5 below:

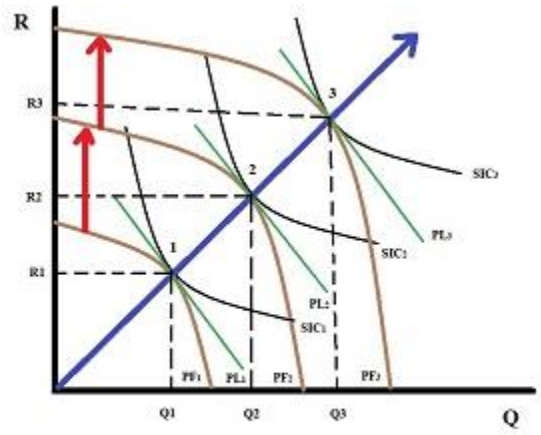


Figure 5 The thinking behind the sustainability market expansion, it leads to increased production and consumption of sustainability based bundles as the sustainability price decreases

We can appreciate in Figure 5 above that sustainability production and consumption has increased from point "1" to point "2" first and then from point "2" to point "3", which means that the sustainability market price(SP) is decreasing at each point from left to right so that $SP_1 > SP_2 > SP_3$. Hence, as the sustainability price(SP) decreases the sustainability production frontiers expands as indicated by the continuous red arrows from point "1" to point "2" and then from point '2" to point "3"; and the sustainability pareto structure shifts to the right on the pareto

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optimality sustainability line as these increases in sustainability based production and consumption are optimal and pareto efficient increases that are taking place in the absence of sustainability gaps as there is full costing. Notice that at point "1" in Figure 5 above, the original sustainability point, we have a lower pareto optimal production and consumption bundle that at point "2" and at point "3" on the continuous pareto optimal sustainability line since as production in sustainability markets expands more and more, it moves towards even more desirable sustainability based production and consumption bundles. In other words, production and consumption at point "3" in Figure 5 above is the most desirable sustainability based production and consumption point as compared to point "1" and point "2".

**The structure and implications of traditional market expansions**

When the traditional market price($P = P_2$) decreases due to technological advances and innovations in reducing costs of production, then the traditional production frontier($TPF = PF_2$) and traditionally based social indifference curve($TSIC = SIC_2$) shift to the right each time the traditional market price($P = P_2$) decreases expanding at the same time each time its embedded socio-environmental sustainability gap(SESG) as more production and consumption takes place at a lower traditional market price, as indicated in Figure 6 below:

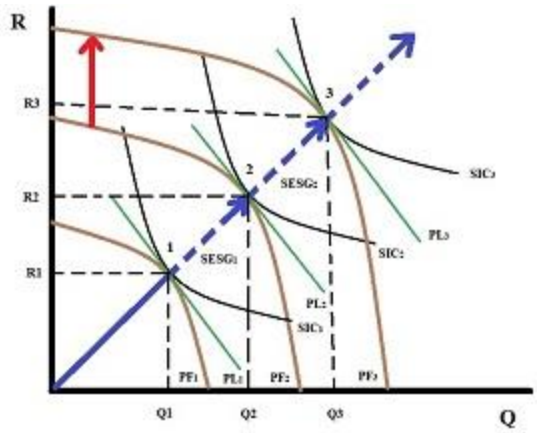


Figure 6 The sustainability issues associated with a traditional market expansion, as price decreases production and consumption of economic boundles increases as well as the size of its associated socio-environmental sustainability gap(SESG)

We can see in Figure 6 above that traditional production and consumption has increased from point "2" to point "3" and the embedded socio-environmental sustainability gap has increased by $SESG_2$, which means that the traditional market price(P) is decreasing from left to right so that $SP_1 > P_2 > P_3$; and the embedded socio-environmental sustainability gap is expanding as at point "3" the socio-environmental sustainability gap is $SESG = SESG_1 + SESG_2$. Hence, as the traditional price(P) decreases the traditional production frontiers expands as indicated by the continuous red arrow; and the traditional pareto structure shifts to the right on the broken pareto optimality sustainability line as these increases in traditional production and consumption are optimal and pareto efficient increases by assumption taking place in the present

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of socio-environmental sustainability gaps as these costs are taken as irrelevant; and therefore, there is no full costing. Notice that at point "1" in Figure 6 above, the sustainability point, we have a higher pareto optimality point that at point "2" and point "3" on the broken pareto optimal sustainability line since as production in traditional markets expands more and more, it moves further and further away from the sustainability based pareto optimality point. However, we can see that from the traditional market point of view, point "3" is the most desirable production and consumption bundle.

In summary, contrasting Figure 5 and Figure 6 above we can highlight the following: a) sustainability market based expansions lead to the migration of optimality points to the right without creating sustainability gaps while traditional market expansions go one to one with socio-environmental sustainability gap expansions making sustainability market expansions more stable; b) sustainability markets expand at higher level optimality paths and traditional market expand at lower level optimality paths because as the sustainability market price reflects full costing and the traditional market price reflects partial costing making traditional market expansion more unstable; and therefore, c) Lower production and consumption in sustainability markets given its higher market prices means less pollution in production and consumption in those markets while higher production and consumption in traditional markets given its lower prices means more pollution in production and consumption in traditional markets. In other words it can be said that; a) there are no sustainability gaps in sustainability markets so sustainability market expansions are not linked to sustainability gap expansions while there is an eco-economic sustainability market in traditional markets that makes traditional market expansions to lead to sustainability gaps expansions at the same time; and b) both sustainability market expansion and traditional market expansions are optimal pareto optimality expansions, but the pareto optimality path in the traditional market is a lower optimality level than the pareto optimality path in sustainability markets.

**The structure and implications of correcting the traditional market to reflect social cost of production**

When the embedded socio-environmental sustainability gap($SESG_1$ = SSG + ESG ) in the traditional market price(TMP) of the traditional market structure(TM) as shown in Figure 4 above is corrected to account for social costs of production(SM), we close the social sustainability gap(SSG) and leave still embedded the environmental sustainability gap(ESG) still active, a situation highlighted in Figure 7 below:

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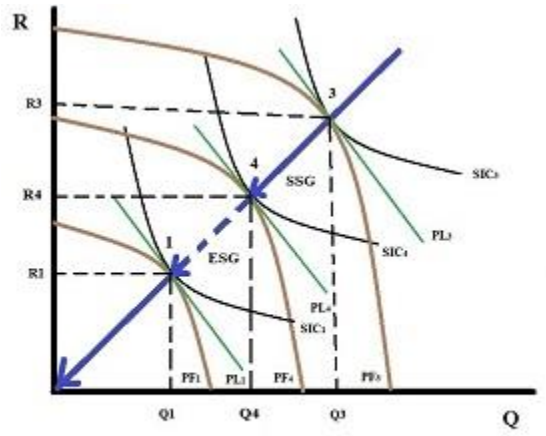


Figure 7 The structure that results from correcting economy only based pareto optimality or traditional market optimality to reflect social concerns

If we have a traditional market optimality point at point "3" in Figure 7 above and we correct its market price($P_3$) to reflect social cost of production(SM) through social cost internalization we shift the optimal point structure from point "3" to point "4" closing its social sustainability gap(SSG) as indicated by the continuous blue arrow between them, where at point "4" the market price is $P_4 = P_3 + SM > P_3$. The market at point "4" in Figure 7 above is a red market or socially friendly market(RM), which is cleared by a red market price($RMP = P_4$) as now social costs(SM) are internalized; and which has an environmental sustainability gap(ESG) separating it from the sustainability based pareto optimality point at point "1". Notice that production and consumption in red markets(RM) at point "4"in Figure 7 above is less than production and consumption in traditional markets(TM) at point "3", but more than production and consumption in sustainability markets(S) at point "1" since $SP = SP_1 > RMP = P_4 > TMP = P_3$. We can see in Figure 7 above that the internalization of the social cost(SM) of doing business in the price of the traditional market at point "3" closes the social sustainability gap(SSG) affecting it from point "3" to point "4"; shifting the optimality point to the left from point "3" to point "4" as cost internalization leads the higher level models closer to the sustainability based pareto optimality point at point "1". Hence, social cost internalization goes one to one with increasing market responsibility leading to higher level optimality as the red market(RM) is a more responsible market than the traditional market(TM) in social terms.

**The structure and implications of correcting the traditional market to reflect environmental cost of production**

When the embedded socio-environmental sustainability gap($SESG_1 = SSG + ESG$) in the traditional market price(TMP) of the traditional market structure(TM) as shown in Figure 4 above is corrected to account for environmental costs of production(EM), we close the environmental sustainability gap(ESG) and leave still embedded the sustainability gap(SSG) still active, as indicated in Figure 8 below:

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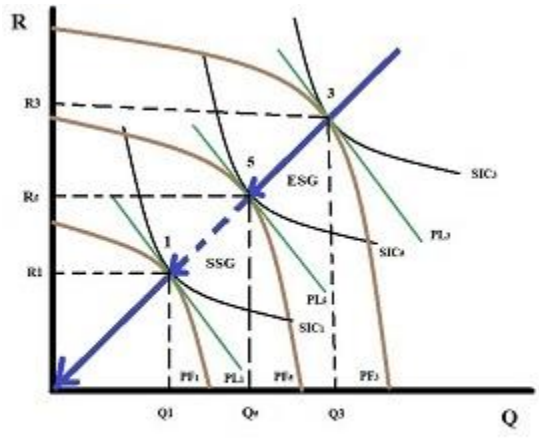


Figure 8 The structure that results from correcting economy only based pareto optimality or traditional market pareto optimality to reflect environmental concerns

If we have a traditional market optimality point at point "3" in Figure 8 above; and we correct its market price($P = P_3$) to reflect environmental cost of production(EM) through environmental cost internalization we shift the optimal point structure from point "3" to point "5" closing the environmental sustainability gap(ESG) as indicated by the continuous blue arrow between them, where at point "5"the market price is $P_5 = P_3 + EM > P = P_3$. The market at point "5" in Figure 8 above is a green market or environmentally friendly market(GM), which is cleared by a green market price($GMP = P_5$) as now environmental costs(EM) are internalized; and which is a point that has a social sustainability gap(SSG) separating it from the sustainability based pareto optimality point at point "1". Notice that production and consumption in green markets(GM) at point '5" in Figure 8 above is less than production and consumption in traditional markets(TM) at point "3", but more than production and consumption in sustainability markets(S) at point "1" since $SP = SP_1 > GMP = P_5 > TMP = P = P_3$. We can see in Figure 8 above that the internalization of the environmental cost(EM) of doing business in the price of the traditional market at point "3" closes the environmental sustainability gap(ESG) affecting it from point "3" to point "5", shifting the optimality point to the left from point "3" to point "5" as cost internalization leads the higher level models closer to the sustainability based pareto optimality point at point "1". Hence, environmental cost internalization goes one to one with increasing market responsibility leading to higher level optimality as the green market(GM) is a more responsible market than the traditional market(TM) in environmental terms.

**The structure and implications of correcting the traditional market to reflect social and environmental costs of production at the same time**

When the embedded socio-environmental sustainability gap($SESG_1 = SSG + ESG$ ) in the traditional market price(TMP) of the traditional market structure(TM) as shown in Figure 4 above is corrected to account for social costs and environmental of production at the same time(SM + EM), we close the socio-environmental sustainability gap($SESG_1$) fully, leaving no remaining sustainability gaps as shown in Figure 9 below:

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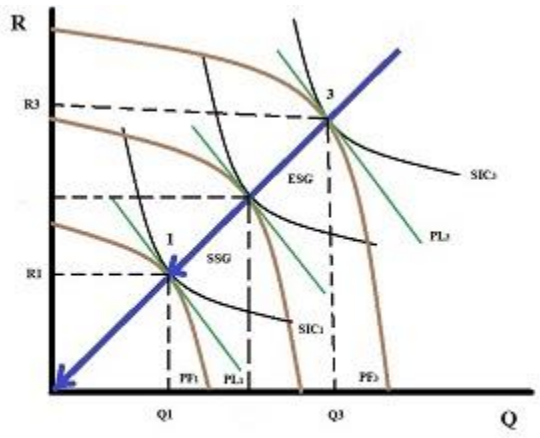


Figure 9 The structure that results when correcting the economy only based pareto optimality or traditional market pareto optimality to reflect social and environmental concerns at the same time

If we have a traditional market optimality point at point "3" in Figure 9 above and we correct its market price($P = P_3$) to reflect social cost of production(SM) and environmental cost of production(EM) through socio-environmental cost internalization we shift the optimal point structure from point "3" to point "1" closing fully the socio-environmental sustainability gap($SESG_1 = SSG + ESG$) as indicated by the continuous blue arrow between them, where at point "1"the market price is $SP = SP_1 = P_3 + SM + EM > P = P_3$. The market at point "1" in Figure 9 above is a sustainability market or socially and environmentally friendly market(S), which is cleared by a sustainability market price($SP = SP_1$) as now social and environmental costs are internalized, a point that has no sustainability gaps as point "1" is the sustainability based pareto optimality point. Notice that production and consumption in sustainability markets(S) at point "1" in Figure 9 above is less than production and consumption in traditional markets(TM) at point "3"since $SP = SP_1 > TMP = P = P_3$. We can see also in Figure 9 above that the internalization of the social costs and environmental costs of doing business in the price of the traditional market at point "3" closes fully the socio-environmental gap($SESG_1 = SSG + ESG$) affecting it from point "3" to point "1" and shifting the optimality point to the left from point "3" to point "1" as full cost internalization leads the highest level pareto optimality model, the sustainability market(S). Hence, full cost internalization goes one to one with full market responsibility leading to highest level optimality model as the sustainability market(S) is a more responsible market than the traditional market(TM) in social and environmental terms.

**Food for thoughts**

1) Would internalizing social costs in green markets lead to a shift towards sustainability markets? I think yes, what do you think?; 2) Would a cold war between red markets and environmental markets lead to a shift towards sustainability markets? I think yes, what do you think?; and 3) Would a clash between red markets and green markets lead to a shift towards sustainability markets? I think yes, what do you think?

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## CONCLUSIONS

1) It was pointed out that when traditional markets are set up as Adam Smith did under the assumption of social and environmental externality neutrality we create the embedding of a socio-environmental sustainability gap that affects the working of the traditional market; 2) It was highlighted that sustainability markets are not affected by sustainability gaps as they are based on full cost internalization; 3) It was indicated graphically and analytically that when sustainability markets expand as sustainability prices decrease due to technological advances and innovation the sustainability based production and consumption bundles to the furthest right are more desirable production and consumption bundles than the original pareto optimal bundle at the pareto sustainability point; 4) It was shown graphically and analytically that when traditional market expand as traditional market prices decrease due to technological advances and innovation the traditional production and consumption bundles to the furthest right are more desirable production and consumption bundles than the original pareto optimal bundle at the traditional pareto optimal point' 5) It was stressed that contrasting sustainability markets and traditional markets in terms of sustainability gaps and prices, we can see that traditional markets have embedded sustainability gaps and sustainability market do not have them; and that production and consumption, and therefore pollution in production and consumption in traditional markets is higher than that in sustainability markets as the traditional market price is lower than the sustainability market price; 6) It was indicated graphically and analytical that if we correct the traditional market price to reflect social or environmental or social and environmental concerns at the same time through cost internalization, the traditional pareto optimal point will migrate towards the red pareto optimal point of red markets or towards the green pareto optimal point of green markets or towards the sustainability pareto optimal point of sustainability markets respectively; and 7) Overall, it was shown that sustainability based market expansions and traditional market expansions are higher and lower level pareto optimality expansions respectively, where market expansions in traditional markets only go one to one with associated socio-environmental sustainability gap expansions as there are no sustainability gaps in sustainability markets expansions.

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