Sustainability indicator system and policy processes in Malaysia: a framework for utilisation and learning

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Abstract

Formulation of effective sustainability indicators for national assessment demands a comprehensive understanding of the utilisation, diffusion and dissemination of information in policy processes. To illustrate the dynamic of sustainability assessment within the context of policy processes, this paper uses a case study of national sustainability indicators development in Malaysia. Subsequently, this paper ascribes the limited achievement of national sustainability assessment in Malaysia to four types of constraints: meta-policy issues; technical capacities; communication concerns; and the inherent knowledge gaps within the indicator developer community vis-à-vis their theoretical limitations. It is proposed that such constraints will be encountered in many countries. Drawing from the literature on public policy, this paper outlines a framework for investigating indicator behaviour within policy processes based on well-established concepts such as knowledge utilisation and policy learning. I conclude this paper by elaborating on the corresponding future challenges that must be addressed before effective integration of sustainability indicators within policy systems can occur.
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We hope to have before long, a board of fact, composed of commissioners of fact, who will force the people to be a people of fact, and of nothing but fact.

Charles Dickens, Hard Times, 1854

1. Introduction

The emergence of sustainability ideas during the past two decades has catalysed high levels of activity in generating 'facts on sustainability' in the form of indicators. Policy *informing systems* such as sustainability indicators are expected to provide a sound basis for planning and decision making (Dovers, 1996; Higgins and Venning, 2001). Efforts to develop sustainability indicators have been a subject of both scholarly interests (see for e.g. Asheim, 1997; Bell and Morse, 2003; Granados and Peterson, 1999; Kuik and Verbruggen, 1991; Liverman et al., 1988; Wiggering and Rennings, 1997) and an active area of practice at various scales of governance (EPU Malaysia, 1999; HMSO, 1996; UN DPSCD, 1996; World Bank, 2003). Given this level of interest, some authors assert that indicator development has become an industry on its own (King et al., 2000; Nix, 1996). The motivation behind this growth is obvious: we want policy to be rational and scientific (Innes, 1998). However, it is important to ask to what extent sustainability indicators have been integrated into actual policy-making. The literature suggests that while the scientific aspects of indicator development is a rapidly developing area, the linkages between policy and sustainability indicators are only beginning to be addressed (e.g. Bell and Morse, 2001; Bosch, 2002; Dhakal and Imura, 2003; Gudmundsson, 2003; Innes and Booher, 2000). Embedding sustainability indicators into the fabric

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of decision-making is a complex task. Harking back to Dicken's fiction, we need to scrutinise the institutional and sociological aspects surrounding the production, utilisation, diffusion and dissemination of sustainability 'facts' in policy processes.

Indicator-policy linkages are especially important when *sustainability problems* (as opposed to discrete *environmental problems*) have been described as different in degree and kind from other policy areas, hence demanding different approaches and processes (Dovers, 1997: 308–309). Part of the demand is a shift from environmental monitoring approaches to sustainability assessment. This shift involves a general reframing of environmental problems to sustainability problems. Within this milieu, the need for a broad means of integration via the creation of *policy processes*, *institutional setting* and *organisational structures* that advance integration of environmental, social and economic factors in policy and decision making are imperative (Dovers, 2002: 8, 2003).

This paper is not about a prescription for sets of sustainability indicators. Rather, it is an analysis concerning the institutional reorientation of national macro-information systems[1] (or informing systems) in order to track sustainable development within the context of policy processes, using Malaysia as a case example. Section 2 sets the scene with a detailed account of post-UNCED policy experiments in assessing sustainability. Subsequently, Section 3 attributes the limited success of national sustainability assessment in Malaysia to four types of implementation constraints. Based on these constraints, and drawing on the literature on public policy, Section 4 discusses the notion of indicator utilisation and types of policy learning that can occur from efforts to develop indicators. Section 5 concludes this paper with a proposal for key elements of a research and policy agenda for the future.

2. Policy experiments in sustainability assessment

It is axiomatic that appropriate information is key to a better policy-making for sustainability. Chapter 40 of Agenda 21 urges the implementation of two programme areas, that is: bridging the gap in the quality, coherence and standardisation of data (paragraph 40.2); and improving data availability vis-à-vis better accessibility for decision-making at all scales of governance (paragraph 40.18). The former is about information we need for tracking

sustainability which does not exist. Post-UNCED responses to this call have taken the form of activities to develop sustainability indicators. The latter deals with information we need which exists, but in inaccessible forms (Lawrence, 1997). The Johannesburg Plan of Implementation (JPOI) (paragraphs 130–131) endorsed at the World Summit on Sustainable Development (WSSD) encouraged further work on developing sustainability indicators at the national level (UN DESA, 2002).

The propositions outlined by both the Agenda 21 and the JPOI demand inter alia two building blocks: (i) sophisticated governmental capabilities to collate and integrate information; and (ii) a democratic political environment conducive to liberal exchange of information among the various segments of society driven by transparent decision-making processes. These are by no means easy tasks to be tackled, as they are dependent on national styles of policy-making, cultures, and ideologies. The ambivalent nature and behaviour of both prerequisites in practice in the Malaysian federation exposes a paradox in terms of the interaction between sustainability indicator systems and the policy processes involved. On the one hand, as a middle-income economy with five decades of experience in development planning, the Malaysian bureaucracy possesses a reasonable organisational capacity to tackle the first building block. Since the early nineties, Malaysia has been a strong proponent of electronic capitalism with strategic policy emphasis on the K-Economy as the engine of economic growth. Within this policy framework, information integration is a recognised imperative. On the other hand, despite regularly held multi-party elections, Malaysia's political system has been characterised by scholars as semi-democratic (Case, 1993), quasi-democratic (Zakaria, 1989), and even as a repressive–responsive semi-authoritarian regime (Crouch, 1996). A crucial feature of the Malaysian political system is that the Constitution provides the state with pre-emptive political control instruments to avoid inter-ethnic conflicts and to provide political stability conducive to socio-economic development (see Section 3.1).[2] Such a political context limits the flow of information within the policy system, which creates barriers to the second building block, an open and liberal decision-making process.

As with most countries, environmental monitoring in Malaysia has evolved in three stages from the quantification of environmental problems to health and ecologically related monitoring programmes (Hezri, 2003). The following discussion concentrates on recent sustainability

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[1] Friend and Rapport (1991) describe the production of environmental statistics, the efforts to develop natural resource accounting and generation of suites of sustainability indicators as components of *macro-information systems for sustainable development*. Such parlance captures the spirit of Chapter 40 of Agenda 21 (Information for Decision-Making) with a broad agenda beyond the generation of sustainability indicators to include bridging the data gap and improving the availability of information (United Nations, 1992).

[2] Many of Malaysia's political problems are believed to stem from the multi-ethnic nature of its population—that is the race *leitmotif* which is largely a legacy of colonialism. Of Malaysia's 24.5 million people in 2002, indigenous Bumiputra, or 'sons of the soil' accounted for 61%, while ethnic Chinese constituted about 24% and Indians 7%. For a detailed account of Malaysian politics, see Crouch (1996); for a brief history refer to Hooker (2003).

programmes in Malaysia in addressing the challenges set out in Agenda 21, in particular the development of sustainability indicators.[3] In essence, these programmes involve the reorientation of previous environmental monitoring activities in the country. Table 1 summarises major indicator development initiatives in Malaysia in terms of goals, main features, stages of implementation, agencies anchoring these initiatives and the scales at which they operate. For the sake of brevity, only four initiatives at the national level are described in greater details in Sections 2.1–2.4.

2.1. Malaysian quality of life index

Taking an anthropocentric view of sustainability, the Macro Economics Section[4] of the Economic Planning Unit (EPU), Prime Minister's Department initiated the *Malaysian Quality of Life Index* (MQLI) in 1999 to provide an aggregate measure of sustainable living (EPU Malaysia, 1999). The publication of the MQLI coincided with the call in Chapter 35 of Agenda 21 'that countries with the assistance of international organizations develop, apply and institute the necessary tools for sustainable development including developing quality-of-life indicators covering, for example, health, education, social welfare, state of the environment, and the economy'. With nearly two decades worth of data and 38 indicators within 10 areas of activity, the index is the nation's most comprehensive assessment of the impact of development and quality of life implications. The second report, published in 2002, was supplemented with subjective indicators of quality of life derived from public surveys (EPU Malaysia, 2002). Although this work is an unprecedented move by the government to provide transparent information for the public, the component indicators are compiled from existing official socio-economic data. Moreover, only five traditional environmental indicators represent the sustainability of biophysical systems. As a result, the message about sustainability was rather biased toward societal well-being.

2.2. Compendium of environment statistics

The need for integration of socio-economic information with environmental parameters began to be addressed in Malaysia with the development of environmental statistics based on the United Nations Framework for the Development

of Environmental Statistics (FDES). The Department of Statistics (DOS) was assigned as the central information depository agency. A dedicated unit charged with collating environmental statistics was established in the late 1990s. The statistics chosen were analysed according to the media-based approach accommodating the Pressure-State-Response (PSR) model and released as a DOS publication known as The *Compendium of Environment Statistics* (CES) in 1998 (DOS, 1998).

CES focuses on four main environmental domains viz. air/atmosphere, water/aquatic environment (inland and marine), land/terrestrial environment and urban environment/human settlements. Although the approach undertaken to develop CES was rather conventional in nature, it nevertheless takes advantage of existing infrastructure and requires minimal new investment (Nordin and Hezri, 2001). Persistence seems to characterise the reporting process so far as two publications have followed the first release in 1998 (DOS, 2000, 2002). A mechanism to ensure continuity for the collection and deposition of environmental statistics as such is crucial and can be a reliable precursor to the development of a viable system of sustainability indicators at a national scale.

Another important development was the setting up of an Inter-Agency Committee on Environment Statistics (IACES),[5] not just with the mandate to determine priorities and facilitate cooperation in gathering environmental statistics, but also to serve as an important forum to share/exchange knowledge, experience and expertise among members. However, IACES ceased to meet after the publication of the first Compendium. It was not resurrected until 2002 (see Section 2.4).

2.3. Urban sustainability indicators

Physical and spatial planning at the national level is under the jurisdiction of the Federal Town and Country Planning Department (FTCPD). Although its mandate encompasses entire states it has most relevance in urban areas, and policies it adopts can significantly influence the patterns of urban development in Malaysia. It has offices in most of the peninsula States of Malaysia and the Federal Town and Country Planning Act has been adopted, largely in toto, by state legislatures (Nordin and Hezri, 2001). In this way there is some uniformity between states in physical planning policies and their implementation. Guided by the policy document *Holistic Guideline on Planning and Development 22/97*, the FTCPD has

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[3] The attempts made in improving and diversifying the availability of information on sustainability in Malaysia is described by this author elsewhere Hezri (2003).

[4] This section is a central government agency that has ultimate responsibility for national development planning and coordination in Malaysia. It produces policy planning documents, five-year development plans (the Malaysia Plans) and decadal Outline Perspective Plans. Through these mechanisms, it determines major policy directions for the country as a whole.

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[5] The Inter-Agency Committee on Environment Statistics (IACES) for Malaysia was established on 7th May 1997. The Economic Planning Unit is the Chair Agency while Department of Statistics acted as the Secretary. Initial members include Department of Environment, Department of Wildlife and National Parks, Waterworks Department, Forestry Department, Department of Fisheries, Department of Mines, and Local Government Department.

Table 1
Descriptions of major indicator development initiatives in Malaysia

	(a) MQLI	(b) CES	(c) USI	(d) MSDI	(e) KVRSQLI	(f) HCI	(g) PRC	(h) SUDI	(i) SDIS
Goal	Expanding the measure of Malaysian success beyond economic achievement	The integration of socio-economic information with environmental parameters	To design and test a set of urban indicators for the tracking of urban development towards sustainability	Develop a national system for tracking progress towards sustainability	To develop stress ratio (spatial, growth and distributional weights) for the allocation of resources for the districts within Klang Valley	Continuously create social and physical environment for healthy urban population	Define sustainable development for Penang utilising a bottom-up participatory approach to planning	Develop indicators to assess the improvement in urban issues such as water quality and waste management	Develop a state-level system for monitoring sustainability in cognizant of the state's administrative and legislative powers
Main features	A composite index showing the improvement in Malaysian Quality of Life with 1980 as the base year	The statistics chosen are analysed according to the media-based approach accommodating the Pressure-State-Response (PSR) model	The first initiative in Malaysia linking indicators to benchmark values. MURNInet is the networked system, which will be used by local authorities to report on sustainability using the selected indicators	Aiming to integrate sustainability elements into national level development planning	Index development involving benchmarks at the district levels from a regional perspective	Based on the World Health Organisation (WHO) framework. The community programme commenced in 1997 but its indicator development part is still at an early stage	Based on the Sustainable Seattle model of active community-based monitoring and organised by an NGO	The use of Environmental Management Systems (EMS) as the guiding framework	Fitness-for-purpose indicator frameworks rather than the usual definitive suite of indicators
Implementation Stage	Institutionalisation	Institutionalisation	Testing	Identification	Formulation Completed	Identification	Formulation Completed (one-off project)	Identification	Identification
Anchor Agency	Macroeconomics and Evaluation Section of the Economic Planning Unit, Prime Minister's Department	Department of Statistics (DOS)	Federal Town and Country Planning Department (TCPD)	Environment and Natural Resource Section of the Economic Planning Unit, Prime Minister's Department	Federal Territory Development and Klang Valley Planning Division, Prime Minister's Department	Department of Health, Municipal Council of Kuching, Johor Bharu, Malacca	Socioeconomic and Environment Research Institute (SERI)	Sarawak Natural Resources Board	Town and Country Planning Department of Selangor
Scale	National	National	National	National	Regional	Local	State	Local	State

MQLI, Malaysian Quality of Life Indicators; CES, Compendium of Environment Statistics; USI, Urban Sustainability Indicators and MURNInet; MSDI, Malaysian Sustainable Development Indicators; KVRSQLI, Klang Valley Regional Sustainable Quality of Life Index; HCI, Healthy Cities Indicators; PRC, Penang Report Card; SUDI, Sustainable Urban Development Indicators; SDIS, Sustainable Development Indicators for the State of Selangor. Implementation Stage is divided into four hierarchical levels: (i) Identification; (ii) formulation Completed; (iii) testing; and (iv) institutionalisation.

developed urban sustainability indicators based on information gathered from five cities of varying achievements and urban densities. A total of fifty urban sustainability indicators in 11 categories of activity have been selected and are currently being tested. All these indicators have a target or threshold for comparison to enable users to assess the significance of the values associated with them (Sham Sani, 2001). Data for these indicators were obtained from existing sources in all relevant government agencies including state and local government agencies. The selected urban sustainability indicators will be electronically networked to form the Malaysian Urban Indicators Network (MURNInet) as a mean to improve data collection and analyses among local authorities.

2.4. Malaysian sustainable development indicators

National level interest in developing sustainability indicators emerged in the Sixth Malaysia Plan document, which states that 'efforts will be initiated to prepare indicators of sustainable development that will provide a yardstick for monitoring and evaluating progress' (Malaysia, 1996). The EPU convened the National Workshop on Sustainable Development Indicators with technical assistance from the Institute for Environment and Development (LESTARI) of Universiti Kebangsaan Malaysia (UKM) in December 1997 with participation from high-level officials from various federal ministries as well as from state governments. Though this workshop itself has met with limited success in initiating a national level working group on sustainability indicators (and essentially a national sustainability indicators program), the importance of indicators in informing policies has received attention from various agencies. The outcome of this is manifested in activities attempting to develop an indicator system responding to sectoral needs (see Table 1: initiatives (c), (e), and (h)).

A potentially viable framework for sustainability indicator development that would take a holistic approach was suggested to the EPU in 1999 (LESTARI, 1999). The framework consisted of indicators of economic sustainability, environmental and resource sustainability, social sustainability and legal and institutional sustainability. It was envisaged that all relevant central government agencies would contribute data to the EPU for the construction of an initial set of sustainability indicators for Malaysia. The set consisted of a total of 25 indicators; 7 for economic sustainability, 14 for environmental and resource sustainability and 4 for social sustainability. The initiative was primarily aimed at establishing national level sustainability indicator working groups with the report as the basis for discussion. The report proposed that there was a need to move decision-making processes and procedures from their traditionally narrow sectoral approach towards greater cross-sectoral co-ordination and co-operation. A briefing

and discussion held on 14th May, 1999 failed to generate progress at the national level.

It can be concluded that the interests in developing sustainability indicators have culminated in a mixed bag of different objectives and levels of implementation (see Table 1). Efforts anchored by Federal agencies such as the EPU and the DOS had a higher level of persistence (initiatives (a) and (b)), while bottom-up approaches and State-led programmes (initiatives (f) and (g)), often participatory in nature, failed to sustain activity beyond project formulation to actual implementation. Apart from the fact that none of these initiatives are enforced and maintained through a statutory mandate, this outcome results from the combined effects of the Federal decision-making supremacy coupled with a generally weak civil society. Not only is the Federal government Constitutionally placed in a strong position compared to the State governments, its capacity to implement programmes is also superior through auxiliary dominance viz. finance, administrative organisation and political parties (see Shafrudin, 1987). Additionally, as 'a democracy without consensus' (von Vorys, 1976), the shaping of policy questions and the corresponding needs for technical information are often unilaterally controlled by the elected leaders of major ethnic groups and the bureaucratic experts. Based on this elite-dominated decision-making model, and exacerbated by anecdotal evidence of a strong tradition of respecting authority and hierarchy that spawns conformity, inputs from the civil society are at best seen only as supplementary (see Section 3.3).

The many efforts to date have provided opportunities to develop coordinated strategies for developing indicators by combining the strength of individual initiatives. While different indicators are needed for different actors and purposes, an integrated national level sustainability indicator system is nevertheless important to address agency inter-linkages and cross-sectoral and strategic issues. This is especially so as the sets of indicators selected mainly belong to the category known as first-generation indicators - selected mostly on the basis of data availability and existing traditional indicators - which does not reflect the integrative nature of sustainability issues (Peterson, 2001).

By the end of November 2001, in a dialogue session with academic researchers at a workshop held at UKM, the EPU had reaffirmed its interests in developing integrative sustainability indicators for national planning. Areas deemed important for indicator development include energy intensity and efficiency, as well as linkages between sectors and their relations with Vision 2020.[6] Following this meeting, a series of internal discussions were held throughout 2002 between the EPU, LESTARI and the Department of Statistics with an aim to revive

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[6] National policy vision for Malaysia to become a fully developed country by the year 2020.

the sustainability indicators programme at the national level by empowering the Inter-Agency Group on Environment Statistics (IACES). The immediate step was to improve the content of the Compendium of Environment Statistics with guidance from IACES. A long-term plan was also proposed which includes a proposal for fully fledged research to identify 'policy-relevant' sustainability indicators for the nation. Additionally, there is also a plan to conduct pilot projects to test the usability of indicators in selected federal government agencies (Komoo and Hezri, 2003). These plans are still being negotiated.

A closely related area worth mentioning is exploratory studies aimed at developing the concept of natural resource accounting (NRA) at the national level. To integrate environment into decision-making, the *National Conservation Strategy* in 1993 incorporated a feasibility study of conducting NRA in Malaysia (EPU Malaysia, 1993). From 1996–1999, the Economic Planning Unit-Danish Cooperation for Environment and Development (EPU-DANCED) programme at the EPU's Environment and Regional Section also carried out many small studies seeking to correct the measure of GNP with concepts such as Genuine Savings and environmental resources valuation. For instance, a study on the environmental impacts of various activities in the economy was conducted with an aim to integrate environmental considerations into economic planning at the federal and state level in Malaysia. This study has six outputs namely: (i) framework for a macro audit; (ii) information on environmental pressure, environmental quality and natural resource use; (iii) sector environmental profiles and state of the environment; (iv) calculation and forecasting of emissions, waste generation and natural resource use in Malaysia; (v) calculation of past and future trends in emissions, discharges and waste generation in Malaysia; and (vi) preface to framework for environmental regulation of the economic sectors.

3. Implementation constraints

While there are reasons to be encouraged by persistent outputs such as the Malaysian Quality of Life Index and the Compendium of Environment Statistics, the broader aim of policy integration through sustainability indicators has been unsatisfactory. A similar situation is reported in other countries participating in the Commission on Sustainable Development's (CSD) work programme on sustainability indicators testing (UN CSD, 1978). The policy experiments conducted in Malaysia could be characterised as fragmented and lacking in persistence. It is convenient to attribute implementation failures to mere government reluctance in executing stated objectives, or more so, its inability to deliver. That the government is only paying a lip service to environmental policy is a common criticism made in many countries. However, an implementation analysis is needed to unravel the underlying reasons constraining the execution

of well-stated policy objectives such as measuring and tracking sustainability. To achieve this, we must describe the variables which affect the achievement (or otherwise) of the policy objectives, for instance, by scrutinising the tractability of the problems being addressed (Mazmanian and Sabatier, 1989). In this section, I argue that the implementation constraints are institutional, reflecting complex and deep-seated challenges inherent in sustainability problems. Four types of constraints are described in the following subsections; meta-policy issues, technical issues, communication issues, and theoretical limitations.

3.1. Meta-policy issues

According to Dror (1971: 74), there is very little that can be done to improve policies without reforming the policy-making system itself. Policy on how to make policy is what he coined as *meta-policy*. Key elements of meta-policy include the 'policymaking culture' and 'rules of the game'. Deeply rooted in a country's history, social contract and constitution, meta-policy issues are resistant to change and to new ideas. The following are proposed as the meta-policy issues constraining the development of sustainability indicators in Malaysia:

(i) Malaysia is yet to fully embrace the principle of freedom of information. Historically, the Official Secrets Act (OSA), the Sedition Act and the Internal Security Act (ISA), have restricted information flow.[7] These legal instruments express the principle of secrecy of administrative proceedings, while ensuring provision of information only for persons that take part in these administrative procedures. In effect, the boundary distinguishing information belonging to public, scientific and policy domains slants heavily towards the policy domain, thus limiting public access to information (see Pierce and Lovrich, 1982). This tradition does not give rise to a general public right to access governmental information, thus limiting the participatory ideal in decision-making inherent in the sustainability agenda. As a result, much of Government's exploratory research for problem identification as highlighted in Sections 2.4 have remained within the province of government officials even though not categorised as confidential.

(ii) Sustainability indicator initiatives directly linked to governmental mechanisms have had higher persistence and longevity. Processes based on active community

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[7] OSA 1972 (Amendment 1985) covers the unauthorised publication of government information including cabinet documents and those relating to security, defence and international relations. The Sedition Act 1948 (Amendment 1969) covers matters with a tendency to promote feelings of ill-will and hostility between different races and classes of the population of Malaysia. ISA 1960 gives authorities wide powers of preventive detention without trial. For a detailed description see Crouch (1996: 77–95).

participation in sustainability indicator development (e.g. the Penang Report Card initiative in Table 1) have faced difficulties in moving beyond the initial project formulation stage and have therefore not persisted. Benefits to policy-making can only happen when indicator systems are maintained, tested and adjusted over time, allowing institutions to change and adapt accordingly.

(iii) As with most rapidly industrialising countries, policy planning in Malaysia is mainly underpinned by an *economic rationality*. Generally, economic rationality is about making choices about decisions and approaches based on their economic efficiency—a utility maximising behaviour (see Mobbs, 2003: 91; Simon, 1978: 4). The paradigm of economic growth has been the credo of national unity in an ethnically-divided Malaysia since the 1970s (Williamson, 2002). Although economic primacy is a universal tendency in most countries, an added nuance is observable with the Malaysian brand of economic nationalism whereby financial success is seen as a sine qua non to avoid ethnic conflict. Within this context, the sustainability of biophysical systems remains an inferior issue and has been undermined by the (potentially) conflicting policy of sustaining economic growth. Although there is a de facto sustainability office at the highest policy planning level in Malaysia (the EPU), policy integration for sustainability is still an unfamiliar and contested idea. Establishing a national working group on sustainability indicators belongs to such integrative strategy, which is based on the quite different *ecologically* and *communicative* rationalities (Dryzek, 1987; Mobbs, 2003) and therefore, has never properly materialised.

(iv) Inter-agency rivalry and lack of trust is still a prominent feature in Malaysian government (and in other countries). This has resulted in limited cooperation in some areas, reducing data sharing and the potential for joint programmes.

3.2. Technical issues

The achievement of any program objectives is contingent upon a number of technical prerequisites (Mazmanian and Sabatier, 1989). For sustainability measurement, key requisites include budgetary and human resource capacity, effective technology transfer and data-storing systems. The key constraints in the Malaysian case are:

(i) Fully fledged inter-agency data networking is not yet possible as different agencies (especially at the state level) and local authorities are at different stages of computerisation and data processing capacity. Hence, though the Modernisation of Administration and Management Planning Unit (MAMPU) serves as the applications repository within a 'smart partnership'

arrangement, in reality many applications from different agencies are not yet ready for sharing and coordination.

(ii) Though highly skilled, many foreign consultants employed to assist governmental planning (mostly through foreign aid packages) lack knowledge of local needs and cultural sensitivities. This affects the level of cooperation with government officials and reduces the potential for technology transfer.

(iii) A large proportion of research grant allocations go to product-oriented research programmes with higher national priority such as Information Technology and Biotechnology–jeopardizing the goal to bridge data gaps in more basic areas such as plant taxonomical studies and socio-economic impact research.

(iv) Information is often not systematically kept and often lacks the continuity needed to allow trend analyses. There were also cases where data gathering techniques were changed with time thus complicating data interpretation and uniformity. Furthermore, there is often discontinuity when the officer in charge moves to another agency or is no longer given responsibility for the task.

(v) Meeting the needs for monitoring planning requires officials in agencies to achieve a balance between fulfilling immediate administrative tasks and the demand for more 'research-oriented' or long term planning. While capacity exists at the federal level, officials at the state and local government are often fully engaged with more 'on-the-ground' practical obligations.

3.3. Communication issues

Good governance requires better communication within society. With the emergence of sustainability, the need for greater levels of public discourse and participation, mutual understanding of issues and general democratisation of planning and policy processes have become widely accepted. Such a perspective is the essence of another critique on economic rationality, termed *communicative rationality* (Mobbs, 2003). The following constraints limit achievement of more communicative policy styles (see also 3.1(i) above).

(i) There is a dearth of publications documenting research publications in Malaysia (e.g. annotated bibliographies of environmental and natural resource studies). Similarly, as the government conducts more sustainability-oriented programmes, there is an increasing need for an accessible database on these initiatives to facilitate learning among researchers and the public.

(ii) Consensus building workshops involving domain experts and NGOs are usually designed after consultants have finished their draft reports. Changes and recommendations from the workshop are rarely incorporated into the final publication and implementation.

The usual reason given is that decisions have been reached at earlier steering committee meetings. These practices run contrary to a widely accepted principle in public policy, that inclusion is particularly important during the problem framing stage, as well as subsequently.

(iii) Generally all data providers impose certain restrictions on the use of their data based on departmental policy and some through act of law, rendering certain information to be considered confidential.

(iv) There is often confusion in environmental and sustainability reporting, on who are the 'users' (the public, managers, politicians, the media, shareholders, NGOs, etc.) and how they use the information (general education, monitoring change, reviewing policy, informing specific decisions). This is a weakness of sustainability indicators and reporting in many countries (Bell and Morse, 2001; Harding and Traynor, 2003). Programmes highlighted in Sections 2.1–2.4 often inadequately explicate users' specific requirements. Clear definitions of what *uses* and *users* mean have yet to materialise, and this has inevitably brought about the failure to effectively address 'user needs'. A better example of concrete user identification is in the case of economic statistics and indicators consciously devised for the needs of business investors to make decisions and gauge return prospects.

3.4. Theoretical limitations

Close interconnections between science and policy is central to the idea of sustainability indicators. But it seems we have been more preoccupied with improving technical measurement rather than advancing indicator 'use' (Pinfield, 1996). Dunn and Holzner (1988) aptly argue that we live in a world that at once expects much of scientific and professional knowledge, but comprehends little of its cognitive content and social functions. Our knowledge-gap in the role of information in policymaking gives rise to theoretical limitations in developing indicators, which are important in informing the sustainability transition. The following have been observed in the Malaysian context:

(i) The fact that national objectives and expectations concerning sustainability are not sufficiently defined at the policy and planning levels hinders satisfactory development of more integrative *second-generation indicators* (see Peterson, 2001; Peterson et al., 2003).[8]

(ii) Sustainability indicator developers generally assume that indicators (information) will always be used in a 'rational' manner by decision-makers. It is important to explicitly recognise the 'non-rational' element in decision-making in order to design more relevant policy indicators. The challenge lies in matching approaches to specific political conditions, i.e. by looking beyond data collection and critically examining the issue of *uses*, *users*, *user needs* and *institutions* that determine the process of monitoring, reporting and information use.

(iii) Authenticity of present trends in sustainability measurement may be suspect to some people—the idea that government-sponsored monitoring will critically evaluate Government's efficacy may be naïve. Some degree of *independence* is necessary to ensure honest assessment of policy (Dovers, 2001a).

Although details may vary, the general types of constraints described above are generic to many countries and provide a common agenda for research and policy on sustainability indicators. The following sections explore this further.

4. Theorising linkages between indicator systems and policy processes

From the Malaysian experience, one can conclude that the development of a macro information system to track sustainable development cannot be considered independently from the policy and political context. It is embedded within a policy process, which has been conventionally described as 'the administrative, organisational, and political activities and attitudes that shape the transformation of policy inputs into outputs and impacts' (Dunn, 1981: 333). While the extent of how strongly the integration of a macro-information system has been pursued varies from one country to another, the underlying questions of its effectiveness as a policy tool and relevance to policymaking apply to the entire indicator industry. Behind effectiveness and relevance are the questions of the types of outputs and the extent of impacts that indicators have had on policy systems. It is necessary to move a step backward and ask, what are the elements that amount to a comprehensive cycle of information in a policy process?

The multidisciplinary literature on *knowledge utilisation* in public policy offers some clues.[9] The focus of this field is on a complex series of four activities: the creation, dissemination, diffusion and utilisation of knowledge (e.g. Knott and Wildavsky, 1980; Nelson, 1979; Weiss, 1980).

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[8] Second generation indicators emphasise the application of sound scientific data to management issues, whether dealing with resources or processes, rather than being an expression of science itself. They are often cross-sectoral or target-oriented. Whereas first generation indicators highlight *symptoms* and *impacts* of development, second generation indicators highlight progress in addressing the *cause* of problems.

[9] The traditional focus of the knowledge utilisation literature has been to examine the use of social science research in decision processes. However, the principles and arguments advanced by this field are also applicable to other distinctive forms of systematically produced information such as raw data and indicators. See Lindquist, (1988).

To complete the feedback loop of an information cycle in a policy process, I would add a fifth activity: policy learning (e.g. Bennett and Howlett, 1992; May, 1992). The creation of information serves as an input to policy, while its dissemination and diffusion catalyse its transformation into an output, that is, information utilisation. Policy learning serves the dual role as a manifested impact on a policy process and at the same time provides feedbacks to the policy system as a whole.

During the past two decades the indicator industry has been very explicit on itemising criteria as guiding principles for assessing sustainability and developing indicators. From the sustainability indicators literature, we can categorise these criteria into four major themes:

(i) *Robustness*—scientifically credible; measurable; sensitive to changes; practical focus such as limited number of key issues and comparing indicator values to targets; based on models with holistic perspectives; appropriateness of scale;

(ii) *Democratic inclusion*—broad participation of community interests, experts and policymakers; openness with accessible methods and explicit judgements;

(iii) *Longevity*—capacity for repeated measurement; iterative and adaptive to change; cost-effective; and

(iv) *Relevance*—institutional capacity for data collection, maintenance and documentation; meets the needs of audience and users; simplicity in presentation structure; guided by clear vision of sustainability.

It is evident from the four themes above that the indicator industry has provided reasonable emphasis on providing guidelines to strengthen information creation, diffusion and dissemination. However, there is a lacuna in efforts to clarify the concept of indicator utilisation and policy learning, that is, the outputs and impacts on a policy process. If we are to gain a better understanding of the extent to which information or indicators have affected public policy in the past, and learn how to make more effective contributions in the future, we need to clarify the concept of *use*. More often than not, credible indicators are assumed to have the capacity to appeal to decision-makers, and it is assumed that positive utilisation[10] will follow. Similarly, we must clarify what constitutes policy learning, which has been generally defined by scholars as 'the general increase in knowledge about policies' (Bennett and Howlett, 1992: p. 288). For instance, despite the visible failure to develop a specific structure and process for sustainability assessment, we can still ask whether policy learning has occurred in Malaysia (and elsewhere). Have these failures generated a feedback loop to the policy system and induced learning and thus increased prospects for future efforts? The conception of utilisation and policy learning would be a constructive theoretical enrichment in strengthening the theme of *relevance* in the sustainability indicators debate.

4.1. Utilisation of indicators

The notion of 'use' in the sphere of public policy is ambiguous regardless of whether it is discussed in relation to research, knowledge, information or even indicator development. Nevertheless, suffice to emphasise that *use* calls upon actions from the recipient to look at, read, and if possible understand the content of message delivered (see Machlup, 1979). Knott and Wildavsky (1980) improved on this approach by asserting that it is important to keep the various levels of utilisation distinct. They conceived the various levels as seven stages in which each is a link in the chain of utilisation. These stages are meant not only to capture the extent to which information is processed cognitively by the policy-makers but also its consequence in the policy process (Landry et al., 2003: p. 193). Constructions of 'knowledge use' proposed by knowledge utilisation scholars are valuable for indicator development, but a simpler format is needed as a starting point for analysis. Following Knott and Wildavsky (1980), I propose an understanding of indicator use based on the following action sequence:

(1) Onset (Reception and Cognition)—policymakers receive policy information. Communications come to rest in the 'in-basket', so that the data 'reach' the policymaker rather than remain on an analysts' desk. The policymakers read, digest, and understand the studies.

(2) Influence (Reference and Efforts)—policy information changes the way the policymakers see the world, i.e. their frame of reference or worldview. Represents some user's judgement that information could be relevant or of value for some purpose which may not have been identified as yet. If information changes their preferences or understanding of the probabilities of magnitude of impacts, utilisation is a reality. If information influences the actions of policymakers, for instance if they then work for the adoption of a study's recommendations (even if political forces or other events block it), a real effort is therefore in place.

(3) Acceptance (Adoption and Implementation)—policy information has contributed to a decision and is an input to the policy process and, more importantly, it goes on to influence policy outcomes. Policy results, not inputs, are the standard here. The users believe that by using information, they were aided in a decision or action.

(4) Impact/Institutionalisation—implementation taken over a period of time, with policy information positively informing the process, enabling learning and preventing policy amnesia and ad-hocery.[11]

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[10] Positive utilisation is viewed here as a clear-cut use of information from its generation to utilisation and action by users.

[11] The phrase is from Dovers, 2000: p. 140.

To assess the extent of utilisation of an indicator system or specific indicators within any given policy systems, an empirical investigation is needed, with the model of utilisation described above serving as a guide. However, this model operates on the premise that information or indicators will follow a trajectory towards positive or rational[12] utilisation based upon linear assumptions of how policy processes function. This might not be the case all the time, as indicators are embedded within a web of administrative, organisational and political activities.[13] In the complex quasi-political world of public policy, comprehensive rationality is a rather unusual phenomenon (Bridgman and Davis, 2000: 47). The notion of policy cycle circumvents such assumptions by stressing the principles of iteration throughout various stages in policy- and decision-making (see Bridgman and Davis, 2000; Howlett and Ramesh, 2003). Based on the literature on public policy (Browne, 1993; Feldman and March, 1981), knowledge utilisation (Weiss, 1977, 1979), and social indicators (Biderman, 1966; Ferris, 1988; Henriot, 1970), we can conceptualise a taxonomy of indicator uses by comparing the degree of rationality exercised in the policy process on them, with the nature of responses from decision-makers as illustrated in Table 2:

A brief description of each type of indicator use is given below:

(i) *Instrumental use* occurs when there is a direct link or linear relationships between indicators and decision outcomes (use for action). Fluctuations of indicator values provide empirical evidence that will induce corresponding policy and management responses.

(ii) *Conceptual use* (or use for enlightenment) occurs when indicators sensitise or change a user's understanding of a problem or situation. Over time, conceptual use may subsequently induce decision outcomes.

(iii) *Tactical use* of information occurs when indicators, or the process of collecting information, are used either as a delaying tactic, as a substitute for action or to deflect criticisms. This has little relevance to the substance of the indicator or what it measures.

(iv) *Symbolic use* of indicators is the process of gathering indicators to give ritualistic assurances that those who make the decisions hold appropriate attitudes towards decision-making. In other words, indicators are used as a sign or symbol of some other reality.

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[12] A conviction that the best knowledge available will be used in the making of policy: that when good theory and good data are placed at the service of policymakers, the subsequent decisions will be sounder and wiser (Weiss, 1978).

[13] There is a growing literature in the area of scientific assessments associated mainly with the IPCC processes scrutinising the benefits that accrue from a cradle-to-grave collaborative effort between scientists and decision-makers. See Biermann (2002); Farrel et al., (2001); Siebenhuner, (2003).

Table 2
A taxonomy of indicator use

Nature of response	Degree of rationality	
	High	Low
Positive	Instrumental *Use for action*	Political *Ammunition to support pre-determined use*
Ordinary	Conceptual *Use for enlightenment*	Symbolic *Ritualistic assurance*
Negative	Not Used	Tactical *Delaying tactic* *Substitute for action* Deflect criticism

(v) *Political use* of indicators, where the content of indicators becomes ammunition to support a pre-determined position of a user. It is about persuading others to a particular view of the problem and ways to solve it for varying reasons of ideology, interest or intellect.

The taxonomy of indicators described above is meant only to serve as a guide without an attempt to attach appropriateness values to them. In any specific context, different actors may use the same indicators in different ways and toward different ends. Rich (1979) discusses at length the value of information or knowledge utilisation while dismissing any uncritical acceptance of utilisation as a desirable quality or non-utilisation as unfortunate. 'It is important', he writes, 'to note that not all utilisation is good and not all non-utilisation is bad' (Rich, 1979: p. 22). In public policy, even the best or most objective indicators, information or knowledge, when 'used' judiciously, can have undesirable secondary effects to the society, and a decision not to act is nonetheless an active policy position.

4.2. Types of policy learning

If policy is viewed as theories of the world, how it operates and thus what we should do or not do, learning then becomes a measure of those theories by testing their validity and key assumptions. As aptly put by Bridgman and Davis (2000), 'in science, no experiment is wasted—there is always something to learn'. Policy learning is an elusive concept and the extent of learning is often difficult to determine (May, 1999). Learning is increasingly accepted as the source of policy change, as an alternative view to conflict-based theories (Bennett and Howlett, 1992). 'Policy change' is a useful concept here, as there is a universal conviction that information changes societal behaviour. In conventional terms, learning is said to occur when individuals assimilate new information, including that based on past experience, and apply it to their subsequent action (Hall, 1993: p. 278). Busenberg (2001) summarises

salient points concerning the process of learning and policy change as:

- occurring within networks of multiple organisations and individuals active in a given policy domain;
- occurring over periods of many years;
- occurring through incremental discussions within policy networks, and through responses to political events;
- occurring through the diffusion of innovations and experiences between different jurisdictions and policy domains; and
- being shaped by institutional context.

Several types of learning have been described. One seminal work disaggregates the concept into policy learning and political learning (May, 1992, 1999). Governmental learning has also been suggested as a distinct type of learning (Connor and Dovers, 2004). Using these terms and Bennett and Howlett (1992) framework, Table 3 illustrates three critical components of the learning process: who learns; what is learned; and what effects on resulting policies emerge as a result of learning. Instrumental and governmental learning do not necessarily require a change in problem definition, whereas social and political learning are less common but bring about redefinition of existing policy problems.

4.3. Indicators as policy learning tools

Learning in policy is generally known to occur somewhere within the spectrum encompassing policy evaluation, problem identification and agenda setting stages. Tools such as evaluation, hearings, assessment and ad hoc inquiries are often employed to improve policy making at these stages of the policy cycle. As a policy-monitoring tool, indicators may have a major role here. We can examine the nature of how indicators can contribute to the different forms of learning based on how the literature on policy learning suggests it should look like. The first step is to remove

ambiguity in terms of indicator purpose and audience, and recognise that indicators may (Dovers, 2001):

- Inform specific decisions;
- Inform general policy direction; or
- Inform community values and understanding.

The next step is to compare what kind of indicator use relates to specific learning. There are three ways to analyse the relationships between indicator utilisation and policy learning. One is to simply mark the likelihood of occurrences based on the literature. For instance, fluctuations in the value of crime indices are often used instrumentally by policy communities and stakeholders alike. The rise in crime figures will trigger societal response to enhance its safety measures—encouraging a form of *social learning*. From the provocative book *The Sceptical Environmentalist* (Lomborg, 2001), a variety of indicators that purport to measure the 'real state of the world' were politically used by the media to discount prevailing scientific convictions about global environmental problems, thus challenging the societal goal of achieving sustainability (see Baker, 2002). The responses from the policy community were equally controversial: the scholarly credibility of Lomborg's work was attacked in scientific publications (Holdren, 2002; Orr, 2002); the epistemic community challenged the integrity of the Danish Committee on Scientific Dishonesty for its ruling on Lomborg's affair (Abbot, 2003); and politicians from the new conservative government appointed Lomborg as the director of the new Danish Environmental Assessment Institute (Anonymous, 2003). These are but 'symptoms' of a societal learning process that deals with social construction of a policy problem with indicators at the centre of debate.

Secondly, we could (deductively and inductively) explicate the elements or principles that would allow for any relations between the concepts of indicator utilisation and policy learning to take place. This is an area where most work has been done in prescribing strategies to encourage

Table 3
Types of learning and policy change

Learning type	Who learns	Learns what	To what effect
Instrumental learning	Policy elites (policy analysts and managers, analysts from stakeholder peak bodies)	Viability of policy interventions (tools and instruments) and implementation design	Understanding of source of policy failure, or improved policy performance in reaching existing goals
Governmental Learning	State officials (senior departmental bureaucrats and government ministers)	Intelligence on the efficacy of structures and related policy processes	Organisational change in structure and process within agencies and delivery systems
Social learning	Wider policy communities (epistemic communities, senior bureaucrats, politicians and stakeholders)	Social construction of policy problems, scope of policy or policy goals	Changed normative and legal expectations concerning existing goals and values, or redefinition of the policy problem and goals
Political learning	Coalitions of policy advocates (people from various organisation who share a set of normative and causal beliefs and often act in concert)	Political feasibility of a given idea or prospects for advancing a given problem through manoeuvring within and manipulation of policy processes	More sophisticated advocacy of a policy idea or problem. 'Strategic retreat' is also possible when policy objective is found to be too costly to obtain

Sources: Bennett and Howlett (1992); May (1992); Connor and Dovers (2004).

instrumental and conceptual use of indicators; for instance, strategies improving better ownership among stakeholders (Bell and Morse, 2004: p. 11–13), approaches to embed indicators further into the European Union policy process (Bosch, 2002: pp. 14–17), and instructions on a set of step-by-step guidelines for establishing a national indicators programme (Peterson, 1997: p. 125–137). In an evaluation of the effectiveness of five community indicators programs in promoting sustainable communities, Gahin et al. (2003) identified elements resulting in instrumental and conceptual use and instrumental learning.

Thirdly we can present case examples of representative indicators for every relation between indicator utilisation and policy learning (cf. Gudmundsson, 2003). This can either be general relations within the sustainability context or empirical work based on national case studies. From an empirical work in progress in Malaysia, it can be deduced that instrumental learning has taken place among the policy elites comprising analysts associated with LESTARI. The earlier failure in establishing any concrete outcome, especially in the objective to launch the Malaysian Sustainable Development Indicators program (see Section 2.4), has caused a recognition that the task is actually not of one of organisational challenge, but rather, an institutional undertaking. When the sets of indicators prescribed did not reach beyond the action sequence 'Onset' and 'Influence' (see Section 4.1), the viability of such interventions was recognised as being more about the 'rules of the game' than the 'players'. As a consequence of this, LESTARI shifted its modus operandi to an advocacy style that espouses smart-partnerships and collaborative efforts between agencies.

Moreover, with learning as the frame of analysis, we could determine how far a country has progressed in improving the quality and quantity of information on sustainability for decision-making. In Malaysia, the environmental statistics unit within the Department of Statistics Malaysia has been upgraded to Divisional status with an initial staff of five being increased to twenty professionals in the course of only five years. Consistent with Radermacher's (1999) contention that good statistics are only possible with higher willingness-to-pay by a society, Malaysia has demonstrated a form of government learning with this significant organisational change.[14]

5. Conclusion

Indicators and their variants are not just mere numbers. What we now identify as statistics was long ago in Germany branded as knowledge for the kings. In England statistics were once labelled as *political arithmetic* (Pearson, 1978). Information in the forms of statistics have been argued to

contribute to the creation of Italy as a nation in the nineteenth century (Patriarca, 1996). Through the lessons brought by history, we should think of the development of a macro-information system to track sustainable development as an institutional challenge. Institutional arrangements—i.e. the customs, laws, underlying rules and persistent organisations—shape our collective behaviour as a society in responding to the challenges posed by sustainability (Dovers, 2001b).

The case of Malaysia presented here is an example of an evolving institutional arrangement orienting towards a more democratic and scientifically credible information system to track sustainability. The constraints highlighted in Section 3 are not peculiar to Malaysia as comparable trends are also reported in developed countries such as Canada (Selman, 1994) and Australia (Harding and Traynor, 2003). Institutional problems call for the broadening of disciplinary perspectives in designing better indicator systems. To create policy-resonant indicators, a more sophisticated debate is needed to elucidate theoretical, and thence operational links between sustainability indicators and policy processes.

This paper argues for the adoption of 'policy orientation' as a framework to analyse and design macro-information systems for sustainability (see Dovers, 2003). The following summarise elements of a future research and policy agenda to enhance the links between sustainability indicators and policy processes:

 (i) Formulation of the strategies, or mix of strategies, that should be used to promote the instrumental and conceptual use of indicators.
 (ii) Identification of appropriate institutional arrangements needed to embed sustainability indicators systems further within policy systems and processes.
 (iii) Investigation into whether indicators as policy instruments have been useful in promoting policy/political learning in the past.
 (iv) Looking beyond data collection and critically examining the issue of *uses*, *users*, *user needs* and *institutions* that would govern the process of monitoring and reporting.
 (v) Understanding of the key influences sustainability indicators systems have had/could have on policy processes and decisions, for instance, the role of indicators in policy integration.

These are the vital issues that need to be considered and better understood before sustainability indicators can have stronger purchase in policy debates and ultimately a more functional penetration into policy systems and processes.

Acknowledgements

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[14] A more sophisticated understanding on the extent of learning is the subject for further empirical research by the author and colleagues.

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