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Paul-Marie Boulanger



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Survey

Sustainable development indicators: a scientific challenge, a democratic issue

P.-M. Boulanger

Institut pour un Développement Durable, 7 rue des Fusillés, 1340 Ottignies, Belgium

Correspondence to: P-M Boulanger, idd@iddweb.be

Abstract

Social indicators, and therefore sustainable development indicators also, are scientific constructs whose principal objective is to inform public policy-making. Their usefulness is dependant on trade-offs between scientific soundness and rigor, political effectiveness and democratic legitimacy. The paper considers in this perspective three important stages in the building of sustainable development indicators: the identification of the various dimensions underlying the concept of sustainable development, the process of aggregating lower dimension indicators in higher level composite indices and the attribution of weights at various levels of the indicators hierarchy. More specifically, it assesses the relative fruitfulness for indicators construction of the four most widespread conceptions of sustainable development, in terms of domains or pillars (economy, society, and environment), in terms of resources and productive assets (manufactured, natural, human and social capitals), in terms of human well-being (needs, capabilities) or in terms of norms (efficiency, fairness, prudence...). It concludes with a plea for the construction of synthetic indices able to compete with and complement the GNP as an indicator of development.



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1. INTRODUCTION

The need for reliable and pertinent indicators to guide the sustainable development process was recognised early, at the time of the Rio Conference. It was reaffirmed in many sections of Agenda 21 the programme document which was agreed at the summit, and was the central theme of Chapter 40, the last one, which deals with information required for decision-making. The most explicit reference to the limitations of existing indicators and to the need for new ones to evaluate sustainability is in paragraph 40.4:

"40.4. Commonly used indicators such as the gross national product (GNP) and measurements of individual resource or pollution flows do not provide adequate indications of sustainability. Methods for assessing interactions between different sectoral environmental, demographic, social and developmental parameters are not sufficiently developed or applied. Indicators of sustainable development need to be developed to provide solid bases for decision-making at all levels and to contribute to a self-regulating sustainability of integrated environment and development systems."

Therefore:

" 40.22. Countries and international organizations should review and strengthen information systems and services in sectors related to sustainable development, at the local, provincial, national and international levels. Special emphasis should be placed on the transformation of existing information into forms more useful for decision-making and on targeting information at different user groups. Mechanisms should be strengthened or established for transforming scientific and socio-economic assessments into information suitable for both planning and public information. Electronic and non-electronic formats should be used."

In the opinion of the authors of Agenda 21, current indicators (including GDP) are incapable of evaluating the "sustainability of systems"¹. Furthermore, existing information cannot be used in this format for decision-making and must be converted and then redirected at the various user groups. Several questions are left unanswered, to which the authors of Agenda 21 would have us reply. Who are these groups of users? Into what forms, more appropriate for decision-making, should the information be converted? How should it be converted for use in decision-making? What sectors are involved in sustainable development? In the following paper, we will be suggesting a few pointers to respond to these questions and some indications on the construction of appropriate information systems for sustainable development, i.e. adequate, pertinent and acceptable to all development actors. In the space available, it will not be possible to provide sufficiently detailed and qualified considerations of these issues, so that certain simplifications will have to be used, at the risk of painting with a broad brush at times. For example, the

subject of the various user groups will be dealt with in a voluntarily reductive fashion, based on the following question "Indicators for whom: governments or citizens?" The question on the more or less usable forms will be limited to asking "scoreboard or synthetic indices?". And the question of sectors involved in sustainable development will be reduced to a comparison between four major approaches to the actual object of sustainable development. Contrary to what a strictly logical sequence would require, we will begin with a discussion of the issue "scoreboard or Synthetic Index" because it necessarily takes us along a preliminary exploration of certain definitions which are essential for an understanding of what follows.

2. INDICATORS: SCOREBOARD OR SYNTHETIC INDEX?

The concept of indicators was originally used in a purely scientific context: sociological research. It designated the translation of theoretical (abstract) concepts into observable variables so that the scientific hypotheses involving these concepts could be submitted to empirical verification. We come across the word in a seminal text by Lazarsfeld on the operationalisation of sociological theories (Lazarsfeld, 1958) where the various stages in the translation of concepts into indices were clearly identified and analysed for the first time.

An indicator is therefore an observable variable used to report a non-observable reality. As regards the word 'index'², it designates a synthetic indicator constructed by aggregating other so-called 'basic' indicators. Most of the indicators used in public policy-making are in fact indices: this is true for GDP, the index of consumer prices, stock exchange indices such as the Dow-Jones and the Human Development Index (HDI) of the United Nations Development Programme (UNDP).

Shortly after Lazarsfeld's article was published, the word 'indicator', to which the 'social' was added as a qualifier, became popular in the public domain, or at least in the domain of public policy. A "social indicator movement" emerged in the United States, then in Europe, following the publication by Bauer, Biderman and Gross (1966) of a report called "Social Indicators". Whereas for Lazarsfeld and later, the scientific community, the role of indicators was purely methodological, it became normative and axiological with the movement for social indicators. The reference to norms and values is given at the outset in the definition Bauer gives for social indicators: "*statistics, statistical series, and all other forms of evidence that enable us to assess where we stand and are going with respect to our values and goals.*" (Bauer et al., 1966, p1).

While the term "indicator" was new, the reality described was much older, not to say immemorial. The same term in fact covered two traditions, one, age-old and the other going back to the industrial revolution. The first is the concept of statistics

¹ This formulation would suggest that sustainable development is primarily concerned with systems and limited to their sustainability. We will come back to the implications of this view.

² Sometimes called a "macro-indicator".



in the original meaning of the word, i.e. the methodical study of social facts by numerical processes (classifications, counting, quantified inventories and censuses) for the purpose of information and assisting governments. The other more recent source is to be found in the numerous movements for social reform and hygiene at the time of the industrial revolution. At the start of the 19th century, philanthropists (often physicians or clergymen) were using statistical data on housing, living and working conditions, income, alcoholism, prisons, etc. with the aim of reforming society and improving the lot of the underprivileged. In the United States, the first known use of social indicators for the purpose of social reform goes back to around 1810, with the production of statistical data for five consecutive years on the number of inmates awaiting trial in Philadelphia prisons (Cohen, 1982). Other surveys are well-known, such as those on poverty by Villermé (1782-1863) in France, Ducpétiaux (1804-1868) in Belgium and Booth (1840-1916) in the U.K.

After the decline of the social indicators movement of the sixties, the concept of social indicator suffered a lapse of several decades before re-emerging quite recently, first with reference to the measurement of human welfare and development and later with reference to the notion of sustainability and sustainable development. Observers, among them Gadrey and Jany-Catrice (2003), Perret (2002) and Sharpe (2004) were numerous in remarking on the recent proliferation of attempts—if not at replacing GDP—at least supplementing it with a more adequate synthetic measurement of well-being. Box 1 gives a brief presentation of these various indices.

Among these attempts, only one achieved a real measure of success: this was the UNDP Human Development Index. All the others—be it the ISEW (Index of Sustainable Economic Welfare) created by Daly and Cobb (1990), the GPI (Genuine Progress Indicator, see Talberth et al, 2006) the MDP (Measure of Domestic Progress, Jackson, 2004), the Index of Economic Well-being created by Sharpe and Osberg (2002), the HWI (Human Wellbeing Index Prescott-Allen, 2001), etc.—failed to gain much favour or sufficient legitimacy to become institutionalised. For an exhaustive census of welfare and quality of life indices or macro-indicators, see Gadrey and Jany-Catrice's (2003) and Sharpe (2004).

The exception represented by the Human Development Index is rather enlightening: without the backing of the Nobel Prize for Economic Science laureate Amartya Sen³, it probably would also have failed to pass muster. On closer examination, it is not so much indicators that come up against a degree of opposition (in particular from the scientific community) but rather indices or synthetic indicators. There is no opposition, quite the contrary, to the proliferation of scoreboards of every variety, i.e. batteries of indicators, be it in the environmental or the "social" sectors⁴. However, the construction of indices, in particular the Human Development Index, sets off

reactions such as the one by Baneth, for example, who goes so far as to say: "It was a vain, pretentious and slightly ridiculous endeavour to try to sum up human development in all its complexity and multiple dimensions with a single figure..." (Baneth, 1998, p23).

And yet the only difference between a management chart and a synthetic index lies in the ultimate phase of the construction and measuring process of the indicators: that is the production, using basic indicators, of a single synthetic value for the purpose of condensing the information contained in the management chart. In other words, a synthetic index is no more or less than a scoreboard to which is added an extra indicator made up of the aggregation of the data contained in it. But it would seem that for some people, this ultimate phase is all the difference between a rigorously serious and scientific effort and a subjective, ideological and fanciful exercise.

3. THE CONSTRUCTION OF INDICATORS

This figure shows the successive phases of the construction of indicators identified by Lazarsfeld:

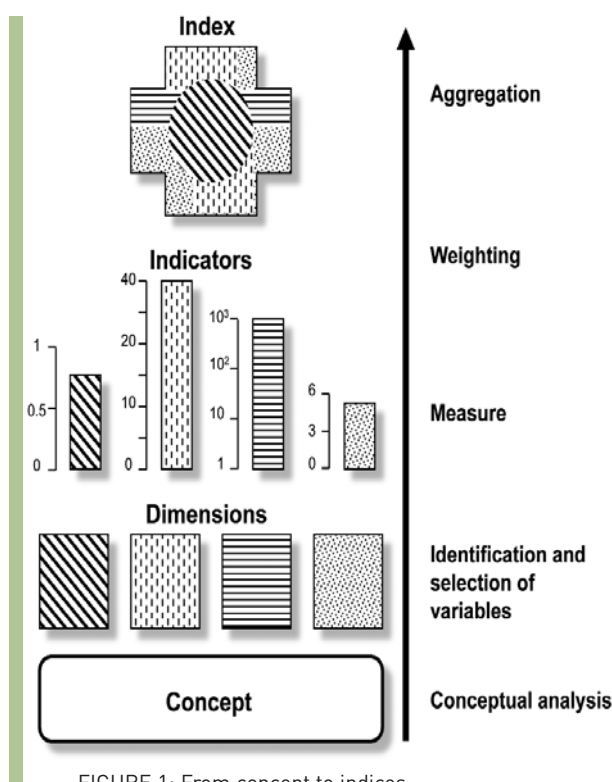


FIGURE 1: From concept to indices

3.1 THE SUCCESSIVE PHASES

3.1.1 From concept to dimensions.

The first phase consists in identifying the various dimensions constituting the concept, given that these are always multidimensional. The concept of poverty, for example, covers a material dimension, but also a social one

3 Which we are told he was at first reluctant to do (see Gadrey, 1993, pp.20-21).

4 The Social Inclusion Indicators developed for the E.U. Commission are the most widely accepted of the "social" scoreboard, see Atkinson et al. (2002).

(exclusion, marginalisation) and also a cultural dimension (level of education, means of expression). The material dimension is itself multi-faceted; it includes financial components (income, level of indebtedness, other financial burdens) and non-financial ones (health, housing, rights). Each of these material dimensions is itself more or less composite. Income, for instance, may or may not be monetary. A further point is that the regular or precarious nature of income matters more sometimes than the level of income at any particular time.

Box 1: The various development indicators

- **HDI**, the *Human Development Index*, was created by the United National Development Programme (UNDP), on the basis in particular of Sen's work. It combines three basic indicators: life expectancy at birth; income; level of education. The latter is itself measured by the extent of adult literacy combined with the school attendance rate of children.
- **ISEW**, the *Index of Sustainable Economic Welfare*, is a monetary index correcting GDP on a certain number of points, in particular taking into account the social and environmental costs ensuing from income inequalities, mobility, road accidents, air and water pollution, noise pollution, the loss of natural ecosystems, the depletion in reserves of non-renewable resources, the fight against global warming and the erosion of the ozone layer. On the other hand, unpaid household work and public health and education expenditure are integrated as positive contributions to welfare.
- **GPI**, the *Genuine Progress Indicator*, has been calculated since 1995 by the Californian institute "Redefining Progress", for the United States. It is directly derived from the ISEW which it slightly modifies, particularly by introducing the positive contribution of voluntary work, consumer durables and transport infrastructures, but subtracting some supplementary expenditures, such as the cost of family breakdown, unemployment, loss of leisure time, loss of natural areas, etc.
- **MDP**, the *Measure of Domestic Progress*, is derived from the ISEW and close to the GPI, of which it is a kind of British version. It is specific in that in particular it takes into account defensive expenditures by households for health and education as well as some improvements in the calculation of environmental costs.
- The **Index of Economic Well-being** created by Sharpe and Osberg consists of a weighted average of four basic indicators, themselves synthetic, of consumption flows in the broad meaning of the term; wealth stocks (economic, human and environmental); economic inequalities and poverty; economic insecurity (a highly original dimension taking into consideration economic risks imposed by

unemployment, illness and single-parent families). Economic and social dimensions play a very important role, in particular as regards environmental issues.

- **HWI**, the *Human Well-being Index*, is one of the indicators (with the *EWI*—the *Ecosystem Well-being Index*) proposed by Prescott-Allen in his book entitled *The Wellbeing of Nations* (2001). It is made up of several basic indicators, relating to health (life expectancy) and family life (family stability), income and degree of satisfaction of basic needs, the health of the economy (inflation, unemployment, indebtedness), the level of education, and means of communication (including the telephone and the Internet), political and civic rights, the state of peace or armed conflict (internal or external), criminality and equality.

3.1.2 From dimensions to indicators.

The various dimensions are then broken down into variables, some of which will be retained as indicators, either because they seem to be particularly pertinent or because they are easier to measure. While the selection of indicators is often based on an assessment of observation and measurement constraints, it does nevertheless always include theoretical elements. For example, again on poverty, there is a theoretical question which conditions the nature of the income indicator, i.e. is poverty an absolute or relative reality? In other words, should people be considered poor if they do not have the minimum income to cover needs considered to be essential, or if they have considerably less income than other people? In the first case, the poverty threshold will be arrived at by calculating the amounts necessary to cover the needs considered to be essential, which will have to be previously defined. In the second case, measuring the phenomenon will require to set a reference level (distribution mean or median), a spread compared to it (40%, 50%, 60%?) and the appropriate scale (household or individual?).

3.1.3 From indicators to measurements.

Once indicators are defined, they must be measured. Then must be decided the level of precision, accuracy, spatial and temporal scale as well as which units are to be used. More often than not, indicators do not have the same degree of precision and are not measured with similar units, which of course complicate the process of aggregation of measurements into a synthetic indicator. For example, the concept of social status, operated by indicators such as length of schooling, level of education, income and type of job, is a mix of purely quantitative (income), semi-quantitative (level of education) and purely qualitative data (job). As a result, it is often necessary to bring down units and measurement scales to the most elementary and least demanding levels, with all that this implies in terms of loss of information.



3.1.4 FROM MEASUREMENTS TO INDEX.

The last operation—an essential one in the context of putting a scientific concept to the empirical test—is to aggregate the various indicators into a synthetic indicator. When testing a scientific hypothesis (the situation being different in the case of social indicators) only the synthetic indicator is considered significant; basic indicators being meaningless individually; they are just pieces of a puzzle of which only the whole is significant. But, as we have already mentioned, to become aggregated, indicators must be capable of expression in a common unit. This is obviously the case for monetary indicators such as GDP, the price index, etc. But if there is no natural common unit such as currency, the different indicators have to be standardised.

3.2 STANDARDISATION

There are several possibilities for standardising, none of them entirely satisfactory.

3.2.1 Statistical standardisation.

Statistical standardisation consists in expressing all the values as standard deviations, after having transformed the variables so that their mean is equal to zero. This type of standardisation is done before a great many statistical modelling exercises but is unfortunately inapplicable in the context of social indicators because each new observation involves a new calculation of the mean followed by a new standardisation.

3.2.2 Empirical standardisation.

To be more precise, we should put empirical standardisation in the plural since various techniques can be used. One of the more common ones consists in using as a base for calculation a base-year (for example the year when the statistical survey began) and expressing all the subsequent values as a percentage of variation from the initial value. This approach is useful for an analysis in terms of progress or regression from an initial situation. Another method consists in attributing a 0 value (min) to the observation considered as the worst case and 1 (or 10 or 100) to the one corresponding to the best score (max). All the intermediate values are then calculated according to the following formula:

$$Y = X - \text{Min}/(\text{Max} - \text{Min})$$

so as to remain within the limits of a scale ranging from 0 to 1 (or 10, 100, etc.). The main problem with this type of standardisation is the variability of the minimum and maximum boundaries. If a new observation spills over, either at the top or the bottom of the scale of observations up to that time, all the variables need to be re-standardised, failing which any new observation will be outside the range.

3.2.3 Axiological standardisation.

The process is identical to empirical standardisation with the min and max boundaries, except that the boundaries are not dictated by the data base (observed values) but are chosen with reference to the context of action or evaluation. The situation from which there needs to be differentiation is given the value 0, and the situation which is viewed as ideal (which may or may not correspond to a strategic objective) is given the value 1.

3.2.4 Mathematical standardisation.

Mathematical standardisation consists in applying a mathematical transform (function) to data so that they remain between a lower and a higher boundary (e.g. -1 and +1 or 0 and 1). The logistical and hyperbolic tangent functions are those most frequently used. However, such manipulations are not recommended for social indicators, firstly because they distort to a certain extent the original distribution, but mainly because they lack transparency for a non-professional user. Clearly, the choice of a method and the maximum and minimum boundaries used for standardisation are not without consequence as regards the interpretation and the use of indicators. Bouyssou *et al.* (2000) give several examples of distortion as a result of minute differences in the choice of one or the other baseline values. Take for example the Human Development Index: one of the three components is life expectancy at birth, the observed values of which are standardised with a lower boundary set at 25 years and an upper limit at 85. What would be the result if instead of using 85 years as the upper limit we were to choose 80? The interval between the maximum and the minimum value would change from 60 to 55, i.e. a 9% reduction. A 55-year life expectancy, instead of being worth 0.50, would be worth 0.545, i.e. 9% more. If the other components of the index did not change, the result would be an increase of 9% in the weight of life expectancy in the calculation of the total... As a consequence, the more or less arbitrary nature of the choice of min and max values, even in the case of empirical standardisation⁵, pleads in favour of the adoption of a normative approach and therefore for maximum values to be chosen so that they effectively correspond to the goals to be arrived at.

3.3 AGGREGATION

Aggregation is the operation consisting in condensing the information contained in each criterion into one single item of information. This supposes that the following questions receive an answer. Should the same weight be given to all the criteria constituting the index? Or should they be given different weights? And if so, how? What is the relationship between the index and the indicators? Is it a sum, a product, or something more complicated?

⁵ The 85-year value for maximum life expectancy corresponds to the highest life expectancy observed at the time.

In practice, both questions usually come down to a dilemma between a simple and a weighted average. The question of weighting is a crucial and distinctly difficult one. It consists in attributing a weight, and therefore a specific value to the various dimensions of the concept. For instance, in the case of a poverty index, it could consist in giving more weight to the material dimension than to the social (isolation, exclusion) or cultural dimensions.

Dimensions and indicators making up an index can be represented in the form of a tree diagram, the concept being the trunk of the tree and each branch representing one of the dimensions, with each branch breaking down into sub-branches ending up with the leaves representing the actual indicators. At each branching out, a weighting can be attributed to the branches arising there, with at the end the leaves to which is attached a weight equal to the product of the coefficients of the sub-branches and the branches from which they arise.

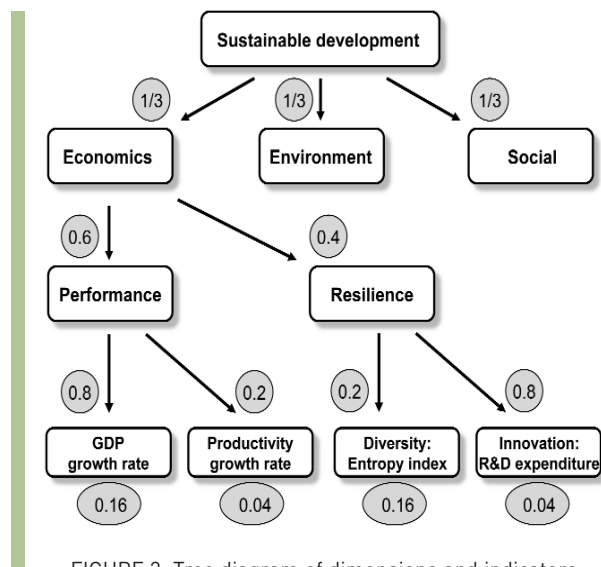


FIGURE 2: Tree diagram of dimensions and indicators

Figure 2 is an example of a tree diagram of this kind where the concept of sustainable development is broken down into three dimensions corresponding to the famous: Economic, Social and Environmental pillars. Only the Economic branch is further developed, with two constituting dimensions, Performance and Resilience. Performance is evaluated with the help of two indicators: two growth rates (GDP and Productivity). The Resilience sub-branch also gives rise to two dimensions: Diversity and Innovation. The cascading weighting process is illustrated by the final weight of each indicator, which is the product of all the previous weights and its own. Thus the GDP growth rate is given a 0.16 weighting, i.e. the product of its own specific weight 0.8, of the 0.6 weight of the "Performance" branch, and the 0.33 weight of the "Economics" branch

3.4 CONSTRUCTION OF INDICATORS AND MULTI-CRITERIA DECISION-MAKING

The hierarchical tree analysis described above is reminiscent of certain methods of multi attribute decision making which use the same kind of decision-tree⁶. As Bouyssou et al (2000) rightly remarked, the construction process of indicators is, in fact, a multi-criteria or multi-attribute decision problem. In essence, it is composed of:

$C = C_1... C_n$, a set of objectives to arrive at or of criteria to be taken into consideration (for example, for purchasing a car: price, safety, fuel consumption, etc.);

$A = A_1... A_m$, a finite set of alternative means to arrive at these objectives or meet these criteria (the different car models);

$W = W_1... W_n$, a set (which may be empty) of weightings of criteria C, such as:

$$\sum_{i=1}^n W_i = 0$$

The decision consists in ordering the m alternatives on the basis, either of a single criterion made up of the aggregation of the n objectives (or criteria), or the different criteria plurally acquired (the multi-criteria approach), all of which serves to evidence the alternative which is the closest to the desired goal.

The approach consists in filling in an alternatives/criteria matrix made up of the values given by the decision-maker to each alternative as it relates to each criterion. The matrix is then interpreted so as to obtain a classification of the various alternatives and identifying the one which is the closest to satisfying the requirements. In the case of a monocriterion (or aggregative) approach, the entire matrix will be synthesised into a vector comprising only one value per alternative. In a multicriterion approach, although the entire matrix may not be considered, there will at least be consideration of a number of criteria greater than 1.

Let us now take the case of an NGO wishing to set up its international headquarters in the best-performing country as regards sustainable development. It will start by selecting a series of economic, social and environmental indicators⁷, collect the relevant data over a certain number of years and examine the performances of the various countries in terms of sustainable development. Depending on such performances, it will be able to determine the ideal location for its headquarters. This is in fact a decision-making problem where the criteria to consider are indicators which may be weighted and aggregated or, at the very least, synthesised so as to be able to classify the alternatives (the countries).

Two consequences arise out of the similarity of situations: on the one hand, the methods and tools developed as part of the aid to decision-making can equally apply to both the weighting and the aggregation of criteria for sustainable

⁶ In particular the AHP [Analytical Hierarchy Process] method comes to mind.

⁷ Of course it adopts the most widespread vision of sustainable development, i.e. an equilibrium between the economic, social and environmental dimensions of development. Other approaches are however possible, and perhaps even preferable, as we shall see later on.



development and therefore to the indicators which account for it; on the other hand, were no aggregated indicator to be produced, this would be comparable to deciding not to classify the various alternatives. Clearly, in the case of sustainable development indicators, this is a matter for collective decision, therefore of social choice, and it is in these terms that it must be considered.

3.5 WEIGHTING

While standardisation and aggregation methods raise serious theoretical and practical difficulties, it is mostly as regards weighting that the main scientific challenges and democratic issues arise. As B. Perret (2002, p27) rightly remarked, "The intrinsic theoretical weakness of synthetic indicators is obvious (a rational justification of the weightings used is difficult)". On what basis and using what procedure should the decision be made, for example, to give the economic pillar a 45% weighting, 35% to the social pillar and 20% to the environmental one? Does this not suppose that the crucial question of possible substitutions between various kinds of assets has been solved? The temptation is strong to take such weightings for substitution rates (a loss of one point in the environmental pillar can be offset by a gain of 20/45 [0.44] point in the economic pillar, for example). It is understood that certain aggregation conventions (called "non compensatory") can limit the risk of erroneous interpretation (see for example Bouyssou and Vansnick, 1986), but nevertheless current scientific knowledge cannot in itself justify any weighting structure applied to such different sectors.

Is such an exercise actually meaningful? Are we not confronted with an insurmountable obstacle because of the intrinsic incommensurability of the sectors we are trying to compare? On this subject, Martinez-Alier *et al.* (1998), in the context of multicriteria and multi-actor decision-making methods, speak of *weak comparability* when there is no common basis for comparison with which to rank the various alternatives without leading to a conflict in values. The criteria considered would therefore be incommensurable, for technical reasons, because the real systems are too complex, and/or social reasons, because of the multiplicity of legitimate value systems within society. Why not then abandon the idea of weighting altogether? This is exactly what certain multicriteria and multi-decider analysis techniques do, e.g. the Electre IV method. And yet, every decision, be it individual or collective, contains some arbitrary options, more often than not subconscious and implicit, such as choosing between today or tomorrow, us or them, economic growth or protecting the environment, employment or quality of life, etc. In the realm of public policy, weighting is therefore in the last analysis, the reflection or the echo of the relative power of the various social groups. But the requirements of sustainable development in fact imply an evaluation of these arbitrary

choices, in the context of democratic debate and in the light of ethical and scientific criteria. And it is precisely because it forces us to put on the political agenda an evaluation of these choices and weights, which are the components of life in society, that constructing synthetic indices for sustainable development is necessary. It is only through democratic debate between randomly selected citizens independent of any pressure group, that abides by proven procedures in mechanisms such as citizen juries, planning units and hybrid forums (Callon, Lascoumes et Barthe, 2001), that real collective intent can be expressed. Existing consultative bodies are, from this point of view, the worst of all solutions, as J.-J. Rousseau had long ago stated:

"If, when the people, being furnished with adequate information, held its deliberations, the citizens had no communication one with another, the grand total of the small differences would always give the general will, and the decision would always be good. But when factions arise, and partial associations are formed at the expense of the great association, the will of each of these associations becomes general in relation to its members, while it remains particular in relation to the State: it may then be said that there are no longer as many votes as there are men, but only as many as there are associations."
Rousseau, (1762) *The Social Contract*. Book II, Chap III.

4 INDICATORS FOR WHOM?

The reasons which disqualify the synthetic index option and argue in favour of the scoreboard are impossible to understand if the user for which the information is provided is not specified. For example, the argument given by Baneth (1998), in opposition to synthetic indices, which reads: "A pilot flies an aircraft using data supplied by a large number of instruments and that data cannot be summed up in a single indicator", is only acceptable if you consider that only pilots, not passengers, need indicators. The aircraft metaphor is irrelevant because the difference between it and a human group or society, is that the passengers of an aircraft are all going to the same destination and all want to get there as safely and comfortably as possible. As a result, once aboard, their only concern is how far they are from their point of arrival and how much time will be needed to get there. This information is in fact displayed on video screens where flight is symbolised by the picture of an airplane moving across a map. In a human society, things are very different. All its citizens do not have, *a priori*, the same destination and perhaps most of them do not even know where they are going. Before even thinking about steering the social aircraft, its pilots must try to get everyone to agree on where they are headed. This is exactly where indicators for sustainable development come into play.

On closer inspection, indicators can be used for as many social appropriations and purposes as there are policy concepts and, in a democratic society, as there are concepts

of democracy. The "aggregative" model in liberal democracies sees the political process as a simple choice, by voting, between *a priori* preferences which were generated before the electoral process. The model is the market (Elster, 1999), not the forum. Following this view, there is no common good except if it relates to the least conflictual of the possible specific concepts of good or of the good life⁸. In such a context, social indicators would have but a small role to play in a situation where the members of a political system do not need them to verify that decisions taken by the people in charge are in their best interests. They have personal indicators they can use for that purpose: their income, their employment, their pension schemes, their environment, etc.

But there is another model for democracies, the "deliberative" model, in which the political process exists precisely for the purpose of creating a common vision of what is good or just. The vote itself is less important than the deliberative process which is the source of decisional legitimacy, more so than voting or negotiation between parties each seeking to defend their private interests. It is deliberation which makes it possible to transform "pre-reflective" preferences, established *ex ante*, into *ex post* reflective preferences, capable of transcending personal opinions and taking the common good into consideration. While in aggregative democracies (the market), preferences are a given and intangible, in deliberative democracies (the forum), they are designed and constructed through rational argumentation during the process of developing a general will. Social indicators then have a much more important role to play, in so far as they can contribute to the construction of a common definition of the situation and to prior agreement on the facts.

The type of addressee for whom the information is mainly intended is what differentiates the two historical traditions from which current social indicators stem. This is the essential difference between administrative statistics and social indicators. The former are a governmental discipline, implemented by the administration in the service and at the behest of central government. Their primary objective is to inform the authorities (and only them) of the state of society. It is not, for that matter, by pure chance that the emergence of statistics came to be associated with the name of Machiavelli (Vole, 1980).

Social indicators, however, developed along very different lines. Their purpose is not so much to inform government—even though officially reports are addressed to the government—as to allow civil society to evaluate public policies (and, in the last resort, government action) and beyond that, evaluate society's entire development⁹. Unlike official statistics, social indicators are meant to be an instrument of democratic evaluation just as much as a management tool in the hands of the authorities alone. The fate of the French Department of Statistics, the *Bureau de*

Statistiques, is an example of the tension which can build up between the two approaches. It was created in 1796, as a division of the Interior Ministry and in 1800-1801 it completed a considerable body of work collecting data involving the use of questionnaires addressed to regional officials (Préfets), on the basis of which it published a large number of monographs on the state of the Nation. Its overriding objective was to inform citizens and reinforce democracy, rather than satisfying administrative requirements¹⁰. This was so true that Napoleon, whose sole concern was the availability of the information required for levying taxes and organising conscription, put an end to its activities in 1811. *The Bureau des Statistiques* monographs were therefore an early kind of social reporting¹¹ insofar as they aimed more at enriching political debate and informing civil society than contributing to the management of public affairs.

Depending on who they are addressed to and for what purpose, when they are part of the democratic process, indicators can serve to discharge one or several of the following functions. They can be an information basis for political decision-making (internal use); in which case we are dealing with traditional statistics: counting, censuses. They can serve to evaluate, internally and/or externally; this is the social indicator approach. They can also be components of the collective definition of a common world (Callon et al, 2001), or even of a common good (goals to arrive at, standards to be maintained) and of the means to achieve it (measurement of well-being).

While the first two uses are well known and amply documented, this is far from being the case for the third which has been almost entirely ignored by political philosophy. And yet, we believe it to be essential, particularly as regards sustainable development.

There is however a notable exception to this lack of interest in the role of statistical information in the democratic process: the analysis of the role of social enquiry in relation to politics proposed by John Dewey in his book published in 1927, *The Public and its Problems*. For Dewey, the public is what is constituted by the awareness of the fact that certain transactions or private activities can generate consequences which affect those who are external to those transactions. Today we would say that the public is born of an awareness of negative externalities. In other words: "*The public consists of all those who are affected by the indirect consequences of transactions to such an extent that it is deemed necessary to have those consequences systematically cared for*". (Dewey, 1927, p245-6).

Transaction or actions whose consequences affect groups or individuals other than those directly involved thereby belong to the public domain and are the subject of regulation and control. However, as soon as they are no longer

⁸ Even Rawls, although he does not abandon the idea of common good, recognises that he is defending the idea of a minimal (thin) common good.

⁹ Osgood's "Social Trends", which also influenced the social indicator movement to a great degree, had exactly that purpose.

¹⁰ "The Bureau des Statistiques [...] was dominated by men who conceived the project in terms of promoting liberal government. They hoped that by gathering up and disseminating great masses of information about all the regions of France, they could promote national unity and an informed citizenry." (Porter, 1995, p35)

¹¹ "Social reporting belongs to the democratic infrastructure and has special functions. To put it simply, social reporting places welfare issues on the political agenda. It supplies material to the public debate, influencing the media and, indirectly, the administration." (Vogel, 1990, p91)



considered to be generating indirect consequences, certain activities which were once part of the public domain can return to the private sector. For example, religious rites and beliefs passed from the public to the private domain when the members of a social community ceased to believe that the consequences of individual piety or impiety could have an effect on the community.

The existence of externalities is not sufficient in itself for a public to be constituted; they must also be perceived and understood. According to Dewey, one of the major political problems of the age of technology is that the consequences of certain individual or group behaviours are so diffuse and remote in time that it is no longer possible to perceive them without recourse to what he calls social enquiry, i.e. scientific investigation of a social nature. We are of the opinion that indicators may acquire their full democratic legitimacy in the context of this social enquiry which is essential for the constitution of an appropriate public.

There may, however, be some mismatch between political and public organisation. While a public state always give rise to some kind of political organisation, it may become inadequate because of the emergence of new publics who may then find themselves deprived of any suitable political organisation. In the preface to the second edition of his book (1946), Dewey considered that relations between nations were in the process of acquiring the properties which constitute a public and that, for that very reason, they needed some kind of specific political organisation which they were lacking at the time.

To counteract and control the undesirable consequences of certain activities, the public creates its own political organisation made up of officials and civil servants designated for that purpose. In a democratic organisation based on the right to vote, every person becomes—because he is a member of the electorate—a public official. Therefore, voting is supposed to serve the public interest and not that person's private interests. Of course, remarks Dewey, "*He may fail, [...] in effort to represent the interest entrusted to him. But in this respect he does not differ from those explicitly designated public officials who have also been known to betray the interest committed to them instead of faithfully representing it.*" (Dewey, 1927, p282) This language shows clearly that Dewey rejects an aggregative vision of democracy and is so much in favour of the deliberative perspective that he considers that using voting rights to serve personal interests is a perversion of democracy.

Publics are born, assert themselves and disappear as a result of external conditions such that activities which were once charged with consequence lose that quality while other activities emerge, the effects of which turn out to be "stable, uniform, recurrent and irreparable". Alterations in material

conditions (technologies in the main) play a major role in such changes. In Dewey's view, the technological changes he was witness to were radically disrupting the situation: "*The machine age has so enormously expanded, multiplied, intensified and complicated the scope of the indirect consequences, has formed such immense and consolidated unions in action, on an impersonal rather than a community basis, that the resultant public cannot identify and distinguish itself.*" (Dewey, 1927, p314).

The changes that have occurred since Dewey wrote these lines have only confirmed his intuition. The quest for sustainable development itself was born of growing discomfort in the face of the hitherto unsuspected magnitude of the long term effects of transactions and economic behaviours¹²? And is it not scientific developments (the social enquiry) which have made us aware that some of our behaviours may affect durably and irreversibly human beings very far away from us in space and in time (future generations)? This explains why certain behaviours which were strictly confined to the private sphere are beginning to enter the public sphere. One example is the management of household waste in which Governments are taking an ever increasing interest by way of regulation, tax incentives, etc.

Very obviously, we are far from being able to appreciate fully the indirect environmental and socio-political consequences of our production and consumption patterns. The public which is building up in relation to these issues still needs structuring; it must find a suitable political organisation for itself and seek out, with the help of this social enquiry process in which indicators of sustainable development are an essential cog, the information needed for action.

5. SUSTAINABLE DEVELOPMENT DOMAINS

As we have seen, seeking out indicators must involve a definition of the essential dimensions of the concept to be made operational. What are the dimensions of sustainable development? To answer that question, we need to begin by agreeing on the reference class of the sustainable development concept, i.e. the type of objects to which it refers. However, there is no consensus on this point. The inaugural definition in the Brundtland report refers to the "needs and aspirations" of present and future generations¹³. It therefore clearly refers to human beings and their well-being. And yet, as regards indicators, Agenda 21—as we saw in our introduction—only refers to systems. In fact, if we examine the various lists of sustainable development indicators, we are confronted with a bewildering diversity of approaches. Simplifying a little, we can whittle them down to four major reference classes: socio-natural sectors (or systems); resources; people; standards.

¹² Think for example of climate change connected to greenhouse gas emissions.

¹³ In this connection, it is a remarkable fact that posterity only remembers, in the entire Brundtland report, the single definition where the aspirations of present and future generations are not mentioned, but only their needs, whereas throughout the report there are innumerable references to needs AND aspirations jointly. The aspirations are even omitted in the French translation of the passage where sustainable development is initially defined.

TABLE 1: Space of sustainable development dimensions

	Sectors Systems	Resources Capital	People	Norms
Development	?	?	Well-being “Capabilities” Functions	Efficacy Participation Freedom Etc.
Sustainability	Equilibrium Disconnection Co-evolution Etc.	Real savings Ecological footprint “Maximum sustainable yield”	?	Equity Efficiency Resilience Prudence
Level	State Region	State Planet	Civilisation	Local – global

Furthermore, in the pair formed by the noun “development” and the adjective “sustainable”, emphasis can be put on one or the other of the two words. For instance, Agenda 21 insists on sustainability. Table 1 shows the area of sustainable development dimensions as a function of the four identified objects and the development-sustainability pair. The last line of the table indicates the institutional level for which the approach described seems the most appropriate. Before examining briefly, each in turn, these various approaches, it must be specified that most of the indicator systems constructed within international institutions or countries¹⁴ are inspired by multiple paradigms. To the best of our knowledge, no list is entirely restricted to one perspective. This is easily explained for both practical and theoretical reasons, as we shall see below.

5.1 THE SECTORAL APPROACH

The sectoral approach is certainly the one which inspired the greatest number of attempts at defining sustainable development indicators. In its most rustic form, it is limited to the famous pillars of sustainable development, with economic, social and environmental “domains” considered separately. This approach centres on sustainability understood as a form of equilibrium in the development of each of these famous pillars. However, there is almost no analysis of the development dimension. It is possibly considered to be a given and therefore included in economic growth together with certain social conditions (not too much unemployment, some degree of social security, etc.), certain environmental conditions (air and water quality, pollution, nuisances). This concept of sustainable development is probably the one which is the closest to dominant political and ideological preconceptions, which explains its relative degree of acceptance in political and industrial circles in rich countries. Furthermore, it follows the disciplinary divisions of the scientific community (economics, social sciences,

natural science), as well as the institutional divisions in so-called neo-corporatist¹⁵ democracies, where in more or less influential advisory councils, representatives of employers sit with representatives of the workforce and of environmental organisations. These representatives are identified respectively with the economic, social and environmental domains.

The construction of the corresponding indicator systems is also greatly facilitated: it is the result of negotiation between these three social forces with the assistance of experts and scientists, whose mission, more often than not, is to reinforce to some degree the environmental pillar which is rather weak compared to employer and union “heavyweights”. The resulting management chart of economic, social and environmental indicators is generally well balanced and there will be no question, quite obviously, of aggregating them into one synthetic index, of whatever variety, since by definition it is precisely the equilibrium between pillars that matters.

Although this outlook does not encourage the construction of synthetic cross-indices, it is not incompatible with the calculation of decoupling indicators nor with the use of sectoral synthetic indices, such as GDP in the economic domain. Decoupling indicators address the relationship between economic and environmental domains. They are inspired by the economic concept of elasticity and express the relation between two growth rates, for example those of household waste and household consumption. They are then the expression of an objective which consists in decoupling economic growth from the use of environmental resources, so that one point of economic growth corresponds to less than one point in the growth of environmental pressures.

14 For a systematic presentation of the various lists of sustainable development indicators, see: Boulanger, Thomas et al., 2003)

15 In the meaning that contemporary political science gives to this description which is in no way pejorative.

16 Generally a fourth kind of capital is identified, social capital, but this has not yet been integrated into genuine savings because it is not sufficiently operational.



The pillar or sectoral approach does have the drawbacks which are inherent to its advantages, plus a few more extraneous ones. The major drawback is the result of its principal advantage, i.e. the risk of being insignificant. There is a real danger that, precisely because it is too consensual, it ends up ignoring the real demands of sustainable development and does not at all prepare us, despite appearances to the contrary, to taking on its challenges. It could almost be said that it smacks of climbing onto the sustainable development bandwagon, particularly when we consider some of the business or political uses made of it, for example.

5.2 THE RESOURCE-BASED APPROACH

The resource-based approach is also silent on the problems of development. It is firmly focused on sustainability, to be understood either in the restricted meaning of a sustainable use of natural resources, or in the wider acceptance, the transmission of an aggregate stock of productive capital per capita sufficient for future generations to produce the goods and services required for their well-being. Almost all the environmental synthetic indicators can be put into this category: the ecological footprint (Chambers et al., 2000), the ESI (*Environmental Sustainability Index* of the World Economic Forum, 2002) the EWI (*Ecosystem Wellbeing Index*), (Prescott-Allen, 2001) etc. Most of these indices adopt a so-called "strong sustainability" outlook, i.e. low substitution between natural capital and man-made capital. Attempting to reduce the issue of sustainability to the sole use of natural resources necessarily entails supposing that there is no possible substitute for these natural resources, or only within very narrow limits.

An indicator such as the genuine saving rate (Hamilton and Clemens, 1999; Dasgupta, 2001) is based on a radically opposite hypothesis. This monetary index is based partly on the national accounts and seeks to measure the degree of true enrichment of a national economy by subtraction from gross national saving as defined in the SNA the depreciation of man-made capital, drawdown on natural resources, the cost of damage to the environment, as well as the external debt, but adding expenditures for healthcare and education which are considered as an investment in human capital. Positive saving is supposed to mean that current generations are not consuming an excessive share of the national product and are transmitting a sufficient productive heritage for future generations. Genuine saving is therefore exclusively an indicator of intergenerational equity. They are not an indication of the degree to which the demand for intergenerational equity is satisfied. Furthermore, there is an assumption of perfect substitution between the three forms of capital under consideration: natural, produced (or manufactures) and human¹⁶.

5.3 THE APPROACH IN TERMS OF WELL-BEING

While the resource-based approach dispenses with defining development, this is not the case for the approach focused on human beings, their needs and their well-being; in this case development is understood as the increase in well-being for the greatest possible number of humans, now and in the future. Contrary to what this formulation might lead one to suppose, an approach based on well-being does not necessarily mean accepting the utilitarian programme which pervades welfare economics. A. Sen's theory bases well-being on the capacity to act (agency) and the satisfaction experienced (well-being), and distinguishes between capabilities and functionings; its philosophical context is very far from utilitarianism. For that matter, Sen was the first recognized economist to propose a multidimensional vision of development focused, not on economic growth or an increase in monetary income but rather on an extension of the real freedom for people to achieve their goals. The concept of well-being defended by Sen follows a tradition that goes back to Aristotle¹⁷ and is related to Adam Smith in his *Theory of Moral Sentiments* and Marx (1844 Manuscripts) who saw in Communism "...the realm of freedom taking the place of the realm of necessity"¹⁸.

Sen refutes utilitarianism by the following: "*In utilitarianism's classical form [...] utility is defined as pleasure, or happiness, or satisfaction, and everything thus turns on these mental achievements. Such potentially momentous matters as individual freedom, the fulfilment or violation of recognized rights, aspects of quality of life not adequately reflected in the statistics of pleasure, cannot directly swing a normative evaluation in this utilitarian structure*". (Sen, 1999, p56-57).

According to Sen, what contributes to people's well-being is not the basket of consumer goods which they have access to, but what they can do with it considering the characteristics of the goods themselves, their own personal characteristics—both physical and mental—as well as social characteristics and external circumstances. The three together define what Sen calls functionings: "*Functionings are what a person succeeds in doing with commodities (and their characteristics), in his possession, given his personal characteristics as well as the existing external circumstances (including factors like physical environment, cultural factors, public goods provision and others that may impact the conversion of the commodity to the functioning*" (Saith, 2001, p7). As to capabilities, they refer to the possibility for individuals to be and act according to their own objectives and values ("people's capabilities to lead the lives they value"). From this perspective, development, in fine, consists in broadening the capability set accessible to individuals and therefore the range of desirable life choices accessible to human beings. As he constructs his theory of capabilities, Sen seeks to make

17 In "*Nicomachean Ethics*", Aristotle wrote: "Wealth is evidently not the good we are seeking; for it is merely useful and for the sake of something else." Ross translation, Book I, Chapter 5.

18 For Sen also, "Development consists of the removal of various types of unfreedoms that leave people with little choice and little opportunity of exercising their reasoned agency. The removal of substantial unfreedoms, it is argued here, is constitutive of development". (Sen, 1999, page xii, Preface)

19 Sen also rejects as being too narrow Rawls' justice theory which restricts the information base to basic goods alone.

possible an evaluation of “social arrangements”. As a result, he extracts the theory of social choice out of the quagmire in which it was floundering since Arrow demonstrated that there was no mechanism for social choice satisfying simultaneously the requirements for rationality and democracy on which everyone could agree. In fact, Sen argued, Arrow’s impossibility theorem was misunderstood. “[...] It establishes in effect, not the impossibility of rational social choice, but the impossibility that arises when we try to base social choice on a limited class of information” (Saith, 2001, p250). The solution to the problem raised by Arrow consists therefore in broadening the information base on which to establish social choice. This broadening must take into account capabilities and functionings¹⁹.

While the resource-based approach has given rise to a number of works mostly concerned with environmental indicators, the well-being approach has also been fertile in attempts to construct synthetic indices. Think for example of the IDH, the ISEW, the GPI, the MDP, and Sharpe and Osberg’s Index of Economic Welfare, etc (see box 1). It is worth noting that, except for the ISEW, none of these indices attempt to include the sustainability dimension.

5.4 THE NORMATIVE APPROACH

The first three approaches to sustainable development, in terms of pillars, resources and well-being, adopt a substantial definition. It is however possible to choose a procedural approach and consider sustainable development in normative terms. From this angle, any form of social action satisfying these norms and/or procedures would be seen as sustainable development. In table 1, as an example and subject to confirmation, we have characterised the “development” dimension as respect for efficacy, participation and freedom standards. In the “sustainability” box, we have put equity (both inter- and intragenerational), efficiency, resilience and prudence (prevention and precaution). These choices are certainly debatable and would require in-depth examination. They are inspired partly by the logical framework to which development projects submitted for financing to international organisations such as the European Commission must conform. Projects must meet requirements of efficacy (achieve the assigned goals), efficiency (do that at least cost) and viability (be lasting). We have added participation and freedom for the development section; equity, prudence and resilience (that could possibly be replaced by viability) for the sustainability section. The placing of freedom and participation in the “development” box is justified, we believe, by Sen’s analyses of development and by all the work which is part of an ethic of development (Gasper, 2004). Its importance for sustainable development was recognised as early as the Rio Conference and it is referred to on several occasions in Agenda 21. Finally, even economists like Stiglitz now see this as necessary in any development process:

“[...] open, transparent, and participatory processes are important ingredients in the development transformation—important both for sustainable economic development and for social development that should be viewed as an end in itself and as a means to a more rapid economic growth” (Stiglitz, 2002, p175).

The outcome is that participation cannot be limited to having the right to vote. It implies that citizens are able to make their voice heard for any decision likely to affect them, at all levels and in all fields, including economic matters.

Efficacy as an evaluation norm raises the question of goals and objectives of any social action and also of institutions and systems. While the object of evaluation is a production or consumption pattern, which is at the core of sustainable development, the efficacy norm brings us back to questions of well-being, needs, etc. In the final analysis, a socio-economic system can only be judged by reference to the well-being (in the acceptance that Sen gives to the term) of the individuals who are its constituent parts and/or whose well-being depends on it, directly or indirectly.

However, “There is no “well-being theory” that can dispense with value judgments necessarily focused on the more or less desirable nature of one or the other state of society”. (Perret, 2002, p25)

We have included in the sustainability norms the two forms of equity constituting sustainable development, which signifies that development which contradicts intragenerational equity can no more be considered sustainable than development which exhausts the resources that future generations will be needing. Therefore, the kind of efficiency that we are dealing with here is not simply economic efficiency as it is defined by cost/benefit or cost/effectiveness analysis procedures. It is overall efficiency, mindful of all scarce resources, i.e. natural, human, social and cultural resources. In fact, once the requirement of double equity posited, other norms become rather superfluous. It is for the sake of equity that it is important to make the most efficient possible use of scarce resources, to adopt a prudent attitude and therefore to respect the principles of prevention and precaution so as to ensure the viability of systems, etc.

A normative approach has the advantage over others of being adequate for all levels of action and for different types of objects. Even though the approach may be sourced in the evaluation of projects and programmes, it can also apply to systems such as business enterprises, production and consumption patterns, national economies, etc. Admittedly, it is not easy to translate such an outlook into measurable and observable indicators. This is probably why it is rarely used to establish a list of indicators. Whereas a great number of such operations refer to some of the norms we

²⁰ It is worth noting that the pillar approach was explicitly rejected because of the ambiguity of these categories and the fact that a single phenomenon could be considered in turn from one or the other viewpoint. However, the authors of the list of indicators were careful to spread them more or less evenly over the three dimensions.



TABLE 2: Correlations between socio-economic and environmental indices

	HDI	HWI	HALE	EWI	EF	ESI1	ESI2
HDI	100.00						
HWI	95.38	100.00					
HALE	94.67	90.10	100.00				
EWI	-24.21	-23.62	-27.75	100.00			
EF	-90.58	-87.89	-83.88	27.46	100.00		
ESI1	7.00	9.69	-2.01	14.28	-12.44	100.00	
ESI2	-26.54	-18.73	-25.21	9.28	30.22	24.31	100.00

have mentioned, such as equity, efficiency or participation, to the best of our knowledge there is no example of any system of indicators based primarily on normative terms. The closest to it is the list of sustainable development indicators adopted by Sweden (Nyman, 2003), which is based on the four following themes: efficiency, equality/participation, adaptability, values and resources for future generations²⁰.

Despite difficulties in its implementation, the normative approach does have some advantages, not the least of which is that it is based on fairly solid justice theories, as was demonstrated by authors such as Barry (1999) or Holland (1999). Another advantage is that it focuses on development actors, projects and policies, and centres on the genuine foundations of the concept of sustainable development, i.e. the demands for justice and equity²¹.

5.5 SUMMARY

Out of the four perspectives discussed above, only the norms-based one can be considered as complete, since it is as informative on development as on sustainability. The resource-based approach dispenses with development and the well-being approach eludes the problem of sustainability. But of course these are ideal types and pure models. In practice, the various approaches intermingle. And from that point of view, the combination of well-being and resources seems to be the best compromise to guide the construction process of a sustainable development information system. On this basis, a hierarchy (a tree-diagram) could be surmised with, on the one side, a synthetic well-being indicator and all its components and, on the other, an environmental synthetic indicator, also broken down into its basic indicators. It is very probable however that the two indices would develop in opposite directions, if the correlation analyses performed by Cherchye and Kuosmanen (2006), of which table 2 gives a preview, are to be relied on. These are rank correlation coefficients (Spearman's rho * 100) between various human development indices and environmental synthetic indices. HDI stands for UNDP's Human

Development Index, HWI for Prescott-Allen's (2001) Human Welfare Index, HALE for WHO's Health-Adjusted Life Expectancy index, EF is the Ecological Footprint (Chambers et al., 2000). ESI1 and ESI2 are the Ecological Sustainability Indices 1 and 2 and are the World Economic Forum's two environmental indices, the former being a status indicator and the latter indicating pressure.

There is a strong negative correlation between the EF and the three human development indices. This is also true of EWI and ESI2, at a lower intensity however than for the EF. But the various socio-economic indices are positively correlated as well as the various environmental indices, except the EWI and the EF which develop in opposite directions. These indications point to the possibility of tension, or even of contradiction, between the pursuance of socio-economic objectives and certain intergenerational justice requirements. We are convinced that this tension would be much less perceptible in a scoreboard or a list of several dozen indicators. There is nothing to prevent us, however, from an in-depth exploration of the contradiction that the synthetic indicators reveal, and to seek its causes and expression in the various basic indicators that were used to calculate them.

6. CONCLUSIONS

After over twenty years spent on research in the field of social indicators, Judith Innes (1990, p4), arrived at the following conclusion:

"The most influential, valid, and reliable social indicators are constructed not just through the efforts of technicians, but also through the vision and understanding of the other participants in the policy process. Influential indicators reflect socially shared meanings and policy purposes as well as respected technical methodology".

It is because it did not recognise the dual nature of indicators, i.e. both scientific and political, that the social indicators movement, in spite of promising beginnings, gradually stalled until it died out completely²². The sustainable development indicators "movement" is in danger of suffering a similar fate if it loses contact with the

²¹ An analysis of the origins of the concept of sustainable development reveals without much room for doubt that it more a question of justice than of the "good life". On the distinction to be made between the two, see Forsé and Parodi (2004), and the anthology by Berten, Da Silveira and Pourtois (1997) on the debate between liberals and communitarians.

²² For an analysis of the history of the social indicators movement, see Cobb and Rixford (1998).

public in the meaning that Dewey gave to the word. There are two ways of turning your back on this public: withdrawing in a scientific ivory tower, as did the social indicators movement scientists; or deciding to address only the powers that be. Back in 1927, Dewey already saw how democracy could be endangered by globalisation and technological development. He thought that the Great Society of the machine age needed to be converted in to a Great Community, in other words a great democracy. The problem is that a scattered, mobile and multiform public has difficulty in recognising, defining and expressing itself. For Dewey, it was first and foremost an intellectual problem, indicating the nature of the only possible solution:

"What is needed today is the perfecting of the means and ways of communication of meanings so that genuinely shared interest in the consequences of interdependent activities may inform desire and effort and thereby direct action." (Dewey, 1927, p332).

In this respect science, social science in particular, has a major role to play and important responsibilities to shoulder. It was science's mission to explore and analyse these consequences and disseminate results as widely as possible, so as to conjure up this public, this community capable of resuming control over the consequences of its actions, in a world confronted with the new challenges of globalisation and technology. This task, more than ever, requires immediate attention.

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