
Introduction to the key issue concerning the use of sustainable development indicators

Hélène Rey-Valette

Department of Economics, LASER-CEP,
Université de Montpellier 1, Faculté des Sciences Economiques,
Avenue de la Mer – Site de Richter, CS 79606,
34960 Montpellier Cedex 2, France
E-mail: helene.rey-valette@univ-montp1.fr

Francis Laloë*

UMR C3ED (IRD-UVSQ)
IRD, BP 64501 F-34 394 Montpellier Cedex 5, France
E-mail: laloe@mpl.ird.fr
*Corresponding author

Jean Le Fur

IRD/CBGP, Campus International de Baillarguet, CS 30016,
34988, Montferrier sur Lez, France
E-mail: lefur@ird.fr

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Biographical notes: Hélène Rey-Valette is a senior lecturer in the Economics Department of the Montpellier 1 University. As a specialist in integrated coastal zone management, she is a member of the Scientific Council of the National Research Programme LITEAU, and for many years has been in charge of the Thematic Research Action Programme (ART, Action de Recherche Thématique) in social sciences as part of the Coastal Zone National Programme (PNEC, Programme National Environnement Côtier). Her theoretical research specialisation includes institutional economics as well as systems approach.

Francis Laloë is a senior statistician and researcher at the IRD (Institut de Recherche pour le Développement) and a member of the research unit C3ED (Centre d'économie et d'éthique pour l'environnement et le développement). He is involved in research on governance in the context of natural renewable resource exploitation systems. He is more specifically interested in the general domain of sampling design and data analysis, with the development and the use of a generic model of joint dynamics of exploitation and resources applied to fisheries exploitation systems.

Jean Le Fur (PhD) is researcher at the IRD. He specialises in the modelling of biological, ecological and social complex fishery systems. He is jointly

involved in characterising complex systems in general as well as the means for sustainable development of fishery sectors in developing countries. The models he has developed are mostly individually based models and deal with studying decision processes, negotiation processes, and bio-economic fluxes at the sector level, as well as biological resources or ecological food web dynamics. He has developed several information systems and worked on knowledge typology. He has been head of several funded projects in France, Senegal and Guinea Republic.

1 Introduction

The concept of sustainable development has become an essential reference, which concerns all public policies, and which, actually, is becoming increasingly assimilated by actors and firms with respect to their behaviour. At the same time, a profusion of institutional initiatives were implemented by international organisations in order to develop indicators for sustainable development, by means of working groups of experts, according to a logic of standardisation based on indicators whose supply is 'rational' and whose use seems logical for aforementioned experts. This process was both homothetic and cumulative between institutions, on the basis of available lists of indicators with the aim of adapting them to new contexts. This abundance of initiatives and associated 'lists' will grow while works are multiplying at the national, regional, as well as sectorial or local scales. These numerous applications will provide a diversity of approaches, with some of them associating actors, in particular in the context of local Agendas 21 or urban ecology charters. Therefore, apart from at the local level, and this is not always the case, 'public' processes for developing sustainable development indicators show a concern based mainly on indicator supply associated with a reduced actual appropriation of indicators.

Initially, indicators are especially designed per sustainable development pillar (environmental, economic, social, and then institutional pillars), based on a relatively exhaustive approach. Nowadays, interactions occurring between pillars are favoured by considering key issues, thus enabling the values and priorities of relevant populations to be taken into account. At the same time, it should be noted that lists are to be reduced. The question of providing an optimal list of indicators is widely discussed and appears as a kind of scientific mirage. There is a need for short lists (comprising 'seven plus or minus two' indicators, see P-M. Boulanger this issue) so that they are appropriate and usable as well as stable over time. Laloë (in this issue) suggests that there is no need for a list necessarily including all the relevant indicators; this list may be considered as a basis useful for calculating these indicators 'on request'. The dimension of this database is determined by the dimension of the representation of the system for which durability is to be determined. This type of distinction between indicators and 'databases of indicator' is also observed during the implementation of the MONET indicator system (de Montmollin and Scheller, in this issue); these authors define three separate objectives: 'Establishing the frame of reference, developing the systemic structure and selecting the sustainable development indicators'. This distinction can also be noted in Le Fur's paper (in this issue) when he defines 'a common information platform used as an effective basis for a multiparty exchange'.

As it has been observed that indicators are not frequently used by public policies, we must analyse the social relationships determining elaboration processes and the use of sustainable development indicators. The papers gathered in this issue will attempt to answer this question. For the sake of clarity, we assume that the use of indicators may be considered as a problem of supply and demand. Consequently, we may examine this relationship from two points of view:

- From demand to supply, in a rather procedural logic, by considering, based on a group of actors and decision makers, various questions they may ask, in order to provide the most appropriate indicators (according to available knowledge and data as well as needs identified beforehand). This logic involves all questions related to indicator social demand, types of actors, users and needs, as well as governance methods, etc.
- From supply to demand, in a rather normative logic, by considering representations (models) available or under development, and by considering that indicators are the parameters of these models (or a limited number of 'simple' functions of these parameters, for example current points of reference). This dimension of the question corresponds to a set of more technical research issues, for which knowledge has to be quantified, and which refers to a set of questions related to quantification; thus, satisfying the demand often appears as a secondary issue.

This distinction underlines the existence of two large communities of scientists operating with different logics and providing specific results. Despite convergent directions, no obvious link seems to exist between these two methods, which appear to be disconnected most of the time.

The aim of this issue is to study this observation in greater detail, in particular by determining in which conditions it would be possible to develop more integrated or coordinated approaches. After having recalled the complexity of this question concerning the use of sustainable development indicators with respect to their various functions, we will successively examine how scientists attempt to identify, to take into account and/or satisfy indicator demand. Finally, following the above issues and in order to conclude, we will introduce the concept of indicator trajectory which appears to be the most appropriate way for accounting for the diversity of indicator statuses and elaboration forms.

2 Complexity related to indicator function plurality

An indicator (whether it is a sustainable development indicator or not) involves more than providing a measurement as a function of available data. The question of using indicators is complex, as it depends on the diversity of exerted functions, in a more or less simultaneous manner, in response to several generic types of demand: coordination, communication, crisis management, warning, monitoring of conditions and pressures, evaluation of reaction capacities, etc.

With regards to the information function, as mentioned by P-M. Boulanger, an indicator firstly represents information which is, on the basis of the definition proposed by G. Bateson (mentioned by Bougnoux (1993)), a 'difference making a

difference'. Consequently, Laloë (in this issue) underlines that an indicator must be defined by at least two points of view, which are necessarily linked and may be related to a supply and demand. This link may be materialised by means of media, for example cartographic media, 'providing' data syntheses corresponding to demands related to vulnerabilities associated with various types of risks, as well as on the identification of resulting needs (Winograd, in this issue). The indicator is also used to generate a problem or an issue, and thus has an inventory-creating function that is fulfilled by indicators elaborated on the basis of pillars. This type of indicator assesses what must be preserved in each dimension of sustainable development. Andrieu et al. (in this issue) focus on the significance of information input for decision making as a relevance criterion of the indicator, whose function is then, according to these authors, to clarify sustainability management strategies.

Considering that society is more and more complex and may no longer be restricted to current systems of reference based on social classes and groups, elaborating sustainable development indicators requires the association of numerous actors with differing points of view. Thus, this coordination function intervenes prior to quantification. The indicator then contributes to linking representations. The success of the link depends on the development of common conventions. Taking this coordination function into account justifies the recent change from an approach per pillar based on an inventory logic to an approach per key issue, which facilitates the integration of the actors' expectations. The latter are nevertheless mostly expressed through pressure groups and lobbies, which aim to increase their influence in an area where the government has been the only decision maker for a long time. Thus, regarding noise and atmospheric pollution monitoring in the urban environment, Zittoun (2006) demonstrates that the method employed for calculating certain indicators leads to the identification of the culprits, i.e. drivers in relation to noise. Consequently, elaborating indicators, in particular with regard to interpretation and normative calibration issues, reveals the 'complex relationships which develop between knowledge, expertise and power' and which are widely dependent on institutional formats. Elaborating indicators then becomes, according to Zittoun (2006), a tool which is useful for contributing 'to resource reallocation as well as to the reassignment of power and governing practices'. According to this author, 'not only indicators have the faculty to measure a problem but they also build it as much as they are built by the problem itself'. This refers to observed constraints from the 'division of labour' mentioned by Desrosières (2004): 'some objectives are negotiated (by politicians), and expressed by means of words denoting indicators. Then, the latter are transcribed using negotiated procedures (by statisticians) in aim of harmoniously quantifying these indicator. These procedures are as similar as possible in the various countries'. This distinction between political and technical issues requires 'the creation and implementation of hybrid forums where these evaluation methods may themselves be assessed' (Desrosières, 2004), such hybrid forums are also considered by Callon et al. (2001). In fact, the author (Desrosières, 2003) further mentions the difficulties associated with the assumed lack of need for connecting information production issues and issues generating information demand: 'these two stories, concerning economic policies and statistics, respectively, are rarely presented, and above all, investigated simultaneously'. Implementing this connection may be one of the needs explaining the importance given to the indicator issue . . .

These reflections about the social role played by indicators lead to considering indicators as a tool for government policies, which is necessarily related to the development of these policies. Initially, indicator supply is ‘taken over’ by the government and the great supranational institutions: indicators are a government attribute and a way for expressing its power, as well as being a management tool for its policies. According to Le Bars (2005), the sound structuring of points of view was made easier due to the direct relationships existing between scientists and the decision makers as they belong or come from the same institution: in this context, the ‘rational positivist model’ described by Boulanger (in this issue) may be sufficient and optimal. Today, changes in public policies, related to the development of a so-called neo-liberal form of government, lead to a complex decision and regulation process comprising various institutions. Some of these institutions are ‘hybrid institutions’, as the public–private distinction is not clear. Consequently, a diversity of points of view associated with an asymmetry in the sources of information and legitimacies are observed. Therefore, various sites of information production and use are identified; they are connected according to various forms of networks, in accordance with the values of subsidiarity, procedural action and negotiation, which characterise this form of government. This situation reinforces the functions of indicator communication and coordination. Taking into account these elements leads to a breakdown over time of the issue and forms inherent to the elaboration process of sustainable development indicators (see Table 1). In this context, the ‘rational positivist model’ is no more efficient and we should consider the ‘discursive-interpretive model’ also described by Boulanger (in this issue). Elaborating and evaluating these indicators becomes an increasingly complex and difficult task as the amount of differences that they associate may increase, and these differences may be expressed using increasingly distant languages.

Table 1 Modification of sustainable development indicator elaboration processes

| <i>Phases</i> | <i>Scale</i> | <i>Domain</i> | <i>Approach</i> |
|--|---------------------------------|--|-----------------|
| Planning and centralisation context for public policies (centralised supply) | Global | Environmental aspects | Normative |
| Decentralisation: priority concerns the supply but it is varied between public actors, who are representative of general interest | National, regional or sectorial | Social aspects | Procedural |
| Diversity of scales and increased participation of actors: general interest is no longer given but elaborated through compromising | Local (territory concept) | Institutional aspects and interactions between pillars | Concerted |

3 Diversity of approaches concerning a demand which is difficult to understand, not greatly expressed and generally generated by the supply

As sustainable development is inherently opposed to standardised solutions, procedures for elaborating sustainable development indicators must be varied and

defined based on contexts and specific expectations regarding the functions they are to ensure. Bouni underlines the need for contextualising procedures by favouring procedural and iterative methods based on indicator demand. He adds that:

“potential users of these information tools are often not aware of what they can gain from monitoring subjects with which they are not particularly familiar. Therefore, demand is not always expressed naturally and the elaboration procedure must include a phase of solicitation in order to facilitate the transformation of an underlying need into a specific demand.”
(Bouni, 1998)

Most experiences described in this issue underline the lack of expression of sustainable development indicator demand. Users are unaware of the ‘products’ that can be provided by scientists; this restricts the expression of their needs, particularly when new types of information are involved. Therefore, in most cases, it is the supply that creates the demand. However, this supply is not always formulated in an appropriate format (regarding the tools most frequently proposed by scientists) and in most cases, as recalled by Antona et al. (in this issue), managers require the use of expert consultancy. The analysis, which is presented by these authors, shows that crisis management situations represent a favourable opportunity for expressing a demand, which is then generally targeted. The significance of transmitting relevant information for managing crisis situations appears in vulnerability indicator research: in a certain way, correctly identifying vulnerability involves identifying sustainability conditions, and both of these aspects, vulnerability and sustainability, can be considered as the two sides of the same coin (Winograd, in this issue).

The papers described herein, underline this difficulty as well as the diversity of approaches for identifying, analysing and taking into account this demand. The paper written by Antona et al. (in this issue) proposes a classification of methods according to the degree of actor proximity, from bibliographical compilations to co-elaboration, which can itself result in a subdivision according to associated actors. The following aspects can be noted:

- Sequential approaches aiming to define the demand before it is integrated into indicator elaboration. This involves organising meetings and surveys with the aim of obtaining an expression of this demand, or more accurately of these demands, because, as already mentioned, there are various expectations.
- Co-elaboration processes based on an ‘action-research’ logic aim to combine indicator producers and users, and implement methodologies corresponding to more or less narrow proximity levels (from simple meetings to co-elaboration). Several examples of these approaches are described in this issue.

These approaches are obviously based on the institutional organisation of indicator elaboration procedures, particularly on their opening degree to actors, with a priori an increased readiness for plural expression in situations involving only a small amount of conflict at local level. This refers to Boulanger’s idea (in this issue), according to which the indicator aiming to facilitate decision making depends on decision models in which it is to be integrated.

In addition to classical question surveys, a great diversity of specific survey methods are tested based on forecasting, economic evaluation or decision support

methods, such as sustainable development indicator classification based on their hierarchy using a multicriteria approach described by Rey-Valette et al. (in this issue). In relation to decision support, indicators may also be elaborated based on elements from a reference or summary list, which is essential regarding ‘indicator dialog box’ notion (M. O’Connor, personal communication) which can be used in an ‘indicator market’ context. Some researchers wishing to avoid ready-made answers, or more commonly, the lack of answers due to the fact that actors do not often assimilate sustainable development issues, attempt to analyse the practices of these actors or the values to which they are sensitive. This involves defining an information demand structure by studying the nature of mobilised information. Approach terms are mostly related to co-elaboration approaches employing participative type surveys, which are extremely diversified and involve the creation of a common reference frame for identifying sustainability issues. As pointed out by Rey-Valette et al. (in this issue), it may be noted that researchers wish to prepare reference protocols (leading to new approaches such as ‘companion modelling’ or role games, as mentioned by Antona et al., in this issue), although Hubert (2004) underlines that: ‘inter-relations between researchers and partners are all the more meaningful as they are not systematically based on instruments formalised in an ad hoc manner’.

Several examples of indicator co-elaboration are described in this issue:

- Andrieu et al., based on explicit presentations of researcher’s points of views and representations of farmers-breeders meeting through ‘focus groups’. This approach enables to develop a common diagnostic and to elaborate a list of indicators involving a sustainability dimension weighting problem (in a compromising manner). This weighting issue is all the more essential as farmers–breeders are not capable of classifying by hierarchy the criteria that they describe.
- Brigand and Le Berre, with the elaboration of a survey protocol following a request from the authorities of a national park; an observatory was constructed for satisfying a demand – and a supply – which were expanded as operations were carried out.
- Chamaret et al., by implementing a bottom-up meeting process for local populations in addition to the top-down process, which is more common and employed by scientists.
- Roussel et al., who describe an experience involving the definition of indicators (which is shared by managers and researchers) enabling to make operational the environmental carrying capacity notion, introduced by the development of regulatory planning tools with the aim of facilitating territory sustainability.

As a general rule, co-elaboration must link the representations of a complex system on which several actor’s points of views are defined, thus resulting in the need for a multicriteria approach (Rey-Valette et al., in this issue, Roussel et al., in this issue, which shows that this type of approach is increasingly used).

Co-elaboration practices are not specific to local approaches: they are also observed at a national level, such as the Suisse indicator approach Monet with a participative indicator selection process involving ‘Thirteen working groups comprising around eighty experts from twenty different federal offices’ (de Montmollin and Scheller, in this issue). According to the various scales, they are the consultation modes and actor

status which vary. However, similar difficulties are encountered: conciliating various points of view, which are often different or even inconsistent, similar interests in relation to communication, tool appropriation readiness and adherence of involved parties to results. Similarly, there is the co-elaboration example described by Roussel et al. (in this issue), which shows that this process may be employed in answer to a 'regulatory' demand, and thus facilitates the appropriation of an institutional procedure. Certain presentations (Chamaret et al., in this issue; Rey-Valette et al., in this issue) define this character, which is often a hybrid form of these co-elaboration processes. Associating or comparing indicators proposed by researchers and indicators based on a process shared by researchers and actors, is a common practice. It leads to approaches aiming to combine the respective advantages of both types of logics that can be considered as mixed (*top-down* and *bottom-up*) in order to take into account the fact that generic models (representations) must be adapted to local specificities (Chamaret et al., in this issue). Although they have always been presented as contextualised indicator elaboration situations, which can be described as 'custom-made', and combined with a transfer of knowledge regarding interpretation modes facilitating indicator use, co-elaboration methods may have many various forms and this diversity is precisely justified by that of the contexts. Therefore, no method can be considered as the 'be-all end-all' and to represent a guarantee regarding indicator use. This is demonstrated by the analysis of inputs from the participative approaches implemented by Rey-Valette et al. (in this issue), and the contribution from Andrieu et al. (in this issue), which shows the persistence of a share of subjectivity in these approaches.

Most papers concerning these questions point out that the plurality of actors formulating the demand complicates the elaboration of a common integrated representation. However, as underlined by Le Fur (in this issue), this plurality must not only be considered at an upstream level of the process regarding the expression of the demand, but also at a downstream level in terms of availability and actual access to generated knowledge. As explained by the author in his contribution, difficulties related to knowledge plurality, and to the diversity of media and knowledge access routes, should be taken into account. Acknowledging this plurality of information and access procedures requires the adaptation and diversification of indicator restitution and communication modes. Indicator formatting and diffusion issues also refer to the nature of information employed for indicator elaboration, as certain pieces of information are more appropriate for these syntheses than others. Andrieu et al. (in this issue) also underline the significance of communication, in this case animation techniques and terminological choices. The latter point is all the more sensitive as sustainable development appears, particularly in Southern countries, as an abstract concept for which indicator elaboration approaches contribute to providing concrete contents.

4 Conclusion

Thus, the indicator may contribute to creating a discourse, making a policy operational, and to the assessment/justification of public policies, and even become a 'manipulation tool'. These functions are dissociated or represent the different steps of

a cycle at the end of which the indicator is re-analysed, readapted or abandoned. Thus, its status may change during its existence or it may be employed by different audiences according to situations and periods. Therefore, success or failure depends directly on the context in which it is used. Its elaboration terms, which are significant, are not the only criteria for assessing its value and usefulness. This point of view leads to a dynamic situation for the indicator, in which the supply–demand approach and compatibility would only represent a manifestation of the existence and operational nature of an indicator.

This type of approach is historical and considers that an indicator has its own existence during which its status, function and audience may change (therefore, the function of indicators as well as their potential users(s) has changed according to Brigand and Le Berre, in this issue). The story starts with the birth and identification of the indicator. This phase may result from the component based on the supply or that of the community focused on the demand. The co-elaboration, participative approach and research-action may also lead to developing an indicator based on a consensus or coordination between the supply and demand. Whatever its origin, the indicator must be generated in a context which is favourable for its future development. Once this process has started, the indicator will or will not be employed by given potential users. The indicator will act as a mediation tool towards other audiences. According to whether the indicator will be co-opted by an increasing or decreasing amount of groups, its usefulness will be more or less reinforced and it will or will not be perpetuated. Based on the indicator taken into consideration, the path may be more or less complex according to the appropriation, recovery, or on the other hand, rejection, denial or desertion of the indicator by varied target populations, whose co-evolution is progressing in parallel to that of the indicator. Thus, it will be possible, according to this reading, to encounter various situations from the judicious, relevant and correctly quantified indicator, which have not gone beyond the scientific publication stage, to the undisputed, universal and long-term indicator, such as the GNP, whose success can be ‘measured’ by the existence of ‘derivatives’ (such as the ‘Soft Domestic Product’), which may be indicators of the existence of a debate concerning alternative reference frameworks . . . From this point of view, the indicator becomes the mediator of a ‘social’ demand, its ‘state of health’ shows to what degree the process is operating correctly (answer to a question, searching for a solution, etc.). The quality of the process that it supports is as important as its indicating value. The keywords are no longer only relevance, representativeness, accuracy and objectivity, but also appropriation; agreement, consensus, appropriateness, mediation, concession, discussion, exchange, partnership or leadership . . .

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