A POLICY COMPASS FOR ECOLOGICAL ECONOMICS

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Abstract

A policy compass indicates the direction and degree of success of a policy in both very general qualitative terms and in robust statistical terms. I propose to modify the compass to reflect the underlying suppositions of ecological economics: that society is dependent on the environment, and that economic activity is dependent on society. We can think of this as three concentric circles, the economy being the smallest.
Any formal institution[1] can develop a policy compass to examine the discrepancy between what the institution would like to do (its mandate) and the actual performance and situation it finds itself in, where the latter is determined through an aggregation of statistical data and facts. These are made robust and stable using meta-requirements[2] of convergence. They can be aligned with some of the fundamental conceptual and normative thinking of ecological economics with this new adaptation of the compass.
In this paper, the general policy compass is explained, followed by an adaptation for ecological economics. The policy compass is original, and so is the adaptation. The compass is inspired by the work of Satish Kumar, Stanislav Schmelev, Anthony Friend, Georgescu-Roegen and Rob Hoffman. In the conclusion, I discuss the accompanying conception of sustainability.

Key words: Policy compass, policy decisions, qualitative accounting, ecological economics, environment, sustainability

A Policy Compass for Ecological Economics

0. Introduction

In this paper, I propose a new tool for policy analysis. I call it a 'policy compass'. It can be used for policies in any institution. I adapt the policy compass to reflect the very important idea in ecological economics that the economy is a subset of society, and society is a subset of the natural environment. See figure 10. 'Subset' here is an existential dependence relation. Visually, the result is something very simple and intuitive. But beneath the simple final representation lies a culturally sensitive, statistically robust and holistic construction.

[1] An institution is any of: a convention or habit, a norm or valued social practice and a formal institution. The latter has a formal structure and distinguishes itself from the other two by including explicit rules and a mechanism for re-enforcement or correction. The legal system, universities, banks, city councils, hospitals, libraries and so on are all formal institutions.

Visually, the result will be one arrow on a trisected circle with two concentric cicles. The thirds of the circle represent very *general* qualities: suppression, passion and harmony. These are general, in the sense that other qualities fall under them. The arrow is located in one of the thirds, indicating the over-all general quality. Its position within the third indicates the tendency towards the secondary quality. See figure 1. The length indicates the relative strength of holding the quality. We can then make, analyse, critique and adjust decisions about the general qualitative direction of the institution, based on the position and length of the arrow. As an institution, we might want to lengthen or shorten the arrow or we might want to change its direction.

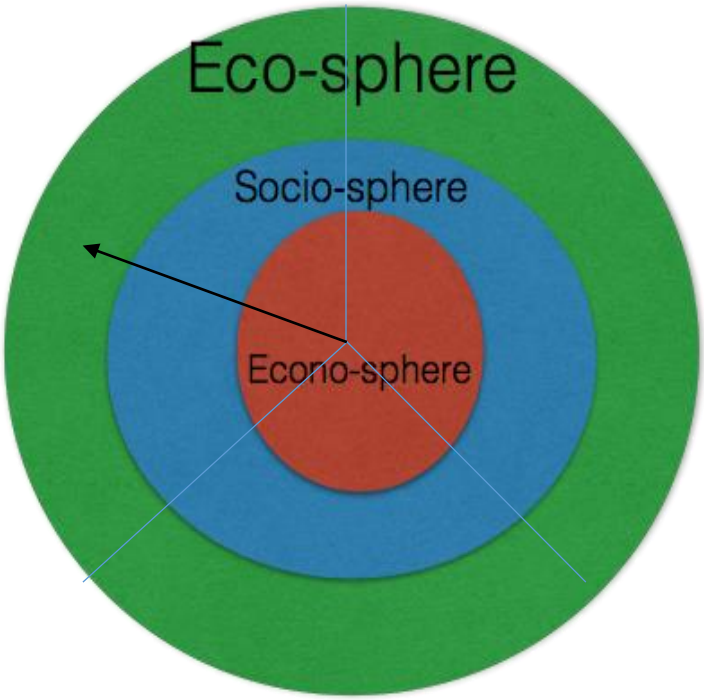


Figure 1.

We construct the arrow using a mathematical aggregation technique on several 'indictor arrows'. The indicator arrows represent carefully chosen statistics. The statistics are chosen on the basis of indicating the general quality, and on the basis of accuracy and availability.

Policy decisions are then made on the basis of the 'aggregated arrow', its position and length or a series of such, representing the same institution over time or comparing similar institutions to each other. What a new policy is, how we adapt or change a policy, how we analyse or criticise a policy, how we justify a policy will then depend on uncovering how it is that we constructed the arrow in the first place. We can do all of these things in a more or less *superficial* manner by addressing or gerrymandering the representation of the dominant statistics that swing the arrow in a particular direction and give it length or, *more deeply*, by looking at the underlying causes of the statistics and their representation. The soundness and longevity of the policy will depend on the depth of analysis.

The structure of the paper is given by the following sections: (1) an explanation of the first part of method for constructing the arrow: getting an overall sense of the circle and its arrow. (2) The second part of the method: choosing particular statistics and representing them on the circle. These are the 'indicator arrows'. (3) The mathematical technique used to aggregate the indictor arrows to end up with one aggregated arrow. (4) The adaptation of the method to reflect the conceptions and normative concerns of ecological economics. (5) The policy compass and what it helps us to understand about our conception of sustainability. (6) Philosophical reflections and conclusion.

1. Introduction: Explanation of the General Qualities

We start with three very general qualities.[3] They are inspired by[4] the three *gunas* of ancient Hindu literature. The *gunas* are: *sattva*, *raja* and *tamas*. I translate them as: harmonious, passionate and suppressive. We divide a circle into three with radii, and label each third with one of the general qualities. Our arrows (indictor arrows or aggregated arrows) will give us a qualitative 'compass reading' on a circle divided into thirds.[5] See figure 2.

Figure 2.

Each of these general qualities, has sub-qualities. Examples of sub-qualities of harmonious are: pure, good, constructive, respectful, pleasant, soft, easy, light, natural and seamless. Examples of sub-qualities of passionate are: active, plush, lively, confused, regal, exciting, sensational, perfumed, exotic, brassy, colourful, showy and spectacular. Examples of sub-qualities of suppression are: darkness, destructive, harmful, painful, chaotic, abrasive, constricting, despotic, putrid, diseased, suppressing, morbid, violent, invasive and violent.

The importance of the three general qualities is that on considered reflection, almost every object, event, institution or society will have one that predominates. Try the following exercise: compare a plastic flower, a flower in a field and a cultivated cut flower for decorating indoors. The plastic flower falls under: 'suppressive' because it is dead and cynical, is made of plastic which is made from fossil fuels, plastic flowers are often dusty. The flower in the field falls under: 'harmonious' since it is alive, natural, pleasant, plays a role in the local ecology and so on. The cultivated cut flower falls under: 'passionate', since it is usually larger and more extravagant than natural flowers, it is taken away from its natural surroundings, so no longer contributes to the ecology; it is cut and brought indoors to add beauty. The cultivation shows mastery over nature, an enhancement of nature.

Try another comparison; this time one that is more institutional. Compare a primary school, a prison and a world-class sports team. The primary school falls under: 'harmony'. This is because it is normal for children to receive a primary school education. This helps to unite the society, giving the students social skills and literacy in numbers and letters so that they can communicate more widely. The prison falls under: 'suppressive' since prisoners are restricted in their movements, have little control over their daily routine,

[3] We might think of these are meta-qualities.

[4] The use of the *guna* terms is only meant as a conceptual inspiration. It is not meant as a spiritual exercise in Hindu philosophy. The choice of the concepts of the three *gunas* will be discussed in the conclusion.

[5] Lest there be some confusion, let us be clear. The compass does not have North, South, East and West. Instead, it has three thirds. The general qualities give us a general qualitative orientation of our arrow.

are punished for disobeying rules, are constantly watched and so on. The world-class sports team falls under: 'passionate'. They show outstanding physical ability, are matched only by the best in the world, bring pride and excitement to those who follow their results, might enjoy high publicity and so on.

A high school, secondary school or gymnasium over time might start as harmonious in its first years, then it might move into the general quality of passionate as it gains a strong reputation and accumulates academic successes and maybe success in sports, in an attempt to protect the high reputation, the high school might become suppressive with more rules, high standards (so failing more students) and an increase in ruthless measures taken to remove students who disrupt the flow of teaching, and mar the reputation.

As school policy makers we might then have a *cyclical* philosophical view and promote harmony again, sacrificing some of the passion in order to re-balance the school away from suppression. Or, we might have a more *mercantile / commercial* philosophical view and want to preserve the high reputation at all (other) costs. How might we do this? We decide that the suppression is the price we have to pay for the high reputation. We then maintain or increase the suppressive measures. Or we might think that the *appearance* or indicators of suppression should be addressed, but we want to do so in such a way as to not sacrifice the high reputation. For this, we have to be more subtle. We can export (to other schools) the disruptive students, so no suppressive indicators show up in our own school – there are fewer detentions, punishments, failed students and so on. Or, more superficially, we can re-represent the statistical data that pulls the arrow into the 'suppressive' so that the aggregated arrow has less length, or swings back into the passionate third. How superficial we want to be in our analysis depends on how deep we want our justification to be for policy changes or decisions, and on the longevity we wish for those decisions. The more in depth the analysis, the greater the longevity of the policy.

2. The Indicator Arrows: Choosing Statistical Data

The aggregated arrow is the result of aggregating statistical data represented by indicator arrows. We shall see the mathematical method of aggregation in the next section. For now, let us concentrate on the statistical data. Each statistic is represented by an indicator arrow. We make several assumptions.

As per any policy decision, we want to choose data that is available, accurate (recent, representative and sufficient) and which we can safely assume will be available in the future (if we are interested in comparing policy of one institution over time) or is available for comparative institutions (if we want to compare institutions to each other). Thus,

Assumption 1: our first assumption is that there exists some data on the institution.

Assumption 2: the quality of the data is reasonably high.

Such assumptions are not meant to be very controversial, at least in the 'Western'/'Northern' world, but might be much more difficult to make in some communities. The assumptions depend on the formality of the institution. That is, more casual, impromptu 'institutions' will have less data: a spontaneous village meeting, a protest march, the teachings of a guru who travels through a village. A more stable and formal institution, such as a government, a well-established industry, a university will all have relatively high quality data available for analysis.

Peculiar to the method here, we want to choose *the same number* of statistical measures for each general quality. That is, if we have three data that indicate the of harmony for our chosen institution, then we should have three that indicate passion and three that indicate suppression. This has to do with the *number* of data, and the sameness of number will contribute to the holistic aspect of the analysis: ensuring balance in analysis. What of the type? The third assumption is that

Assumption 3: for any institution, there exists data that fairly clearly positively falls under one of the general qualities.

This third assumption is not all that mysterious, but there are some complications to be seen soon. Starting with the banality of the assumption: when someone informs us of a statistic, he, or she, does so to indicate a general quality to which we are supposed to react emotionally. The person might elicit the general

sensation: that by-and-large everything is running smoothly (harmony), or that we should be on our guard, feel angry, frustrated or want to take political action (suppression) or that we should feel excited, proud/jealous and passionate. A borderline feeling such as 'alarm' might be thought of as part of suppression and tend more-or-less towards passion. To get a balanced view of an institution, we want to consider statistics that each positively indicate one of the three general qualities. By 'positively' I mean that the statistic indicates the presence of the general quality, not its absence. This reflection on the qualitative and emotional reaction to the data draws in a normative aspect to the analysis. This is deliberate, and is considered to be a strength of the analysis: that we can now be quite explicit as to where and in what sense our policy has a normative element.

We have to be careful here. We are discussing the indictors at two levels; the meta-level of the general qualities: harmony, passion and the suppression, and the object-level where we discuss a statistic *within* the general quality. We usually think of suppression as a negative quality and harmony or passion as positive. This attribution of positive or negative is at the meta-level, that is the level of the general quality. This should be distinguished from the attribution of 'positive' or 'negative' *within* the general quality, at the object-level. We can 'positively' (object-level) indicate a meta-level 'negative' quality, by looking at a statistic that indicates, or squarely shows, that negative general quality.

The complication is that a 'low' statistic might fall under a different general quality than a 'normal' or 'high' statistic.[6] For example, it might be statistically 'normal', comparing all countries in the world to each other that there should be a ratio of people in prison to people outside prison of 1:10,000. That is, for every 10,000 people, there is one in prison. A close to 'normal' or higher than normal would positively indicate suppression. But a country with a much lower ratio, say, 0:10,000 or 1:100,000 would indicate harmony in the society rather than suppression.[7] Which third we think a statistic belongs to, will depend on its clearly *positively* indicating (projecting into) the general quality, which itself might, at the meta-level, be thought to be negative or positive. If there is too much disagreement about which general quality a statistic belongs to, then drop that statistic and look for another.

Let us look at more examples. National statistics are fairly accurate and available (now, in the future and in several nations). Statistics that indicate harmony in a nation might include: literacy rate, participation in an electoral process, longevity of the population. Statistics that (positively) indicate (the negative quality of) suppression might include: percentage of people in prison, a large gap between 10% highest income earners and 10% lowest income earners, a high volume of waste or pollution. Statistics that indicate passion might include: high level of education, sporting achievements, number and volume of peaceful protests.

It is not easy or obvious how to come up with these, and for emotional or psychological reasons, many statistics that are cited and available are more naturally placed in the suppressive. That is, we pay attention to them, and want to know them because suppression elicits high emotions, and as I wrote earlier, one of the reasons someone cites a statistic is to draw our emotion laden attention to something. We can then counter-balance the emotion by citing a (less available because emotionally boring) statistic that indicates harmony. This is a complication of availability, but again, to get a balanced view of an institution, we want to see statistics that positively indicate all three general qualities. Noticing the emotional quality

[6] Moreover, whether the statistic is 'high' comforting the general quality, or falling short of that general quality – is culturally sensitive. In a culture, we come to think of something as 'normal' that maybe was not a few years ago. For example, in some societies, owning a car is a luxury, in others it is normal, or usual. Thus, a statistic that says that there is approximately one car by inhabitant of a country is very high for the first society, but normal or low for the second. This difference does not disrupt the analysis, but is part of the analysis and development of the compass.

[7] In case you think that the numbers would have to be fictional: there are no prisoners in some very small nations, such as Vatican City.

of a statistic is part of the exercise. That emotional quality varies with culture, individual psychology and individual past history.

Let us examine the cultural element more closely. How we react emotionally to some statistics, depends on our culture. Thus, one culture might view a statistic as indicative of the general quality of harmony while another might view it as suppression. Take for example, a low divorce rate. This might be due to harmony in the marriages in the society, since there is little need for divorce. In another society, we might think that the laws make it so difficult to divorce, or the economic structure makes it too dissuasive to divorce, so it is economically not an option, and so a low rate of divorce indicates the general quality of suppression. Which general quality the low divorce rate indicates has to do with a wider context and general cultural values. If we have difficulty here, then we can drop the statistic, or better, we can further qualify the statistic, adding a footnote about the wider cultural context. This adds transparency to our policy analysis. Again, this adds to what I have called 'depth' of analysis, and will play into the justification for, and longevity of, the policy decisions.

Taking seriously these complications is what adds depth to our policies. Remember, we use the arrow to make new policies, adapt or change policies, analyse or criticise policies or justify policies. And remember that we can do all of these things in a more or less *superficial* manner by addressing or gerrymandering the representation of the dominant statistics that swing the arrow in a particular direction and give it length or, more deeply, by looking at the underlying causes of the statistics and their representation. The soundness and longevity of the policy will depend on the depth of analysis.

Summing up: assumption three is delicate but also adds normativity and depth. Continuing with the method, we want to represent each statistic as an indicator arrow on the circle. Assumption one tells us that we can draw an arrow at all. Assumption two tells us that it is reliable. Assumption three is enough to situate each indicator arrow in one of the thirds. What of length and position?

We now have to be even more sensitive to culture and pay close attention to the nuance surrounding the qualitative measure of the indicator arrow. Some statistics will fall in the middle of the third, and some will tend towards one of the other thirds, in limit cases an indicator arrow might sit right on the border between two qualities, in which case, I recommend that we choose another statistic, for reasons of having the same number of indicator arrows in each general quality/ third of the circle. The position of the indicator arrow within the third, will be represented by degree. If a statistic by-an-large indicates harmony, it is located in the harmony third. But the arrow does not have to be placed in the middle of the third. It might tend towards passion or towards suppression.

Let us take an example. Say, there is a high literacy rate in a country. This might be because the standard of living is sufficiently high throughout the population that every family can afford to send its children to school, and the schooling system is well run, in fact a high proportion of the population then goes on to higher education. There is, moreover, good support for children with disabilities that affects literacy, there is a good transportation infrastructure for getting children to school, they are well nourished and healthy enough that they have the energy and attention to learn and the leisure time after school to: rest, play or re-enforce the lessons learned in the classroom and so on. This is quite impressive, and so the arrow will be in the third labelled "harmony" but will tend towards "passion".

In contrast, the high literacy rate might have some sinister underlying causes. Illiterate children might be forcibly taken from their parents and put into unpleasant boarding schools, people responsible for collecting the statistic on literacy might have a high incentive to report a high literacy rate, and so the statistic is flawed, working against the second assumption. The literacy rate might be measured in terms of "functional literacy" that is, just enough to read commands or orders, but most of the literate population does not enjoy the greater fruits of education, and do not go on to higher education, do not read novels, do not read well enough for political engagement and so on. In this case, the arrow still sits in the third "harmonious" but tends towards suppression.

We decide on the actual degree within the third collectively, or using whatever protocol we think best for policy making or analysis. The degree will be the result of a *qualitative* judgement, and that qualitative aspect cannot be avoided. However, what justifies representing the particular degree will be the other considerations and the weight that they bring to the analysis of the indicator arrow. The stories I told

in the example also add depth and transparency to our policies. That we can even construct such a story is a fourth assumption:

Assumption 4: For every indicator arrow, we can (make up a protocol to) determine degree of the arrow within its third in the circle or we can find an alternative indicator for which we can make up a protocol.

One easy protocol is to vote. Say, a large group decides on an indicator arrow for the suppressive third. We then vote on whether the arrow should then swing towards harmony or passion. If 20 % would swing the arrow towards harmony, and 80% would swing it towards passion, then since there are 120 degrees allotted to suppression the arrow will be 96^0 towards passion.

We might want to do something more sophisticated than straight voting, and have degrees of vote, so people who feel strongly, medium or lightly about their choice. We might visually swing the arrow until people in the room agree. It is surprising how quickly this can be done, and how easy it actually is.

An alternative protocol is to use visual feedback. We display an indicator arrow on the circle and see how people feel it represents what they think, we move it around, change its length, discuss the changes until we reach consensus.

When making policies, based on statistical findings, it is highly relevant and important to have these discussions about what it is that a statistic indicates in general. Such discussion might be long and frustrating for some people, but they will save time in the long run, due to the stability of the policy.

What of length? This is just as important as degree, but in some ways it is less problematic. Length of arrow is a numerical measure that is used for comparison of that statistic with others. Length will be nothing more mysterious than a function of scale, what we think are reasonable parameters and where other comparable statistics lie. To dispel the mystery, think of our usual representation of a statistic. We start by stating a fact. For example: the average longevity of the population is seventy years. This bald statement will elicit no emotional reaction without some context which might be known already or which might need to be articulated. Say that this is the statistic today, and that it was higher in the past, say seventy-six. To represent the relationship between the two statistics we draw a graph with an arrow pointing left to right along the bottom, and another arrow bottom to top starting where the other arrow started. Along one axis we put time (usually the left to right arrow), according to some scale, along the other axis we put average longevity. We then plot the two measures on the graph. Whether the representation elicits alarm or not will depend on scale. See figure 3. On the left side, we have a small scale, and the difference

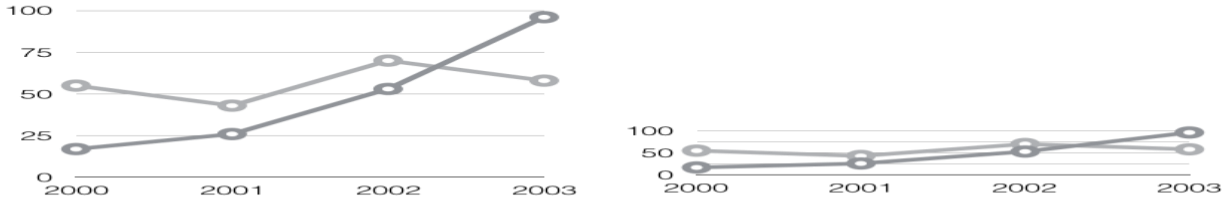


Figure 3.

Looks large, on the right side we have a larger scale so the difference looks small. Now consider that (a) we have to make the representation on a page of a book or article (so this determines something of the parameters of possible scales) and we might think of future or past measures of longevity, not bothering with longevity below 40, since this is ‘unimaginable’. These are features of representation with which we work every day. And this is just how we determine scale. In the case of our indicator arrow on the circle, its length is then determined in the same way but adapted to the circle. We fix parameters according to what

is reasonably imaginable, and the scale is determined by the length of the radius of the circle. The statistic is then very high if the number reaches the edge of the circle but is low if it is close to the centre.

Now note: say longevity belongs in harmony. A high longevity is more harmonious, say, than a low longevity, subject to considerations about what it is that is influencing the statistic be it for suppressive reasons (no laws allowing people to terminate their lives, so the quality of life is very low, but they are nevertheless kept alive) or for passionate reasons (the quality of health is very good, or the medical system is very advanced and widely available). To re-enforce the quality of harmony, the arrow will be longer. A longer average longevity brings the arrow closer to the edge of the circle.

Assumption 5: For every indicator arrow, we can determine the length of the arrow.

None of the above assumptions is all that controversial, although for some analysts or policy makers it might be worth making them explicit, again adding depth to the analysis. Developing the indicator arrows is the hardest and most qualitative and normative part of the exercise.

3. The Mathematics of Aggregating the Indicator Arrows

The mathematical modelling has eight steps.

(i) Under the five assumptions of the last section, we develop the same number of indicator arrows in each third of the circle. We arrange them in a table thus:

General Quality	Name of statistic	degree	length
Harmony			
Harmony			
Harmony			
Passion			
Passion			
Passion			
Suppression			
Suppression			
Suppression			

(ii) Represent each indicator with an arrow that is in a particular third, and within that third, has a length and direction. See figure 4. Note that there are 3 arrows in each general quality, each representing a different indicator.

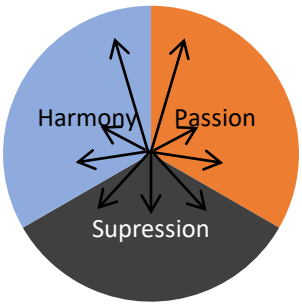


Figure 4.

(iii) Within each third, add the arrows – now treated as vectors. This gives us three 'joined arrows'. They give us each, within their respective general quality, an overall-reading of that general quality for the institution. See figure 5.

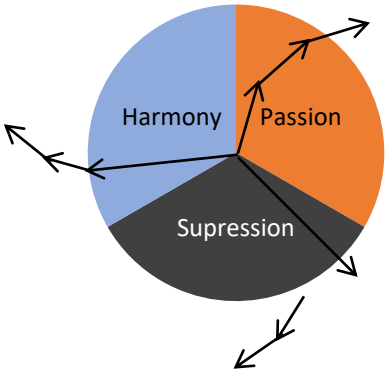


Figure 5.

(iv) Draw a triangle linking the three end points of the joined arrows as in figure 6.

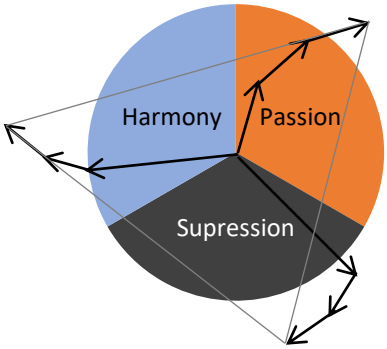


Figure 6.

(v) Erase the vectors. See figure 7.

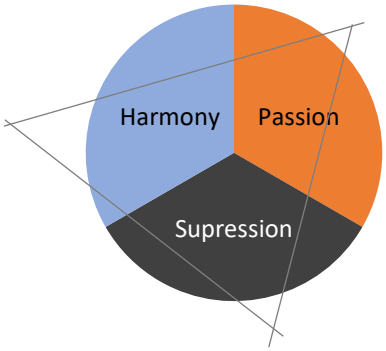


Figure 7.

(vi) Find the centre of the triangle. See figure 8.

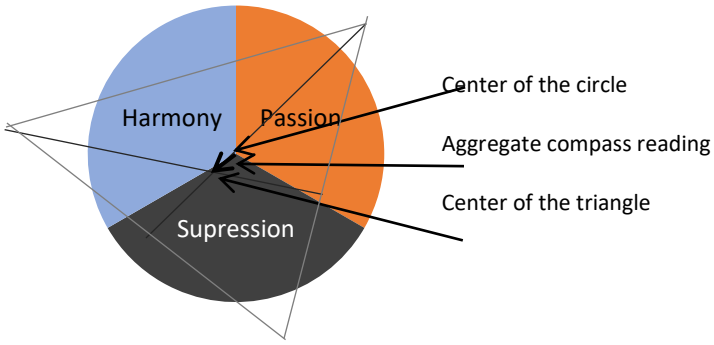


Figure 8.

(vii) Draw an arrow from the centre of the circle to the centre of the triangle. See figure 9.

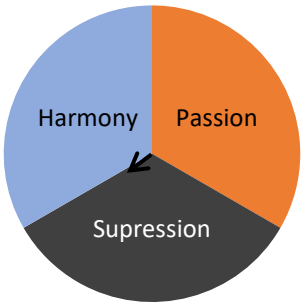


Figure 9.

This is the *aggregated* arrow *given* the particular indicators we chose, together with the direction and length we thought represented that indicator. It is a compass reading, giving us an orientation in terms of the three general qualities.

We now have to do some more sensitive and philosophical work, since we were working with a first approximation. The arrow has to be tested for robustness and stability. The robustness is necessary for the policies to stand up under scrutiny and for them to be effective over time.

(viii) To ensure robustness, we re-examine our choices of indicators, maybe we want to add more. Assuming that good statistics are available, or that the poor quality of the data will be overcome by adding more, we can continue to add statistics, until we discover that the length and direction of the joined arrows within each third stabilise in proportion to the other joined arrows of the other thirds. That is if we return to step (iii), the relative (to the other arrows) length and position stabilises.

This is a meta-statistical step in the method. Assuming the luxury of reliable and independent statistics, we should find a relative stability between the three joined arrows. The relative stability is what brings robustness to policy in a very real mathematical and statistical sense. Moreover, this is another reason for adding the arrows not all together, but adding the indicator arrows within each third separately. We thereby treat each general quality independently of the others.

We can now make new policies based on the aggregated arrow, change existing policies, criticise policies and justify policies. We make the new policies, changes, criticisms and justifications based upon recovering the story we told in developing the indicator arrows. As was remarked in the previous section

we can perform these exercises in a superficial manner or in a deeper manner. If our arrow is robust, then the margin between superficial and deep treatment diminishes.

4. Adapting the Compass to Align it with Ecological Economic Thinking

We now consider our institution from the perspective of ecological economics. This has three separate implications, the first conceptual, the second conceptual-normative and the third is ethically-normative. The conceptual implication is that we think that economic activity, the econo-sphere is a subset of / is dependent upon, society, the socio-sphere and society is a subset of / is dependent upon the physical and biological environment: the eco-sphere. See figure 10.

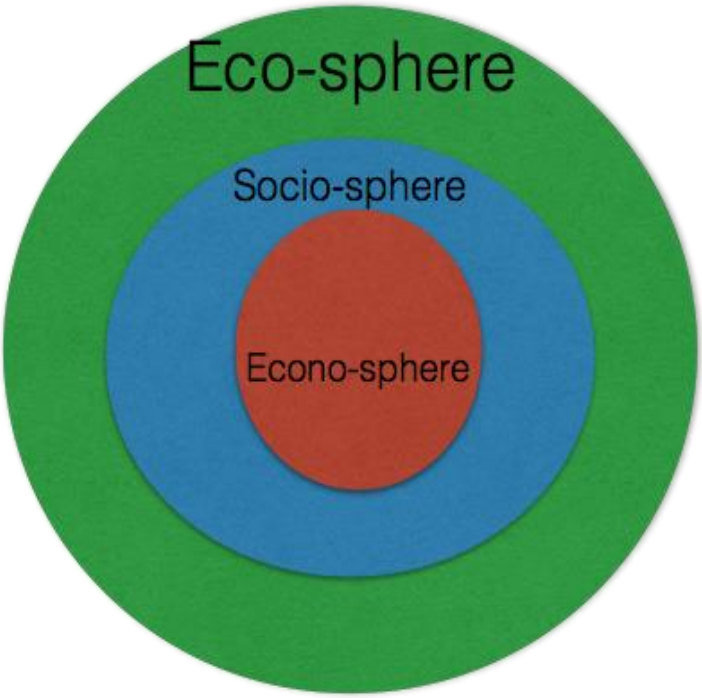


Figure 10.

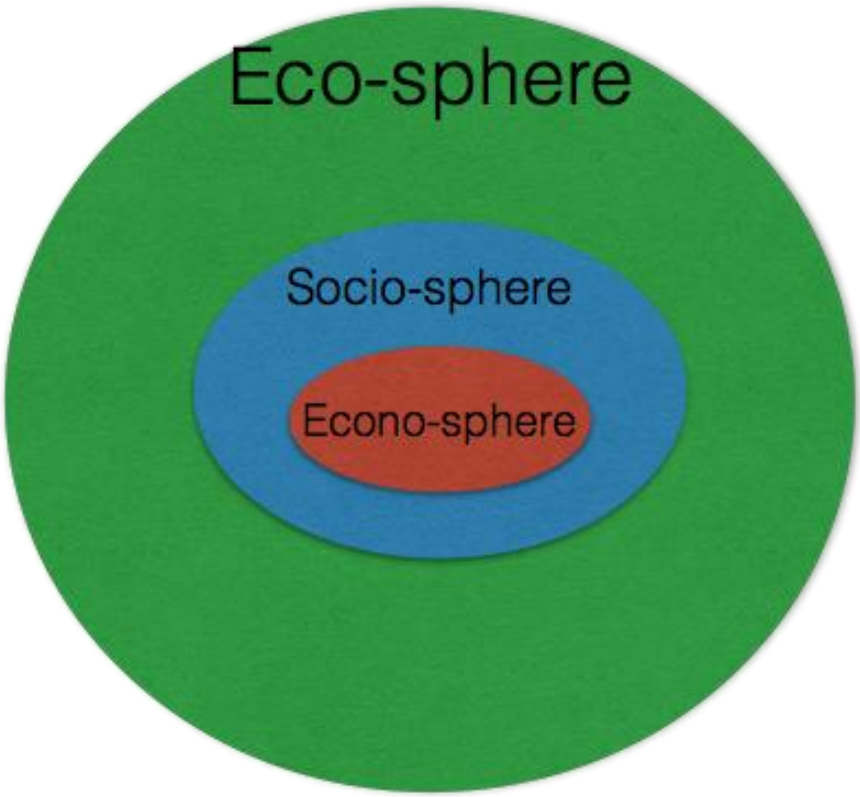
Make a policy compass for each circle separately: one representing the relationship of the institution with the eco-sphere, one for the relationship of the institution to the socio-sphere and one representing the relationship of the institution to the econo-sphere.

Some examples of relevant statistics might help. Say the institution is a library. With respect to the institution's relationship to the environment, under 'suppressive' we might think of pollution, energy used by the building. Under passionate we might wonder if there re any projects that help the environment – special exhibitions or displays, a bee-keeping project on the roof of the library, a special green-house space for reading. If all of these are absent, then the arrows would have no length. We might then want to think about how to have the environment passionate arrows have some length! In the Harmony third, we would consider the green space outside, or plants indoors, or recycling facilities and so on.

In the same, library, institution for creating our compass for the socio-sphere under suppressive we might think of controls for taking out books, oppressive security measures, or lack of fresh air in the building (disease and fatigue inducing). In the passionate third we could consider the statistics concerning exciting exhibitions, a series of talks or media coverage. In Harmony, we would consider the steady adherence and

participation in the library's facilities by the public, the facility with which they obtain material, the smooth running of the service in general. As for economic indicators the suppressive costs are rent, cleaning, repairs. Harmony might be looked at in terms of regular membership fees, steady acquisition of books or electronic material, payment of regular staff. Under passionate, we might make money from a special exhibition, or hire an artist to come in and paint the walls in some exciting way, we might acquire new equipment that will attract new members.

The conceptual-normative element of ecological economics is represented by the sub-set relationship of the three circles. We think that the environment has to be given priority over society, and the latter has priority over economic considerations. This will now be represented by the relative sizes of the circles, placed one on top of the other, each sharing the same centre point. See figure 11.



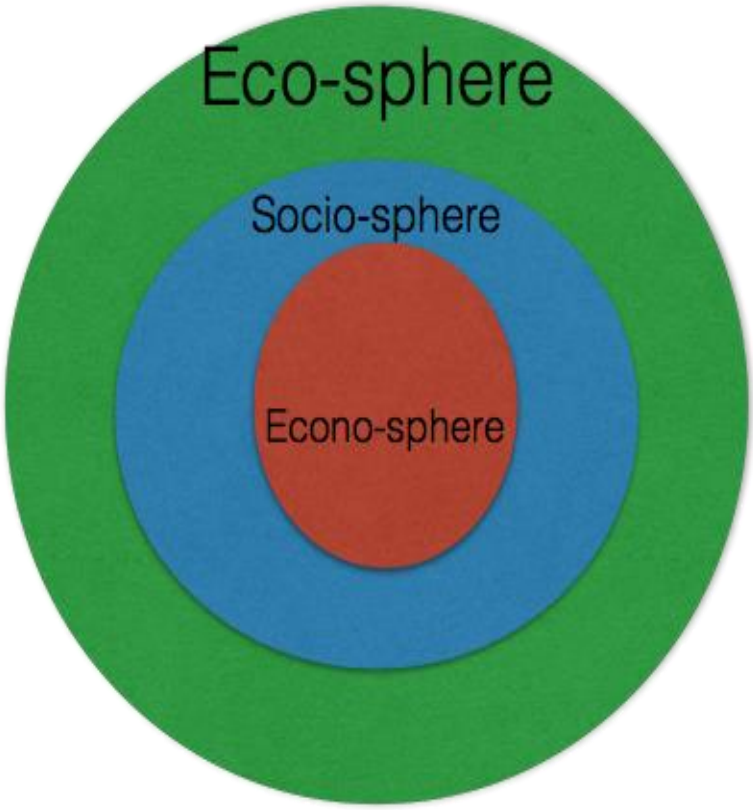


Figure 11.

The relative length of the radii of the three circles reflects how much more important we think, for example, that the eco-sphere is with respect to the socio-sphere; and this will also be cultural. We aggregate in the same way as for the first policy compass: we draw a triangle tying the three end points of the separate aggregated arrows of the spheres. See figure 12. In it, you will notice that the centre of the new aggregated triangle is not going to have the tip in the eco-sphere. Thus, this tells us that we had better do something about it!

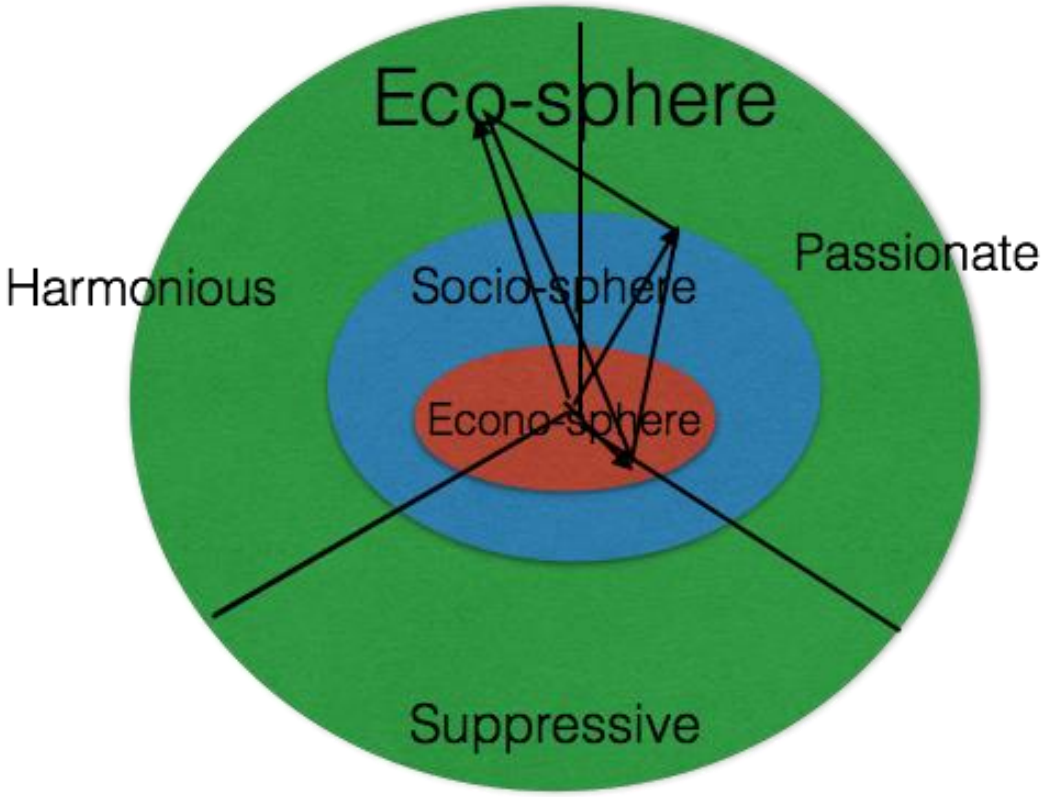


Figure 12.

There might well be times when we think that it is worthwhile to compromise the eco-sphere. Kozo Mayumi puts it very nicely: as a society, or institution, we decide on an acceptable rate of entropy production per unit of consumption. We might also allow some institutions more leeway in compromising the environment than others. These are decisions it is better to make consciously than unconsciously – again adding depth to the analysis and ultimate defence of a policy, or informing changes in policy.

The ethically-normative element has to do with 'sustainability' and what it is we want to sustain and what we are willing to sacrifice. Under the ethical-normativity, we want for the natural environment to remain relatively stable. In very basic terms we need to ensure that water, the air and the soil are natural and harmonious. Therefore, in general, to align with an ecological economic perspective on sustainability, the ecologically-economic aggregated arrow had better find itself in the harmony third, and the tip should find itself reaching all the way into the eco-sphere![8] Moreover, we all know that increasing entropy damages the environment, and therefore, entropy production is one of the obvious choices for representing the suppressive with respect to the environment. Another environmentally suppression indicator is pollution. Insofar as we are willing to sacrifice the environment to our social or economic ambitions, we think less

[8] This is rationally dubious. However, it is justified in terms of the psychology of visual representation.

and less in alignment with ecological economists. Let us be quite clear. There is the scientific aspect of ecological economics and the more ethical aspect. It is this distinction that has been magically drawn out in the exercise of constructing our ecological-economic policy compass.

5. Sustainability and the Policy Compass

It is politically in *vogue* to claim that an institution is sustainable. Such a claim is almost empty when we consider the number of different definitions we might have of 'sustainability'. An industry might not be 'sustainable' just because it is not financially solvent; or, we might be concerned with sustaining a certain standard of living; or we might be concerned with the yearly stability of an ecological system. The word was used to refer to the natural environment, but has been appropriated by business and government under the pressure of its being positively received by the public. Since it is a vague but positive term, its meaning is seldom made explicit by business or government.

Ecological economists use the word in the older sense. We have to sustain the econo-sphere, and it is only if this is sustained, that we can think of sustaining society (within the bounds and context of the natural environment). This is important for government, other public institutions and NGOs (non-governmental organisations), but, at least for the ecological economist, government ought to take very seriously the natural environment in which, and from which, the society lives. Lastly, economic activity should not be 'sustained' at the 'cost' of society (stimulating social break-down). Thus, the ethical element is what plays into the notion of sustainability for the ecological economist. Similarly, a business institution which claims sustainability in the ecological economist's sense would take seriously both the society in which it is couched and the natural environment. Thus, I put forward the suggestion that

> for the ecological economist, an institution is sustainable iff the ecolocial-economics policy compass's aggregated arrow is in the third of harmony and the tip is in the eco-sphere!

6. Philosophical Remarks and Conclusion

As noted in the introduction, we can construct several aggregated arrows, representing change in an institution over time, or for comparing institutions to each other. The construction is sensitive work due to our making qualitative decisions, as per section two. But it is not impossible.

The first philosophical remark is that our analysis can be shallow or deep. We can address an 'outlier' statistic in our table (step one of the methodology), where an 'outlier' statistic is one that influences the length and direction of the aggregated arrow disproportionately. We can simply erase it and replace it with a 'better behaved' statistic, or we can change direction and length (by changing context or further qualifiers and by changing scale of the outlier arrow). Of course, relative 'objectivity' is then sacrificed, since rather than deciding on the direction and length *independently* of the other indicator arrows, we do so *with respect to* the other indicator arrows and in particular with respect to the aggregated arrow. This is trickery, but might be enough to justify a policy in the short term or to a gullible audience.

A deeper analysis can be made by working out how to change the length and direction of the outlier arrows. This can be done through changes in policy. An even deeper analysis involves looking at the statistics more thoroughly: re-examining the context and culture that give weight to the decisions concerning degree and length. We can also look for the underlying causes of the statistics within the predominant or secondary third (we look back to the joined arrows), or by looking at the whole, hence the holistic aspect of the analysis.

The second philosophical remark is that the method can have even wider application than suggested at the beginning. There the scope of the method was simply 'any institution', and then it was modified to any institution that is governed by principles found in ecological economics. It was understood that an institution can be: governments of countries, trade agreements between countries, businesses, universities or even an individual person. This has not changed. However, there are at least two other ways of widening the scope of application. The widening is not necessarily in terms of more institutions or other sorts of institution or other things than institutions, or even in ways of thinking of an institution (such as an

ecological-economics way of evaluating the policy of an institution. Rather, we can widen the scope by considering the type of qualitative arrow we construct (which we then might find applies to things other than institutions). One way of changing the type of aggregated arrow is by adding or subtracting general qualities. The other is by changing the three general qualities to another three general qualities. It is this latter that might suggest applications to things other than institutions.

Let us start with adding more general qualities. This is counter-recommended for the following reasons. The three qualities are conceptually orthogonal to each other. That is, they were chosen to be in some sense incommensurable. Yet every institution displays one of these predominantly. They are not strict opposites. That is why there are three and not four. We cannot make a policy compass by dividing the circle into four since this would suggest that the two opposing quarters are opposites. Thus, to mathematically represent the orthogonality/ conceptual incommensurability of four general qualities, one would need three dimensions. This is by no means mathematically difficult, but it is difficult to represent on paper or on a computer screen (although there are computer programs for representing figures in three and four spatial dimensions). They are of limited use because they are difficult *for us* to see and understand. Remember that, here we are interested in making policy decisions based on a simple final representation, and that is what would be sacrificed; similarly for more-than-four general qualities.

We could *reduce* the number of general qualities and just have two polar opposites, say, 'passionate' and 'suppressive', so we take 'harmony' for granted. Passionate and suppressive are then short-hand for very general qualities: 'good' and 'bad'. This is simple, but loses subtlety and sacrifices too much of the complexity of the situations in which we try to make difficult policy decisions. 'Good' and 'bad' are relative terms and are sensitive to context and time. Forgetting these sensitivities is what leads to poor policy decisions.

We could *change* the three general qualities to three others. For example, in deciding on the general quality and suitability of a piece of fabric, we might want to compare durability, beauty, insulation. Durability would be indicated by how easy it is to tear or wear out the fabric; beauty by possible patterns imprinted, shininess, pliability; and insulation by togs, noise penetration, wind penetration and so on. A piece of fabric is not an institution, so we have widened the scope in terms of what the compass arrow exercise can be applied to.

Another suggestion is to align the thinking with *environmental* economic thinking: where we think of the economy, society and the environment as three intersecting circles. To represent this way of thinking we divide the circle into the three categories: economics, society, environment. This might be quite suitable under the following meta-assumptions: that they are all equally important and are meaningfully orthogonal. If we disagree with the first meta-assumption (say we favour the economy because of our neo-classical economic thinking) then we can make that third bigger. Then the joined arrow pulls more weight towards that third. Or, we might even reverse the exercise of ecological economics and make the economic circle the largest, the social circle embedded in the economic circle and the ecological circle is then embedded in the social circle. The assumptions about the relationship between economics, society and environment are deep cultural questions.

The policy arrow can be used by any institution which makes policy decisions. Developing the arrow gives guidance for developing a well thought through policy decision. This makes for longevity of the policy. Successive arrows can be used for comparison – comparing institutions to each other or comparing the same institution over time. As the arrow shifts over time, we can re-adjust policy to suit new ambitions or changing circumstances. We can use the arrow to critique policy decisions of others by developing our own. Or, we can justify our own policy by uncovering the exercise of developing the arrow. The depth to which we do this will depend on the patience and interest of the audience to which we are making the justification. At the very least, we show an arrow on a trisected circle. This is visually simple and clear.

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